Original Research Article

Cramming Analysis Based on Time to Start Studying and Time the Exam Being Held

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ABSTRACT

Aims: to explore the time that crammer start to study and the time of exam being held and relate this two with the result of the remedial exams which conducted electronically (computer based)
Study design: simple descriptive cross sectional study
Place and Duration of Study: conducted during January to February 2024 in the faculty of Medicine, Universitas Kristen Indonesia, Jakarta-Indonesia. Sample: respondents who join the remedial exam during 2022.
Methodology: electronic questionnaire regarding time to start studying being distributed prior the exam/test. Sufficient explanation regarding the research is given before consent is politely requested to each exam's participant. Data obtained from questionnaire were combined with demography data (gender, place of residence) and the result of the exam.
Results: Cramming conducted by 69.7% of our respondents, with the involvement of male student is more common compared to female student and regarding their place of residence, more student that live in their own house with their family do the cramming. Most of the perpetrator started studying at 20.00 – 24.00 pm. Students passing rate in this study were low. Female students score better when they did not cram while only male students who conduct cramming and still fail the exam get a slightly higher mean score than male students who fail the exam and did not cram. Female students got a slightly higher mean score than male students.
Conclusion: Cramming is risk taking like gambling behavior. It can give negative impact to the perpetrator's mental health. The phenomenon of cramming is quite common, especially among male student, but the passing rate was poor. Cramming mostly started late at night. Male students who fail the exam tend to get higher grades if they cramming while on the other hand our female student tend to get higher score in they did not cram.

Keywords: Procrastination, academic risk taking, gambling behavior, medical student, pass, fail

1. INTRODUCTION

Ideally regarding time, the general rule of thumb regarding college studying is, that for each science class, students should spend approximately 2-3 hours of study time for each hour that they spend in class. Non-science courses, for every 1 unit you are enrolled, you are recommended to spend approximately two hours outside of class studying. Unfortunately for nowadays students, social non-academic activities took so many from their precious time which supposed they used to study. So it is a common thing to bypass everything and conduct cramming, especially when they realize final exam coming soon.

Time is the most valuable resource for a medical student but unfortunately, it is also one of the most neglected and wasted of resources [1]. The volume of information a medical student be expected to know and the pace at which he/she will be learning it are going to be much larger and quicker than what he/she is probably used to; and this tend to make the information gap wider [2]. This is often an academic shock to new medical students, e.g., trying to incorporates academic failure, course disruption and early course exit [3] and can be persist for a long time [4]. Scientifically based learning strategies are not a standard part of the curriculum in medical school. During their early days as a freshman, students are largely unaware of how to learn successfully and improve memory and caused horrible stress [5]. Medical student as a human being are blessed with a built in coping mechanism [6] where they have the ability to rapidly balance between act and adapt to varying environmental conditions [7] and that has made it possible for them to survive in most regions of the world, including the Medical faculty; this is a life skills that are taught from the first time someone enter medical school and are increasingly refined over time, in every aspects of their professional life [8] In the context of surviving from the sudden coming of final exams/tests, their act of adaptation is called cramming. Cramming is risk taking, perhaps similar to gambling which very little effort and expecting to gain everything. To our opinion, cramming can have negative effects on the mental health of perpetrators.

Cramming per definition is a short-term memorization technique or an emergency approach considered by the perpetrator as study strategy for test-preparation [9] It comprehends an exhaustive attempt to read, digest and absorb wide array of information within a short period of time, perhaps just hours before an exam [10] as the end of academic semester approaches at lightning speed, final exams and pile of lecture related exam materials loom — and then as business as usual — students will get ready to cram for these serial tests, resulting often in ephemeral achievement [11] followed by immortal forgetfulness [12] because the problem with cramming, as other daily and routine executive task, is that information obtained just stored into working memory, not long-term memory [13].

Cramming usually happens when students put off studying until the last possible second [14]. Then, in all the sudden during the night before the exam, students spend hours memorizing as much of the material as possible in a short period of time. They may stay up all night, convinced that they are working hard. This type of studying may become routine, or become the only way that a student knows how to study [15]. There are pros and cons regarding cramming, each of which has its own logical basis [16].
Examination/test in our medical school basically can be divide in to two categories: the regular and the remedial. All type of exams consists of cognitive based multiple choice questions, clinical skill's lab and laboratory practice. Examination conducted in the last week of each six-week duration of block teaching. The lower threshold of passing the exam is 65. If a student failed in one exam, he/she is required to take one remedial exam in the current semester; If they fail to reach the lower limit of passing, the student is declared not to have passed that component.
From the complexity of facts which previously explained, time is very crucial in determining the success of the perpetrator of cramming [17] It is interesting to explore the time that crammer start to study and the time of exam being held and relate this two with the result of the remedial exams which conducted electronically (computer based), and this become the aim of this simple study.

2. METHODOLOGY

This simple descriptive study analyzes the student's response to our short electronic questionnaire being asked prior the remedial exam carried out. Sufficient explanation regarding the research is given before consent is politely requested to each exam's

participant. Questionnaire was distributed only to those who were freely willing to take part in the research.

Questions are formulated in the form of closed ended questions with multiple choices covering the topic of (1) whether students conducted cramming for the exam (Y/N), (2) if (Y), what time to start cramming (divided into five choices, namely 12^{00} - $16.^{00}$pm, $16.^{01}$ - $20.^{00}$ pm, 20.01 – $24.^{00}$ pm, $00.^{01}$-$04.^{00}$ am, $04.^{01}$ – $08.^{00}$) as well as (3) if (Y) did study all topics (Y/N). We also obtain data regarding the examination (what examination, number of questions, time of the exam carried out, results obtained and pass/fail in the exam. All data obtained is put together into one Excel table and then exported to SPSS for further processing and analysis.

Study on basic data (collected throughout 2022 by Sunarti et al) conducted during January to February 2024 in the faculty of Medicine, Universitas Kristen Indonesia, Jakarta-Indonesia.

3. RESULTS AND DISCUSSION

2413 student's data collected from 37 examinations/tests which can be grouped in terms of implementation time into eight groups (the $08.^{00}$ -$09.^{00}$ am, $08.^{00}$ -$10.^{00}$ am, $09.^{00}$ -$10.^{00}$ am, $09.^{00}$ -$11.^{00}$ am, $10.^{00}$ -$11.^{00}$ am, $10.^{00}$ -$12.^{00}$ am, and $11.^{00}$ -$12.^{00}$ am) and demographically consist of 643 (26.6%) male and 1770 (73.4%) female, 1054 (43.7%) lived in boarding houses and 1359 (56.3%) lived in their own house with their family. Based on the exam, 731 (30,2%) did not cramming while on the other hand 1682 (69.7%) students did cramming. Male student who conducted cramming were 462 out of total 643 (71.8%) while their female counterpart who conducted cramming 1220 out of 1770 (68.9%). The result of the exam, 1043 (43.2%) pass the exam and 1370 (56.8%) failed. Students passing rate that attended the test in this study were low (<50%).

Table 1. Demographic and Exam Properties of the Respondents

Cramming	Gender	Living in		Mean Score	Total
		Boarding house (n=1054)	Own House (n=1359)		
NO (n=731)	Male	77 (42.5%)	104 (57.4%)	Fail: 47.9 Pass: 75.6	181
	Female	314 (57%)	236 (42.9%)	Fail: 50,4 Pass: 76.5	550
	Total	391 (53.4%)	340 (46.5%)	Fail: 50 Pass: 76.3	731
YES (n=1682)	Male	140 (30.3%)	322 (69.6%)	Fail: 50.4 Pass: 74.8	462
	Female	523 (42.8%)	697 (57.1%)	Fail: 50 Pass: 75.8	1220
	Total	663 (39.4%)	1019 (60.5%)	Fail: 50 Pass: 75.5	1682

Cramming based on gender is slightly higher among male students compared to their female compatriot (71.8% vs 68.9 %) and overall the practice of cramming is relatively high and seems to be higher in those who live in their own house where out of 426 male student live

in own house vs 217 male student live in room rented boarding house the prevalence of cramming was 75.5% (n=322) vs 64.5% (n=140). On the other hand, in the female group the same phenomenon also occurred but with only slightly reduced (out of 933 female student live in own house vs 837 in own house, the prevalence of cramming among female student based on their place of residence was 74.7% (n=697) vs 62.4% (n=523).
Based on the mean score of student who pass the exam, male student who conducted cramming got slightly lower mean score compare to male student who did not cram (74.8 vs 75.6) and in the female student sub group, those who conducted cramming surprisingly achieve a slightly higher mean score than those who did not cram (76.5 vs 75.8). This data showed us, that our female student tends to get better mean score when they study correctly, effectively and efficiently.
But in case of the failed group, the opposite happened (the opposite of what was stated in the group that passed the test). Female student who failed the exam and did not cram get higher mean score compared to those who cram (50.4 vs 50) while male student who failed the exam by conducting cramming achieve slightly better mean score than those who did not cram (50.4 vs 47.9). Our findings regarding crammer score in the failed group support many previous report regarding male and risk behavior. It is clear that cramming is risk taking activity.
Across many real-world domains, men engage in more risky behaviors than do women [18], including in test or exam. A study conducted by Hasan et al [19] revealed that male students have higher score of risk-taking behavior in comparison to their female counterpart. According to Harris and Jenkins, in the issues of health, recreational, and gambling, women reported a lower likelihood of engaging in risky behaviors. In all three domains, there were significant gender differences in perceptions of probabilities of negative consequences from engaging in risky behaviors, with women reporting greater probabilities. Women are more averse to risk than men due to heightened sensitivity to potential [20] Contrariwise, men, expressing greater optimism [21] are more willing to engage in risk-taking activity [22]. To our opinion, cramming can be considered as academic risk-taking behavior.

Cramming is common practice among struggling medical students. Previous study reveals that cramming can lead to disruptions in normal routines, increased academic stress, and affect physical well-being and caused symptoms like palpitation, nervousness and headaches [9] Moreover, the deliberate act of cramming is not considered effective learning by experts and can result in poor academic performance in the long time, including their future built-in confidence [16].

Boarding school experience has been found to have an impact on students' academic achievement, social development, and mental health [23] Boarding students' academic performance was significantly associated with the students' living conditions, especially feeding, sanitation and accommodation [24]. Boarding house as a type of temporary residence functions to ensure the continuity of daily domestic activities, as well as a comfortable place to study for students as its occupants. According to Setijanti et al [25] students can optimize space in their own rented room by modifying spatial attributes such as layout, wall openings, material and furniture ensures that learning takes place in the maximum privacy possible, enabling a practical function of multimodal learning activities. students optimize space by modifying spatial attributes such as layout, wall openings, material and furniture. Perhaps, this also the reason why, living in a boarding house does not significantly affect student's academic performance compared to living at their own house.

Unfortunately, there is no previous literature available in the internet regarding cramming option among medical student living in boarding house/dormitory or living in their own house with their family. To our opinion, the reason why the practice of cramming conducted by students live in their own home is higher compared to those live in small rented room of

boarding house because family related comfortness factors (e.g., internet availability) and other non-academic activities may interfere and caused those who live in their own home to procrastinate. Although the negative consequences of procrastination in an individual's daily life might not be considered, the outcomes of its prevalence between medical students who are about to take significant responsibilities in the future can be irreparable [26]. Procrastination defined as the unnecessary postponement or avoidance of work or necessary tasks by focusing on more satisfying activities that are due to a certain neurochemical in the brain. [27] Neurophysiologically, procrastination boils down to a continuous confrontation between the limbic system and the prefrontal cortex [28]. The limbic system is a part of brain structures specifically deal as the pleasure center [29], while the prefrontal cortex controls executive planning and decision making [30]. Since the prefrontal cortex is not as developed and thus feeble [31], so often for the crammer's limbic system wins out, leading to procrastination [32].

On the other hand, living alone and away from home, residing on rented room near campus or in a dorm setting provides of the utmost importance opportunities for personal growth and improvement by cultivating independence and a sense of responsibility [33] Boarding school students tend to develop practical life skills such as obedience to regulation, time management, work and social ethic, and autonomous independence in a hastened manner than a public school student.

Regarding the time to start studying, we divided into 6 groups, namely 12-16pm (means that the respondent start studying within this time frame) with 261 (10.8%) respondents, 16.^{00} - 20.^{00} pm with 354 (14.7%) respondents, 20.^{00} - 24.^{00} pm with 637 (26.4%) respondents, 00.^{00} -04.^{00} am with 218 (8.7%), 04-08am with 211 (8.7%) respondents and the non-cramming group. Figure 1 showed us their distribution.

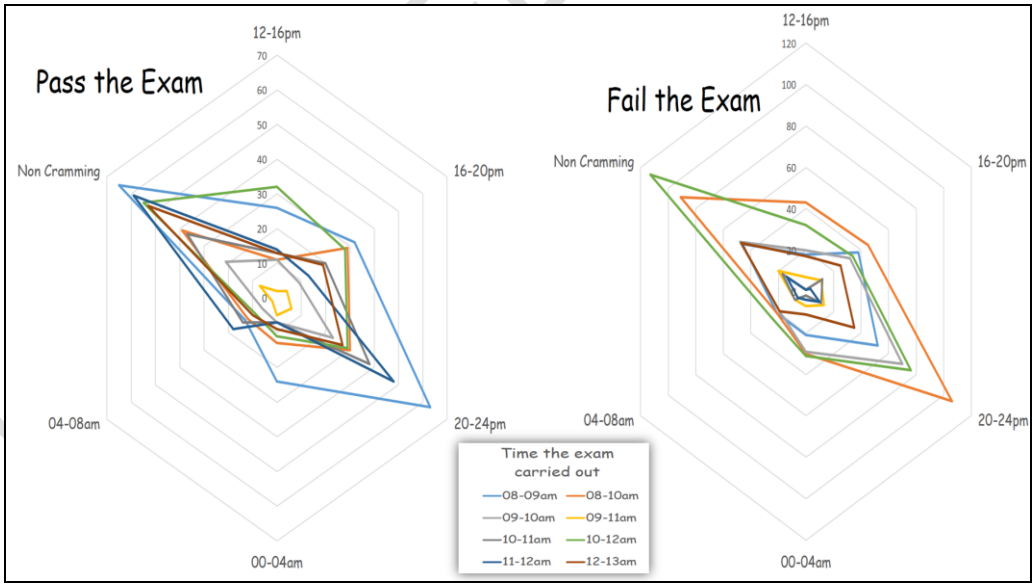

Fig. 1. Radar chart of group of respondents who passed the exam (left) and those who failed the exam (right) based on the time they started their studying the day before the exam and the time of exam carried out.

Our data revealed the time option choose by most of our crammer students is unique. Radar chart in fig. 1 showed us that most of our respondents which conducted cramming start quite late the night before the exam (20.^{00} -24.^{00} pm) and this phenomenon can be seen in both

group, whether passed or failed the exam, no matter what time the exam carried out the next day.

Medical students are prone subpopulation for harmful health behaviors due to their academic related stress [34]. Increased screen time is a global common problem for medical students and practitioners due to long and late studying/working hours. It is associated with adverse health behavior, particularly delayed bedtime, shorter sleep duration and poorer sleep quality [35]. Sleep deprivation, which may primarily result in a decline in their academic or professional performance while practicing medicine [36]. To our opinion, cramming can give negative impact to the mental health of the perpetrators.

In addition to those previously mentioned stressors that leads to justification of cramming by the perpetrator, medical students often have poor diets, which include eating junk food/fast food [37], drinking caffeinated [38] or soda based soft and energy beverages [39] and tobacco/electric smoking [40] during late-night studying sessions and indulging in excessive alcohol during the weekends holiday [41,42]. It is interesting to dig deeper what kind of food or beverages did our students consume when they are studying until late in the night, especially during the exam period.

Dietary habits actually are important for ensuring overall health condition and have been shown to impact academic performance. Tobin in her study [43] revealed the relationship between poor nutrition and test scores may genuinely be quite cynical, strengthening the impetus for schools to consider policies that support students' healthy eating. A study by Bitar et al [44] showed results indicated a significant remarkable correlation between medical students' grades and their consumption amount of tea, instant coffee, and fast food. Eating snacks [45] or store bought foods [46] were reported to be a common occurrence amongst students and that can be an indicator of poor diet quality, especially when he/she in need to be ready for a 24-hour shift, e.g., during a clinical night watch rotation [47]. Inappropriate nutrition leads to an energy deficit in medical students. Certain foods also related to aggressive behavior and risky behavior [48]. From this aspect, we encourage medical schools to promote their students' health, both physical and mental, and also life style in response and also as future investment to the high demands of the courses that medical students must follow [49]. This may include health promotion activities aimed at the students themselves, encouraging them to adopt healthier lifestyles, especially healthier eating habits, which can affect the student's wellness [50], so that they can share their own experiences with future patients and also their country [51] This may benefit their professional practice, giving them greater confidence when giving advice and guidance to their patients, as they will have already experienced and applied the principles in their own lives [52]. This perspective may help students effectively switch to healthier habits, thereby reducing suffering and improving quality of life [53] Empowerment through activities that receive and support the student and the patient is an essential tool for behavioral change.

Furthermore, data related to the mean score of group based on the time to start studying for exams and the time of exam carried out the next day are presented in table 2.

Table 2. Cross tabulation between time to start studying and time the exam/test carried out with whether or not the respondent passes the exam

Pass/Fail			Time Exam Carried Out								Total Mean
			08-09am	08-10am	09-10am	09-11am	10-11am	10-12am	11-12am	12-13pm	
Pass	Time to start studying	12-16pm	77	73	72	71	77	75	84	77	76
		16-20pm	72	75	69	69	77	76	80	75	74
		20-24pm	74	74	71	71	79	74	80	77	75
		00-04am	74	70	72	69	78	77	83	77	75
		04-08am	73	75	70	74	76	77	81	74	75
		Non Cramming	76	72	72	69	81	75	81	75	75
	Total Mean		74	73	71	70	78	76	81	76	75
Fail	Time to start studying	12-16pm	58	51	49	57	56	52	32	51	51
		16-20pm	52	49	45	46	57	50	40	52	49
		20-24pm	55	50	49	49	54	49	58	49	52
		00-04am	53	50	44	50	47	48	52	49	49
		04-08am	51	45	49	47	52	49	46	48	48
		Non Cramming	52	50	47	49	54	49	55	47	50
	Total Mean		54	49	47	50	53	50	47	49	50

(The value displayed is the average value in that group)

The highest total mean score among respondents who passed the exam, based on time to start studying, is 76 from the Cramming group that started very early ($12.^{00}$ – $16.^{00}$ pm) while the lowest (74) come from the cramming group that started at $16.^{00}$ – $20.^{00}$ pm. While based on the time of exam carried out, the highest mean (81) obtained by respondents who join the exam at $10.^{00}$ – $11.^{00}$ am and $11.^{00}$ – $12.^{00}$ am, on contrary, the lowest total mean score (70) came from the respondents of $9.^{00}$ – $11.^{00}$ am. According to their gender, mean score for male student who passed the exam was 75 and for female student was 76.1. Female student in general achieve better score than their male counterpart.

On the other hand, in the unfortunate failed group, based on the time to start studying, the highest total mean score (52) obtained by those who start quite late, around $20.^{00}$ – $24.^{00}$ pm and the lowest total mean score (48) was made by the group who start studying $04.^{00}$ – $08.^{00}$ am. Based on the time of exam carried out, the highest total mean score came from the respondents who join the $10.^{00}$ – $11.^{00}$ am exam, while the lowest (47) was from the $11.^{00}$ - $12.^{00}$ am exam. According to their gender, mean score for male student who failed was 49.6 and for female student was 50.1 and once again, even in this unfortunate group, female student achieves higher mean score.

Once again, to our knowledge this is the first report on crammer and non-crammer's post exam achievement regarding when to start studying and the time of exam carried out. Assessment of learning outcomes is an important evaluation material to show how the teaching and learning process has been carried out [54]. Test scores are always positively affected by the amount of time a student spends studying effectively [55] and how fast they complete an exam [56]. Increased study time is boosted and improved long term memory, e.g., spacing out study sessions over a longer period of time improves long-term memory [57], and surely increased academic outcome and performance [58].

Students' study sessions outside class are important learning opportunities in university or college courses. When students study longer, they tend to score better on tests [59] until a point where further addition of study time does not govern to significant improvements in test/exam result [60]. Low-performing students who intentionally increase their study time and evoking their own interest on the subject being studied can encounter the highest benefit in academic performance [61]. Relied on the theory of action, high-achieving students employ positive governing variables, whereas low-achieving students are forced by negative governing variables. Hence, governing variable-based remediation is needed to help low-achieving students interrogate the motives behind their actions and realign positive governing variables, actions, and intended outcomes [62]. Once again, good preparation through self-regulated efficient study time has a pivotal role in achieving higher grades [63]. Limitation of this study, regarding the time allocation for crammer to start studying, that this

research does not specifically explore what is studied (in quantity), how it is studied and the extent to which understanding is formed; and this seems to provide space for other researchers to dig deeper into this matter.
Finally, this study also does not necessarily represent all of our medical students, because the respondents of this study are specific, namely only those who took remedial exams and it is very likely that the same person took several remedial exams in certain time period when the research was carried out; but still, this is an honest attempt by academics to reveal the practice of cramming among medical students in order to make improvement in the future.

4. CONCLUSION

The phenomenon of cramming is quite common, especially among male student, but the passing rate was poor. Cramming mostly started late at night. Male students who fail the exam tend to get higher grades if they cramming while on the other hand our female student tend to get higher score in they did not cram. Cramming is risk taking like gambling behavior. It can give negative impact to the perpetrator's mental health.

CONSENT (WHERE EVER APPLICABLE)

Not needed

ETHICAL APPROVAL (WHERE EVER APPLICABLE)

Not needed

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