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Brooke, Tess; Brown, Makaela; Orr, Rob Marc; Gough, Suzanne

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Stress and Burnout in Postgraduate Physiotherapy Students: A Mixed Methods Observational Cohort Study

Tess Brooke

Bond University

Makaela Brown

Bond University

Robin Orr

Bond University

Suzanne Gough (✉ sgough@bond.edu.au)

Faculty of Health Sciences and Medicine, Bond University, 2 Promethean Way, Robina, Gold Coast, QLD 4226, Australia <https://orcid.org/0000-0002-1320-3558>

Research article

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Abstract

Background and Purpose: The impact of stress and burnout in students is an emerging topic. When students perceive that they are unable to cope with stressors, there is increased potential for burnout. To maximise students' higher educational institution (HEI) outcomes, students must be able to effectively cope with stressful demands. Research suggests physiotherapy students, in particular, suffer from a high risk of stress and burnout, however limited research exists on postgraduate, pre-registration, physiotherapy students. The purpose of this study was to determine perceived stress, burnout and associated coping strategies across three time points in the first year of a post-graduate, pre-registration physiotherapy program.

Subjects: All first year Doctor of Physiotherapy (DPHTY) students at Bond University 2019 were invited to participate.

Methods: A mixed methods observational cohort design was implemented in one Australian HEI to determine stress, burnout and coping strategies across 3 time points. The 51-item self-administered questionnaire consisted of demographics, the Coping Self Efficacy (CSE) Scale and Maslach Burnout Inventory – General Survey for Students (MBI-GS (S)), and open-ended questions.

Results: A response rate of 62% (n=38) was achieved. There were no differences in stress and burnout scores between sexes, nor differences in stress and burnout over time. Highest median CSE scores were seen at T1, with highest median MBI-GS (S) cynicism (CYN) scores at T2, exhaustion (EX) at T1 and T2, and professional efficacy (PE) at T1 and T2. The greatest mean CSE changes were seen from T1-T2 and T1-T3, and PE greatest changes from T2-T3 and T1-T3. No strong correlation was found between stress and burnout. Curriculum coursework was a frequently reported stressor, along with clinical placement and transition periods. Coping strategies utilized by students were both positive and maladaptive. Positive strategies included sporting activities, baking, listening to music, and social connections, whereas maladaptive strategies included alcohol consumption, excessive eating and gaming.

Conclusion: Student consistently identified periods of stress and burnout, with curriculum coursework in particular being a trigger. Findings acknowledge the need for further investigation on sources of perceived stress, burnout and coping mechanisms to optimise student welfare and enhance HEI outcomes.

Background

Stress is defined as the dynamic interaction encompassing the physical, emotional, and psychological responses between the individual and their environment²⁵. Not only is stress influenced by higher educational demands within physiotherapy programs, but stress is also affected by other external factors including relationships, relocation, and financial pressures²³. Previous studies^{2,13,23} of both undergraduate and postgraduate physiotherapy students have reported that the leading cause of stress in pre-registration physiotherapy students is academic stress, followed by social related stressors (e.g. spending time on extra-curricular activities, or time with friends and family).

When physiotherapy students perceive that they are unable to cope with stressful demands, the impacts of the stressors may manifest as burnout²⁵. Burnout is considered to be a multifaceted behavioural syndrome often leading to negative responses for an individual when exposed for a prolonged period of time²⁶. Burnout can affect an individual's physiological and psychopathological system causing anxiety, depression, interpersonal sensitivity, alcoholism, and other addictive disorders²⁶. Previous research by Balogun et al.⁵ found that emotional exhaustion and depersonalization scores in physiotherapy students were higher than reports for normative data within the majority of service professionals. Noting this potential risk of burnout in pre-registration physiotherapy programs, identifying whether students are capable of implementing coping strategies is of importance.

Individuals have differing perceptions of stress and as a consequence utilize different coping strategies²⁷. Coping strategies can be defined as the ability to adapt in response to a range of events that are perceived as stressful²⁸. A study by Kohn, et al. ²⁸ suggests that three general strategies exist in an attempt to cope with situations that are stressful; 1) problem-focused coping, which aims to remedy the threatening situation; 2) emotion-focused coping, which aims to manage the response; and 3) avoidance-focused coping, which involves attempts to remove the threatening situation. While differences exist between coping perceptions over time, along with an increased ability to positively respond to stressful situations,³ Pierceall et al. ²⁹ suggest the following as commonly successful coping mechanisms: talking to family and friends, leisure activities, and exercising. However, despite implementation of positive coping strategies, maladaptive coping strategies commonly arise, including alcohol abuse, drug abuse and smoking.

In the last decade, studies conducted globally have explored the relationship between physiotherapy coursework and perceptions of student stress and burnout²⁻²⁴. Current research identifies challenges and imposing demands placed on physiotherapy students and the subsequent impacts both psychologically and emotionally that these demands have^{2,3,6}. The impact of stress and burnout in physiotherapy students across the first year of study, in particular, is of concern. It has been shown that the ability to cope with stress is an important factor affecting a student's success in an academic program³. Stress and burnout can furthermore affect students emotional wellbeing and can result in psychological morbidity. One study reported that among undergraduate physiotherapy students, the frequency of depression, anxiety and stress was 48%, 69% and 53% respectively²².

Noting these concerns, there are differences in the structure of physiotherapy programs with some programs being conducted in an intensive fashion. For example, the Doctor of Physiotherapy (DPHTY) program at Bond University in Australia, a post-graduate pre-registration physiotherapy program, comprises six semesters over two years (three trimesters per year), totaling 18 subjects and over 1200 clinical placement hours (50% of the program)¹. How first year physiotherapy students in an intensive, post-graduate, course perceive, and experience stress and their coping strategies may differ from those completing the degree over several years and / or completing their first degree. The aims of this study were to identify the complexity of factors that influence first year Doctor of Physiotherapy (DPHTY) students' perceptions of stress, burnout and coping strategies with the intent of answering three research questions being: 1) Was there a difference in perceived stress and burnout over time?; 2) Did sex influence the amount of stress and burnout experienced?; and 3) What were the coping mechanisms utilized by pre-registration DPHTY students?

Methods

Design

An observational cohort study design was used. The questionnaire was designed to establish students' perceptions of stress, burnout and coping strategies across three time points being 1) At the beginning of the program, 2) At the end of their first semester of coursework and 3) At the end of the first two placement blocks, 5 weeks respectively (cardiorespiratory and orthopaedics). The quantitative and qualitative components collectively addressed the three research questions.

Subjects

All 61 students in their first year of a post-graduate pre-registration, insensitive DPHTY program conducted in Australia in 2019 were invited to participate. None of the DPHTY cohort were excluded from the study. Students were invited to

participate 1-week prior to the first time point and further invited to participate in the data collection at each successive time point, irrespective of participation in previous time points.

Instrumentation

A self-reported 51-item mixed methods questionnaire was designed, consisting of demographic questions, two validated questionnaires, the Coping Self-Efficacy Scale (CSE) and the Maslach Burnout Inventory-General Survey for Students (MBI-GS (S)), as well as open-ended questions. The CSE is a valid and reliable tool with a reported intra-class correlation coefficient of $p < 0.001$ and criterion validity of $p < 0.001$ ³¹. The CSE scale was incorporated to measure an individual's perceived ability to cope effectively with life challenges, and to assess changes in CSE scores³³. The MBI-GS has also been proven to be a reliable and valid tool. There are no current reports on psychometric properties in the student version MBI-GS (S) hence the use of the general version MBI-GS reliability and validity scores³². The MBI-GS (S) was adapted and selected for inclusion in the questionnaire as it is recognized as the leading measure of burnout in students at college and university³⁴. Additionally, open-ended questions allowed for qualitative responses to be gathered on; periods of stress encountered in the current semester, coping strategies that have been successful or unsuccessful during the current semester, further information not covered in previous questions, and three things the students wish they had known before starting the current semester and why. It was anticipated that the questionnaire would be completed within 15–20 minutes.

Data analysis

Descriptive statistics were used to summarise and present quantitative data. All quantitative data were assessed for normality using the Shapiro-Wilk test. Where a lack of normal distribution was found medians and ranges were reported [Table 1]. A Fisher's Exact test was conducted to assess the significance of each variable, with a significance level of $p < 0.05$ [Table 1]. A paired samples t-test was completed to compare the mean total scores of stress and burnout at opposing time points (T1vT2, T2vT3, T1vT3) [Table 2]. A Mann Whitney U test was conducted to assess significance, with a p-value of ≤ 0.017 that accounts for multiplicity (0.05/3) [Table 2]. A Pearson Correlation was then conducted to determine the relationship between stress and burnout across all time points [Table 3]. Qualitative responses were subjected to a 5-step thematic analysis approach³⁰ with global themes and subthemes being identified and a priori themes integrated [Table 4].

Table 1

Demographic information and descriptive data for student scores, CSE scale, MBI-GS (S) in relation to gender

Characteristic	Total (n = 38)	Females (n = 22)	Males (n = 16)	p-value
Age (years), median (range)	24.0 (20.0–38.0)	23.0 (20.0–38.0)	26.5 (21.0–36.0)	0.012
Qualification, n (%)	33.0 (86.8%)	18.0 (81.8%)	15.0 (93.8%)	0.370
Bachelor	5.0 (13.2%)	4.0 (18.2%)	1.0 (6.3%)	
Masters				
T1 CSE	170.0 (79.0-254.0)	157.0 (79.0-220.0)	171.5 (97.0-254.0)	0.256
T2 CSE	165.5 (88.0-258.0)	159.0 (88.0-254.0)	177.5 (128.0-258.0)	0.185
T3 CSE	162.5 (95.0-260)	155.0(95.0-222.0)	167.0 (125.0-260.0)	0.370
T1 MBI CYN	1.0 (0.0–4.0)	1.0 (0.0–4.0)	1.0 (0.0–4.0)	0.193
T2 MBI CYN	2.0 (0.0–4.0)	1.0 (0.0–3.0)	2.0 (0.0–4.0)	0.185
T3 MBI CYN	1.0 (0.0–6.0)	1.0 (0.0–5.0)	1.0 (0.0–6.0)	0.955
T1 MBI EX	4.0 (1.0–5.0)	4.0 (0.0–5.0)	3.5 (0.0–5.0)	0.427
T2 MBI EX	4.0 (0.0–6.)	4.0 (1.0–6.0)	4.5 (0.0–6.0)	0.950
T3 MBI EX	3.5 (0.0–6.0)	4.0 (0.0–5.0)	3.0 (0.0–6.0)	0.392
T1 MBI PE	5.0 (2.0–6.0)	5.0 (2.0–6.0)	5.0 (4.0–6.0)	0.581
T2 MBI PE	5.0 (0.0–6.0)	5.0 (3.0–6.0)	5.0 (0.0–6.0)	0.415
T3 MBI PE	4.0 (0.0–6.0)	4.0 (0.0–6.0)	4.0 (0.0–6.0)	0.955
<i>Key: CSE, Coping Self Efficacy Scale; MBI-GS (S), Maslach Burnout Inventory – General Survey (Students); T1, time point 1 start of course; T2, time point 2 prior to clinical placement; T3, time point 3 immediately post placement; CYN, Cynicism subscale; EXH, Exhaustion subscale; PE, Professional Efficacy subscale. Note: significance: p-value ≤ 0.05</i>				

Table 2
Paired Samples t-test for CSE Total scores and MBI-GS (S) scores

Outcome measure	Total/Subscale (Time point)	Mean difference	(95% CI)	Paired diff. p-value
CSE	CSE – Total (T1–T2)	-9.2	(-27.9, 9.5)	0.318
CSE	CSE – Total (T2-T3)	0.6	(-11.9, 13.2)	0.914
CSE	CSE – Total (T1-T3)	-8.8	(-27.5, 9.9)	0.330
MBI-GS (S)	CYN T1-T2	-0.5	(-1.1, 0.2)	0.135
MBI-GS (S)	CYN T2-T3	0.7	(-0.0, 1.3)	0.055
MBI-GS (S)	CYN T1-T3	- .02	(-1.0, 0.6)	0.628
MBI-GS (S)	EXH T1-T2	-0.2	(-1.0, 0.6)	0.565
MBI-GS (S)	EXH T2-T3	1.1	(0.1, 2.1)	0.040
MBI-GS (S)	EXH T1-T3	-0.2	(-1.1, 0.8)	0.682
MBI-GS (S)	PE T1-T2	1.3	(-2.5, 5.2)	0.482
MBI-GS (S)	PE T2-T3	4.7	(-1.5, 10.8)	0.128
MBI-GS (S)	PE T1-T3	3.1	(-1.8, 8.0)	0.194

Key: CSE, Coping Self Efficacy Scale; MBI-GS (S), Maslach Burnout Inventory – General Survey (Students); T1, time point 1 start of course; T2, time point 2 prior to clinical placement; T3, time point 3 immediately post placement; CYN, Cynicism subscale; EXH, Exhaustion subscale; PE, Professional Efficacy subscale. Note: significance p-value ≤ 0.017 (accounted for multiplicity 0.05/3). Negative mean differences indicate smaller scores at the corresponding time point.

Table 3

Pearson Correlation for Stress and Burnout over time points (as measured by CSE and MBI-GS (S))

	CSES Total T1	CSES Total T2	CSES Total T3	CYN AVG T1	CYN AVG T2	CYN AVG T3	EX AVG T1	EX AVG T2	EX AVG T3	PE AVG T1	PE AVG T2	PE AVG T3
CSES Total T1	1											
CSES Total T2	.462	1										
CSES Total T3	.639	.849*	1									
CYN AVG T1	-.342	-.175	-.365	1								
CYN AVG T2	.037	-.106	.224	.245	1							
CYN AVG T3	-.032	-.271	-.367	.570	.373	1						
EX AVG T1	-.395	-.608	-.559	.485	.098	.407	1					
EX AVH T2	-.161	-.502	-.347	.031	.452	.324	.269	1				
EX AVG T3	.053	-.076	-.544	.127	.071	.636	.206	.347	1			
PE AVG T1	.739	.196	.245	-.478	-.114	-.357	-.488	-.190	-.014	1		
PE AVG T2	.021	-.072	-.110	-.085	.147	.252	.149	.155	.129	.126	1	
PE AVG T3	.390	.253	.319	-.293	.047	.280	-.242	.317	.630	.017	.188	1
<p><i>Key: CSE, Coping Self Efficacy Scale; MBI-GS (S), Maslach Burnout Inventory – General Survey (Students); T1, time point 1 start of course; T2, time point 2 prior to clinical placement; T3, time point 3 immediately post placement; CYN, Cynicism subscale; EXH, Exhaustion subscale; PE, Professional Efficacy subscale; AVG, average. * significant at $p < 0.05$</i></p>												

Table 4: Thematic Analysis

Theme	Subtheme and time point prevalence	Exemplar Quotations
1. Curriculum coursework	1.1 Academic functioning ^a challenges T1, T2	<p>“Workload stress [leads to] feeling pressure/stress regarding amount of work to review and get done.”</p> <p>“I feel there aren’t enough hours in the day. We spend hours in class and then are expected to go home and study/do work. I feel stressed and overwhelmed when I don’t have enough time to go for a run or do something for myself.”</p>
	1.2 Examination stress T1, T2, T3	<p>“During the exam period where we had 3 exams in 3 days which were quite different from each other, week prior to the week of exams, after the exams where we are waiting for results of exams/ assessment.”</p> <p>“Exams were really stressful and overwhelming, I found my mental health deteriorated and I felt so much pressure to do well and know what I how much to study, I broke down a couple of times in the week or two leading up to the written exam.”</p>
2. Clinical placement	2.1 Placement duration T3	<p>“Having the placements before our holiday break was very helpful to solidify our learning. I loved the 10-week block of placements. I feel it will be nicer to have shorter blocks at class and then placements back to back, 10 and 10 is great. It’s a very stressful course.”</p> <p>“I feel it may be useful to have a few days break in between placements to have a good mental/physical break prior to starting the next block.”</p>
	2.2 Placement stress T3	<p>“I felt extremely stress on my first 5 weeks of my clinical placement. My educator hardly gave any immediate feedback and it made me very anxious as to knowing whether I was doing well or not. I got very unwell in my second block of my placement and I was physically/mentally exhausted making it difficult to perform to the best of my abilities.”</p> <p>“Being on placement, coming home and preparing an in-service presentation and reflection - very overloaded at end each time.”</p>
3. Transition periods	3.1 Relocation adjustment T1, T3	<p>“First week of class, it was a big adjustment moving from home and disruption of routine.”</p> <p>“The biggest stressor has been missing family and friends back home at the end of the semester.”</p>
	3.2 Transition to academic life T1	<p>“During the first week of classes it was overwhelming to be back at school again after 2 years, but I adapted quickly.”</p> <p>“During exam periods having back to back exams trying to balance sleep and stress of studying. Initially starting uni at bond.”</p>
	3.3 Transition to placement T3	“Transitioning from placement 1 to 2 over a short period of time was quite stressful mentally and emotionally.”
	3.4 Transition doubt T3	“[I’m] questioning if this is really what I want to do because I haven’t enjoyed much of the course.”
4. Work-life balance	4.1 Lack of time management skills T1, T2	<p>“Constantly thinking about how much I have to get done. Leads to anxiety attacks and poor sleep.”</p> <p>“How little time off I would have. How much university would cut into my social life.”</p>
	4.2 Health impact and wellbeing	“I’ve been burnt out from last semester, which made me ill with the flu and I’ve had lingering flu ever since leaving me extra upset about situations and it has been affecting my relationship and my strong mindset.”

	T1, T2, T3	
5. Coping Behaviours^a	5.1 Study skill social support ^b	“Being with friends from cohort, discussing any uncertainties regarding study or content with friends, calling my family members regularly.”
	T1, T2	“Studying on campus rather than at home. Studying with others at times but also studying on my own at times.”
	5.2 Exercise/recreational activities	“I get up at 5.30am every morning to exercise as I feel this is personal time for me to destress and do something for myself.”
	T1, T2, T3	“I tried to maintain my exercise regime, but I believe it made me even more exhausted after really long days.”
		“Listen to music/podcast (not physio related)”
	5.3 Maladaptive behaviours	“Excessive drinking [alcohol]” “Stress eating to the extreme which has been unsuccessful”
	T1, T2, T3	
	5.4 Mindfulness and positive self-talk ^b	“Trying to have positive thoughts on what I achieved so far and trusting ill get 'through' this”
	T1, T3	“Focus on end goal and the impact I can make in end”
	5.5 Religion/spiritual ^b	“Pray and calm down mind” “Attending church every weekend to reignite my spirit”
	T3	
	5.6 Psychological intervention	“Saw psychologist week 6. Not feeling myself, felt brain couldn't concentrate or process”
	T1, T3	“I visited a psychologist a few times whilst on placement and I believe this helped me to develop some coping strategies”
6. Financial pressures	6.1 Curriculum costs	“The travel to each of my placements was also very stressful as I was unable to afford extra accommodation in [X location] as I rent with my [name] on the [Y location]. It was 2.5 hours each way every day”
	T1, T2, T3	“Main periods of stress have been reassuring myself I can do what I want with this degree, that it's not a waste of time/money and it was the best decision for me”
7. Course survival tips	7.1 Curriculum details	“I wish I knew what a typical day as a Bond University physiotherapy student looked like”
	T1, T2, T3	“The amount of content that was going to be covered in a short period of time” “How much travel I would need to do for clinic”
	7.2 Self-management techniques	“Take time for yourself so you don't burn out. Learn as the semester goes.” “Best strategies for dealing with homesickness. Best way to focus on work is thinking about how close I was to going home. A little more about how working in a hospital really feels.”
	T2, T3	

Key: ^aA priori themes from the Social and Academic Functioning (SAF) Scale, ^bA priori themes from the CSE scale

Results

Of the 61 DPHTY first year students invited to participate in the study, 38 (62%) participated across any of three time points. Of these respondents, 27 (71%) responded at T1, 30 (79%) responded at T2, and 20 (53%) responded at T3. The demographics of the student population are detailed in Table 1.

The median age of female participants was 23 (20–38) and for males was 26.5 (21–36) years, with strong evidence for significance between groups ($p = 0.012$) [Table 1]. The percentage of those that had previously completed a Bachelor's degree was 87%, with the remaining 13% completing a Masters degree. The difference between groups in relation to their previous degree was not significant [Table 1].

Differences between sexes were observed across CSE scale and MBI-GS (S) subgroups, however these differences did not reach significance (Table 1). Highest median CSE scores for both males and females were seen at T1, and lowest scores at T3 (Table 1). The highest MBI-GS (S) CYN median scores were reported at T2, EX at T1 and T2, and PE at T1 and T2 (Table 1). CSE scores showed the greatest mean changes from T1-T2 and T1-T3, however these differences were not significant (Table 2). MBI-GS (S) mean scores identified that PE changes were greatest from T2-T3 and T1-T3, however were likewise not significant (Table 2).

No significant correlations were found between stress and burnout (Table 3). However, a strong, significant, and positive correlation was found between stress scores at CSE T2 and CSE T3 ($r = 0.848, p < .05$). Of the 51 total responses across time points for the MBI-GS (S) question "I feel depressed by my studies", 44 (86%) gave scores greater than zero, indicating that at some point during the time points, students have felt depressed by their studies.

Thematic analysis of the open-ended questions revealed common stress and burnout influencers and common coping strategies [Table 4]. Thematic analysis revealed seven global themes across the three time points including: curriculum coursework, clinical placement, transition periods, work-life balance, coping behaviors, financial pressures, and course survival tips.

Theme 1: Curriculum Coursework

The most frequent global theme causing stress as reported by students was curriculum coursework. The sub-theme 'academic functioning challenges' was evident throughout responses during T1 and T2. Students report not knowing where to focus or prioritize study, for example finding balancing study and study topics challenging. Another academic functioning challenge reported was a lack of accent training and language barriers, as students often study abroad and English may be their second language. Examination stress also appeared to be a prevalent sub-theme where participants described increased stress especially with completing three exams in three days [Table 4].

Theme 2: Clinical Placement

In general, students described the 10-week clinical placement block as "enjoyable", with reports that a few days break between the clinical placement block may be beneficial. Due to these responses arising in T3, potentially, students were less focused and less stressed about clinical placement during the earlier aspect of the program. The majority of responses indicated that students were stressed about professional behaviours – receiving feedback, performance standards, self-directed learning and professional development (Table 4).

Theme 3: Transition Periods

Transitions to university life, clinical placement and relocating were discussed in T1 and T3. Participants reported difficulty with being away from friends and family, and difficulties with cohort cohesion. There are reports of transition doubt where students question whether they want to continue the program due to not currently enjoying the course.

Theme 4: Work-Life Balance

A global theme in the students' responses across all time points was the difficulty finding the right balance between university life and having time for themselves. Students reported a lack of time management and guilt when doing activities other than study. Difficulties maintaining relationships and having time to be involved in social activities were also reported (Table 4).

Theme 5: Coping Strategies

Both positive and maladaptive coping strategies were evident in written responses. Successful coping strategies commonly reported included social support coupled with study skills, exercise/recreational activities, and mindfulness and positive self-talk (Table 4). The open-ended responses further revealed that some students were seeking psychological intervention in order to cope. Students also reported maladaptive coping mechanisms including excessive alcohol consumption, excessive eating, and gaming.

Theme 6: Financial Pressures

Financial burden was reported across all three time points. Difficulties were noted especially whilst on placement due to travel requirements and having to source accommodation (often resulting in paying multiple rent). With this, sourcing part-time work was reported to be difficult for students due to time pressures and course intensity (Table 4).

Theme 7: Course Survival Tips

Students consistently reported that they wish they had known more curriculum details and self-management techniques throughout all three time points. They wish they had known more information on content delivery along with a typical day as a Bond university student. Participants also reported that they needed to take time to themselves so to avoid burnout, with other reports stating that they wish they had known the best strategies for dealing with homesickness (Table 4).

Discussion

This study explored pre-registration Bond University DPTHY students' levels of perceived stress, burnout, and associated coping mechanisms. The first research question focused on differences in perceived stress and burnout over time. The quantitative data from the CSE and MBI-GS (S) scores showed no significant changes at time points and between time points. These results are in contrast to previous research. A previous study reported by Van Veld et al.³, conducted in the United States, found changes in CSE scores over time in first year DPHTY students. This difference between studies could be due to a variety of factors including timing of placement blocks, the curriculum coursework demands as well as the structure of the different programs.

Findings relating to the MBI-GS (S) are unique to this study, as it is the first study completed on physiotherapy students to utilise this version of the MBI. Previous studies^{4,5} have utilized the MBI, however an alternate version has meant the subscales differ from those within this study. Balogun et al.⁴ completed a study in 1996 that determined that academic performance was not correlated with physiotherapy students' perceived levels of burnout. In another

study, the same authors⁵ found the emotional exhaustion and depersonalisation scores for physiotherapy students, were higher than the norms reported for the general population and most human services professionals.

Qualitative data suggests that changes in written responses in regards to the type of stressors across the time points could have been associated with transition periods. These difficulties found within transition periods including; relocation adjustments, transition to academic life, transition to placement, and transition doubt, support the findings of previous¹⁸ studies conducted on students. This study determined that there was no strong correlation between stress and burnout. However, findings indicate a strong correlation between stress scores at the start of the course (T1) and pre-placement (T2). These results could have been due to similarities in stress perceptions and coping at these time points.

A strong theme throughout the open responses was that curriculum coursework within the program and examinations caused heightened levels of stress. Students reported periods of stress with coursework and course load commitments, which is in line with previous research^{3, 12, 14, 18, 23, 24} conducted on undergraduate and pre-registration postgraduate students in several countries including Australia, USA, Israel and Sweden. Students frequently reported that their social life was lacking, along with time to undertake their hobbies due to workload and demands of the program. Students are required to undertake written examinations, seminar presentations, and practical examinations (OSCEs). Participants within the study reported feeling underprepared and anxious in the week/s leading up to assessments. A previous cross-sectional study²³ conducted in Australia and the United Kingdom found coursework stress to be the greatest source of stress for students. Similarly, Indian Bachelor of Physiotherapy students¹⁸ reported that unpredictability of examinations and fear of failure were sources of stress, which align with responses generated from this study.

Placement related stressors have been frequently identified across time points 1 and 3. Student responses were commonly related to professionalism, with stress arising when not given immediate feedback from clinical educators and having to complete self-directed learning and professional development tasks. Additionally, financial pressures arose as a theme throughout this study, and was amplified during the clinical placement block. Students often had to travel, therefore increasing accommodation costs, as well as finding difficulty to attain or maintain part time positions. Hampshire et al.³⁶ found that negative placement experiences have a significant impact with the potential for becoming the 'tipping point' for students. This study by Hampshire et al.³⁶ proposed a variety of suggestions for avoiding attrition, which include flexible start and finish times, maximum travelling distances to placement, central feedback database, and student financial support funds. Similarly, a Dutch study¹⁰ on six undergraduate students conducted across three universities found placement stressors had an impact on the student's well-being. Some stressors included demanding supervisors, worrying about not being good enough, and worrying about meeting expectations. Potentially, students are being taught the appropriate clinical and academic skills but are not being taught appropriate professional skills. Students may benefit from skills in taking on feedback and understanding the importance of reflective practice. If expectations of clinical placements are clearly defined prior, students may have reduced stress or better coping mechanisms.

The second research question focused on the influence of sex in relation to stress and burnout throughout the first year of the program. Whilst the current study did not identify sex to influence stress or burnout, there were unique differences across all three time points in the first year, and female students self-reported experiencing more stress. The sex difference has previously been reported, with females experiencing more stress than males²⁰. This cross-sectional study completed on 231 undergraduate students in Pakistan reported that not only did women differ in their perception of stressors, but their reactions also differed, where they were more overtly reactive. It is explained this

could be due to the gender role socialization of emotions, or that females are possibly more emotionally responsive. This cross-sectional study may have differing experiences of stress for females due to a variety of factors including the length of the study, the age of the participants, or the outcome measure utilised (Student Life Stress Inventory).

The third research question concentrated on coping mechanisms utilized by DPHTY students during the first year of their program. Qualitative themes from open-ended questions revealed a mix of maladaptive and positive coping strategies. Previously, a cross-sectional study reported²⁸ that three general strategies exist in an attempt to cope with stressful situations: problem-focused coping, emotion-focused coping, and avoidance-focused coping. Within our study students reported that they wish they had been made aware of and equipped with effective coping strategies to overcome such stressors from course demands. The theme, course survival tips, demonstrated that students felt unprepared for the course demands, and desired more self-management strategies when stressful periods arise.

The most common problem-focused coping strategy reported in the current study was exercise, with reports of it being a beneficial stress reliever across all three time-points. Whilst the use of exercise as a coping strategy is potentially not surprising for a physiotherapy cohort, such strategies should be promoted due to its proven stress-relieving benefits^{23,35}. For university students, opportunities to engage in sporting and social clubs often incur no additional costs, potentially promoting accessibility. This may be of benefit for HEIs; not only encouraging health and well-being, but also allowing for social interaction outside of class time. Students reported that maintaining social relationships within and outside of the program have been an effective emotion-focused coping strategy in managing stress. These findings concur with previous studies^{3,9} where maintaining relationships are important for coping. Being able to debrief and have open conversations appears to be imperative to the well-being of students.

Although the majority of students reportedly utilize positive coping strategies, there were also accounts of maladaptive coping strategies. The avoidance-focused coping strategies that have been identified as maladaptive include alcohol consumption, excessive eating, and gaming. Maladaptive coping strategies found by a cross-sectional American University study²⁹ included alcohol abuse, drug abuse, and smoking. They further recommended that universities provide ongoing research outlining stress, how to detect when an individual may be experiencing high levels of stress, and positive strategies to deal with such stressors. Perhaps in future, HEIs could increase wellness education and services such as advisement and counselling. Students may benefit from group discussion around health and wellbeing, and the challenging aspects around maladaptive coping strategies. This environment may elicit more students to speak when feeling stressed or burnt out.

The findings from our study offer unique insights around the pressures and expectations of pre-registration physiotherapy students. Responses provide information to aid in the maintenance of student well-being, whilst ensuring production of quality health professionals, that may be of benefit to HEIs. It is important for physiotherapy programs to know the causes of stress and burnout in their students, and associated coping mechanisms utilised. Findings from previous studies^{36, 37} in which students also report burden with travel for placement, financial costs, inflexible timetabling, and clinical placement stressors, demonstrate commonality with this research. It would be valuable to determine the tipping point for students undertaking pre-registration physiotherapy programs and trial targeted intervention strategies to mitigate potential stress and burnout.

Strengths And Limitations

To our knowledge, this is the first study to explore both perceived stress and burnout in pre-registration DPHTY students. This study aims to serve as a foundation for future guidance and to inform HEIs program structure to optimize student welfare, academic ability, and support. This paper also allows for increased understanding of how an

intensive course can impact the welfare of students. The use of previously validated and reliable tools coupled with open-ended questions allowed for a broad understanding of the complexity of being a student in an intensive entry-level pre-registration program. Quantitative and qualitative data gathered has allowed for the research questions to be answered with a humanistic view. The use of two reliable and valid questionnaires (CSE and MBI-GS (S)), further enhances the strength of this study and allows for confidence in results generated.

The authors acknowledge methodological limitations identified as the students' lack of understanding of the true definition of burnout. This was recognised as students reported feeling burnt out in the open-ended questions however did not meet the criteria according to the Maslach Burnout Inventory. This was discovered as a potential threat after the implementation of the survey. It is recommended that future studies provide a list of key definitions prior to the delivery of the survey. Another methodological limitation included the length of time conducted, as well as a relatively small sample size. This study across three time points spanned two semesters and the results generated could have more impact if the spanned time included the entire physiotherapy program.

Conclusion

In summary, this study has presented a unique insight into experiences, attitudes and behaviours that pre-registration physiotherapy students possess in response to perceived stress, burnout, and coping strategies. This study has demonstrated that the DPHTY students reportedly experience varying levels of stress and burnout throughout their first-year program. Students consistently exemplified high levels of stress within the context of coursework and academic load. Although not significant, female students, generally, trended to reporting higher levels of perceived stress across all three time points. There were no differences between the sexes in regard to self-reported burnout. Whilst the relationship between stress and burnout was explored, no strong correlations were found. This study has also identified that physiotherapy students were implementing coping strategies, both positive and maladaptive and highlights the importance of continued research within postgraduate pre-registration physiotherapy programs to identify why students may be experiencing stress and burnout and to guide positive rather than maladaptive coping strategies. With further research, HEIs may implement frameworks to identify student stressors and burnout, adapt their program structure, and implement management strategies for students. Further programs to optimise student coping self-efficacy as well as developing tools for identification and management of stressors would be beneficial. Findings of this research provide valuable insights to inform curriculum design and optimize pre-placement support for DPHTY pre-registration physiotherapy.

Abbreviations

AVG	Average
CSE	Coping Self Efficacy
CYN	Cynicism
DPHTY	Doctor of Physiotherapy
EXH	Exhaustion
HEI	Higher educational institutions

MBI-GS(S)

Maslach Burnout Inventory- General Survey for Students

PE

Professional Efficacy

SAF

Social and Academic Functioning

T1

Time point one

T2

Time point two

T3

Time point three

Declarations

Ethical approval and consent to participate

Ethics and gatekeeper approval were sought prior to commencement of the study from Bond University Research Ethics Committee (SG03019). A research assistant, independent to the Academic staff, recruited participants at each time point. Involvement in the project was voluntary and participants were invited to return the completed questionnaire to a locked survey box located on University Campus, within 1-week of distribution. Reminders were provided at each of the 3 time points to boost response rates. Surveys were entered into a purposely designed database and checked for accuracy by 2 members of the research team.

Consent for publication was gained in accordance with ethical approval SG03019.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Permission was obtained from Mind Garden, Inc on 26 June 2019 to reproduce copies of the Maslach Burnout Inventory™ Instruments and Scoring Keys for the purpose of this study. MBI - General Survey for Students - MBI-GS (S): Copyright ©1996, 2016 Wilmar B. Schaufeli, Michael P. Leiter, Christina Maslach & Susan E. Jackson. All rights reserved in all media. Published by Mind Garden, Inc., www.mindgarden.com

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

Study concept (SG, RO), study design (SG, RO), acquisition and interpretation of the data (SG, MB, TB), data cleaning and management (MB, TB), statistical analysis (MB, TB), drafting of the manuscript (MB, TB), revising for submission (TB, RO, SG). All authors read and approved the final manuscript.

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