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Improving students' performance with time management skills

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Practitioner Notes

1. First year students experience significant challenges to transition. 2. Time management is a key success factor for effective first year transition. 3. Time management training creates higher student success and retention.

Keywords

Time management, academic achievement, university transition, defence academy, synthetical-age, gender differences



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Research at the University of New South Wales with Defence Force Academy students found time-management skills significantly improve the academic results of male students but not female students when controlling for the usual effect of prior academic ability. While much previous research has revealed a positive link between time management and academic results within civilian environments, there is a lack of research on this link in dual-military or employment and academic settings. Our research also extends on many national and international studies' by researching the efficacy of a direct training intervention in time-management skills. The study is unique in evaluating the size of the likely effect on academic results. This study used a mixed-methods evaluation design and a standardised questionnaire to compare two groups of 70 first-year undergraduate students. The experimental group were taught time-management skills in a workshop setting, while a control group did not attend time-management workshops. While the time-management workshop interventions did not improve the academic performance of female students, female students did benefit comparably to males in fewer subject failings and improved attitudes towards time-management attributes. The findings confirm an effect between time-management skills and academic success that offers substantial savings from fewer lost students. Recommendations are made to improve time-management skills and academic performance for all transitioning university students and examine if this significant effect translates to other initial training employment.

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Introduction

'If the price of success is hard work and hard work is achieved through excellent time-management skills, then isn't time one of the greatest resources a human can have?'

[Vince Lombardi, 1967]

Universities are continuing to intensify efforts to improve scholastic progress and degree completions. Consequently, first-year university students experience additional pressures in transitioning from externally imposed and highly structured time environments at high schools into relatively unstructured and internally regulated university environments (Rosen et al., 2017). While numerous papers discuss the importance of time management, there is a scarcity of research reporting the learning environment in which military or other employers and universities exist collectively. Recent national and international research into university transition listed later in this paper finds time management a significant influencer towards first-year undergraduate academic success and failure, building on earlier findings by Cowan (1991) and Hussey and Smith (2010). The previous research reviewed does not examine a treatment or intervention and generally uses self-reporting of time-management skills to establish a causal link, which is likely unreliable in establishing actual effect.

Time management research has long called for policymakers and institutions to focus on first-year university students (Krause et al., 2005; Yorke, 1999; Yorke & Longden, 2008). Transition pedagogy and the linking of time management skills to effective transitioning is covered by Kift et al. (2010) and Nelson et al. (2012). They state, "student engagement and success should not be left to chance, particularly those aspects such as curriculum design and enactment that are within our institutional control" (n.p.).

The rational and intellect required by high school students to achieve academic success may segue into students' university skills, enabling them to transition to university confidently. However, although this transition may be facilitated before and during work-integrated learning experiences, there is predictably a disconnect between skills learnt in high school education and the skills required at universities (Bandaranaike, 2018).

Developing time management skills in first-year university students' lives is critical to academic success (Nonis et al., 2006; Nonis et al., 1998; Sauvé et al., 2016). The development of time management skills assists students when analysing tasks and scheduling their completion, giving students more vital planning skills and a greater understanding of responsibilities and their significance when constructing task schedules (van der Meer et al., 2010). Notably, research reports that good time-management practices can extend beyond university study to significantly increase a person's quality of life (Wang et al., 2011).

This paper explores the impact of providing a comparatively short training treatment of five time-management workshops on students' first-year study performance. The Research Skill Development (RSD) framework, the Models of Engaged Learning and Teaching (MELT), (Willison, 2018), Work Integrated Learning and the Work Skills Development frameworks (Bandaranaike, 2018) are all learning theories that positively align with the workshop curriculum and pedagogy used. The paper reports academic results before and after treatment, failure rates, study disruptions, and the associated cost-saving estimates for military and academic settings from the positive effects observed. This paper recommends implementing time management training for

all transitioning university students and further research on whether this significant effect translates to other initial training employment.

Background

Australia's Defence Force is one of the largest training organisations. Panek (2014) has hypothesised there is likely insufficient structured time-management training for its recruits, cadets, and trainees to manage their time unsupervised. The Australian Defence Force Academy (ADFA) campus is educated by the University of New South Wales (UNSW), with over 1,000 military trainee officers studying there. First-year students are generally high-school leavers who experience numerous transitional tensions (Figure 1). These pressures are attributed in part to students' preparedness (Jansen & van der Meer, 2012) for university (Daniels, 2019; Wicks, 2010) and the effect on first-year undergraduate attrition rates and academic performance (Smith, 1992).

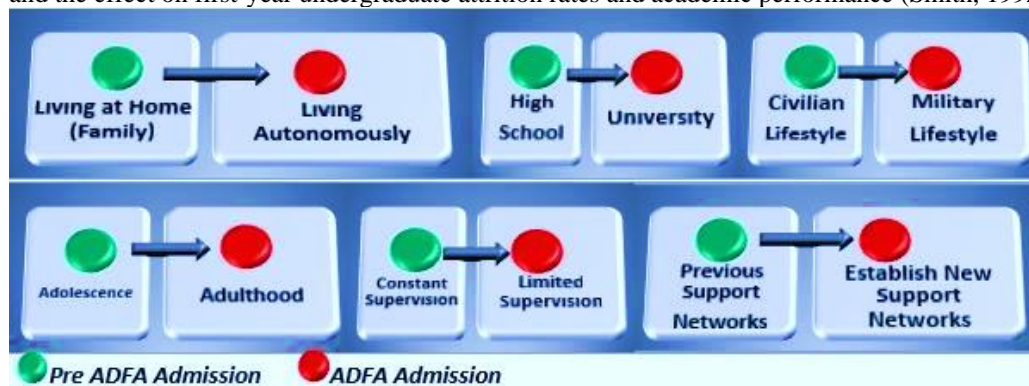


Figure 1:
Transitioning tensions

The tensions are compounded by increasing pressure to assume dual military and academic identities as scholarly soldiers (Wilson et al., 2015). Also, the Academy sponsors international military students who experience further transitional tensions (Kambouropoulos 2014). The academic challenges at secondary schools likely exacerbate the student transition, often being less demanding when compared to Academy and university schedules (Balduf, 2009; Dalli, 2014; Krause & Cotes, 2008; Ruiz-Gallardo, 2016; Wintre, 2011).

Surprisingly, the teaching of time-management skills to students usually does not explicitly occur in high schools, resulting in first-year undergraduate students struggling without the levels of supervision and structure previously provided to them by their secondary school teachers and parents (Cutrona et al., 1994; Nasrullah et al., 2015; Steinberg et al., 1992; Van der Meer et al., 2010). Notably, first-year students have a higher failure rate compared to second, third and fourth-year students. Each of the limitations, challenges, and issues that first-year students encounter contributed to conducting a pilot trial of delivering time-management workshops to first-year undergraduate students at the Academy in 2018 (Britton & Glynn, 1989; Gürbüz & Boyraz, 2016; Panek, 2014).

The different types of approach, efficacy and results of time management training have been reported over many decades and are supported by at least one major early meta-review (Claessens et al., 2007). As stated earlier, many studies into the influence of time-management skills in

students during the transition to university show a positive link but are not based on intervention. Recent examples of such research include an Australian study of gender and age groups (Richardson et al., 2019); an Asian research on living up to the pressures of expectations and standards (Ding, 2017); a Norwegian study of procrastination (Sæle, et al., 2017); a German reporting of unpreparedness and unrealistic perceptions (Mah & Ifenthaler, 2018); a Belgium's examination of non-academic determinants of study success, (Pinxten et al., 2019); a Scottish report linked to over-confidence (Goldfinch & Hughes, 2007); and, an Irish research into attitudes in transitioning to university and new students' anxieties (Gibney et al., 2011).

Since early work by Claessens et al. (2007), no public research could be found on implementing time-management training and the effect on student's academic outcomes, especially for military academies. Two groups were formed to analyse the impact of time-management training on students' academic performance: an experimental group of first-year students who attended time-management workshops and a control group who did not.

The first trial (Semester 1, 2018), where the failure rate of the experimental group was 1.21 per cent compared to the control group's failure rate of 14.66 per cent. Given the results of the initial trial, more detailed research was undertaken in 2019. The evaluation again consisted of two groups: an experimental group that attended five time-management workshops and a control group that did not. Out of a total of 280 subjects undertaken by the 2019 trial students, the experimental group failed eight subjects, and the control group failed 28 subjects (Figure 2), indicating a positive effect between academic performance and exposure to time-management training.

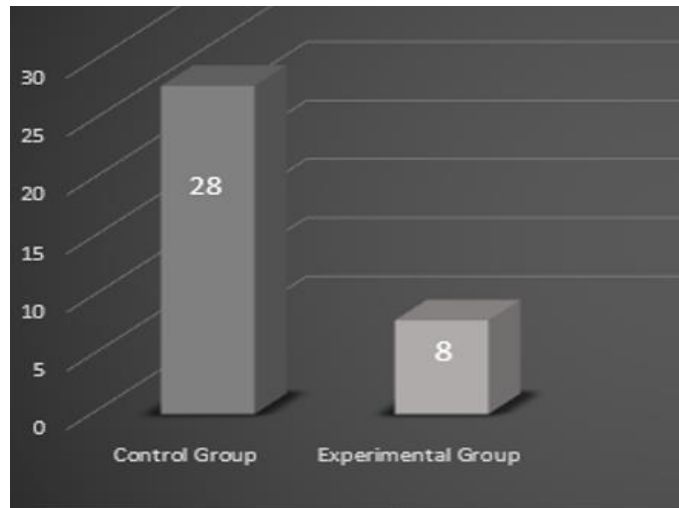


Figure 2:
2019 failed subjects

Literature review

This Section reviews previous scholarly attempts to measure and test the impact of tertiary time-management workshops (e.g., Claessens et al., 2007), to frame the research method. As highlighted earlier, research into providing time-management training and the size of the effect is rare or quite dated. For example, early research found was by Britton and Tesser (1991) and Alay and Kocak (2002). Alay and Kocak (2002) found a positive effect between time-management workshop training and enhanced academic results. Britton and Tesser (1991), Kirkpatrick (1985), Britton and Glynn (1989) are the most popularly cited papers since the publication of each of their respective scholarly fields. As such, this research was modelled primarily on the work of Britton and Glynn (1989).

Theoretical cognitive model of time-management practices

The most relevant models for the Academy are those where university students have dual commitments such as university/military, university/sports-scholarship, and university/work (Evangelista, 2015; Hall, 2010). Examining previous research aimed to compare theoretical models and test the effect of time-management training on academic results (Razali et al., 2018). Our systematic review of time-management research revealed a popular cognitive model of time management to boost students' scholarly efficiency: the Mental Time Management Model (MTMM) illustrated in Figure 3. The cognitive MTMM is popular due to its high accuracy rate, accessibility, and robustness in maximising intellectual productivity (Britton & Glynn, 1989).

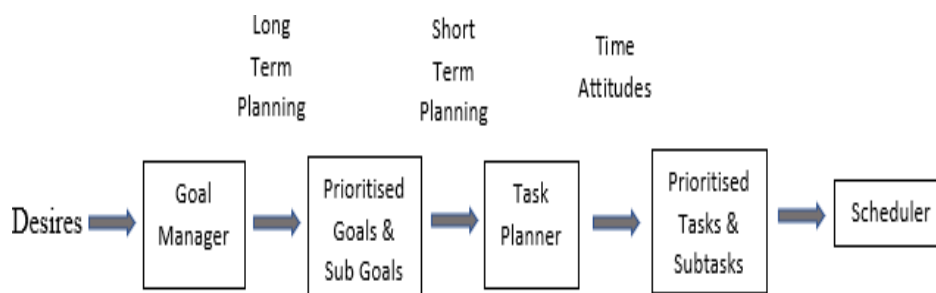


Figure 3:
Top-level component of a mental time management model (Britton & Glynn, 1989)

Time-management questionnaires

The three main tools considered to record and manage time for scholarly research are all self-reporting tools designed to measure specific aspects of students' time management. The first was a 4-factor time-management behaviour scale (Adams & Jex, 1997), a questionnaire containing 33 items and four factors: priorities and goals, mechanics, organisation preference, and the perceived 'control of time' (Macan et al., 1990). The second was the 5-factor time-structure questionnaire, a multidimensional self-reporting questionnaire focusing on time structuring and time management (Francis-Smythe & Robertson, 1998). The third was the 3-factor time-management questionnaire containing 35-item questions relating to tools, planning (short and long-range) and attitudes (Britton & Tesser, 1991). The third questionnaire uses a 5-point Likert scale to score responses: never (one), infrequently (two), sometimes (three), frequently (four) and always (five) (Robinson,

2014). The higher a questionnaire's scores, the greater the time-management practices of the surveyed students.

A critical strength of past research was the success of the time management questionnaire as a data collection tool for large sample-sized groups due to its ability to provide accurate feedback (Alay & Koçak, 2002). A limitation of the questionnaire is its reliability in small sample sizes. A weakness of these studies can be that the length and quality of the time-management training programs are often not measured (Gafarian, 1999). The age, maturity level and gender of study participants could have created limitations such as self-reporting biases and inconsistencies.

Notwithstanding these limitations, the review identified the time management questionnaire as an appropriate model to measure students' time-management skills. It had the highest self-reporting accuracy, completion and comprehension rates among sample groups and provided accurate data reporting. Furthermore, using the questionnaire enabled researchers to measure the level of time-management ability and awareness that Academy students believed they applied and practiced.

Method

Research design

The Department of Defence Veterans Affairs granted ethical approval of this study, namely, the Human Research Ethics Committee (DDVA HREC), *Protocol Number 140-19*. Two sample groups of 70 first-year undergraduate students commencing Semester One of 2019 participated in the detailed research evaluation. The experimental group received five one-hour time-management training, whereas the control group did not. The research recorded each student's Australian Tertiary Admission Ranking (ATAR) score (i.e., Year 11 & 12 results) to estimate and account for prior academic performance and ability when determining impacts on their Semester One 2019 university-weighted average mark. Figure 4 displays the evaluation design for both groups.

The five one-hour workshops were presented in five different categories, namely, long term planning, short term planning, time attitudes, the art of networking at the Academy, and chunking combined with exam study information. Four of the time-management lessons were conducted in March 2019, over four weeks. However, the fifth lesson relating to chunking combined with exam study information was undertaken not until late May 2019. The delay was to provide students with new, positive, and motivating information relating to exam study as close as possible to the trainee's exams in June 2019 (Martin, 2010).

Numerous possible impacts were considered when preparing the time management presentations. Upon exposure to the time management workshops, the experimental cohort group would receive additional support, including the involvement of senior staff that would likely positively impact the students' studies. Students as a cohort had recently completed a month-long, demanding, and challenging military training program where they developed their teamwork and accountability. Attendance was therefore excellent despite the time management workshops being optional. If a student were absent from the workshops, the missed lesson would be provided to the student separately.

Gender differences were considered likely in this training as military academies can be androcentric, and there are different development times of adolescent brains (Wilson, Tranter & Devereux, 2015). As such, gender was recorded, and the training provided equally to all genders.

Hypothesis

The formal hypothesis is that the experimental group (who receive the workshop training) will have improved academic results. Therefore, academic results are the dependent variable (DV), while the independent variables (IVs) are training in long-term planning ability, short-term planning ability, and time attitudes. The evaluation design is illustrated in Figures 4 and 5. Statistical significance and statistical hypothesis testing underpin or reinforce qualitative observation by the instructors, academics, and student supervisors.

Curriculum

The workshops topics included two lessons in long-term planning (linked in with successful academic networking), one lesson in short-term planning, and two-time attitude lessons (tied in with chunking and exam time management). The lessons were derived from the first author's research online into academic success through improved study habits, namely, students improving their time management skills. Additionally, the author interviewed and requested feedback from academic and military staff at the Academy. However, the most notable influence on the presentations was the first author's observations of the students within several locations, namely university, the accommodation buildings, and military training.

The author was motivated by frustration in what he witnessed as poor time-management behaviours allowed by adolescent minds (Wilson et al., 2015). The students were engaged in the presentation via the use of an auditorium, providing minimal distractions. The students viewed PowerPoint presentations on time management. Namely, each presentation was targeted at one of the five discussed areas to improve time management and study. The author spoke during the lessons, actively engaged with the students and provided the students with positive and encouraging verbal statements and information.

Most notable with first-year trainees is the unsettled nature of the students (March 2019), as they have been intensively directed by staff while being physically and mentally challenged for four weeks during induction (February 2019), and they are missing their families. The quicker the students readjust and transition into their studies, provides more opportunity to enhance their academic and later military performance. Therefore, a common theme was agreed upon and presented to the students that, 'you could not be in a better place, at a better time or be with better people.' The staff and senior students would stand up and look around at the students in a friendly manner whenever this was stated during the presentation, thus, providing students with a sense of acceptance and belief that their decision to join the military was the right choice.

The experimental group was instructed not to communicate time management workshop information to the control group. The two groups were from different squadrons at the Academy. A degree of inter squadron rivalry existed that has helped maintain delineation of the intervention between the groups. The measurement tool for the independent variables was the time management questionnaire that was overviewed earlier and delivered after completing Semester One, 2019 (Britton & Tesser, 1991).

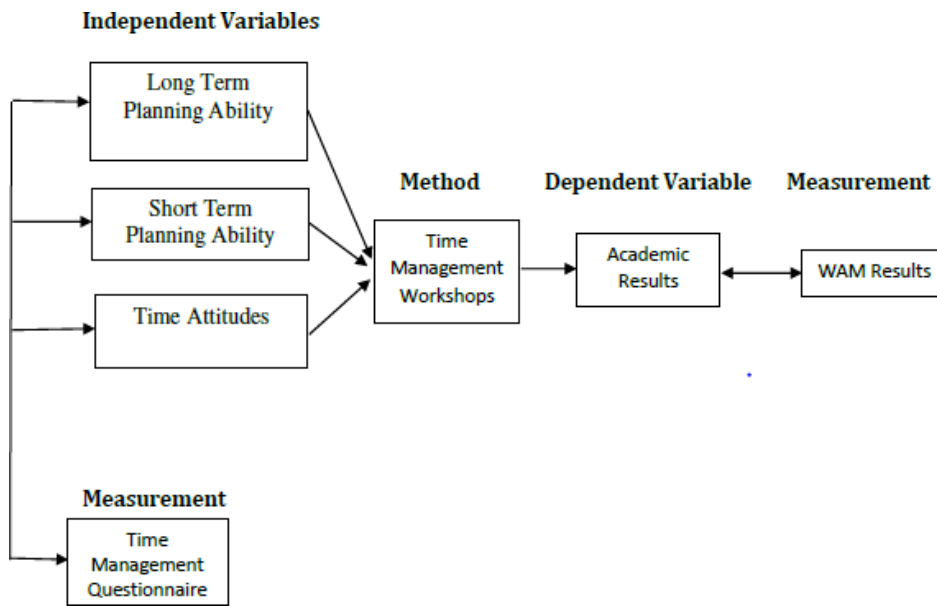


Figure 4:
Evaluation design: Experimental group

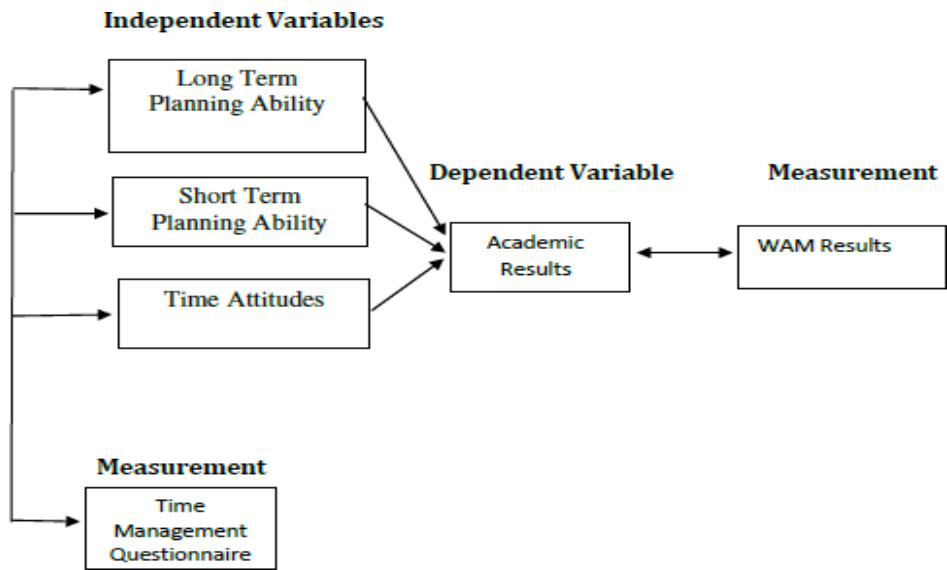


Figure 5:
Evaluation design: Control group

The experimental and control groups were in different locations (theatres) on the same day at the Academy while completing their questionnaires: all 140 questionnaires were returned. The Semester One 2019 academic results of both groups were compared, and the questionnaire and Year 12 admission rankings were investigated. The relationships between time-management skills and the academic outcomes of both groups were analysed, and the differences were reported. The academic results (weighted-average marks) from both groups were compiled in October 2019.

Findings

A one-way analysis of variance (ANOVA) identified differences between each group's Year 11 and 12 academic performances (Table 1). The control group had a slightly higher prior performance than the experimental group. However, it was not statistically significant ($p = 0.344$) and thus not an impediment to the experiment (Wilson, 2019). Results are presented first for time-management awareness and attitude, then for effect on academic success overall, the effect on success controlled for prior ability, and finally gender differences in effect.

Table 1.
Analysis of variance for ATARs

Cases	Sum of Squares	DF	Mean Square	F	P	N2
Experimental (1)	21.607	1.000	21.607	0.901	0.344	0.006
Control (2)						
Residual	3310.814	138.00	23.991			

Post Hoc Tests		Post Hoc Comparisons - Experimental (1) Control (2)			
		Mean Difference	SE	t	P <u>tukey</u>
1	2	-0.786	0.828	-0.949	0.344

Descriptive - ATARS			
	Mean	SD	N
1 Experimental	82.171	5.139	70
2 Control	2.957	4.645	70

Effect on time-management awareness and attitudes

The experimental group scored the highest in 14 out of the 18 time-management questions (Table 2), indicating that the time-management workshop training positively affected the acquired understanding (awareness) of the groups' ability to manage time, which confirmed supervisory observation of improved awareness. Responses to five of these questions were statistically significant (Q2-5 & Q7-8 all with 5 per cent confidence: p-value of less than 0.05, Table 2), particularly short-term planning, where the workshops and semester of implementation had resonated with students. An aggregate of the short-term planning questions clearly showed the significance of the experiment in this dimension ($p = 0.016$). This significance was based on a multiple linear regression calculated to predict students' aggregate short-term planning responses based on experimental or control group, students' ATAR and the demographic information of students' gender, military service (i.e., Army, Navy or Air Force), and degree type. There was a significant regression equation found ($F(1, 138) = 5.9804$, $p = 0.0157$), with R^2 of 0.0415. Experimental-control grouping was the only significant predictor ($p = 0.016$). As the questionnaire was administered at the end of the semester and the time-management workshops were at the start, the effect on students' time-management attitudes was surprisingly sustained.

Table 2.
Time-management questionnaire

Short Term Planning	t	df	p	Cohen's d
Q1 List Each Day	0.077	138.00	0.939	0.013
Q2 Schedule Activities	2.034	138.00	0.044	0.344
Q3 Plan Day Prior	2.000	138.00	0.047	0.338
Q4 Daily Goals	3.314	138.00	0.001	0.560
Q5 Weekly Goals	2.265	138.00	0.025*	0.383
Q6 Spend Time Planning	1.000	138.00	0.319	0.169
Q7 Set/Honour Priorities	1.041	138.00	.0299	0.176
Time Attitudes				
Q8 Continue Negative Acts	-2.050	138.00	0.042	-0.347
Q9 Room to Improve Time-Management Skills	0.418	138.00	0.677	0.071
Q10 Time with Others/Can't Say No	1.070	138.00	0.286	0.181
Q11 In Charge of Own Time	1.610	138.00	0.110*	0.272
Q12 Majority of Time Negative Actions	0.637	138.00	0.525	0.108
Q13 Make Use of Time	0.241	138.00	0.810	0.041
Long Term Planning				
Q14 Leave Tasks Until the Last Minute	1.238	138.00	0.218	0.209
Q15 Goals for The Next Three Months	0.576	138.00	0.565	0.097
Q16 Study Area Tidy	-0.507	138.00	0.613	-0.086
Q17 Task Prioritisation	-0.710	138.00	0.479	-0.120
Q18 Review Study Notes	0.679	138.00	0.498	0.115

Effect on academic success overall

Table 3 reports on the effects for the average academic achievement of both groups, where the experimental groups' academic results were significantly higher than the control groups ($p = 0.024$).

Table 3.

Analysis of variance: Average mark for Semester 1, 2019

Cases	Sum of Squares	DF	Mean Square	F	P	N2
Experimental (1)	362.694	1.000	362.694	5.202	0.024	0.036
Control (2)						
Residual	9622.348	138.00	69.727			
Post Hoc Tests						
Post Hoc Comparisons - Experimental (1) Control (2)						
Mean Difference	SE	t	P tukey			
1 2	3.219	1.411	2.281	0.024		
Descriptive - Average Mark For Semester 1, 2019						
Experimental 1	Control 2	Mean	SD	N		
1 Experimental		66.111	6.802	70		
2 Control		62.892	9.653	70		

Effect on academic success when controlling for prior academic ability

The positive effect of the time-management intervention on students' average achievement was not the primary factor among students' ability and demographics when using multivariate linear regression because students' prior ability (i.e., ATAR) is still the most significant factor. A multiple linear regression was calculated to predict students' average subject grade based on experimental or control group, students' ATAR and the demographic information of students' gender, military service (i.e., Army, Navy or Air Force), and degree type. A significant regression equation was found ($F(5, 134) = 5.267$, $p < 0.000$), with R^2 of 0.1643. ATAR ($p = 0.001$) and square of ATAR ($p = 0.001$) were significant predictors and the interaction between gender and experimental grouping ($p = 0.054$) was a likely significant predictor.

In a similar check on the factors that might influence students in their' number of failed subjects, the experiment grouping was the most significant predictor ($p = 0.002$), as clearly shown in Figure 2. Although, the experimental grouping was still not the greatest effect in this regression with the interaction between students' prior ability (i.e., ATARs) and the control-experiment being marginally higher (absolute coefficient 0.138 c.f. 0.119, $p = 0.045$). This second significant regression equation ($F(2, 136) = 7.603$, $p = 0.0001$) had an R^2 of 0.1436 and only the two significant

predictors discussed. Investigation of the interaction between students' prior ability and the experimental grouping on students' number of failed subjects showed that the experimental intervention helped those with the lowest prior achievement not fail subjects to the same extent as the control group. The size of the predictive effect is shown in Figure 5, noting the lines indicate the coefficient sizes for probabilistic modelling using significant aspects of a multivariate linear regression (i.e., do not read this too literally).

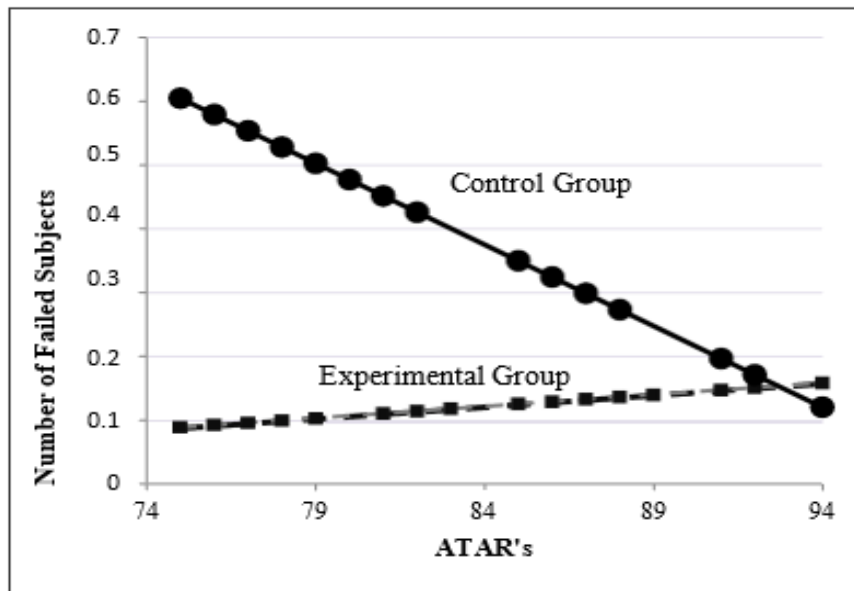


Figure 5.
Marginal means plot of predictive interaction

Gender differences

In checking for other demographic influences on students' average achievement, the interaction between gender and experimental grouping was a likely significant predictor. This interaction was investigated, and it showed males in the experimental groups achieved significantly better than males in the control group ($p = 0.0028$) and likely significantly better than females in the experimental group ($p = 0.072$). The individual comparison tests of the interaction between gender and the control-experimental grouping found the experimental male data 'not normal' (Shapiro-Wilk, $p = 0.0189$) and variances unequal (Levene's test, $p = 0.0434$), such that two-sample Wilcoxon rank-sum test confirmed significant difference of experimental males ($M = 66.97$, $SD = 7.04$, $n_1 = 50$) higher than control males ($M = 62.01$, $SD = 9.28$, $n_2 = 53$) with $t = 3.07$ and $p = 0.0028$; likely significant difference of experimental males higher than experimental females ($M = 63.96$, $SD = 5.77$, $n_3 = 20$) with $t = 1.85$ and $p = 0.072$. Note that control females had $M = 65.65$, $SD = 10.55$, and $n_4 = 17$, and all other permutations were not significantly different.

Females in the experimental group achieved marginally worse than females in the control group (subject average 65.65 percentage c.f. 63.96 percentage). However, this was not statistically significantly different. Other metrics like 'the number of failed' subjects and the questionnaire scales for time management planning and attitude showed no gender differences, such that females

benefitted equally on these measures. A check for gender differences in prior academic achievement (ATARs) found no significant differences. In this check both male and female ATARs were not normally distributed (Shapiro Wilks) but not of unequal variance (Levene's test, $p = 0.401$), such that the comparison used the Mann-Whitney test and found no significant difference (male ATARs, $Md = 82$, $n_1 = 103$; female ATARs, $Md = 85$, $n_2 = 37$; $W = 2781$ adjusted for ties, $p = 0.4131$).

Discussion

The discussion begins with curriculum and methodology aspects, then covers the academic success aspects before moving to the health and financial ramifications. While this research preceded Covid-19, the discussion ends with a short overview of how the effect of pandemic restrictions might be managed for time-management training.

Curriculum and method

The research has reinforced the curriculum used (Wilson, 2019) and contributed to research on the utility of the time-management questionnaire (Britton & Tesser, 1991). Further, the research has, 30 years later, reinforced the efficacy of Britton and Glynn's (1989) research approach for time-management intervention. A point of discussion is how transferrable the curriculum and research would be to other university transition contexts and other Defence and employment training contexts. The findings suggest that time-management training needs to be understood as a series of practices and tools that can be mobilised, particularly in transition into employment training or education after high school, however, also through life. The delivery of this training is a personal and organisational capability that needs understanding and refining as contexts and tasks change over time. Our research suggests that we need to abandon the simplistic instrumental view that asks, 'what individual activities can occur at a single unit or establishment that will affect the time management abilities of staff?'. Instead, the issue of how to nurture and support the knowledge contained in standardised time-management packages may need to address how time-management capability can be taught, developed, and improved through a reflective and continual monitoring of one's time-management knowledge. That is a training continuum with broad applicability.

In tailoring time management workshops to other university or employment contexts, it is worth reinforcing that the Work Skills Development framework (Willison, 2018) and its application contributed to Work Integrated Learning pedagogy. This framework has specific applicability to tertiary academia and scholars' influence in promoting student attitudes to bridge the gap between high schools and tertiary institutions requirements (Bandaranaike, 2018). The Work Skills Development framework can mainly be used to ensure the time management workshops emphasise study skills and student autonomy. Similarly, the Research Skills Development framework can assist in two aspects. First, it can help articulate how educators best facilitate student knowledge through vigorous investigation in techniques, growing skills in erudition, learnedness and rigour. Second, it can assist in structuring students' time management presentations with sufficient autonomy (Willison, 2018).

Academic impact

This research reveals time-management training is a positive and significant influence on improving academic achievement for males and reducing the number of failed subjects for all

students, particularly students with lower prior academic achievement. This outcome suggests that males and those with lower ATARs likely have poorer or reduced time-management planning and attitudes than females or students with higher ATARs, and importantly, those skills can be readily addressed.

The fact that the academic results of females in the experimental groups were not significantly affected by the workshops possibly reflects transitioning female university students manage their time better than males, as reported by Dalziel and Peat (1998). The workshops may have only confirmed information already known and practised to a greater extent among the female experimental group.

Financial implications

In calculating the costs incurred by Australian Defence through failed subjects, a model average of ten failed subjects per Academy division was used for first-year students. On average, between 10-30 subjects are failed per semester out of 45 students (one division) studying four subjects each, giving 180 subjects. The costs of the failed subjects in second, third and fourth-year university students were also calculated (failure rates are generally lower as the student progresses through the years, as indicated in Table 4).

Additionally, over the past five years at the Academy, an average of five students per year repeat an academic year. Each student salary is around \$50,000 per annum (PA), not including employer disbursements of \$10,000 PA of subsidised meals, \$2,000 PA of subsidised utilities (gas/electricity), and \$43,200 PA in university fees. The total cost of a student repeating a year is \$105,200, or for five students repeating is \$526,000.

Table 4:
Indicative academy subject failure costs

Liabilities	Number of Subjects	of Failed	Semester 1	Semester 2	No. of Divisional Years	Total
1 st Year Students	10 (\$5,400 per Subject)	per	\$54,000	\$54,000	8	\$864,000
2 nd Year Students	6 (\$5,400 per Subject)	per	\$32,400	\$32,400	8	\$512,000
3 rd Year Students	4 (\$5,400 per Subject)	per	\$21,600	\$21,600	8	\$345,600
4 th Year Students	3 (\$5,400 per Subject)	per	\$16,200	\$16,200	1	\$32,400
Repeating a Year	8 Subjects = 48 Units		\$50,000	\$10,000	\$2,000	\$526,000
5 Students Avg Per Year	Times \$900 per UOC = \$43,200 per Student		Wage	Food	Utilities	
Total						\$2,280,400

Cost of Students Failing One Subject = 6 UOC

1 UOC – Unit of Credit Costs Between \$780-\$1,180 (Arts-Business-Science-Engineering) 6 UOC x \$900
(mean AVG) = \$5,400 per Subject

Over the next decade, inflation and rising costs will result in \$2,280,400 PA over the next ten years, and ADFA/UNSW will lose more than \$25,000,000 in failed subjects.

The total failure costs of \$2,280,400 PA in Table 4 would be significantly reduced by implementing time-management workshops at the Academy. It is important to note that the cost calculations in this table are dwarfed compared to the external and ongoing support costs that occur when students fail subjects or have to repeat an academic year. For example, the evaluation does not account for the loss in capability at Defence units around Australia that require officers who are held indefinitely at the Academy until they pass. In addition, the cost calculations do not account for the additional medical staff necessary to treat trainee officers with the mental depression, confidence, anxiety and stress problems that relate to academic failure (Balduf & Megan, 2009; Kaya et al., 2012; Kearns & Gardiner, 2007; Hamaideh & Shaher, 2011; Misra & McKean, 2000).

Health and vocational benefits

Department of Defence Veterans Affairs (2014) suggests that achieving a balance between exercise, sleep, and diet decreases illness (Murphy et al., 2018; O’Connell, 2014; Piro et al., 2018), such that time management can affect physical health (Ranjita & McKean, 2000). Evidence from previous studies also indicates substantial differences in students’ time-management behaviours in different university year levels (Razali et al., 2018). Moreover, poor time-management practices have been reported as a significant source of stress and poor academic performance (Balduf, 2009).

Improving the time-management skills of military personnel improves Defence Force capability. The requirement for military personnel to measure and manage their time more effectively is increasing; ultimately, what gets measured gets managed (Wallentin et al., 2007). Hence, when people practice excellent time-management skills, higher standards are achieved (Dalziel & Peat, 1998).

We are in the *Synthetical Age* or sometimes referred to as the Fourth Industrial/Digital Revolution (Preston, 2019; Roy et al., 2020). To function at an adequate level within the workplace, digital natives born between 1995-2008 (Gen Z) will likely require the assistance of a digital twin (a computer-based version of themselves) to manage their time optimally (Atkinson, 2012a; Schawbel, 2013). The digital twin will operate in an autonomous loop in digital reality, assisting with predicting outcomes, managing tasks and utilising numerous strategies to gather, analyse and store data. Digital twins will mirror their human twins (Bongomin, 2020). Furthering the digital revolution, these digital natives (Gen Z) will likely produce far more digital currency than prior generations. As such, the necessity for time-management skills is likely to increase. Also, the workshops will need to evolve to inform, engage, and encourage these skills in students and students’ digital twins.

Pandemic type scenarios

The research reported occurred before COVID-19. Pandemics, such as COVID-19, likely impact

the professional delivery of time management workshops and further challenge the academic success of university students. A framework of factors to assess the criticality of skills training during pandemic restrictions are pedagogy, worth, parity, well-being, tractability, leadership, and finances (Kinash et al., 2021; Parsell, 2021). These factors would help decide whether to continue time-management workshops and how they might further equip students to cope with more flexible learning during a pandemic situation.

During such a pandemic scenario, the time management research would likely be delivered online. As such, 'education can be a force for connecting people who, after months of social isolation and physical distancing, may recognise more than ever the value of supportive networks and solidarity among members of society' (Boeren et al., 2020). Similarly, while the military and university provide diverse training and knowledge models, they both serve a duality for togetherness and team promotion. Trainees are generally accommodated, messed and educated together, even in lockdown. Through this kinship, trainees are collectively more likely to succeed as a whole (Labaree, 2008) despite pandemic restrictions. That said, the interaction and shared experience of large face-to-face workshops on time management was such a positive influence in 2019, this face-to-face pedagogy should be preserved whenever pandemic restrictions allow.

Conclusion

This research is an original contribution of knowledge towards time-management effectiveness in a dual military and academic context. It reinforces many listed international studies' finding time-management skills critical to the success of university transition. It extends significantly on these listed previous studies by showing the efficacy of a comparatively short training treatment.

The evaluation question, 'If students attend time-management workshops, will they score higher in their academic results than those who do not attend the time-management workshops?' was answered by the research findings. Students who attended workshops scored higher than those who did not participate, failed fewer subjects, and rated better short-term planning. The time management workshops aided students of lesser prior academic performance more than those of better prior performance, and as such, was an inclusive measure. Male students benefitted more from the workshops; however, that may be a factor of lower maturity in these skills than female students and requires further research.

The research demonstration hoped to improve the organisational understanding of the importance of time management, first at the Academy, then more widely in the Defence Force and into other universities and training providers. It supports the implementation of time-management training within the broader Defence Force. Combined with the many international studies listed, it confirms the efficacy of providing first-year university students comparatively short training treatments, especially within settings where universities and student employers cooperate.

The evaluation provides strong evidence to support the longer-term benefits of time-management workshops at the Academy to reduce the Academy's costs and permit students to commence their career progression as soon as possible. Implementing time-management tools early in a military student's career will also likely contribute to better workforce outcomes for Australian Defence and Australia's overall future Defence capabilities. Notably, military leaders must also be excellent managers of time (Kotter 2000), and the provision of these workshops begins that ideal training continuum. In the current economic climate, with the impacts of a pandemic and the uncertainty in which the World can spiral, Defence forces must be vigilant and disciplined in their financial

conduct. 'It does not do to leave a dragon out of your calculations if you live near him' (J.R.R. Tolkien, 1937).

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