



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

Research Commons

<http://researchcommons.waikato.ac.nz/>

## Research Commons at the University of Waikato

### Copyright Statement:

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

The thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of the thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from the thesis.

**Measuring procrastination:  
A delay discounting approach within a New Zealand academic domain**

A thesis  
submitted in partial fulfilment  
of the requirements for the degree  
of

**Master of Applied Psychology  
(Behaviour Analysis)**

at  
**The University of Waikato**

by  
**Karissa Paterson**



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*  
T A U R A N G A

2023

## Abstract

Delay discounting is often used to measure impulsiveness and has contributed to the development of interventions within the scopes of gambling, eating disorders, and drug addiction. Procrastination is the opposite of impulsiveness and, therefore, can be measured using delay discounting tools, as shown in previous research on scalloping behaviour. Procrastination is a common issue faced within academia, with research detailing the impacts on student grades and mental wellbeing. I aimed to assess the validity of an academic discounting task (ADT) in measuring procrastination within a cohort of university students while assessing if procrastination impacts students' grades. Other measures of procrastination were used to analyse the validity of the  $k$  values produced by the ADT, such as the latency with which assignments were submitted by students, the number of late submissions, and the level of engagement within the paper. Forty-nine participants enrolled in a 3rd-year university paper completed an online questionnaire on Qualtrics that included the ADT. Additional data on student marks and engagement were collected through Moodle and Panopto. The  $k$  values produced from the ADT were not related to student marks or any other measure of procrastination. However, a relationship was identified between student overall marks and measures of procrastination such as latency of submission, number of late submissions and engagement scores, while scallop behaviour was also apparent within the cohort, but varying between tests and assignments. The findings of a relationship between the non-ADT measures of procrastination and overall marks suggests student procrastination behaviour does impact overall marks and therefore the ADT  $k$  values were not measuring procrastination and future research is needed with amendments to the ADT to make it a valid measure of procrastination. The variance in scallop behaviour between tests and assignments suggested that the scallop behaviour may not necessarily be always under control by the closeness of the reinforcer and can also be impacted by other variables.

## **Acknowledgements**

To my supervisor Rebecca Sargisson, thank you for your guidance and expertise along this journey. Your patience and feedback allowed me the grace to manage work life, motherhood and academic writing while consistently taking steps forwards.

To my husband and children, especially Carter, thank you for allowing me this time to focus on our future. All the evenings that everyone else carried the household so I could be shut away, working on my thesis did not go unnoticed. You were my cheerleaders and rocks when I needed you the most. To my family, thank you for believing in me while I was on this journey and never giving up hope that I would succeed.

To Nick, thank you for your support when you were on Earth's side and for always making me feel like my successes were noticed. Thank you for all the times you stepped up and allowed me the space to focus on my academics, creating a better future for our boy.

Finally, thank you to my participants; this research could not be possible without you. Your insight and reflections have benefited the research domain of procrastination.

## Table of Contents

<b>Abstract</b> .....	ii
<b>Acknowledgements</b> .....	iii
<b>Table of Contents</b> .....	iv
<b>List of Figures</b> .....	v
<b>List of Tables</b> .....	vi
<b>Introduction</b> .....	1
<b>Method</b> .....	11
<b>Results</b> .....	15
<b>Discussion</b> .....	27
<b>References</b> .....	32
<b>Appendix A</b> .....	37
<b>Appendix B</b> .....	38
<b>Appendix C</b> .....	39

## List of Figures

Figure 1.....	17
Figure 2.....	17
Figure 3.....	19
Figure 4.....	19
Figure 5.....	20
Figure 6.....	21
Figure 7.....	22
Figure 8.....	22
Figure 9.....	23
Figure 10.....	24
Figure 11.....	25
Figure 12.....	25

## List of Tables

Table 1 .....	15
Table 2 .....	16
Table 3 .....	16
Table 4 .....	18

## **Measuring procrastination: A delay discounting approach within a New Zealand academic domain**

Procrastination is a common daily problem among adults and students (Michinov et al., 2011). The prominence of procrastination has made it well-researched; however, it is explained in different ways across research (Kim & Seo, 2015). For example, Lay (1986) defined procrastination as the action of delaying or postponing something important, while Howell et al. (2006) defined procrastination as the tendency to delay starting or completing a task to the point of discomfort. Klingsieck (2013) suggests differentiating between domains where procrastination occurs, as those who procrastinate in one area may not procrastinate in another. For example, the domain of academic procrastination relates particularly within an educational setting to academic tasks (Aznar-Díaz et al., 2020). However, academic procrastination has also been defined in various ways (Lay & Schouwenburg, 1993; Senécal et al., 1995; Steel, 2007). The most common understanding is when a student chooses not to work on or complete an academic task requiring attention (Tan et al., 2008). Aznar-Díaz et al. (2020) went on to define academic procrastination as the delay in completing tasks that must be completed per course requirements, whether it is studying, writing, posting on an online forum, or failing to finish a task (Aznar-Díaz et al., 2020; Concepcion, 2020). Mohammadi Bytamar et al. (2020) extended the definition with emphasis on postponing the academic tasks deliberately in favour of another more enjoyable task, while others have stated that procrastination is specifically related to the gap between the intention of doing the work and the action of doing so (Dewitte & Schouwenburg, 2002; Steel et al., 2001). Various definitions of academic procrastination have resulted in a variety of measures and outcomes in previous research (Kim & Seo, 2015).

Most individuals can recall at least once in their life when they delayed doing an important task. Mostly, procrastination is not harmful, and the tasks are eventually completed without consequences. However, those who consistently procrastinate suffer consequences such as failed bill payments, delayed access to medical treatment, and failure to solve conflicts in social situations (Ferrari & Díaz-Morales, 2014). Sirois et al. (2015) found that students who reported engaging in procrastination also claimed to feel fatigued, supporting the same view as Steel (2007). Steel suggested that, amongst students, the cycle of procrastination and lack of sleep leads to problems concentrating and a lack of energy resulting in further procrastination and physiological stress. Academic procrastination is an ongoing issue within education, specifically higher education (Arnold, 2022).

According to Concepcion (2020), previous researchers found that 70-90% of students engaged in academic procrastination. Concepcion also found a demographic influence on the relationship between procrastination and grade performance; younger people engage more in procrastination and experience more negative consequences. Ultimately, procrastination is a damaging cycle, with research such as that by Klibert et al. (2011) finding a positive relationship between suicide proneness scores and procrastination.

Michael (1991) described what he termed motivating variables necessary for students to complete their coursework. Michael grouped the motivating variables under six classes. *Intrinsic interest* is the first class, explained as the student's interest in a particular topic, and simply engaging in the content is reinforcing. Therefore, the student may engage in assessments or study with a preference over other papers and activities. However, Michael doubts the strength of this motivating variable, suggesting that students would become satiated given the length of time required to engage in the topic for it to be valuable long term. Additionally, other competing activities are still at play, and the intrinsic interest in the topic is still available even if the task is put off for some time. The second motivating variable is *approval/disapproval*. Students are surrounded by peers and, potentially, family who may offer praise or reprimands for engagement in their studies and motivate a student to study more. Like the second class, *social reactions* - the third class - is explained as the positive interactions between the student and their lecturers/tutors, other academics in the same field, and peers in the same class. Social reactions are only available if the student has studied and learnt the content and can interact positively. Michael explains the fourth class, *immediate advantages*, as the learnt content becomes immediately applicable. Although, this class does not apply to all courses of study and this motivating variable does not apply to every student compared to the fifth class of *long-term rewards*. Most students, if not all, will have a long-range payoff. It is the purpose of their study, whether it is getting a job, contributing to their chosen industry, or making changes in society. However, this motivating variable only requires a student to engage at some point, and depending on the value of this motivating variable for a student, the student is still susceptible to procrastination. The final motivating variable class is *course grade*. Some students may unintentionally compete against each other or intend to achieve high grades for various reasons. High grades can substantially motivate students to engage in academic tasks (Michael, 1991).

Sokolowski and Tonneau (2021) noted a typical pattern of student procrastination behaviour. Students are more involved in the online teaching platform closer to the point of submission or as the close of access nears. This pattern is likely due to the reinforcer being temporally closer to the action of studying when the time is closer to the deadline. Response strength is generally more likely to increase when an immediate consequence follows, as reinforcers lose value when there is a delay to their receipt (Concepcion, 2020). Howell et al. (2006) further explains, stating that credit or a grade for an assignment can only be obtained once it is submitted. Therefore, the action of submitting is critical in receiving the reinforcer, contingent on assignment completion. Academic procrastination results in observable behaviour similar to that in a fixed-interval schedule of reinforcement (Pierce & Cheney, 2017). An observer would see increased academic submission and engagement as the deadline gets nearer, also referred to as a procrastination scallop. The interval is the time an assignment is available with a deadline date. Individuals who procrastinate would not engage until closer to the deadline, and their engagement behaviour would increase as it nears. The pattern of behaviour in a procrastination scallop differs from the behaviour of an individual who regularly engages with the assignment until the deadline or submission (Michael, 1991). Michael (1991) suggested that the pattern of responding in a procrastination scallop is exaggerated due to the impacts of aversive control. The act of completing an academic task can increase in aversiveness due to varying factors, the main two being the length of time till it is due and how much of the task needs to be done to be completed (Michael, 1991). Having a reasonable length of time to complete the task with minimal work needed is a safe and non-aversive state to be in. To be in the opposite state of little time left and little work completed is aversive, which generally results in escape behaviour. For most individuals, the escape behaviour is to complete the task leading to negative reinforcement and still resulting in completed work (Michael, 1991).

Researchers have reported behaviours associated with anxiety due to academic procrastination (Saplavska & Jerkunkova, 2018). McCown et al. (1989) concluded that as the delay between an exam being notified and occurring reduces, anxiety increases and studying decreases, suggesting students engage in non-studying behaviours to avoid experiencing anxiety. Academic procrastination involves a trade-off of delays whereby avoidance behaviour, such as the use of social media, produces smaller but immediate reinforcers, whereas studying behaviour produces larger but delayed reinforcers (Olsen et al., 2018). The trade-off of delay

is due to competing reinforcement schedules influencing a student's choices. Environments surrounding the student provide many competing schedules of reinforcement ranging from sporting events, social interactions, relationships, entertainment activities, and the readily available apps on a device. Therefore, students may struggle to engage in academic activities, especially considering the reinforcement of completion is generally delayed, such as completing the paper, graduation, grades, or employment (Concepcion, 2020; Michael, 1991). In addition, academic procrastination is reinforced when the student still achieves a grade they are satisfied with, which results in a higher probability that the student will procrastinate again in the future (Concepcion, 2020). However, Tan et al. (2008) found that those who scored high in academic procrastination generally had lower expectations of course grades.

Doherty (2006) found that procrastination and poor time management are the main reasons people gave for dropping out of online learning. Online learning has become a prominent way of learning as it makes education more accessible to people despite their constraints, whether distance or family life (Michinov et al., 2011). Since the COVID-19 global outbreak, online learning has increased, with more people than ever engaging in online education as a preferred option (Hong et al., 2021; Masalimova et al., 2022). Michinov et al. (2011) found that those with higher procrastination scores engaged less with their peers and tutors. In contrast, those with lower procrastination scores contributed regularly and comprehensively (Michinov et al., 2011). Depending on the environment in which online learning is engaged, there may be many competing activities that can result in a student engaging in procrastination. In contrast, regularly visiting a campus, library, or classroom exposes students to discriminative stimuli associated with an academic environment (Concepcion, 2020). The lack of discriminative stimuli within the environment may also contribute to academic procrastination (Concepcion, 2020). Regardless of what is causing the procrastination and lack of engagement, Michinov et al. stated that students not engaging in the discussion forums and having regular contact with peers and tutors is detrimental.

Discounting reflects the weakening of reinforcers due to the delay in receiving the reinforcer. Typically, discounting is used within research addressing issues of impulsivity/self-control (Critchfield & Kollins, 2001; Odum, 2011). Steep discounting functions indicate that the value of the reinforcer is rapidly devalued over time, whereas shallow functions reflect the fact that the reinforcer holds its value over time (Concepcion, 2020).

Waiting for a potentially larger reinforcer rather than collecting a smaller, more immediate reinforcer is considered "self-control", whereas choosing the smaller, sooner reinforcer is considered "impulsive".

Procrastination is on the other side of the coin to impulsivity, where impulsivity is doing something to acquire an immediate reinforcer; procrastination is delaying doing something associated with a delayed reinforcer (Concepcion, 2020).

Schouwenburg and Groenewoud (2001) explored whether discounting is observable in social situations where procrastination may occur. To measure a participant's discounting rates, the researchers used what they termed *situations of interest*. Participants were presented with scenarios where they could be studying, but a social situation or entertainment activity presented itself, which prevented them from studying. The researchers presented these scenarios with varying delays to the assignment due date and scaled participants' discounting rates based on their choices. Participants' discounting curve slopes increased as the assignment deadline increased; that is, they were more likely to choose the social or entertainment option over studying when there was a larger delay to the assignment due date. Unlike Schouwenburg and Groenewoud, who used hypothetical scenarios, Dewitte and Schouwenburg (2002) conducted more of a direct observational discounting study. Participants provided self-report data of how many hours they planned to study and the number of hours they actually studied. If there was a difference, they asked participants why they did not study for the intended hours. The results further supported the hyperbolic curve idea suggested by Schouwenburg (1995), where students increased their study activities closer to the time of submission. Participants reported engaging in fun activities when procrastinating instead of feeling tired or for other external reasons.

To further the research into academic procrastination and discounting, Moon and Illingworth (2005) and Howell et al. (2006) based their studies on the findings of Schouwenburg and Groenewoud (2001) and Dewitte and Schouwenburg (2002). Howell et al. hypothesised that students would display a pattern of temporal discounting, such as a scallop, whereby they would engage at higher rates as the submission timeframe became closer. Howell et al. predicted that those who described themselves as procrastinators would display temporal discounting. Their findings supported their hypothesis, as the number of students who submitted increased as the deadline drew closer. A correlation was also found between those who self-identified as high procrastinators and those who submitted late. Their overarching research question was whether procrastination, to an extent, is

'normal' behaviour, as Schouwenburg and Groenewoud suggested, which was supported by their findings. Howell et al. concluded that, due to a large proportion of students displaying procrastination, a degree of procrastination is 'normal' behaviour. They did not find a correlation between grades received and delay in submission. However, they found a correlation between the three self-reporting measures and the behaviour measure of procrastination (Howell et al., 2006). Moon and Illingworth, like Howell et al., hypothesised that there are temporal changes in students' behaviour that can be described as procrastination. Moon and Illingworth described the pattern as a curvilinear growth curve, another term for scalloping. Their findings supported their hypothesis with students displaying a curvilinear trend over five tests during a semester. They also used self-report measures of procrastination and found their behaviour measure was a better predictor of performance on the test than their self-report measure.

Concepcion (2020) noted that much previous research had used questionnaires that ask students to self-report their procrastination (e.g., (Balkis et al., 2013; Basith et al., 2021; Hensley, 2014; Kroese et al., 2014; Rabin et al., 2011)). Using self-reporting to measure procrastination does not capture the behaviour of procrastination directly (Concepcion, 2020). Furthermore, procrastination has often been researched as a fixed personality trait or disposition, assuming it does not change across contexts, tasks, or time. However, recent research has disputed this, finding procrastination is a dynamic behaviour and occurrence depends on the tasks and contexts and the individual interaction with those (Moon & Illingworth, 2005; Schouwenburg, 1995). Procrastination as a behaviour is challenging to measure when an observer can never be sure what a student is doing with their time outside of the classroom. Kim and Seo (2015) suggested, in their meta-analysis of 33 studies, that the different measures used across studies resulted in an inconsistent relationship between academic achievement and procrastination. While most studies found a negative correlation between procrastination and grades, some found nil or a positive correlation (Kim & Seo, 2015). A large portion of the research included in Kim and Seo's meta-analysis used psychometric tests to measure procrastination which may not reflect actual procrastination behaviour. Previously, Steel et al. (2001) and Moon and Illingworth (2005) found a higher correlation between observed procrastination data and grades than with self-reported data. Kim and Seo noted that the research that produced negative correlations with academic achievement relied heavily on self-reported data. Self-reporting measures of verbal scales and questionnaires have been a common

form of procrastination data collection in previous studies (Concepcion, 2020). More recent research has used online university platforms that collect data like login times and when content is viewed, allowing for a more reliable measure of academic engagement, such as discounting (Sokolowski & Tonneau, 2021).

Sokolowski and Tonneau (2021) conducted a replication study based on the findings of Howell et al. (2006) and Moon and Illingworth (2005), examining the stability of procrastination patterns in an online course. The authors used retrospective data from a previously run psychology paper. The students had completed four online tests on a platform called Moodle. The date and time students completed the test was recorded and used to measure the latency between test availability and completion. Students were given a latency score of 1 to 30 depending on when they did the test; for example, if they did the test on Day 10, they received a latency score of 10. Additionally, they collected data on student grades from each test and rescaled them between zero and 10. An integral aspect of their research was the computer simulations they conducted to assess the relationship between individual procrastination and group scalloping (Sokolowski & Tonneau, 2021). Group scalloping is when a whole group displays the same behaviour in a scallop response pattern found in a fixed-interval schedule of reinforcement (Bird & Chase, 2021). Sokolowski and Tonneau had the same findings as Howell et al. and Moon and Illingworth: Students displayed a scallop-like response individually and as a group. Additionally, they found a negative relationship between mean latency and grades: The probability of a student failing a test was higher for those who submitted closer to the due date. However, although a relationship was found, it was only weak (Sokolowski & Tonneau, 2021). The previous research into procrastination and discounting has created a strong research foundation detailing the relationship between the two. However, previous researchers have not included a delay discounting task (DDT) as a measure of discounting.

DDTs have been used as a tool over a range of research and predict certain impulsivity-related behaviours, for example, gambling, smoking, drug use, eating disorders, phone use while driving, and behaviours associated with Attention Deficit Hyperactive Disorder (ADHD) (Concepcion, 2020; DeBarge, 2022). A DDT is used to measure an individual's rate of discounting. Most commonly, participants answer a series of hypothetical questions that offer them the choice between a smaller, sooner reward or a larger, more delayed reward. Choosing the smaller-sooner reward would be considered impulsive. The questions run sequentially until a person chooses the immediate and delayed reinforcer equally within that delay, termed the

indifference point. The indifference point is then used to calculate a discounting rate (Concepcion, 2020; Odum, 2011). A hyperbolic model, ( $V = A/(1+kD)^2$ ), is most commonly used to calculate a person's rate of discounting (Odum, 2011).  $V$  is the indifference point and is equal to the reward value ( $A$ ) divided by the delay to the reward ( $D$ ). The delay ( $D$ ) is multiplied by  $k$ , a free parameter describing how much the delay affects the value (Odum, 2011).

Sutcliffe et al. (2019) assessed the relationship between academic procrastination, psychological flexibility, and delay discounting using a DDT. Participants were 139 3<sup>rd</sup>-year university students who consented to the use of their data from a class activity. The Tuckman Procrastination Scale was used to measure their likelihood to procrastinate, AAQ-II to measure their psychological flexibility, and a video discounting task and hypothetical money task to measure participants' delay discounting. The DDT involved participants choosing a shorter, sooner video or a longer, later video. Delays ranged from 1 to 24 s, with each being presented once randomly. The five single trials of each delay were repeated four times, resulting in 30 trials. Sutcliffe et al. used a titrating procedure, where the shorter, sooner video length was increased or decreased by 2s depending on the participant's choice, while the longer, later video length was held constant at 20s. If the participant chose the shorter, sooner video, the time decreased by 2s, whereas choosing the longer, later video would result in a 2-s increase on the shorter, sooner video. The procedure for the hypothetical money task was similar to the video discounting task but using money rather than videos. Instead of delays of seconds, they used months till receiving the larger, later amount of \$100 compared to the titrating smaller, sooner amount that started at \$50 with adjustments of \$10. Participants completed the tasks in a random order and then were asked for consent to use their data, finishing the class with an exercise using data collected from their DDT. A negative correlation was found between psychological flexibility and academic procrastination, while no other correlations were found. Researchers noted that a correlation was not found between the two DDT's suggesting they are measuring different discounting indices (Sutcliffe et al., 2019).

Concepcion (2020) examined the relationship between the latency of quiz submission and delay discounting rates. The 26 participants completed a DDT via Qualtrics using hypothetical monetary-based questions. The DDT had a series of 'would you rather' questions between a smaller, sooner reward and a larger, later reward. The six series of the DDT questions altered the smaller, sooner value in a fixed sequence ranging

from \$1000 to \$1, with delays on each series ranging from 1 week to 10 years. Data on students' latencies of quiz submissions were recorded from an online learning platform. The results supported the hypothesis that those who submit later in the available submission timeframe also discount more steeply, with the authors concluding there is a relationship between procrastination and discounting rates from a DDT. However, Concepcion had two exceptions in their data; one participant reported a high salary in the demographic data collection series of the DDT and produced the same discounting rate as those who had a low salary but yet had a high latency. Concepcion suggests exceptions are caused by the fact that monetary discounting tasks are not being equal across participants, and academic-related scenarios would be more reliable.

Olsen et al. (2018) developed an academic discounting task (ADT) based on Rachlin et al.'s (1991) hypothetical money discounting task. To assess the reliability of their ADT, participants made hypothetical choices between working to earn money or working on an assessment due between 2 and 21 days. For all trials, the monetary value was titrated; if a participant chose to work for money, the monetary value decreased for that delay, and if the participant chose to work on their assignment, the monetary value increased. Before presenting the scenarios that included delays, participants were presented with 0-delay questions where the monetary value was also titrated. The 0-delay questions allowed the researchers to calculate the point of indifference of what value of money is a valuable enough reinforcer to change their behaviour. Participants were given an initial value of \$500, adjusted by \$50 each time, with a maximum of \$1000 and a minimum of \$100. Participants completed five trials unless they did not switch between working or studying, in which case they would do more trials until they switched or reached the maximum or minimum. Olsen et al. conducted two experiments; they first examined whether their ADT task was an effective discounting task, and secondly, whether there was a magnitude effect as found in previous literature. Their first experiment found the ADT to be a reliable measure of delay discounting within an academic setting. However, they also noted some limitations they rectified in their second study. They initially used delays of 2, 4, 7, 14, and 21 days. They thought adding more delays between 0 and 2 days would create a better curve as steep discounting occurred between 0 and 2 days. Delays of 0, 3, 8 hours, and 1, 4, and 7 days were included in the second study. Another change was the maximum amount of money for the 0-delay trial. In the first study, Olsen et al. set the maximum at \$1000 but found that a few participants reached that point without changing their preference, so they set it at \$2000. After

the second experiment using these changes, Olsen et al. found that adding smaller delays produced a better description of discounting for more participants than in Experiment 1. In the final discussion, Olsen et al. reflected on the wording of the scenario. The scenario had previously just stated they would work for money without any other information about the type of work, which could lead to variability across individuals. Olsen et al. thought some participants might have perceived the work as dangerous when higher pay affected their choices.

Procrastination has been examined through various lenses resulting in varying measures and definitions. There is currently minimal research on procrastination using an applied behaviour analysis (ABA) lens (Sokolowski & Tonneau, 2021). Research comparing delay discounting with a DDT and procrastination is new, and I could only find three articles (Concepcion, 2020; Olsen et al., 2018; Sutcliffe et al., 2019). I built the current study from these three studies, addressing their limitations and furthering the research into delay discounting and procrastination. My methods were similar to those of Concepcion (2020) but used the ADT created by Olsen et al. (2018) to measure discounting rates, addressing the limitation Concepcion mentioned with their monetary DDT not being a valid measure of  $k$  values in an academic setting. Additionally, Concepcion solely used quizzes to collect procrastination data, whereas I used a mixture of assignments, tests, and other online behaviour. I also sought to include more participants than the 26 in Concepcion's research. I examined whether the ADT developed by Olsen et al. is a reliable measure of discounting in the domain of academic procrastination by assessing whether  $k$  values correlated with overall grades achieved and the measures of procrastination. Demographic data were also collected to determine whether there were any other predictors of overall grades. I used the changes made for the second study of Olsen et al. due to their identified limitations, such as the monetary value starting point and shorter delays. Additionally, due to Olsen et al.'s reflection on the participants' views of the pay in the ADT, a statement in the scenario indicating that the hourly pay does not reflect the type of work was included to address this limitation.

I sought to address the mentioned limitations while advancing the research of delay discounting, exploring whether procrastination scores ( $k$  values) from the ADT developed by Olsen et al. (2018) predicted student procrastination and correlated with marks received. Additionally, I analysed whether there are other predictors of student marks, such as level of engagement, grade expectations, number of late submissions,

submission latency, and demographic information. I hypothesised that a correlation would be found between overall marks and level of engagement, the number of late submissions, and submission latency, as these are included in a definition of procrastination behaviour. I also hypothesised that  $k$  values would correlate with overall marks and, therefore, level of engagement, number of late submissions, and submission latency as a predictor of procrastination. Furthermore, I hypothesised that student  $k$  values will be identified in a regression analysis as a valid predictor for student overall marks. Finally, I endeavoured to replicate research findings on student scalloping behaviour, which I hypothesised would be found and be consistent with previous research. That is, student behaviour of engagement or submission would increase nearer to the due date and time of assessments.

## **Method**

### **Participants**

The participants were 49 third-year psychology students with an average age of 29 ( $SD = 10$ ) enrolled in a psychology-based paper during the year's second half. The paper was offered online to students on campus and distant learners. Students were asked to be part of the research after the completion of the paper, and consent was gathered before data was analysed. Information sheets given to participants are in Appendices A and B. Students were offered one course credit for participation that could be used for the current paper. Ethics approval was received for this research from ALPSS Human Research Ethics Committee (FS2022-35).

### **Materials**

Moodle, an online academic platform, was used to collect student grades and access completion and submission data through the convenor of the paper. To obtain a discounting score for each participant, Qualtrics was used to deliver the ADT. Initially, participants answered a series of consent questions, resulting in task termination if participants did not consent. After the consent questions, participants were presented with questions collecting demographic, general income, and study information. The information consisted of their age, whether they have children or not, grade expectations, and whether they think they procrastinate, as seen in Appendix C. Participants were then presented with the ADT, which started with the scenario presentation (below). The scenario replicates the one that Olsen et al. (2018) used with minor changes regarding explaining the type of work and making it relevant to students in a 300-level paper.

*In each of the following scenarios, you are currently completing a 300-level psychology paper. You have a 20% assignment due at various times, and the assignment is not a requirement for passing the paper. However, failing this assignment means you can only achieve a top grade of 80% (A-) if you pass everything else. The assignment is a 1500-word report that requires a minimum of five references.*

*You will also be presented with the option to pick up some extra hours of work which will be immediately paid that day. Imagine the work is something of average enjoyment and the pay is not reflective of how hard or extreme the work is.*

*In each scenario, the time is 9am and you will only have time to either work for money or work on your assignment, not both.*

*Please read each of the scenarios carefully because the amount you will earn from working and when the assignment is due will vary.*

Initially, for the ADT task, participants answered questions pertaining to the 0-delay condition, which had a zero delay in their assignment being due, stating it was due that morning; but the value of the money they could earn increased or decreased depending on their answer, for example, “Work today and earn \$500” or “Work on a 20% assignment that is due today”. The value started at \$500 and was adjusted by \$50. If a participant decided to work for money, the value decreased, and if they chose to do the assignment, it increased. Participants completed a minimum of five trials in the 0-delay condition before the software progressed to the next condition. An indifference point was calculated by a computer algorithm embedded in the software of Qualtrics by calculating the average between the smaller amount of the final trial and what it would have been with one more adjustment lower. If participants did not switch options in the five trials, they continued to do trials until they switched or until the maximum (\$2000) or minimum (\$100) was reached. For the remainder of the delays, participants were presented with the scenario prior to the series of questions to remind them of the task. The delays were 3 and 8 hours and 1, 4, and 7 days. The delays were presented randomly using half of the participant’s indifference point as the smaller, sooner option. The amounts were then titrated with adjustments of 10% for subsequent trials, changing depending on the participant’s choice of delay in the previous trial.

## **Procedure**

The paper was offered entirely online on Moodle, including weekly activities, online labs, and Zoom contact with academic staff. Additionally, the option of face-to-face labs was offered to students. Students had a range of activities to engage in across the 12 weeks, from online discussions to assessments. All the data regarding when they accessed, contributed, or completed tasks is recorded on Moodle. Students taking the paper had a final test at the end of the paper. At the end of the test, they were asked if they would like to partake in a study that requested consent to access their data and gave them access to the ADT on Qualtrics, which needed to be completed at that moment or within 19 days post-test. It took the participants approximately 15 minutes to complete the Qualtrics questionnaire.

## **Data Analysis**

### ***Delay Discounting***

Fifty-seven students participated in the study; however, the data of eight participants were removed according to Johnson and Bickel (2008)'s recommendations for unsystematic data, resulting in 49 participants. The Discounting Model Selector (<https://smallnstats.com/dms>) was used to find individual  $k$  values according to Rachlin (2006) hyperboloid function. The multiple regression analysis used the  $k$  value as an independent variable.

### ***Correlation Analysis***

Correlation analysis was used to analyse the relationship between all eight numeric variables. The numeric variables included final mark, age, number of late submissions (including incomplete), engagement scores, latency of submission, grade expectations, and  $k$  values. The final mark was obtained through Moodle and ranged from 1-100 while, the engagement score was a score out of 62 calculated by counting if a participant had engaged in that aspect of the paper and then converted into a percentage. The paper offered various activities and opportunities for the participants to engage in, ranging from online discussions and lessons to readings. An activity was counted as having been engaged in if Moodle recorded that activity as being accessed by the participant at any point over the paper. The engagement score was converted to a percentage of engagement. Latency of submission data was calculated in minutes by finding the mean of each participant's submission latencies across their four assessments and two tests separately. Zero was given to participants who submitted on the deadline. A negative score was given based on minutes past the due date/time

regardless of an extension, and a positive score was given based on how many minutes before the due date/time the assignment was submitted. Assignments and tests were calculated separately due to the variance in available time to submit; Assignments 1 and 2 were available for 9 days, 3 and 4 for 11 days, and the two tests were available for 24 hours. Grade expectations were measured on a scale from 1 – 9, with 1 being a C- and 9 being an A+. Further analysis was done on independent assessment components to analyse the correlations between latencies and grades, final grade, and  $k$  value. Of the 49 participants, only 47 were included in this analysis due to non-submission of assignments

### ***Multiple Regression***

Multiple regression was used to analyse the relationship between the dependent variable (DV: final mark) and the 10 independent variables (IV). The 10 IVs included whether they have children or not (“yes” = 1, “no” = 2), whether they think they procrastinate or not (“yes” = 1, “no” = 2), whether they focus on getting a better grade or submit as early as possible (“focus on a better grade” = 1, “submit as early as possible” = 2), age,  $k$  value, engagement score, grade expectations, the number of late submissions and latency of submissions. Initially, weekly income had been included as the 11<sup>th</sup> DV and was calculated by the income and number of hours a week they work. However, only 40 of the 49 participants responded in this section, and no correlation was found, so it was excluded as a dependent variable to prevent lowering participant numbers available for analysis.

### ***Moodle - Assessment Submission Data and Lesson Data and Panopto - Access Data***

Moodle was accessed to collect data on assessment submission times and the number of complete lessons and completion date, for each participant. Panopto data was used to see how many people accessed Panopto from the 18<sup>th</sup> of July till the 1<sup>st</sup> of November. Data collected from Moodle and Panopto was transferred to a Microsoft Excel spreadsheet and plotted on graphs with change-of-condition lines displaying when the submission of assignments or tests was due, similar to an ABAB design, to display scalloping.

### ***Qualitative Data***

As mentioned above, participants were asked to complete a questionnaire with an ADT, as seen in Appendix A. Three short-answer questions collected data on participants' beliefs as to why they procrastinate, how they plan

for an assessment, and what they were thinking about while answering the questions in the ADT. Responses were coded and grouped into common themes of each question and are presented in the results.

## Results

Table 1 displays the eight quantitative variables' maximum, minimum, mean, and standard deviation. The minimum final mark was 48.5% (D), with a maximum of 95% (A+) and an average of 78.7% (B+). The minimum and average varied from the grade expectations ( $Min = C-$ ,  $M = A-$ ). Additionally, 67.35% of participants reported not having children, 73.47% reported they procrastinate, and 79.59% said they focused on getting a better grade over submitting early.

**Table 1**

*Descriptive Statistics of Study Variables*

Variable	Minimum	Maximum	Mean	SD
<i>k</i> value	.001526	1.417220	.08922502	.216586992
Overall Grade	48.5%	95%	78.7%	10%
Engagement Score	37%	92%	74%	12%
Age	20	52	29	9
Grade Expectations	C-	A+	A-	
Number of Late	0	4	1	1
Latency Mean - Assignments	-7715	4269	-235.43	2500.97
Latency Mean - Tests	-7261	892	137.31	1480.07

A Pearsons correlation analysis was conducted to assess the correlations between the eight numeric variables. As seen in Table 2, overall marks had a weak positive correlation with engagement score and latency of submissions of assignments, a moderate positive correlation with grade expectations. A weak negative relationship was found between overall marks and number of late submissions; when participants' number of late submissions increased, their overall marks decreased. Latency of submissions of assignments had a weak positive relationship with engagement score and grade expectations. Additionally, a strong negative correlation was found between the number of late submissions and the latency of submission for assignments while a weak negative relationship was found with latency of submissions for tests; when participants' number of late submissions increased, their latency of submission times decreased.

**Table 2***Correlations of Study Variables*

Variable	1	2	3	4	5	6	7	8
1. Overall Mark	-							
2. K Value	-.147	-						
3. Engagement Score	.369*	-.006	-					
4. Age	-.068	.274	.205	-				
5. Grade Expectations	.628 <sup>^</sup>	-.120	.179	-.126	-			
6. Number of Late	-.324**	-.115	-.229	.029	-.093	-		
7. Latency Mean (Assignments)	.356**	-.037	.371*	.039	.297**	-.749 <sup>^</sup>	-	
8. Latency Mean (Tests)	-.135	-.066	-.069	.029	-.206	-.370*	.130	-

Note. <sup>^</sup>  $p < .001$ . \*  $p < .01$ . \*\*  $p < .05$ .

A multiple regression was conducted to predict the DV (overall mark) from the 10 IVs. The results show that 56.1% of the variance in overall marks was accounted for by at least one of the 10 Ivs,  $F(10,38) = 7.127, p < .001$ . As shown in Table 3, engagement score and grade expectations were found to significantly positively predict overall marks, while children, focus or submit, and the number of late submissions negatively predicted overall marks. Grade expectations was the strongest significant predictor of overall marks followed by children, number of late submissions and focus or submit; being the weakest significant predictor. No significant relationship was found between participants' *k* values and overall marks.

**Table 3***Regression Coefficients of the DV and 10 IVs*

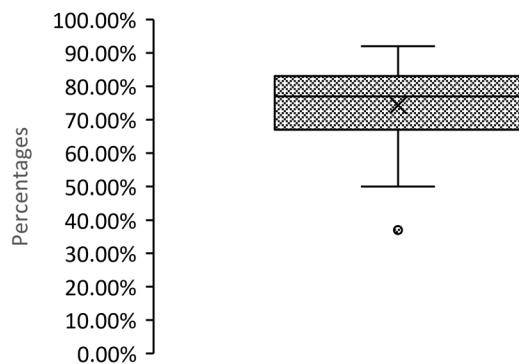
Variable	B	Std. Error	Beta	t	Sig.
(Constant)	80.952	13.296		6.088	<.001
Grade Expectations	2.366	.674	.423	3.512	.001
Children	-8.444	3.400	-.399	-2.483	.018
Number of Late Submissions	-3.434	1.495	-.388	-2.298	.027
Age	-.311	.179	-.301	-1.738	.090
Focus or Submit	-6.642	2.860	-.270	-2.323	.026
Engagement Score	18.923	8.685	.233	2.179	.036
Latency Mean (Assignments)	-.001	.001	-.176	-1.031	.309
<i>k</i> value	-6.193	4.806	-.134	-1.289	.205
Latency Mean (Tests)	-.001	.001	-.085	-.756	.454
Procrastinate (self-report)	1.292	2.538	.058	.509	.614

Table 4 details the correlations between individual assignment mark and latency, individual test mark and latency, and overall marks and  $k$  value across 47 participants. The latencies of Assignments 1, 2, and 3 had a positive relationship with overall marks. However, Assignment 4 was not significantly correlated. Assignment 3 mark also had a negative relationship with  $k$  values; when participants' marks for Assignment 3 increased, their  $k$  value decreased. No assignment or test marks were correlated with latencies or marks.

The spread of assessment latency means and engagement scores can be seen in Figures 1 and 2. Figure 2 specifically details how the outliers impacted the latency score mean in comparison to Figure 1's mean being consistent with the spread of the data.

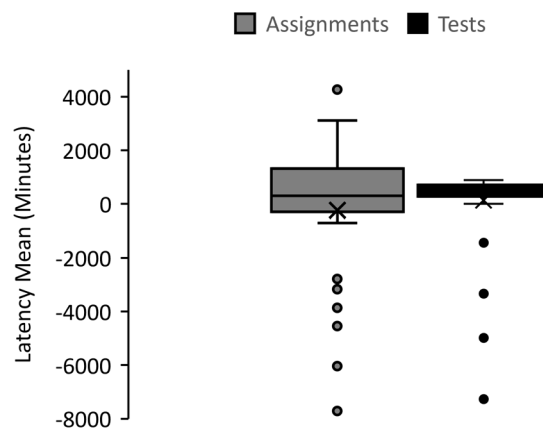
**Figure 1**

*Data Spread of Engagement Scores*



**Figure 2**

*Data Spread of Assignments and Tests*



**Table 4***Correlations of individual assessment marks and latency, overall marks, and k values across participants.*

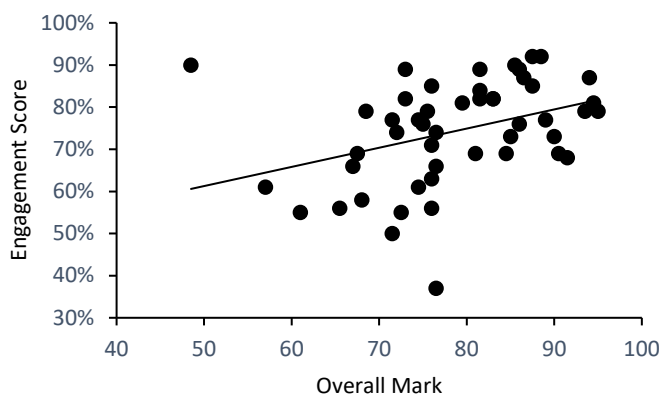
Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Overall Mark	-													
2. K Value	-.181	-												
3. A1L	.375*	.060	-											
4. A2L	.483^	-.049	.592^	-										
5. A3L	.291**	-.045	-.108	.260	-									
6. A4L	-.039	-.034	.399*	.226	-.165	-								
7. A1M	.474^	-.230	.078	.159	.301**	-.241	-							
8. A2M	.708^	-.062	.243	.186	.242	-.117	.374*	-						
9. A3M	.698^	-.368**	.286	.547^	.287	.062	.371*	.464^	-					
10. A4M	.856^	-.196	.383*	.424*	.094	-.020	.436*	.550^	.603^	-				
11. T1L	-.057	.030	-.099	-.023	-.041	.035	.146	-.042	-.074	-.071	-			
12. T2L	-.153	.047	.086	.058	.029	.445*	-.114	-.268	-.064	-.101	.006	-		
13. T1M	.616^	.074	.246	.161	.046	-.203	.068	.431*	.104	.377*	-.088	-.224	-	
14. T2M	.755^	-.043	.173	.321**	.156	-.075	.154	.343**	.391*	.571^	-.056	-.055	.565^	-

*Note.* T = Test; A = Assignment; L = Latency; M = Mark^  $p < .001$ . \*  $p < .01$ . \*\*  $p < .05$ .

Figure 3 displays the positive linear relationship between participants' overall marks and engagement scores. Also noticeable within Figure 3 are the outliers; Participant 39's engagement score of 90% and an overall mark of 48.5%, and Participant 8's engagement score of 37% and a overall mark of 76.5%. Displayed in Figure 4 is the positive linear relationship between participant grade expectations and their actual overall mark. Participant 37 reported a grade expectation of a C-, 39 a B-, and 30 a C+; otherwise, every other participant expected a B or higher grade. Data point outliers included Participant 11, with a grade expectation of A and an overall mark of 56% (C), and Participant 37, with a grade expectation of a C- and an overall mark of 61% (C+)

**Figure 3**

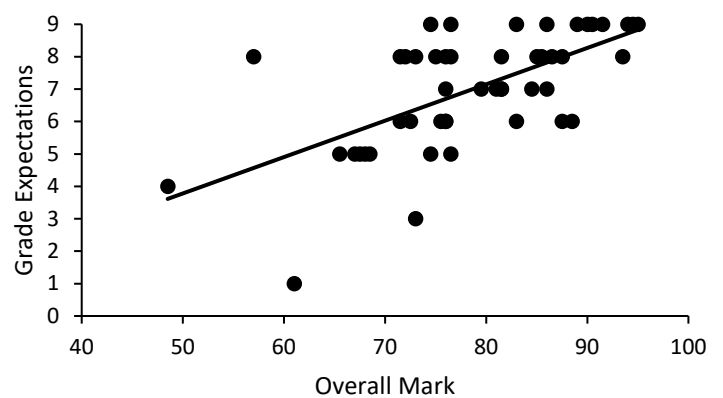
*Engagement Score as a Function of Overall Mark as Percentages*



*Note.* Straight line fit using trendline function in Excel.

**Figure 2**

*Expectations of Grade as a Function of Overall Mark as Percentages*

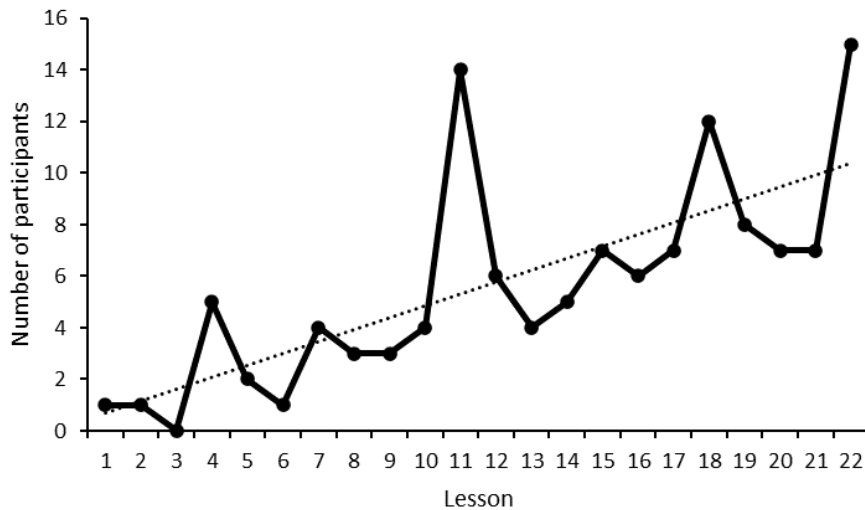


*Note.* Straight line fit using trendline function in Excel

Overall, there were 22 lessons throughout the course. As seen in Figure 5, participants' non-completion of lessons increased as the paper progressed, with two peaks of incomplete lessons in the weeks that tests were held (Lessons 11 and 22).

**Figure 5**

*Number of Participants with an Incomplete Lesson Across Lessons*

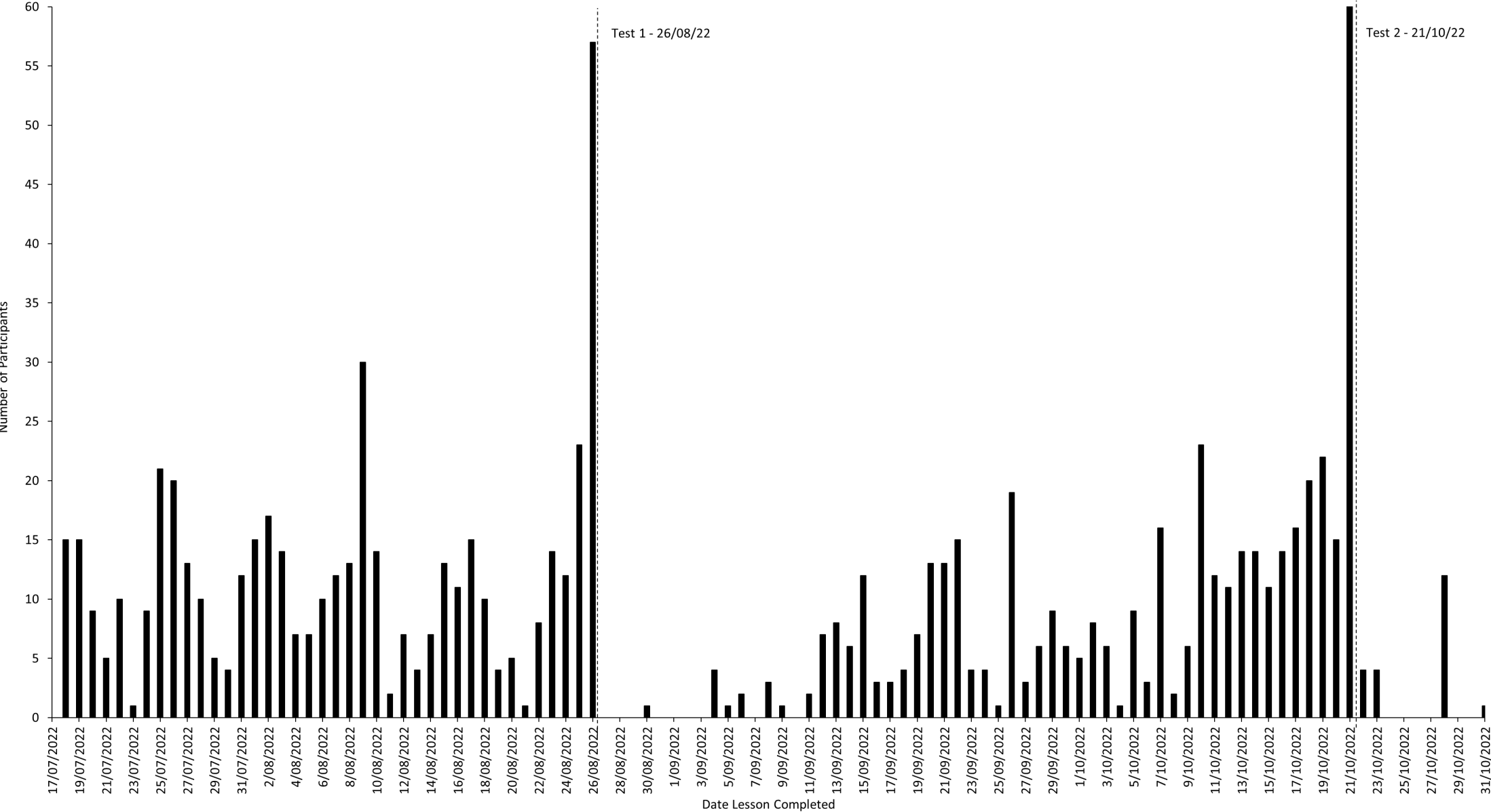


*Note.* Straight line fit using trendline function in Excel.

Figure 6 depicts the scallop effect in completing lessons throughout the paper. A large number of lessons were completed on the day a test was due, and then lesson completion suddenly declined. A closer analysis of the data in Figure 7 (the first half of the trimester) shows a scallop pattern of behaviour over a week with an increase of lesson completions on Mondays and Tuesdays and then reducing over the week, except for during Week 6 which shows an increase as the test nears. Figure 8 displays the second half of the trimester and shows no consistent scallop pattern over the weeks but does display an increase in lesson completion two weeks prior to the test and a substantial burst of behaviour on the day of. Noticeable across both Figures 7 and 8 is that lessons were not consistently completed within the week they were offered. For example, the Week 2 Lessons 3 and 4 were still being completed in Week 3 and by some students up until Week 6. Figure 9 displays a scallop in accessing Panopto resources; accessing Panopto appeared to be under the control of assignment due dates compared to lesson completion being under the control of tests. Accessing Panopto behaviour prior to Assignment 1 appears to be consistent and then dropping off after the date of submission to which it then had a burst of behaviour prior to submission date of Assignment 2. The same scallop was apparent for Assignments 3 and 4 but on a smaller scale, suggesting the behaviour burst was not maintained throughout the paper.

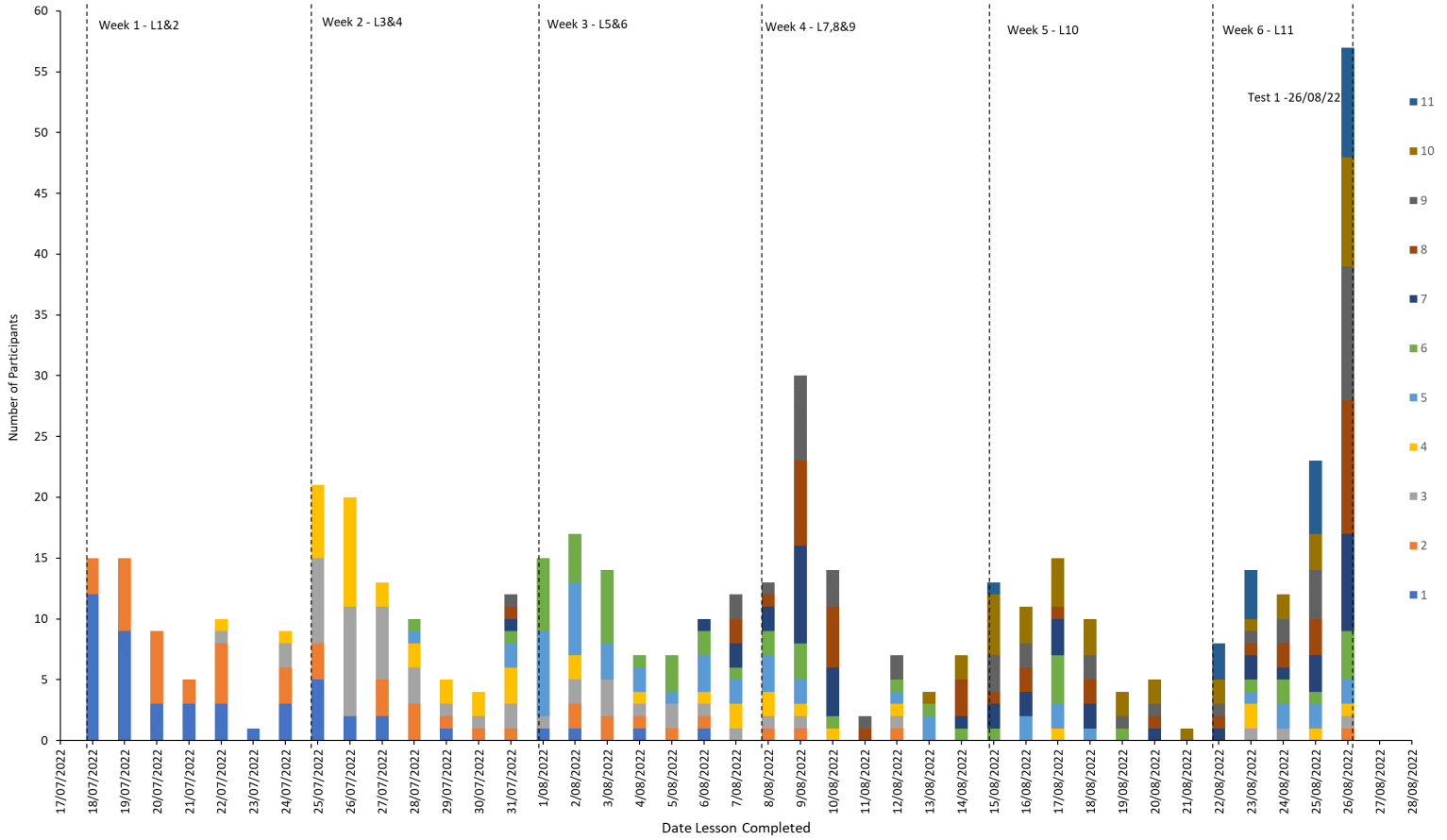
**Figure 6**

*Number of Lessons Completed by Participants Across Dates*



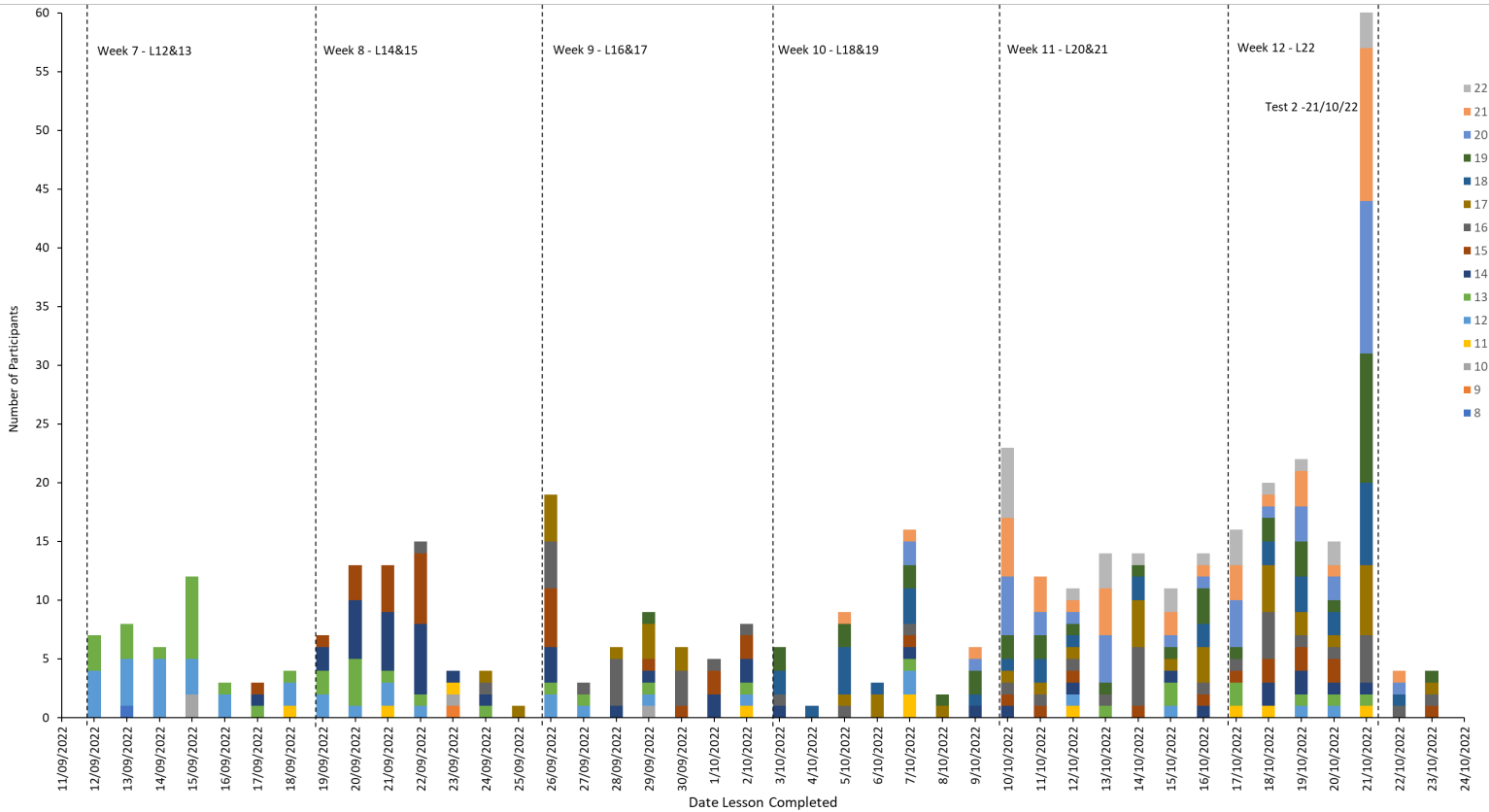
**Figure 7**

*Number of Participants Who Completed Lessons Across Dates for the First Half of Trimester*



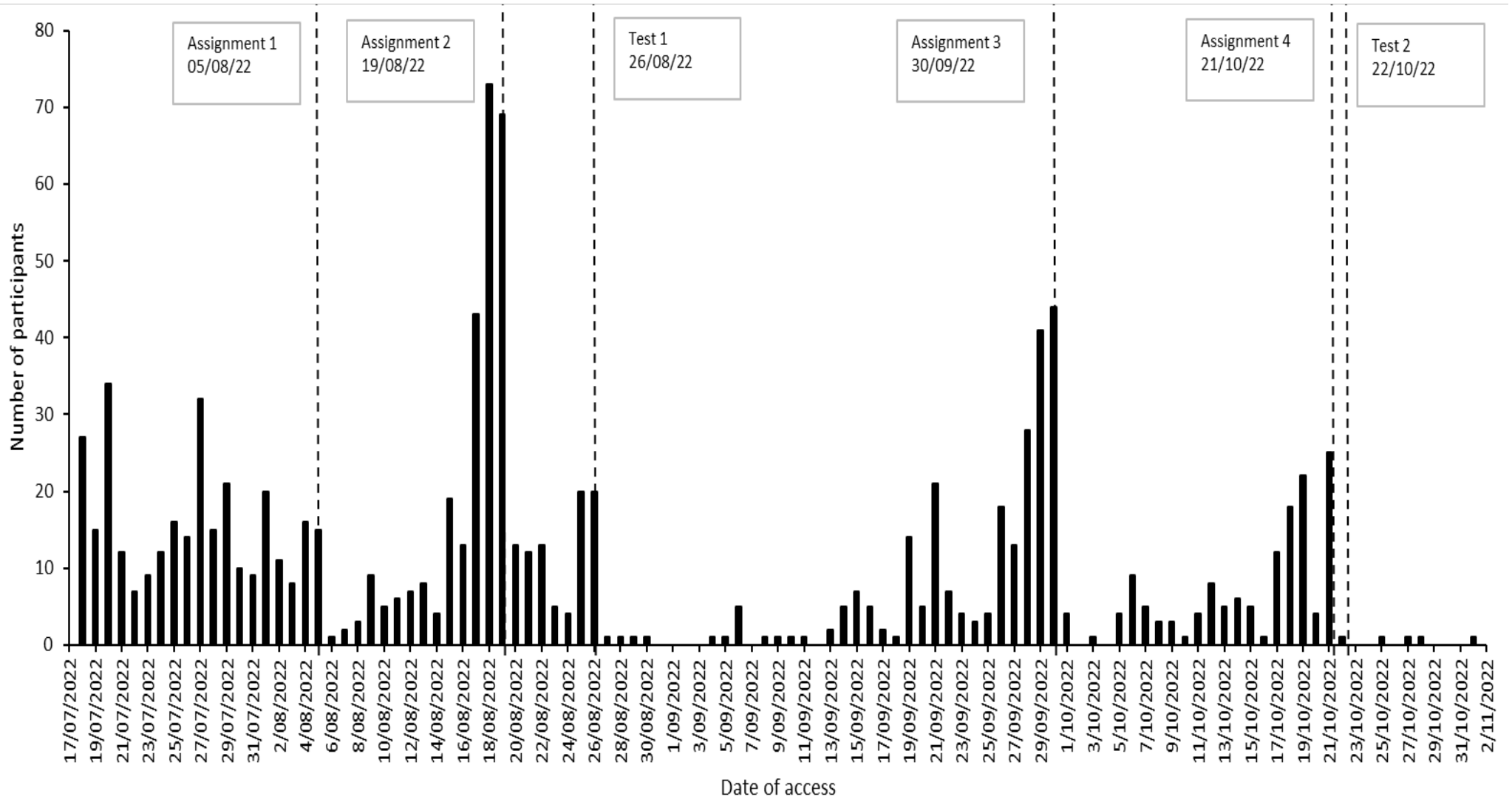
**Figure 8**

*Number of Participants Who Completed Lessons Across Dates for the Second Half of Trimester*



**Figure 9**

*Number of Participants Who Accessed Panopto Across Dates*

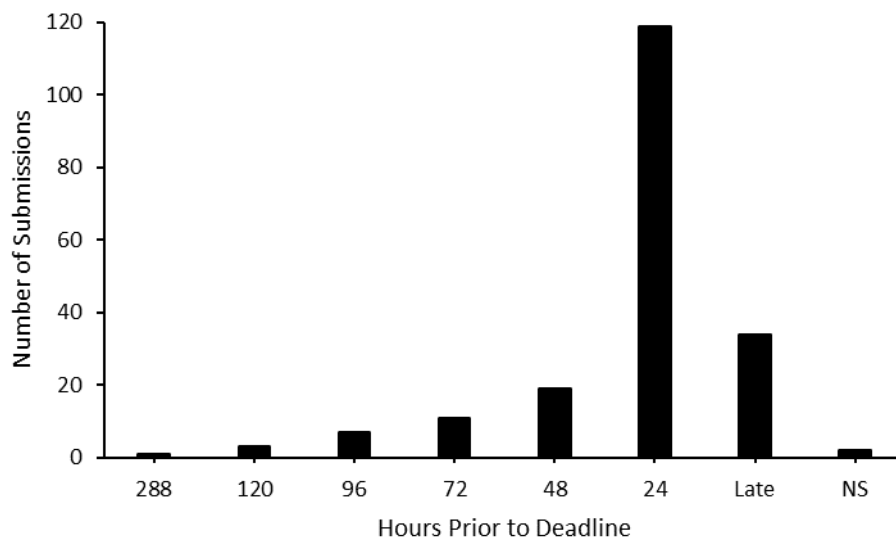


Note: Assessment components include the date it was due to be completed and submitted

There were four assignments to complete throughout the paper, providing 196 (4 x 49 participants) opportunities to submit an assignment; two of the 196 were not submitted. In the final 24 hours before the deadline shown in Figure 10, 119 out of 196 assignments were submitted, of which 34 assessments were late. A further breakdown of those 24 hours and submission numbers is in Figure 11, detailing 38 of the 119 submitted in the last 24 hours were submitted in the last 2 hours. Overall, the maximum number of late submissions a participant had was four, with an average of one across participants. Out of the 49 participants, 45% submitted assessment components late overall. Of all the assessment components, 14% were submitted late, 8% were due to an extension granted, and 6% received a late penalty. For Assignment 1, five participants submitted late; for Assignment two; 10, Assignment 3; five, including one non-submission and for Assignment 4; 15, including one non-submission. Test 1 had one late submission, and Test 2 had four. Two tests throughout the paper gave 98 (2 x 49) submission opportunities. Within the last 12 hours before the deadline, 23 submissions occurred, with 18 occurring within the final 2 hours, as seen in Figure 12.

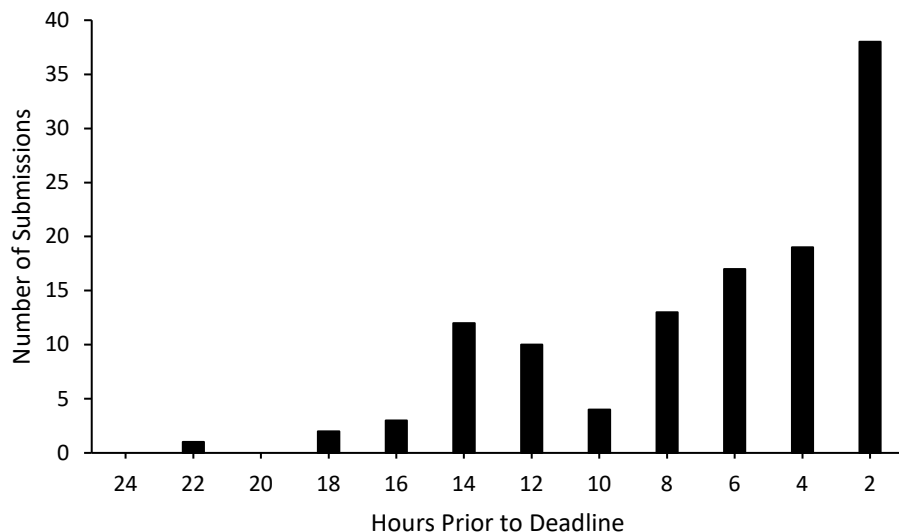
**Figure 10**

*Number of Submissions of Assignments Across Hours Prior to Deadline*



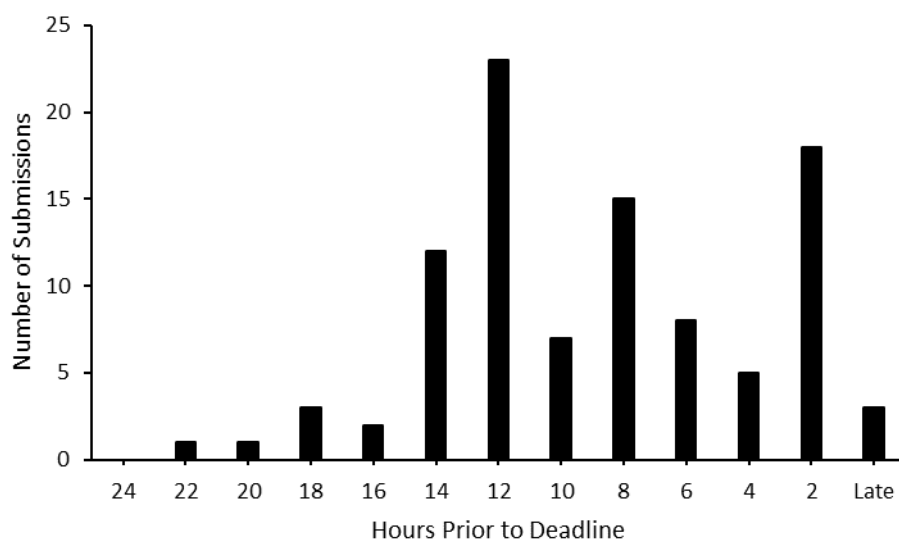
**Figure 11**

*Number of Submissions of Assignments Across the 24-Hour Period Prior to the Deadline*



**Figure 12**

*Number of Submissions of Tests Across the 24-Hour Period Prior to the Deadline*



Qualitative information was collected over three questions within the questionnaire, “How do you plan for assessments/tests?”, “Why do you think you procrastinate?” and a post-ADT question, “What did you think about when answering the question?”. Common themes found within participant planning were participants planning by using diaries/calendars and prioritising assessments based on the weight of grade, due date, and how many hours the assignment would take to complete. Participants suggested time-blocking as a tool and as well as needing to plan around other commitments such as work and dependents’ routines dictating the time they spent on their studies. Participants mentioned doing assignments first to allow their focus to be on tests

when they are due around the same time. Many mentioned that staying on top of the work by engaging in weekly tasks was a factor of preparation and re-watching and re-reading relevant content when it came time to complete an assessment. Another theme was that some participants had complex planning processes, such as breaking assessments up into sections and working through them bit by bit or developing research questions. Furthermore, the timeframe was another theme; some mentioned 24 hours was enough to work on an assignment, while others mentioned they worked on it the week leading up to or at the last minute.

Common themes found for why they think they procrastinate were getting distracted and using TV, phone, leisure activities, or other productive activities such as cleaning. A factor that came up was participants' enjoyment of the topic; if they enjoyed it, they would procrastinate less. Some people identified that they dislike studying and, therefore, always procrastinate. Participants reported working better under pressure and leaving it to the last minute, but also a lack of confidence in the task or the task feeling big and daunting, causing them to delay starting. Additionally, it was mentioned that being tired or not in a study environment surrounded by others studying impacted their ability to focus. Another common theme was mental health or a diagnosis, e.g., ADHD impacting their ability to study/focus and leading to procrastination.

Common themes found for thoughts while answering ADT questions were participants feeling as though they only needed 24 hours to do an assignment. If they had more than 24 hours, they would take the money. The most common and expected theme was participants weighing up the value of the money and delaying till the assignment needed to be submitted. Participants mentioned the immediate pay playing a factor and the limitations of being unable to get the money elsewhere. The value of the money differed for individuals and would depend on what money they had and what they needed to buy/pay. Participants mentioned their weekly schedule influencing their choices and whether they already had other commitments such as work. However, they also felt a workload description could have helped with the choices. Participants mentioned they would consider if they had already done some work to contribute to the assignment and therefore would weigh up how much is left, as well as what grade they were happy to achieve and what their motivation to study is with participants wondering whether it could even be handed in late.

## Discussion

I sought to determine whether participant  $k$  values from an ADT would predict student procrastination and correlate with received marks. I was unable to reject the null hypothesis as no correlation was found between  $k$  values and overall marks or any other variable. I also examined the relationship between submission latency and marks achieved across assessments and whether there were correlations with  $k$  values within individual assessments. Assignment 3 marks was the only assessment component that had a significant relationship with  $k$  values but not its latencies, while Assignments 1 and 2 submission latencies correlated with overall marks but not their individual marks. A lack of significant relationship was also found between Assignment 4's latency and mark as well as overall mark. These findings suggest assessment marks do not have a consistent relationship with procrastination as measured by the ADT within this research. The ADT may not be accurately measuring student procrastination because money is an aspect of the ADT. Participants reported weighing up the value of money and time left to submit; however, depending on their financial situation, this would have impacted their choice and, in turn, the steepness of their  $k$  value as found by Concepcion (2020). Therefore, the outcome may have been measuring at what point they value money over the time to submit rather than the likelihood of procrastination. My research was unable to measure participant income due to a methodological flaw of collection of data in the questionnaire.

I also examined other variables to determine whether they correlated with overall marks. A positive relationship was found between grade expectations, engagement score, and latency of assignment submission with overall marks, while the number of late, focus or submit, and children had negative relationships. The observed procrastination, measured by latency of assignments, the number of late submissions, and engagement, correlated with marks, supporting previous research (Kim & Seo, 2015; Michinov et al., 2011; Sokolowski & Tonneau, 2021). The lack of correlation between these variables and  $k$  values may further suggest that the ADT may not be measuring procrastination. Aznar-Díaz et al. (2020) and Concepcion (2020) previously defined latency of assignment submission, submitting assignments late, and level of engagement as procrastination. Latency of assignment submission correlated with the number of late submissions and engagement scores, suggesting that, compared to the ADT findings, these measures were assessing procrastination or an aspect of procrastination. If these variables accurately measure procrastination, it would

explain the correlations found between overall marks and engagement scores, assignment submission latency, and late submissions, suggesting that procrastination impacts student grades, supporting the findings of Michinov et al. (2011) and Kim and Seo (2015). Although the latency of assignments was positively related to overall marks in the correlation analysis, it was not a significant predictor in the regression analysis. These findings are likely due to how multiple regression is run and that the number of late assignments and submission latency measure very similar things; therefore, only one of these variables will be significant in a regression. Whichever is entered first, in this case, the number of late submissions, will account for the same variance that the other predictor accounts for. The regression analysis produced no additional benefit of the second predictor variable: the latency of assignment submissions.

A negative relationship was found between focus or submit and overall mark; that is, students who focused on having a better grade and did not submit as early as possible also had higher overall marks. This finding potentially accounts for why most participants were submitting their assignments within the final 24 hours of submission time. The time of submission is possibly not the same construct as procrastination due to the student's study behaviour. For example, students may have worked on their assignment ahead of the deadline but chosen not to submit their finished assignment until just before the deadline in case they wanted to make any final changes. This is different to envisioning procrastination as unfinished work being completed just in time. The positive relationship between submission latency and overall marks; those who submit later have lower marks, would reflect those submitting within the last 2 hours, between 10 pm and midnight. These findings are consistent with those of Howell et al. (2006) that student submissions are likely to increase within the final hours of a deadline. Latency of test submission did not correlate with any variable except for the number of late submissions. These findings may be due to how the tests are set up with a midnight deadline and procrastinating on the test means submitting it late in the evening. Submitting the test early may be less about procrastination and more about practicality. Although assignments were able to be submitted late, they could be submitted over several days rather than 24 hours.

A number of researchers have found results that reflect scallop behaviour (Howell et al., 2006; McCown et al., 1989; Moon & Illingworth, 2005; Sokolowski & Tonneau, 2021) in that the bottom of the scallop is when people are not engaging in observable study behaviours. Scallop behaviour was also found for the current

participants with student engagement in lessons increasing prior to assignment deadlines and student engagement with Panopto recordings increasing prior to a test. The observed scallop behaviour may be explained through participants reporting that they review all the content in the week leading up to it before tests. However, some study behaviour was not measured, such as work not on Moodle or Panopto—for example, writing an assignment on Word or researching in the library or online. Therefore, the bottom of the scallop could be due to engagement in study behaviours in non-measured ways.

Additionally, scallop behaviour was also noted in submissions of assignments with the majority of assignments being submitted within the last 24 hours before the deadline, with a further breakdown detailing that the majority of submissions were in the last two hours. The behaviour of test submission displayed a different pattern of scallop behaviour, with the majority of participants being submitted 12 hours before due time, with a burst of submissions 2 hours prior. These findings are consistent with Sokolowski and Tonneau's (2021) findings of increased student engagement behaviour as the time to submit decreases, suggesting it may be due to the reinforcer being temporarily closer to the point of submission that controls submission behaviour. Though, some participants reported feeling they work better under pressure, which could support Michael's (1991) suggestion that students engage in escape behaviour of completing the work when the deadline nears.

### **Limitations and future research**

The lack of correlations with  $k$  values may suggest that the  $k$  values were not measuring procrastination, a common limitation within procrastination research (Kim and Seo (2015)). Procrastination was purposefully not defined in the current research and instead measured through  $k$  values, the latency of submission, engagement score, number of late submissions, and scallop behaviour. If  $k$  values were measuring procrastination, a correlation should have been found between  $k$  values and at least one of the other measured variables. The lack of correlation is consistent with Sutcliffe et al.'s (2019) findings of no correlation between their measure of procrastination and DDTs. These findings may indicate that, although Olsen et al. (2018) found correlations between their  $k$  values from their ADT and a monetary DDT, the ADT may not be measuring procrastination. Additionally, Olsen et al. thought still smaller delays were needed, which was supported by my participants commenting that they would take the work as long as there were 24 hours left to do the assignment. Future research could break up the 24 hours into shorter delays to analyse whether this impacts  $k$  values.

Another potential limitation of the ADT lies within the 0-delay component. This part of the ADT is set up with the scenario stating it is 9 am, and the delay will indicate how much time is left to submit. Submitting and working for money on the same day is not an option; it must be one or the other. Participants may have interpreted the 0-delay differently, impacting their  $k$  values. If submission is at 9 am, a 0-delay implies there is no time left to work on the assignment and it is due in at that moment, which could have been interpreted in different ways. It is also possible that participants viewed the 0-delay differently, not truly understanding what it was implying, which could also lead to differing  $k$  values.

Additionally, the ADT still held a monetary component despite measuring within an academic domain. With the ADT still having a monetary component, it could be largely impacted by financial circumstances rather than procrastination. Future research could explore the wording of the ADT while exploring other scenarios potentially via a preference assessment of activities prior to delivering the ADT. For example, participants mainly reported watching television, using their phone and leisure activities as reasons they procrastinate. These would provide more instant reinforcers than working, as they would still need to do the day's work to receive their pay. If these were used within an ADT, it could measure a more accurate depiction of procrastination. Prior to the ADT, there were a few optional questions regarding financial circumstances, which were to provide data to investigate whether financial circumstances would impact their choice (in line with Concepcion's (2020) findings). However, the questions in the current research were framed in a way that they could not gather accurate data, and several participants opted out of answering. Therefore, future research could explore a more precise way of obtaining that information to analyse its correlation to the ADT.

A fundamental limitation of my research was that the participants were third-year behavioural psychology students. As Michael (1991) suggests of *intrinsic motivation*, the students at this point in their education are within areas of their interest and enrolling in papers that have a prerequisite of a second-year paper. In addition, some psychology students within this paper could intend to pursue a career as a psychologist with a behavioural scope as they enjoy the content. Therefore, procrastination may not have been as high as for a first-year paper, as found by Howell et al. (2006). Future research could observe students throughout a degree and potentially examine whether procrastination behaviour within a paper decreases as the reinforcer of graduating becomes nearer. Longitudinal research over a degree would also provide an opportunity to use

different measures of procrastination, a self-reporting measure and an ADT to examine whether there is a correlation at different points of education. My measure of self-reporting procrastination did not correlate with overall marks within the multiple regression, and it could not be used in a correlation analysis of other variables due to it being coded categorically, preventing findings on whether a participant's self-report of procrastination correlated with other measures of procrastination.

## **Conclusion**

Measuring academic procrastination with an ADT could provide future opportunities for developing interventions imbedded in education structures. My research, despite limitations, has provided valuable information on procrastination behaviour within an academic domain that allows future research to progress in amending the ADT to improve validity or to develop a new ADT. Scallop behaviour was identified within the current cohort, allowing for further understanding of how the setup of the assessment components, such as deadline times, produce scallop behaviour. The findings support hypotheses suggesting a relationship between student grades and variables defined as procrastination. Although not every variable that may impact students' procrastination can be controlled by the education provider, any change that supports a student's success by reducing the chances of procrastination is a step forward.

## References

- Arnold, I. J. (2022). The link between procrastination and graduation rates: evidence from the ALEKS learning platform. *Education Economics*, 1-13.
- Aznar-Díaz, I., Romero-Rodríguez, J.-M., García-González, A., & Ramírez-Montoya, M.-S. (2020). Mexican and Spanish university students' Internet addiction and academic procrastination: Correlation and potential factors. *PloS one*, *15*(5), e0233655-e0233655. <https://doi.org/10.1371/journal.pone.0233655>
- Balkis, M., Duru, E., & Bulus, M. (2013). Analysis of the relation between academic procrastination, academic rational/irrational beliefs, time preferences to study for exams, and academic achievement: a structural model. *European Journal of Psychology of Education*, *28*(3), 825-839. <https://doi.org/10.1007/s10212-012-0142-5>
- Basith, A., Rahman, M. S., & Moseki, U. R. (2021). Students' Academic Procrastination during the Covid-19 Pandemic: Focusing on Academic Achievement. *Jurnal Kajian Bimbingan dan Konseling*, *6*(3).
- Bird, Z., & Chase, P. N. (2021). Student pacing in a master's level course: Procrastination, preference, and performance. *Journal of applied behavior analysis*, *54*(3), 1220-1234. <https://doi.org/10.1002/jaba.806>
- Concepcion, A. (2020). *Temporal Discounting and the Assessment and Treatment of Academic Procrastination* [Doctoral dissertation, University of South Florida]. ProQuest Dissertations and Theses Global.
- Critchfield, T. S., & Kollins, S. H. (2001). Temporal discounting: Basic research and the analysis of socially important behavior. *Journal of applied behavior analysis*, *34*(1), 101-122.
- DeBarge, E. (2022). *Utilizing Acceptance and Commitment Therapy to Decrease Student Procrastination: An Investigation of Procrastination as a Function of Delay Discounting* [Doctoral dissertation, The Chicago School of Professional Psychology]. ProQuest Dissertations and Theses Global.
- Dewitte, S., & Schouwenburg, H. C. (2002). Procrastination, temptations, and incentives: The struggle between the present and the future in procrastinators and the punctual. *European Journal of personality*, *16*(6), 469-489.
- Doherty, W. (2006). An analysis of multiple factors affecting retention in Web-based community college courses. *The Internet and Higher Education*, *9*(4), 245-255. <https://doi.org/https://doi.org/10.1016/j.iheduc.2006.08.004>

- Ferrari, J. R., & Díaz-Morales, J. F. (2014). Procrastination and mental health coping: A brief report related to students. *Individual differences research, 12*(1), 8-11.
- Hensley, L. C. (2014). Reconsidering active procrastination: Relations to motivation and achievement in college anatomy. *Learning and Individual Differences, 36*, 157-164.  
<https://doi.org/https://doi.org/10.1016/j.lindif.2014.10.012>
- Hong, J.-C., Lee, Y.-F., & Ye, J.-H. (2021). Procrastination predicts online self-regulated learning and online learning ineffectiveness during the coronavirus lockdown. *Personality and individual differences, 174*, 110673. <https://doi.org/https://doi.org/10.1016/j.paid.2021.110673>
- Howell, A. J., Watson, D. C., Powell, R. A., & Buro, K. (2006). Academic procrastination: The pattern and correlates of behavioural postponement. *Personality and individual differences, 40*(8), 1519-1530.  
<https://doi.org/10.1016/j.paid.2005.11.023>
- Johnson, M. W., & Bickel, W. K. (2008). "An algorithm for identifying nonsystematic delay-discounting data": Correction to Johnson and Bickel (2008). *Experimental and clinical psychopharmacology, 16*(4), 321-321. <https://doi.org/10.1037/1064-1297.16.4.321>
- Kim, K. R., & Seo, E. H. (2015). The relationship between procrastination and academic performance: A meta-analysis. *Personality and individual differences, 82*, 26-33. <https://doi.org/10.1016/j.paid.2015.02.038>
- Klibert, J., Langhinrichsen-Rohling, J., Luna, A., & Robichaux, M. (2011). Suicide Proneness in College Students: Relationships with Gender, Procrastination, and Achievement Motivation. *Death Studies, 35*(7), 625-645. <https://doi.org/10.1080/07481187.2011.553311>
- Klingsieck, K. B. (2013). Procrastination in Different Life-Domains: Is Procrastination Domain Specific? *Current Psychology, 32*(2), 175-185. <https://doi.org/10.1007/s12144-013-9171-8>
- Kroese, F. M., De Ridder, D. T. D., Evers, C., & Adriaanse, M. A. (2014). Bedtime procrastination: introducing a new area of procrastination [Original Research]. *Frontiers in psychology, 5*.  
<https://doi.org/10.3389/fpsyg.2014.00611>
- Lay, C. H. (1986). At last, my research article on procrastination. *Journal of research in personality, 20*(4), 474-495. [https://doi.org/10.1016/0092-6566\(86\)90127-3](https://doi.org/10.1016/0092-6566(86)90127-3)

- Lay, C. H., & Schouwenburg, H. C. (1993). Trait procrastination, time management. *Journal of social Behavior and personality*, 8(4), 647-662.
- Masalimova, A. R., Khvatova, M. A., Chikileva, L. S., Zvyagintseva, E. P., Stepanova, V. V., & Melnik, M. V. (2022). Distance Learning in Higher Education During Covid-19 [Mini Review]. *Frontiers in Education*, 7. <https://doi.org/10.3389/feduc.2022.822958>
- McCown, W., Johnson, J., & Petzel, T. (1989). Procrastination, a principal components analysis. *Personality and individual differences*, 10(2), 197-202.
- Michael, J. (1991). A behavioral perspective on college teaching. *Behav Anal*, 14(2), 229-239.  
<https://doi.org/10.1007/bf03392578>
- Michinov, N., Brunot, S., Le Bohec, O., Juhel, J., & Delaval, M. (2011). Procrastination, participation, and performance in online learning environments. *Computers and education*, 56(1), 243-252.  
<https://doi.org/10.1016/j.compedu.2010.07.025>
- Mohammadi Bytamar, J., Saed, O., & Khakpoor, S. (2020). Emotion Regulation Difficulties and Academic Procrastination. *Frontiers in psychology*, 11, 524588-524588.  
<https://doi.org/10.3389/fpsyg.2020.524588>
- Moon, S. M., & Illingworth, A. J. (2005). Exploring the dynamic nature of procrastination: A latent growth curve analysis of academic procrastination. *Personality and individual differences*, 38(2), 297-309.  
<https://doi.org/https://doi.org/10.1016/j.paid.2004.04.009>
- Odum, A. L. (2011). Delay discounting: I'm a K, you're a K. *Journal of the experimental analysis of behavior*, 96(3), 427-439. <https://doi.org/10.1901/jeab.2011.96-423>
- Olsen, R. A., Macaskill, A. C., & Hunt, M. J. (2018). A Measure of Delay Discounting Within the Academic Domain. *Journal of Behavioral Decision Making*, 31(4), 522-534.  
<https://doi.org/https://doi.org/10.1002/bdm.2074>
- Pierce, W. D., & Cheney, C. D. (2017). *Behavior analysis and learning : a biobehavioral approach* (Sixth edition. ed.). Routledge, Taylor & Francis Group.

- Rabin, L. A., Fogel, J., & Nutter-Upham, K. E. (2011). Academic procrastination in college students: The role of self-reported executive function. *Journal of Clinical and Experimental Neuropsychology*, 33(3), 344-357. <https://doi.org/10.1080/13803395.2010.518597>
- Rachlin, H. (2006). Notes on discounting. *Journal of the experimental analysis of behavior*, 85(3), 425-435. <https://doi.org/10.1901/jeab.2006.85-05>
- Rachlin, H., Raineri, A., & Cross, D. (1991). Subjective probability and delay. *Journal of the experimental analysis of behavior*, 55(2), 233-244.
- Saplavska, J., & Jerkunkova, A. (2018). Academic procrastination and anxiety among students. *Engineering for rural development-International Scientific Conference 2018*, 23, 1192-1197. <https://doi.org/10.22616/ERDev2018.17.N357>
- Schouwenburg, H. C. (1995). Academic Procrastination. In J. R. Ferrari, J. L. Johnson, & W. G. McCown (Eds.), *Procrastination and Task Avoidance: Theory, Research, and Treatment* (pp. 71-96). Springer US. [https://doi.org/10.1007/978-1-4899-0227-6\\_4](https://doi.org/10.1007/978-1-4899-0227-6_4)
- Schouwenburg, H. C., & Groenewoud, J. (2001). Study motivation under social temptation; effects of trait procrastination. *Personality and individual differences*, 30(2), 229-240. [https://doi.org/10.1016/S0191-8869\(00\)00034-9](https://doi.org/10.1016/S0191-8869(00)00034-9)
- Senécal, C., Koestner, R., & Vallerand, R. J. (1995). Self-regulation and academic procrastination. *The journal of social psychology*, 135(5), 607-619.
- Sirois, F. M., van Erde, W., & Argiropoulou, M. I. (2015). Is procrastination related to sleep quality? Testing an application of the procrastination–health model. *Cogent Psychology*, 2(1), 1074776.
- Sokolowski, M. B. C., & Tonneau, F. (2021). Student Procrastination on an E-learning Platform: From Individual Discounting to Group Behavior. *Perspectives on Behavior Science*, 44(4), 621-640. <https://doi.org/10.1007/s40614-021-00321-y>
- Steel, P. (2007). The nature of procrastination: a meta-analytic and theoretical review of quintessential self-regulatory failure. *Psychological bulletin*, 133(1), 65.
- Steel, P., Brothen, T., & Wambach, C. (2001). Procrastination and personality, performance, and mood. *Personality and individual differences*, 30(1), 95-106.

- Sutcliffe, K. R., Sedley, B., Hunt, M. J., & Macaskill, A. C. (2019). Relationships Among Academic Procrastination, Psychological Flexibility, and Delay Discounting. *Behavior analysis (Washington, D.C.)*, 19(4), 315-326. <https://doi.org/10.1037/bar0000145>
- Tan, C. X., Ang, R. P., Klassen, R. M., Yeo, L. S., Wong, I. Y. F., Huan, V. S., & Chong, W. H. (2008). Correlates of Academic Procrastination and Students' Grade Goals. *Current Psychology*, 27(2), 135-144. <https://doi.org/10.1007/s12144-008-9028-8>

# We need you for our research!

---

- We need participants to complete a questionnaire including a delayed discounting task that will take about 20 minutes for 1-course credit.
- The study investigates the relationship between delay discounting and procrastination and their impacts on students' grades. Delay discounting can be explained as examining the point of preference for a smaller reward you get instantly rather than waiting for a larger reward later.
- The questionnaire asks general questions about your demographics and study habits. The questionnaire will seek consent for access to your Moodle data. Moodle data from your PSYCH314 paper will then be used to examine correlations between the delay discounting task, your answers to the questionnaire, and your Moodle data.
- If you have any questions regarding the study, please contact me at [kimp2@students.waikato.ac.nz](mailto:kimp2@students.waikato.ac.nz). Alternatively, you can also contact Rebecca Sargisson at [rebecca.sargisson@waikato.ac.nz](mailto:rebecca.sargisson@waikato.ac.nz).



## Appendix B

### Participant Information Sheet

**Researcher:** Karissa Paterson

Dear fellow students,

I want to invite you to participate in the research project I am completing as part of my Masters's degree at the University of Waikato under the supervision of Rebecca Sargisson.

My study investigates the relationship between delay discounting and procrastination and their impacts on students' grades. Delay discounting can be explained as examining the point of preference for a smaller reward you get instantly rather than waiting for a larger reward later.

#### **What will you be asked to do?**

You will be asked to complete a questionnaire that asks some general questions about your demographics and your study habits. The questionnaire will also include an academic delay discounting task to examine your discounting rates. This questionnaire will take approximately 20 minutes, and you will receive 1-course credit for completing it. Moodle data from your PSYCH314 paper will then be used to examine correlations between the delay discounting task, your answers to the questionnaire, and your Moodle data. The Moodle data that will be collected is how long you took to complete tasks and the grades you received.

#### **How will data be collected and stored?**

Rebecca Sargisson will gather the data from Moodle for those who consent to be in the study. Your data will then be stored on a document in a password-secured OneDrive. Once all data collection and analysis are made, your names will be removed from the data set and replaced with an arbitrary number. You will be given complete confidentiality, and your names will not be used in any data publication.

If you have any questions regarding the study, contact me at [klmp2@students.waikato.ac.nz](mailto:klmp2@students.waikato.ac.nz). Alternatively, you can also contact Rebecca Sargisson at [rebecca.sargisson@waikato.ac.nz](mailto:rebecca.sargisson@waikato.ac.nz).

Kind regards,  
Karissa Paterson

*This research project has been approved by the Human Research Ethics Committee of the Division of Arts, Law, Psychology and Social Sciences. Any questions about the ethical conduct of this research may be sent to the Secretary of the Committee, email [alpss-ethics@waikato.ac.nz](mailto:alpss-ethics@waikato.ac.nz), postal address, Division of Arts, Law, Psychology and Social Sciences, University of Waikato, Te Whare Wananga o Waikato, Private Bag 3105, Hamilton 3240*

## Appendix C

### Questionnaire excluding the ADT

---

#### Start of Block: Consent Questions

Q1 Please give us your details for the purpose of recording consent

First Name (4) \_\_\_\_\_

Last Name (5) \_\_\_\_\_

---

Q2 I have received a copy of the information sheet describing the research project

I have had an opportunity to ask questions, and any questions that I have relating to the research have been answered to my satisfaction.

I understand that I can withdraw my participation for up to two weeks after completing the questionnaire.

I understand that my identity will remain confidential in the presentation of the research findings.

I understand that I do not need to answer all of these questions if I do not feel comfortable doing so.

I understand that my data will be stored on a password-protected OneDrive folder that only the researchers will

have access to.

I understand that my grades will not be impacted if I decline to partake in this study.

I consent to the researchers using my Moodle data and the answers to these questions for the purpose of this study.

Yes (1)

No (2)

*Skip To: End of Survey If I have received a copy of the information sheet describing the research project I have had an opp... = No*

**End of Block: Consent Questions**

---

**Start of Block: General Demographic Information**

Q1 What gender do you ascribe as?

Male (4)

Female (5)

Non-Binary (6)

Prefer to self describe (7) \_\_\_\_\_

---

Q2 How old are you?

▼ 17 (1) ... 70 (60)

---

Q3 What is your ethnicity? You may select multiple

- Pākehā/Non Māori New Zealander (1)
  - Māori (2)
  - Pacific Islander (3)
  - Asian (4)
  - Middle Eastern (5)
  - Other (6) \_\_\_\_\_
-

Q4 What best explains your study enrolment?

- Full-time (4 papers a trimester) (1)
- Part-time (2-3 papers a trimester) (2)
- Less than part-time (1 paper a trimester) (3)

**End of Block: General Demographic Information**

---

**Start of Block: Income Demographic Questions**

Q1 Do you receive a student allowance or weekly student loan payments?

- Yes (1)
  - No (2)
- 

*Display This Question:*

*If Do you receive a student allowance or weekly student loan payments? = No*

Q2 What is your main source of income?

- Scholarship (1)
- Paid employment (2)
- Money from parents/caregivers (3)
- Other - please detail (4) \_\_\_\_\_

End of Block: Income Demographic Questions

---

Start of Block: Employment Demographic Questions

Q1 Do you work?

- Yes (1)
  - No (2)
- 

*Display This Question:*

*If Do you work? = Yes*

Q2 How many hours a week on average?

▼ 1 (1) ... 4 (4)

---

*Display This Question:*

*If Do you work? = Yes*

Q3 How much on average do you get paid an hour?

▼ Minimum wage (\$21.20) (2) ... More than \$29.00 (7)

**End of Block: Employment Demographic Questions**

---

**Start of Block: Living Circumstances**

Q1 Do you live at home with caregivers or independently?

At home with caregivers (1)

Independently (2)

---

Q2 Do you live in a flatting situation?

Yes (1)

No (2)

Q3 Do you consider your home an easy place to study and focus in to complete coursework?

Yes (1)

No (2)

End of Block: Living Circumstances

---

Start of Block: Dependent Demographic Questions

Q1 Do you have any children?

Yes (1)

No (2)

---

*Display This Question:*

*If Do you have any children? = Yes*

Q2 How many children do you have?

- 1 (1)
  - 2 (2)
  - 3 (3)
  - 4 (4)
  - 5 (5)
  - 6 (6)
  - 7 (7)
  - 8 or more (8)
- 

*Display This Question:*

*If Do you have any children? = Yes*

Q3 Are your children in your care....

- Part-time (1)
  - Full-time (2)
  - On a casual basis (3)
-

*Display This Question:*

*If Do you have any children? = Yes*

Q4 Are you a solo parent when they are in your care?

Yes (1)

No (2)

**End of Block: Dependent Demographic Questions**

---

**Start of Block: Continued Demographic Questions**

Q1 Do you have any extracurricular activities outside of study/work? This may include but is not limited to; Sports, gym, clubs, volunteering, church etc

Yes (1)

No (2)

*Display This Question:*

*If Do you have any extracurricular activities outside of study/work? This may include but is not lim... = Yes*

Q2 How many hours a week do you spend doing these on average?

▼ Less than 1 (1) ... 20 (24)

---

Q3 Do you have any other responsibilities that consume your time each week?

Yes - Please provide detail of what and how many hours each week on average (1)

\_\_\_\_\_

No (2)

**End of Block: Continued Demographic Questions**

---

**Start of Block: Study Planning Questions**

Q1 How do you plan for an assessment/tests etc?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Q2 What grade do you aim to achieve when doing tests etc?

▼ 50-54 (C-) (1) ... 90-100 (A+) (9)

---

Q3 Do you like to get something done and submitted as soon as possible or do you spend time studying and trying to focus on a better grade?

- Submitted as soon as possible (1)
  - Focus on a better grade (2)
- 

Q4 Do you believe you procrastinate in doing your study commitments such as tests and assignments?

- Yes (1)
  - No (2)
- 

*Display This Question:*

*If Do you believe you procrastinate in doing your study commitments such as tests and assignments? = Yes*

Q5 Please explain why you think you procrastinate.

---

**End of Block: Study Planning Questions**

---

**Start of Block: Access to study resources**

Q1 Where do you do most of your study?

- Home (1)
  - University Campus (2)
  - Other - please provide detail (3) \_\_\_\_\_
- 

Q2 Do you have a computer that you use for study?

- Yes, I own one (1)
  - No, I do all my work on a university computer (2)
  - Yes, but I have to borrow someone's (3)
-

Q3 Do you have access to reliable Wi-Fi at home?

Yes (1)

No (2)

---

Q4 Would you say having access to equipment and resources is a struggle for your study?

Yes (1)

No (2)

**End of Block: Access to study resources**

---

**Start of Block: Explanation of academic discounting scenario**

*Q7 In each of the following scenarios, you are currently completing a 300-level psychology paper. You have a 20% assignment due at various times and the assignment is not a requirement for passing the paper. However, failing this assignment means you can only achieve a top grade of 80% (A-) if you pass everything else. The assignment is a 1500-word report that requires a minimum of five references.*

*You will also be presented with the option to pick up some extra hours of work which will be immediately paid that day. Imagine the work is something of average enjoyment and the pay is not reflective of how hard or extreme the work is.*

*In each scenario, the time is 9 am and you will only have time to either work for money or work on your*

*assignment, not both. Please read each of the scenarios carefully because the amount you will earn from working and when the assignment is due will vary.*

**End of Block: Explanation of academic discounting scenario**

---

**ADT zero-delay questions**

**Q109 Reminder:** In each of the following scenarios, you are currently completing a 300-level psychology paper. You have a 20% assignment due at various times and the assignment is not a requirement for passing the paper. However, failing this assignment means you can only achieve a top grade of 80% (A-) if you pass everything else. The assignment is a 1500-word report that requires a minimum of five references.

You will also be presented with the option to pick up some extra hours of work which will be immediately paid that day. Imagine the work is something of average enjoyment and the pay is not reflective of how hard or extreme the work is.

In each scenario, the time is 9 am and you will only have time to either work for money or work on your assignment, not both. Please read each of the scenarios carefully because the amount you will earn from working and when the assignment is due will vary.

**ADT questions**

---

**Start of Block: After ADT Questions**

Q1 Did you find the scenario questions easy to answer?

Yes (1)

No (2)

---

---

Q2 What did you think about when answering the questions?

---

---

Q3 How many hours do you expect it would take you to complete a typical 20% assignment?

▼ 1 (5) ... 50 (54)

**End of Block: After ADT Questions**

---

**Start of Block: Receive study results**

Q1 I wish to receive a copy of the study findings

Yes - Please provide your email address you want these sent to (1)

---

No (2)

**End of Block: Receive study results**

---