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Emotional intelligence and perceived stress of Australian pre-registration healthcare students: A multi-disciplinary cross-sectional study

Kim Foster[a,*], Judith Fethney[b], Desirée Kozlowski[c], Romano Fois[d], Fareen Reza[e], Andrea McCloughen[f]

[a] Australian Catholic University & NorthWestern Mental Health, Royal Melbourne Hospital, Grattan St., Parkville, VIC 3032, Australia
[b] Biostatistician, Sydney Nursing School, University of Sydney, 88 Mallett St, Camperdown, NSW 2006, Australia
[c] Discipline of Psychology, School of Health and Human Sciences, Southern Cross University, Coffs Harbour, NSW 2450, Australia
[d] Faculty of Pharmacy (A15), University of Sydney, NSW 2006, Australia
[e] University of Sydney, Psychology for Kids, Bella Vista, NSW 2153, Australia
[f] Sydney Nursing School, University of Sydney, 88 Mallett Street, Camperdown, NSW 2050, Australia

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ABSTRACT

Background: Healthcare students can experience high levels of stress. Emotional intelligence can moderate stress and increase wellbeing however there has been no prior research on the relationship between emotional intelligence and stress in Australian healthcare students.

Objectives: To measure emotional intelligence (EI) and perceived stress (PS) in final year healthcare students (nursing, pharmacy and dentistry), and to explore the relationships between EI, PS and discipline.

Design and Setting: A cross sectional survey of pre-registration healthcare students at a metropolitan university in Australia.

Participants: 203 pre-registration final year healthcare students (n = 58 nursing; n = 112 pharmacy; n = 34 dentistry).

Methods: Emotional Intelligence was measured using the GENOS Emotional Intelligence Inventory (Concise Version) and stress was measured using the Perceived Stress Scale (PSS).

Results: A significant negative correlation was found between EI and PS in nursing and pharmacy students. No difference was found in EI across disciplines. Mean EI scores were lower than normative means. PS was significantly higher than the normative mean for pharmacy and dentistry students and higher than nursing students.

Conclusions: Emotional intelligence can have a protective effect against stress for healthcare students and can be increased via targeted educational interventions. To support student wellbeing there is a clear need for pre-registration healthcare curricula to include educational components on strengthening EI.

1. Introduction

Interpersonal work can be stressful for healthcare clinicians due to the emotional demands involved in caring for patients and their families (Ito et al., 2014) and the complex environments in which this work occurs (Hurley, 2008). Extended periods of emotional labour in pressured clinical settings is associated with negative outcomes including burnout and compassion fatigue (Berger et al., 2015), and decreased quality of patient care (McHugh et al., 2011). In their clinical placements, healthcare students are exposed to the realities of interpersonal work in demanding environments (Por et al., 2011). Students can experience high levels of stress associated with this work (Birks et al., 2009), as well as current life challenges and academic requirements (Pryjmachuk and Richards, 2007).

Emotional intelligence (EI) involves the ability to perceive and effectively use self and others' emotions, and to integrate emotion to facilitate thinking, and understand and regulate emotions to promote personal development (Birks et al., 2009). EI behaviours are essential for healthcare workers as they include the relational skills to effectively manage the interpersonal demands of practice (Mayer and Salovey, 1997). Increasing EI is an effective strategy to mediate stress and decrease burnout (Görgens-Ekermans and Brand, 2012). EI behaviours

* Corresponding author.
E-mail addresses: kim.foster@acu.edu.au (K. Foster), Judith.fethney@sydney.edu.au (J. Fethney), Desiree.Kozlowski@scu.edu.au (D. Kozlowski), romanofois80@gmail.com (R. Fois), fareen.reza@psychologyforkids.com.au (F. Reza), andrea.mccloughen@sydney.edu.au (A. McCloughen).

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such as perceived emotional self-control and emotional competence have helped undergraduate nursing students manage stress and increase their subjective well-being (Por et al., 2011). Higher levels of EI are also associated with reduced stress in dentistry students (Pau et al., 2007) and better psychological health in pharmacy students (Othman et al., 2016).

2. Background

EI comprises skills associated with distinguishing, understanding, managing and using emotions in self and others (Mayer and Salovey, 1997). Measures of EI ability capture maximal performance on skills associated with EI (Roberts et al., 2008), however, it has been argued that a measure of typical EI performance provides a more useful index, particularly when assessing EI skills in workplace settings (Gignac, 2010).

The majority of EI research in healthcare has focused on nurses (Birks et al., 2009; Marvos and Hale, 2015). In nursing students, higher EI is associated with higher clinical and academic performance (Rankin, 2013), better practice performance (Beauvais et al., 2011) and improved patient healthcare outcomes (Quoidbach and Hansenne, 2009). EI has been investigated to a more limited extent with other healthcare students. In dental undergraduates, higher EI is associated with lower stress levels (Pau et al., 2007) and burnout (Görgens-Ekermans and Brand, 2012), and higher patient satisfaction (Azimi et al., 2010) and predicts subjective well-being (Montasem et al., 2013).

In the UK, Birks et al. (2009) examined the relationship between EI and perceived stress (PS) in pre-registration students. Higher EI was significantly associated with lower PS. Schneider et al. (2013) propose that EI facilitates stress resilience but males and females may differ in the mechanisms by which this occurs. A number of factors, for example, self-efficacy (Yefei et al., 2016) and achievement motivation (Magnano et al., 2016), co-vary with EI and are likely to be involved or even mediate the relationship between EI and PS. EI has also EI has been positively related to age (Scheibe and Carstensen, 2010) with higher EI scores occurring in older adults. Birks et al. (2009), however, found no systematic gender or age differences on EI scores or on PS and no difference in EI scores across disciplines.

Effective relational skills and emotional competence are fundamental capabilities for healthcare students to promote their wellbeing and strengthen their professional practice (McCloughen and Foster, 2017). Pre-registration healthcare curricula have been criticised for inadequately preparing students for the inter/personal demands of practice (Hurley and Rankin, 2008). There is a need for teaching and learning that equips students to be self-aware and emotionally competent (Foster et al., 2015). This is particularly relevant as undergraduate healthcare students experience high levels of stress (Alzahem et al., 2011; Geslani and Gaebelein, 2013) and EI may moderate stress (Birks et al., 2009). High levels of stress in students in health-related disciplines have been reported from an Australian perspective (Leahy et al., 2010) although there is no prior reporting of the relationship between EI and PS in a multidisciplinary group of Australian healthcare students. In Australian dentistry students, a cross-cultural comparison of the relationship between EI and PS revealed a weaker correlation between them than for dentistry students in some other countries (Pau et al., 2007). It is unclear whether that finding was discipline-specific, country-specific, or for other reasons. Given the widely reported relationship between EI and PS in healthcare students, a cross-disciplinary examination of an Australian sample was undertaken as there was no prior reporting of the relationship between EI and PS in this group.

2.1. Aims and Hypotheses

The primary aim of the study was to investigate the relationship between EI behaviours and PS in pre-registration healthcare students in an Australian university. Based on prior literature it was hypothesised there would be a negative correlation between EI and PS.

Secondary objectives were to determine whether there was:

- A relationship between demographic variables and EI and PS
- A difference in EI and PS scores between pre-registration nursing, pharmacy and dentistry students
- A difference in EI and PS in the student samples compared with normative means

3. Method

As this study is observational in nature and involves exploring associations between EI, PS and demographic/educational variables, a correlational cross-sectional survey design was used (MacDonald et al., 2015).

3.1. Participants

A convenience sample of final year pre-registration nursing, pharmacy and dentistry students participated. The sample comprised pre-registration Master of Nursing degree or combined Master of Nursing degree students with Bachelor of Arts, Science or Health Science degrees, and pre-registration Master or Bachelor of Pharmacy, and Bachelor of Dentistry, students. Final year students were selected for inclusion as they had experienced most of their theory units and clinical placements, and previous literature (e.g. Birks et al., 2009; Pau et al., 2007) indicates a gap in knowledge on final year students' levels of stress and EI.

3.2. Pre-registration Program

Master of Nursing students had completed approximately 360 h of clinical placement prior to the study. Students in a combined Master of Nursing and Bachelor degree (Arts, Science, or Health Science) had completed approximately 400 h. Master of Pharmacy students had completed around 105 h of placement. Bachelor of Pharmacy students had completed around 145 h of placement. Dentistry students had completed approximately 968 h of placement.

3.3. Instruments

Participants received a survey booklet comprising demographic questions and two self-report measures: the GENOS Emotional Intelligence Inventory – Concise Version (Gignac, 2008) and the Perceived Stress Scale (Cohen et al., 1983).

3.3.1. Demographic Questions

Demographic information included age, gender, nationality, level of education completed and clinical placements.

3.3.2. GENOS Emotional Intelligence Inventory – Concise Version

The 31-item GENOS Emotional Intelligence (EI) Inventory (concise version) (Gignac, 2008) measures typical EI functioning in the workplace according to a 7-factor conceptualisation of EI behaviour comprising emotional self-awareness; emotional expression; emotional awareness of others; emotional reasoning; emotional self-management; emotional management of others; and emotional self-control (Gignac, 2010). Respondents rate how they think, feel and act in their work. For example, "*I demonstrate to others that I have considered their feelings in decisions I make at work*." Responses are scored on a five-point Likert scale, ranging from '1 = *Almost Never*' to '5 = *Almost Always*.' Higher scores indicate greater levels of EI behaviours. The Concise version has sound internal consistency reliability, with Cronbach's $\alpha = 0.93$. Normative data based on adult populations in a range of industries ($N = 4775$) and countries, indicated a mean EI score of 121.86

(*SD* = 13.84).

3.3.3. Perceived Stress Scale (10-item Version) (PSS-10)

The PSS-10 (Cohen et al., 1983) measures perceived stress. Respondents rate how often, during the last month, they felt or thought a certain way. For example, "*In the last month, how often have you been upset because of something that happened unexpectedly*?" Responses are scored using a five-point Likert scale, ranging from '0 = *Never*' to '4 = *Very Often*.' Higher scores indicate higher levels of PS. The PSS-10 has sound internal consistency reliability, with Cronbach's α = 0.78 (Cohen, 1988). Normative data based on 2387 respondents in the US indicated a mean score of 12.1 (*SD* = 5.9) for males and 13.7 (*SD* = 6.6) for females.

3.4. Ethical Considerations and Data Collection

Human Research Ethics Committee approval was gained from the relevant university. Participation was voluntary and anonymous. All data were coded by a research assistant so that the researchers were blinded and could not identify participants. Students were initially informed about the study via email. A research assistant who was not teaching in the programs provided students with study information and the survey at the end of a classroom session in first semester of the final year of their program. Students completed the surveys at the end of the session or at a later time, returning it in a sealed envelope.

3.5. Data Analysis

Descriptive statistics are reported for demographic characteristics. Pearson's correlation was used to explore the relationship between EI and PS; Pearson's correlation, independent samples *t*-tests and analysis of variance were conducted to explore the relationship between demographic variables and EI and PS. General Linear Model Analysis of variance was used to compare EI and PS across the three disciplines. Statistical significance was set at α = 0.05. Due to the exploratory nature of the study, adjustments were not made for multiple testing. Data were assessed for normality, linearity and equality of variances. Missing data (< 2% per item or survey question) were substituted with the mean score on that item for students in that discipline. All data were analysed using SPSS V20.0.

Post-hoc effect sizes were calculated to enhance interpretation of clinical significance. In this study, effect sizes are reported as Cohen's *d* for differences between 2 means (based on *t*-test results), eta squared for differences across > 2 means (based on ANOVA results) and the correlation coefficient *r*. Cohen's (1988) conventions are as follows: *d* - small = 0.2, medium = 0.5, large = 0.8; eta squared (η^2) – small = 0.01, medium = 0.06, large = 0.14; *r* – small = 0.1, medium = 0.3, large = 0.5. In order to have a standard against which to assess the effect sizes in this study, the 0.5 criterion reported in (Norman et al., 2003) was used. Across a range of psychosocial measures, these authors determined that discrimination occurred at approximately half a SD, or medium effect size.

4. Results

The sample comprised 203 pre-registration healthcare students. Participant demographics are reported in Table 1.

Response rates were calculated by dividing the total number of surveys distributed by the total number of completed surveys. Of 180 enrolled nursing students, 99 were present when surveys were distributed, and 57 were completed (58%). Of 283 pharmacy students, 262 were present during survey distribution, and 112 were completed (43%). Of the 79 students enrolled in dentistry, 34 completed surveys (43%).

The reliability of the GENOS EI Inventory – Concise Version was good to excellent; Cronbach's α = 0.870 (nursing), 0.914 (pharmacy) and 0.881 (dentistry). The reliability of the Perceived Stress Scale was adequate; Cronbach's α = 0.786 (nursing), 0.863 (pharmacy) and 0.915 (dentistry). All data were normally distributed and no violations of linearity or homogeneity of variances were detected.

Table 1
Summary of participant demographic characteristics.

	Nursing (*N* = 57)	Pharmacy (*N* = 112)	Dentistry (*N* = 34)
Gender *n* (%)			
Male	11 (19%)	38 (34%)	16 (47%)
Female	46 (81%)	74 (66%)	18 (53%)
Age (years)			
Mean (SD)	26.96 (9.37)	22.11 (2.14)	26.00 (3.06)
Range	20–62	20–33	21–40
Program *n* (%)			
Graduate Entry Master of Nursing	31 (55%)	–	–
Graduate Entry Master of Nursing combined	26 (46%)	–	–
Graduate Entry Master of Pharmacy	–	19 (17%)	–
Bachelor of Pharmacy	–	93 (83%)	–
Bachelor of Dentistry	–	–	34 (100%)
Highest level of education completed *n* (%)			
Year 12/6th form	27 (47%)	84 (75%)	0
TAFE certificate or diploma	1 (2%)	0	0
Bachelor's degree	23 (40%)	25 (22%)	33 (97%)
Master's degree	3 (5%)	1 (1%)	0
Doctoral degree	1 (2%)	0	0
Other/missing	2 (4%)	1 (1%)	1 (3%)
Nationality *n* (%)[a]			
Australian	31 (54%)	36 (32%)	20 (59%)
European	1 (2%)	0	4 (12%)
N/S America	3 (5%)	1 (0.9%)	1 (3%)
Asian	16 (28%)	50 (45%)	7 (21%)
African	3 (5%)	0	0
Mixed/missing	3 (5%)	25 (22%)	2 (6%)

[a] Based on students' responses to the question: *What is your nationality*?

4.1. Relationship Between Emotional Intelligence and Perceived Stress

Statistically significant negative correlations were found between EI and PS for nursing ($r = -0.30$, $p = 0.02$) and pharmacy students ($p = -0.53$, $p < 0.001$), indicating that as EI increased, PS decreased. No significant relationship was revealed for the dentistry cohort ($p = -0.19$, $p = 0.29$) (Table 2).

4.2. Emotional Intelligence, Perceived Stress and Demographic Characteristics

No significant relationships were found between age and EI for the three disciplines (Nursing: $r = 0.18$, $p = 0.18$; Pharmacy: $r = 0.07$, $p = 0.49$; Dentistry: $r = 0.13$, $p = 47$). Age and PS were significantly correlated for nursing only ($r = -0.32$, $p = 0.02$) (Table 2). Separate independent samples *t*-tests were conducted to assess the relationship

Table 2
Correlations between EI, PS and age.

	Nursing (*N* = 57)	Pharmacy (*N* = 112)	Dentistry (*N* = 34)
EI and PS	−0.30*	−0.53**	−0.19
Age and EI	0.18	0.07	0.12
Age and PS	−0.32*	0.01	−0.17

Values in table are Pearson's correlation coefficients (r-values).
* $p = 0.02$ (2-tailed).
** $p < 0.001$ (2-tailed).

Table 3
Male and female EI and PS scores.

	Nursing (N = 57)	Pharmacy (N = 112)	Dentistry (N = 34)
Emotional intelligence			
Male mean (SD)	114.73 (12.35)	113.79 (12.84)	113.09 (12.00)
Female mean (SD)	115.37 (14.07)	108.62 (18.33)	115.31 (11.34)
P value	0.89	0.12	0.59
Effect size	0.05	0.33	0.17
Perceived stress			
Male mean (SD)	13.82 (5.36)	17.89 (7.15)	17.66 (6.68)
Female mean (SD)	15.28 (6.04)	21.01 (6.61)	21.88 (8.09)
P value	0.47	0.03	0.11
Effect size	0.26	0.45	0.57

GENOS EI normative mean (SD): 121.86 (13.84).
PS normative means (SDs): males = 12.1 (5.9), females = 13.7 (6.6).

between gender and EI and gender and PS for each discipline (Table 3). Results indicated there was no statistically significant difference in EI between males and females in the disciplines and all effect sizes were small, indicating no clinically relevant differences in scores. Means and standard deviations (SD) were: Nursing, male 114.73 (12.35) vs female 115.37 (14.07), $p = 0.89$, $d = 0.05$; Pharmacy, male 113.79 (12.84) vs female 108.62 (18.33), $p = 0.12$, $d = 0.33$, Dentistry, male 113.09 (12.00 vs female 115.31 (11.34), $p = 0.59$, $d = 0.17$).

For PS, the means and (SD) were: Nursing, male 13.82 (5.36) vs female 15.28 (6.04) $p = 0.47$, $d = 0.26$; Pharmacy, male 17.89 (7.15) vs female 21.01 (6.61), $p = 0.03$, $d = 0.45$ and Dentistry, male 17.66 (6.68) vs female 21.88 (8.09), $p = 0.11$, $d = 0.57$. There was therefore no statistically significant difference in PS scores between males and females for nursing and dentistry students, while male pharmacy students had lower mean PS scores than females. The effect size for this was approaching that where a trained observer would detect the difference. The effect size for dentistry was also medium. The statistical non-significance associated with this effect size is likely due to the smaller sample size of the pharmacy group (Table 3).

4.3. Differences in EI and PS Between Disciplines

Using ANOVA there were no statistically significant differences in EI score between the disciplines: Nursing, 115.25 (13.65); Pharmacy, 110.37 (16.79); Dentistry 114.27 (11.53), ($p = 0.11$, $\eta^2 = 0.02$). Belonging to different disciplines did not have explanatory power regarding EI. Results of separate one-sample *t*-tests highlighted that mean EI scores for each discipline were statistically significantly lower (all $p \leq 0.001$) than the normative EI mean (SD) of 121.86 (13.84). For PS between disciplines the mean (SD) scores were Nursing, 15.00 (5.90); Pharmacy, 19.97 (6.92); Dentistry, 19.83 (7.63) and the overall model was significant with a medium effect size ($p < 0.001$, $\eta^2 = 0.10$), indicating that membership of a discipline has some explanatory power regarding PS. Post-Hoc contrasts revealed that, on average, nursing students' PS was significantly lower than that of pharmacy ($p < 0.001$) and dentistry ($p = 0.001$). There was no statistically significant difference in PS between pharmacy and dentistry students ($p = 0.92$). Normative means for males and females are available for PS. Results from one-sample *t*-tests revealed no significant difference in mean PS between nursing students compared to either the normative male mean (SD) of 12.1 (5.9) ($p = 0.13$) or normative female mean (SD) of 13.7 (6.6) ($p = 0.08$). In contrast, mean PS scores were higher than either normative male and female means for pharmacy (males: $p < 0.001$; females $p < 0.001$) and dentistry students (males, $p = 0.01$; females $p = 0.001$) (Table 4).

Table 4
EI and PS scores across disciplines.

	Nursing N = 57	Pharmacy N = 112	Dentistry N = 34
Emotional intelligence			
Mean (SD)	115.25 (13.65)	110.37 (16.79)	114.27 (11.53)
Range	89–148	39–151	89.5–136
95% CI	111.21–119.28	107.49–113.25	109.13–119.40
Perceived stress			
Mean (SD)	15.00 (5.90)[a]	19.97 (6.92)	19.83 (7.63)
Range	2–38	3–40	4–32
95% CI	13.22–16.79	18.70–21.24	17.51–22.16

EI between subjects effects: $p = 0.11$, $\eta^2 = 0.02$.
PS between subject effects: $p < 0.001$, $\eta^2 = 0.10$.
GENOS EI normative mean (SD): 121.86 (13.84).
PSS normative means (SDs): males = 12.1 (5.9), females = 13.7 (6.6).
[a] Nursing perceived stress mean statistically significantly lower than pharmacy ($p < 0.001$) and dentistry ($p = 0.001$).

5. Discussion

In this study the EI and PS of pre-registration nursing, pharmacy and dentistry students were measured and the relationship between demographic variables and EI and PS was tested; differences in EI and PS scores between the three disciplines; and differences in EI and PS in the student sample compared to normative means. The identified significant inverse relationship between EI and PS is consistent with the hypothesis and with previous work in nursing and pharmacy (Birks et al., 2009; Pau et al., 2007). The relationship was moderate and statistically significant ($r = -0.30$, $p = 0.02$) for nursing and strong and statistically significant ($r = -0.53$, $p < 0.001$) for pharmacy students. For these two groups, higher EI was significantly associated with lower PS and vice versa. For dentistry students, however, the relationship between EI & PS was weak and non-significant. Pau et al. (2007) also found a weak, non-significant correlation between those measures in Australian dentistry students, while correlations were stronger for students from other countries. The current findings suggest different factors may be influencing Australian dentistry students than those studying nursing and pharmacy, however the reasons for this are not clear and need further investigation.

Birks et al. (2009) note that, although EI moderates stress, this effect may be more potent at lower stress levels than when acute stressors are present. The GENOS model of EI measures *exhibited* EI behaviour. This model contrasts with other models that conceptualise EI as a stable trait, or a latent *capacity* for EI behaviour (Gignac, 2010). It is possible the GENOS measure is more sensitive than other measures to changes in behaviour in times of stress. In the Birks et al. (2009) study, which used the PSS-10 and Schutte Emotional Intelligence scale, both EI and stress scores changed across two administrations and the degree of change was significantly correlated. Students whose stress scores increased between the two time points were likely to have scored lower on the EI measure and vice versa. This result is consistent with acute stress causing a drop in EI, however making such a claim is beyond the scope of a correlational design.

There was no significant relationship between age and EI for any discipline. No significant correlation was found on age and PS for dentistry or pharmacy students however PS was lower for nursing students with increased age. That correlation was moderate and statistically significant ($r = -0.32$, $p = 0.02$). The significant inverse correlation between PS and EI may be of relevance. Hur et al. (2014) found that the relationship between professional experience and emotional labour strategies is mediated by EI. Further work on PS, EI and age is needed to explore the influences of each on the other.

No difference in overall EI scores between female and male students was found. This is consistent with previous studies (Birks et al., 2009; Por et al., 2011; Victoroff and Boyatzis, 2013). Female pharmacy

students were significantly more stressed than male counterparts (moderate effect size). There was no significant relationship between gender and PS for nursing or dentistry students, however, mean PS scores were higher for females in all disciplines. For dentistry students the effect size was also moderate (F > M). Further investigation of factors associated with differences in PS between male and female students is warranted. Female dental (Alzahem et al., 2011; Divaris et al., 2014) and pharmacy students (Marshall et al., 2008) have been found to experience higher PS than males. Polychronopoulou and Divaris (2010) reported that female dentistry students scored higher than males on stress scales for workload, performance pressure, and self-efficacy beliefs. Weinberg and Creed (2000) and Ito et al. (2014) found that levels of social support inside and outside work were associated with workplace stress. It may be that male and female students in the current study differed on the amount of social support experienced within their particular discipline. Gender bias has been found to contribute to reduced support for female students from science disciplines, where there can be a perception that female students have lower competence than males (Moss-Racusin et al., 2012). A lack of meaningful difference in PS between male and female nursing students in the current study may be a result of lower PS overall for nursing students, or could potentially reflect differences between nursing and the other disciplines in gender biases related to perceived competence.

Consistent with previous research (Adams et al., 2011; Birks et al., 2009), there were no significant differences on EI scores between the three disciplines. However, all students had scores lower than normative means. Lower than average EI scores for healthcare students have been reported elsewhere. A recent study found that fewer than 12% of dental pre-registration students had strong levels of EI (Ravichandra et al., 2015) and Marvos and Hale (2015) and Holston and Taylor (2016) identified that undergraduate nursing students had below average EI scores. The sample in the current study differed from the normative sample for the GENOS EI measure. The study sample had a mean age just below 27 years, while adults under 29 years comprised fewer than 8% of the normative sample. This is relevant given there is some evidence that EI increases with age (Scheibe and Carstensen, 2010). The association between EI and leadership (Batool, 2013) should also be considered because at least 66.6% of the normative sample held positions of project manager or higher; this may indicate that the GENOS norms are on the higher end of what might be expected in the general population, including tertiary students.

Both dentistry and pharmacy students scored significantly higher on PS than normative means. This is consistent with research reporting that pharmacy (Marshall et al., 2008) and dentistry (Amith et al., 2012; Pöhlmann et al., 2005) students experience high levels of PS. Common stressors include workload, examination stress, restricted leisure time, and clinical practice demands (Abu-Ghazaleh et al., 2011; Geslani and Gaebelein, 2013; Pöhlmann et al., 2005). Dentistry students are the most stressed of all disciplines (Geslani and Gaebelein, 2013) and report generally higher levels of PS than medical students (Murphy et al., 2009). One suggested contributing factor is that dental students are responsible for delivering critical patient treatment with minimal discipline involvement, whereas medical students are more often shadowed by senior practitioners (Murphy et al., 2009). In our sample dentistry students had completed more than double the clinical placement hours of other students; a factor previously associated with increased stress (Suresh et al., 2013), and this may explain their higher PS scores.

Unlike prior reports of high stress levels in nursing students, nurses in this study reported lower PS than pharmacy and dentistry students and did not differ from normative means. This may in part be due to the fact that the pre-registration programs across the cohorts are structured differently, and students would have been exposed to different factors known to influence stress, including varied assessment loads (Alzahem et al., 2011). This is consistent with Birks et al. (2009) who found that self-reported stress varied considerably across healthcare students from one administration to the next. Diverse academic demands of the programs may account for some of the variation between the disciplines in the current study. That chronic stress can have a harmful effect on health is well established (Ganster and Rosen, 2013). This is also the case for healthcare students. A significant negative correlation between PS and quality of life has been identified in pharmacy students (Marshall et al., 2008). In another study, dentistry students' depressive symptoms rose across the first to fifth semesters and quality of life decreased (Burger et al., 2016). The results of our study indicate that PS is a relevant concern for Australian healthcare students.

5.1. Study Limitations

This study is limited to a single survey at one time point with a group of pre-registration healthcare students and may not be generalizable to students in other contexts. The correlational nature of this study precludes causal attributions. It is possible that owing to the smaller sample of dentistry students compared to pharmacy and nursing, some analyses were underpowered.

5. Conclusions

Consistent with prior literature, this study has confirmed an inverse relationship between EI and stress in healthcare students, but there were differences between disciplines with dentistry students displaying this link only weakly. Further work, including qualitative research, is needed to explain the mechanisms by which EI and stress are linked in these groups. In particular, the nature of the relationship between EI and acute stress requires further examination on causal factors. EI has a protective effect against stress and can be increased via targeted educational interventions. There is a clear need for pre-registration healthcare curricula to include educational components focused on strengthening EI. The need for university student counselling services and stress management support is also indicated. Future research is needed to investigate EI, stress, and wellbeing outcomes for students with/out an evidence-based intervention to increase EI.

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References

Abu-Ghazaleh, S.B., Rajab, L.D., Sonbol, H.N., 2011. Psychological stress among dental students at the University of Jordan. J. Dent. Educ. 75 (8), 1107–1114.

Alzahem, A., Van der Molen, H., Alaujan, A., Schmidt, H., Zamakhshary, M., 2011. Stress amongst dental students: a systematic review. Eur. J. Dent. Educ. 15 (1), 8–18.

Amith, H., D'Cruz, A.M., Srivastav, T., Soumya, R., Sony, B., Thomas, S.P., 2012. Perceived sources and coping mechanisms of stress among undergraduate Indian dental students. SRM J. Res. Dent. Sci. 3 (3), 180. http://dx.doi.org/10.4103/0976-433X.107398.

Adams, A., McCabe, K., Zundel, C., Price, T., Dahl, C., 2011. Perceived emotional aptitude of clinical laboratory sciences students compared to students in other healthcare profession majors. Clin. Lab. Sci. 24 (3), 167–171.

Azimi, S., AsgharNejad Farid, A., Kharazi Fard, M., Khoei, N., 2010. Emotional intelligence of dental students and patient satisfaction. Eur. J. Dent. Educ. 14 (3), 129–132.

Batool, B.F., 2013. Emotional intelligence and effective leadership. J. Bus. Stud. Q. 4 (3), 84–94.

Beauvais, A.M., Brady, N., O'Shea, E.R., Griffin, M.T.Q., 2011. Emotional intelligence and nursing performance among nursing students. Nurse Educ. Today 31 (4), 396–401. http://dx.doi.org/10.1016/j.nedt.2010.07.013.

Berger, J., Polivka, B., Smoot, E.A., Owens, H., 2015. Compassion fatigue in pediatric

nurses. J. Pediatr. Nurs. 30 (6), e11-e17.
Birks, Y., McKendree, J., Watt, I., 2009. Emotional intelligence and perceived stress in healthcare students: a multi-institutional, multi-professional survey. BMC Med. Educ. 9 (1), 1–8. http://dx.doi.org/10.1186/1472-6920-9-61.
Burger, P.H.M., Neumann, C., Ropohl, A., Paulsen, F., Scholz, M., 2016. Development of depression and deterioration in quality of life in German dental medical students in preclinical semesters. Ann. Anat. Anat. Anz. 208, 183–186. http://dx.doi.org/10.1016/j.aanat.2016.05.011.
Cohen, J., 1988. Statistical Power Analysis for the Behavioral Sciences, 2 ed. Lawrence Earlbaum Associates, Hillsdale, NJ.
Cohen, S., Kamarck, T., Mermelstein, R., 1983. A global measure of perceieved stress. J. Health Soc. Behav. 24.
Divaris, K., Polychronopoulou, A., Villa-Torres, L., Mafla, A.C., Moya, G.A., González-Martínez, F., ... Duque-Restrepo, L.M., 2014. Extracurricular factors influence perceived stress in a large cohort of Colombian dental students. J. Dent. Educ. 78 (2), 213–225.
Foster, K., McCloughen, A., Delgado, C., Kefalas, C., Harkness, E., 2015. Emotional intelligence education in pre-registration nursing programmes: an integrative review. Nurse Educ. Today 35 (3), 510–517. http://dx.doi.org/10.1016/j.nedt.2014.11.009.
Ganster, D.C., Rosen, C.C., 2013. Work stress and employee health. J. Manag. 39 (5), 1085–1122. http://dx.doi.org/10.1177/0149206313475815.
Geslani, G.P., Gaebelein, C.J., 2013. Perceived stress, stressors, and mental distress among doctor of pharmacy students. Soc. Behav. Personal. Int. J. 41 (9), 1457–1468. http://dx.doi.org/10.2224/sbp.2013.41.9.1457.
Gignac, G., 2008. Genos Emotional Intelligence Inventory: Technical Manual. GENOS, Sydney, NSW.
Gignac, G., 2010. Seven-factor model of emotional intelligence as measured by GENOS EI. Eur. J. Psychol. Assess. 26 (4), 309–316. http://dx.doi.org/10.1027/1015-5759/a000041.
Görgens-Ekermans, G., Brand, T., 2012. Emotional intelligence as a moderator in the stress–burnout relationship: a questionnaire study on nurses. J. Clin. Nurs. 21 (15–16), 2275–2285.
Holston, E.C., Taylor, J.Y., 2016. Emotional intelligence in nursing students. Int. J. Adv. Psychol. 5, 11–22. http://dx.doi.org/10.14355/ijap.2016.05.003.
Hur, W.-M., Moon, T.-W., Han, S.-J., 2014. The role of chronological age and work experience on emotional labor. Career Dev. Int. 19 (7), 734–754. http://dx.doi.org/10.1108/cdi-12-2013-0162.
Hurley, J., 2008. The necessity, barriers and ways forward to meet user-based needs for emotionally intelligent nurses. J. Psychiatr. Ment. Health Nurs. 15 (5), 379–385.
Hurley, J., Rankin, R., 2008. As mental health nursing roles expand, is education expanding mental health nurses? An emotionally intelligent view towards preparation for psychological therapies and relatedness. Nurs. Inq. 15 (3), 199–205.
Ito, S., Fujita, S., Seto, K., Kitazawa, T., Matsumoto, K., Hasegawa, T., 2014. Occupational stress among healthcare workers in Japan. Work 49 (2), 225–234.
Leahy, C.M., Peterson, R.F., Wilson, I.G., Newbury, J.W., Tonkin, A.L., Turnbull, D., 2010. Distress Levels and Self-Reported Treatment Rates for Medicine, Law, Psychology and Mechanical Engineering Tertiary Students: Cross-Sectional Study. Aust. N. Z. J. Psychiatry 44 (7), 608–615. http://dx.doi.org/10.3109/00048671003649052.
MacDonald, D.E., Wong, E., Dionne, M.M., 2015. Correlational designs. In: The Encyclopedia of CLinical Psychology. Wiley Online Library, pp. 1–6. http://dx.doi.org/10.1002/9781118625392.wbecp401.
Magnano, P., Craparo, G., Paolillo, A., 2016. Resiliencia e Inteligencia Emocional: qué rol tienen en la motivación al logro. Int. J. Psychol. Res. 9 (1), 9–20. Retrieved May 15, 2017, from. http://www.scielo.org.co/scielo.php?script=sci_arttext&pid=S2011-20842016000100002&lng=en&tlng=es.
Marshall, L.L., Allison, A., Nykamp, D., Lanke, S., 2008. Perceived stress and quality of life among doctor of pharmacy students. Am. J. Pharm. Educ. 72 (6).
Marvos, C., Hale, F., 2015. Emotional intelligence and clinical performance/retention of nursing students. Asia-Pac. J. Oncol. Nurs. 2 (2), 63–71. http://dx.doi.org/10.4103/2347-5625.157569.
Mayer, J.D., Salovey, P., 1997. What is emotional intelligence? In: Salovey, P., Sluyter, D. (Eds.), Emotional Development and Emotional Intelligence: Implications for Educators. Basic Books, New York, pp. 3–31.
McCloughen, A., Foster, K., 2017. Nursing and pharmacy students' use of emotionally intelligent behaviours to manage challenging interpersonal situations with staff during clinical placement: a qualitative study. J. Clin. Nurs. http://dx.doi.org/10.1111/jocn.13865.
McHugh, M.D., Kutney-Lee, A., Cimiotti, J.P., Sloane, D.M., Aiken, L.H., 2011. Nurses' widespread job dissatisfaction, burnout, and frustration with health benefits signal problems for patient care. Health Aff. 30 (2), 202–210.
Montasem, A., Brown, S.L., Harris, R., 2013. Do core self-evaluations and trait emotional intelligence predict subjective well-being in dental students? J. Appl. Soc. Psychol. 43 (5), 1097–1103. http://dx.doi.org/10.1111/jasp.12074.
Moss-Racusin, C.A., Dovidio, J.F., Brescoll, V.L., Graham, M.J., Handelsman, J., 2012. Science faculty's subtle gender biases favor male students. Proc. Natl. Acad. Sci. U. S. A. 109 (41), 16474–16479. http://dx.doi.org/10.1073/pnas.1211286109.
Murphy, R.J., Gray, S.A., Sterling, G., Reeves, K., DuCette, J., 2009. A comparative study of professional student stress. J. Dent. Educ. 73 (3), 328–337.
Norman, G.R., Sloan, J.A., Wyrwich, K.W., 2003. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. Med. Care 41 (5), 582–592.
Othman, C.N., Yusof, M.S.B., Din, A.M., Zakaria, L.A., 2016. Emotional intelligence and personality traits in relation to psychological health among pharmacy students in Malaysia. Proc.-Soc. Behav. Sci. 222, 253–262.
Pau, A., Rowland, M.L., Naidoo, S., AbdulKadir, R., Makrynika, E., Moraru, R., ... Croucher, R., 2007. Emotional intelligence and perceived stress in dental undergraduates: a multinational survey. J. Dent. Educ. 71 (2), 197–204.
Pöhlmann, K., Jonas, I., Ruf, S., Harzer, W., 2005. Stress, burnout and health in the clinical period of dental education. Eur. J. Dent. Educ. 9 (2), 78–84. http://dx.doi.org/10.1111/j.1600-0579.2004.00359.x.
Polychronopoulou, A., Divaris, K., 2010. A longitudinal study of Greek dental students' perceived sources of stress. J. Dent. Educ. 74 (5), 524–530.
Por, J., Barriball, L., Fitzpatrick, J., Roberts, J., 2011. Emotional intelligence: its relationship to stress, coping, well-being and professional performance in nursing students. Nurse Educ. Today 31 (8), 855–860. http://dx.doi.org/10.1016/j.nedt.2010.12.023.
Pryjmachuk, S., Richards, D.A., 2007. Predicting stress in pre-registration nursing students. Br. J. Health Psychol. 12. http://dx.doi.org/10.1348/135910706x98524.
Quoidbach, J., Hansenne, M., 2009. The impact of trait emotional intelligence on nursing team performance and cohesiveness. J. Prof. Nurs. 25 (1), 23–29. http://dx.doi.org/10.1016/j.profnurs.2007.12.002.
Rankin, B., 2013. Emotional intelligence: enhancing values-based practice and compassionate care in nursing. J. Adv. Nurs. 69 (12), 2717–2725.
Ravichandra, K., Ravi, G., Kandregula, C.R., Vundavalli, S., Srikanth, K., Lakhotia, D., 2015. Emotional intelligence among dental undergraduate students: an indispensable and ignored aspect in dentistry. J. Int. Oral Health JIOH 7 (4), 69.
Roberts, R.D., Schulze, R., MacCann, C., 2008. The measurement of emotional intelligence: A decade of progress. In: Boyle, G., Matthews, G., Saklofske, D. (Eds.), The Sage Handbook of Personality Theory and Assessment. Vol. 2. Sage, New York, pp. 461–482.
Scheibe, S., Carstensen, L.L., 2010. Emotional aging: recent findings and future trends. J. Gerontol. Ser. B Psychol. Sci. Soc. Sci. 65B (2), 135–144. http://dx.doi.org/10.1093/geronb/gbp132.
Schneider, T.R., Lyons, J.B., Khazon, S., 2013. Emotional intelligence and resilience. Personal. Individ. Differ. 55 (8), 909–914. http://dx.doi.org/10.1016/j.paid.2013.07.460.
Suresh, P., Matthews, A., Coyne, I., 2013. Stress and stressors in the clinical environment: a comparative study of fourth-year student nurses and newly qualified general nurses in Ireland. J. Clin. Nurs. 22 (5–6), 770–779. http://dx.doi.org/10.1111/j.1365-2702.2012.04145.x.
Victoroff, K.Z., Boyatzis, R.E., 2013. What is the relationship between emotional intelligence and dental student clinical performance? J. Dent. Educ. 77 (4), 416–426.
Weinberg, A., Creed, F., 2000. Stress and psychiatric disorder in healthcare professionals and hospital staff. Lancet 355 (9203), 533–537. http://dx.doi.org/10.1016/S0140-6736(99)07366-3.
Yefei, W., Guangrong, X.I.E., Xilong, C.U.I., 2016. Effects of emotional intelligence and self-leadership on students' coping with stress. Soc. Behav. Personal. Int. J. 44 (5), 853–864. http://dx.doi.org/10.2224/sbp.2016.44.5.853.