Original article

Factors affecting self-efficacy and the effects of self-efficacy on academic achievements among medical and health sciences students at a Malaysian private university

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ABSTRACT

Background: Self-efficacy refers to ones' beliefs in his or her own ability to perform and complete novel tasks or to cope with adversity in challenging situations. It is an important aspect of the self-concept and has been linked to the one's academic achievement, life satisfaction and self-esteem. The present study aimed to investigate the interdisciplinary differences in general self-efficacy (GSE) among medical and health sciences students at SEGi University, Malaysia. The effects of demographic factors on GSE, as well as the effects of GSE on the students' academic achievements were also explored.

Materials & Methods: This was a cross-sectional study involved 86 medical, 81 dental and 64 optometry Year 1 and Year 2 students at a Malaysian private university. The General Self-

Efficacy Scale (GSES) was used to assess the GSE of the participants. Analysis of data was carried out using the Statistical Package for the Social Sciences (SPSS) software version 22. Analysis of Variance (ANOVA) and t-test were used for comparisons of means. Relationship between two continuous variables was determined using Pearson's correlation. A p value of <0.05 was considered statistically significant.

Results: Findings showed significant interdisciplinary differences in mean GSE scores among medical, dental and optometry students. Various demographic factors were observed to play a role in the GSE of the students. However, the GSE of high achievers and non-high achievers did not differ significantly.

Conclusions: Age, gender, nationality, family income and the type of course and accommodation of students were factors affecting the GSE, but GSE had no significant influence of the academic achievements of students.

Keywords: Self-efficacy; interdisciplinary differences; medical students; health sciences students; academic achievements

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Introduction

Perceived self-efficacy is defined as "people's beliefs about their capabilities to produce designated levels of performance that

exercise influence over events that affect their lives". According to Bandura, there are four sources of self-efficacy information: 1) mastery experience, 2) verbal persuasion, 3) vicarious experiences and 4) physiological states.[1] In the first, one's previous successes or failures shape one's beliefs about one's ability, whereas in the second, one is verbally persuaded concerning his or her competence by others. Thirdly, vicarious experiences allow one to build his or her beliefs through modelling influences by those similar to oneself. On the other hand, one's physiological states has been related to how one perceives one's personal capacity. For example, aches, fatigue and pain have been linked to physical inefficacy.[2]

Self-efficacy may be viewed as a double-edged sword as both its positive and negative effects have been reported. For instance, a meta-analysis based on 36 studies reported a positive and significant effect of self-efficacy on academic performance.[3] However, self-efficacy can sometimes lead to overconfidence. Moores and Chang[4] reported that a negative relationship was observed between self-efficacy and subsequent performance when overconfidence was taken into account. Besides, self-efficacy can also affect a person's thought patterns and behaviour. Low self-efficacy individuals tend to think that tasks are more difficult than they actually are, and thereby experience increased stress with poor task planning.[5]

Self-efficacy has been widely studied in the field of positive psychology. In one, study, self-efficacy of young adults significantly correlated to their life satisfaction (r=0.483,

p=0.000).[6] Although self-efficacy are not the same as self-esteem, they are closely related and are important aspects of the self-concept. Self-efficacy and self-worth have been viewed as two important factors of self-esteem and that they reinforce one another.[7] In one study investigating the relationship among loneliness, self-esteem and self-efficacy among college students, it was found that self-esteem was strongly correlated with self-efficacy (r =0.59, p <0.001). A negative and moderate correlation between loneliness and 1) self-esteem (r = -0.48, p <0.001) and 2) self-efficacy (r = -0.46, p <0 .001) was also observed in the same study.[8]

To this end, several studies have investigated the self-efficacy of medical students. However, these studies mainly relate to the students' self-efficacy to various learning activities such as problem-based learning, [9] knowledge and communication in adolescent medicine, [10] objective structured clinical examination (OSCE) performance.[11] Studies on the factors affecting medical students' self-efficacy are relatively few or lacking. There is also a scarcity of related research on optometry students, whereas a few sporadic studies reported the general self-efficacy of dental students.[12, 13]

Moreover, there are only a few comparative studies on the interdisciplinary differences in self-efficacy between medical and health sciences students in the published literature. [14, 15] Knowledge on the interdisciplinary differences in self-efficacy among medical and health sciences may be beneficial to the teachers and has practical significance as it is not uncommon that

the teachers often have to cross-teach various disciplines. Data generated from this study may help the teachers to adjust their teaching strategies based on these differences when dealing with students from different disciplines. This study, therefore, aimed to investigate the 1) interdisciplinary differences in the perceived general self-efficacy (GSE) among medical, dental and optometry students, 2) factors affecting their GSE, as well as 3) the effects of GSE on the students' academic performance.

Materials and Methods

Study design and sample size

This was a cross-sectional study carried out on preclinical (Year 1 and Year 2) medical and dental, as well as Year 1 and Year 2 optometry students at a Malaysian private university. A total of 231 students (86 medical, 81 dental and 64 optometry) took part in the study.

Study instrument

The General Self-efficacy Scale (GSES) [16] was used to determine the participant's perception of his or her ability to perform various tasks. The instrument has been validated in an earlier study.[17] The questionnaire has 10 items graded on 4-point Likert scale whereby 1 indicating 'definitely not true' and 4 indicating 'definitely true'. The GSE score ranges from 10 to 40, with a higher score indicating a higher self-efficacy. The participants were to provide information about their demographic data before attempting the questionnaire.

Permission and consent

Written permissions were obtained from the Deans of the Faculty of Medicine, Faculty of Dentistry and the Faculty of Optometry and Vision Sciences of the university in which the research was conducted. A written consent was obtained from voluntary participants from the three faculties before they attempted the questionnaires, which were anonymous and treated with confidentiality.

Statistical analysis

Analysis of data was carried out using the Statistical Package for the Social Sciences (SPSS) software version 22. Analysis of Variance (ANOVA) and t-test were used for comparisons of means. Relationship between two continuous variables was determined using Pearson's correlation. A p value of <0.05 was considered statistically significant.

RESULTS

Demographic data and response rate

The demographic data of the participants is summarised in Table 1. The overall response rate of the participant was 89.9%.

Table 1 Demographic data

Demographic data		Frequency
Age (year)	Min	17
	Max	25
	Mean	20.73
	SD	1.30
Gender (n, %)	Male	77 (33.3)
	Female	154 (66.7)
Race (n, %)	Malay	44 (19.0)
	Chinese	124 (53.7)
	Indian	25 (10.8)
	Other	38 (16.5)
Nationality (n, %)	Local	189 (81.8)
	International	42 (18.2)
Types of accommodation (n, %)	Staying with family	60 (26.0)
	On campus hostel	70 (30.3)
	Other	101 (43.7)
Household income (n, %)	Low income group	169 (73.2)
	High income group	55 (23.8)
	Unspecified	7 (3.0)
Academic achievements (n, %)	High achievers	103 (44.6)
	Non-high achievers	114 (49.4)
	Unspecified	14 (6.1)

Interdisciplinary differences in mean general self-efficacy scale (GSES) score among medical, dental and optometry students

The mean GSE scores of the students are summarised in Table 2. Overall, the mean GSE score for all students was 29.30 (*SD*=4.24). The medical students (*M*=31.28, *SD*=4.23) had the highest mean score. This was followed by the dental students (*M*=28.75, *SD*= 3.96) and the optometry students (*M*= 27.33, *SD*=3.45). Analysis of Variance (ANOVA) was statistically

significant [$F(2,228)=19.76$; $p=0.000$) when comparing the mean GSE scores of medical, dental and optometry students. The medical students scored significantly higher than the dental ($p=0.000$) and optometry students ($p=0.000$), whereas the dental students scored significantly higher than the optometry students ($p=0.000$) (Table 3).

Table 2 Mean GSES score of medical, dental and optometry students

Course	N	Mean	SD
Medical	86	31.28	4.23
Dental	81	28.75	3.96
Optometry	64	27.33	3.45
Overall	231	29.30	4.24

Table 3 Interdisciplinary differences in mean GSE scores

Discipline	Mean	SD	Discipline	Mean	SD	P value
Medical	31.28	4.23	Dental	28.75	3.96	0.000
Medical	31.28	4.23	Optometry	27.33	3.45	0.000
Dental	28.75	3.96	Optometry	27.33	3.45	0.000

Effects of demographic factors on self-efficacy

The demographic data of the students is summarised in Table 1 and the effects of various demographic factors on self-efficacy are summarised in Table 4. Age was observed to be weakly, positively and significantly correlated to the GSES score ($r=0.20$, $p=0.003$) whereas a significant gender difference was observed, with male students ($M=30.09$, $SD=4.54$) scoring significantly higher than female students ($M=28.90$, $SD=4.04$; $p=0.044$).

Nationality was also observed to play a role in the self-efficacy of the students, with the international students (*M*= 31.48, *SD*=4.48) demonstrated a higher mean GSES score than local students (*M*=28.81, *SD*=4.04), and the difference was statistically significant (*p*=0.001).

Table 4 Effects of demographic factors on self-efficacy

Age	**Correlation with GSE**			
	Pearson correlation	0.20		
	Significance (*p* value)	0.003		
		Mean	**SD**	**Significance (*p* value)**
Gender	Male	30.09	4.54	0.044
	Female	28.90	4.04	
Nationality	Local	28.81	4.04	0.001
	International	31.48	4.48	
Income	Lower income group	28.57	4.21	0.000
	Higher income group	31.47	3.74	
Accommodation	Staying with family	28.40	4.58	0.029
	Not staying with family/on campus	30.18	4.16	

The participants were divided into two income groups. Those in the higher income group had a monthly household

income >RM 5000 and those in the lower income group, <RM 5000. It was shown that those from the higher income group (*M*=31.47, *SD*=3.74) had a statistical significant higher mean GSES score than those from the lower income group (*M*=28.57, *SD*=4.21; *p*=0.000). ANOVA was significant (*F*(2,228)=4.12; *p*=0.017). When comparing the mean GSES scores among those who stayed with their families, those who stayed on campus and those whose accommodation were not staying with family or on campus, Post-hoc analysis showed that students who stayed with their families reported a statistical significant lower mean GSES score (*M*=28.40, *SD*= 4.58) than those students who were not staying with their families or on campus (*M*=30.18, *SD*= 4.16; *p*=0.029).

Effects of self-efficacy on academic achievements

The students were divided into two main groups according to their academic achievements. The high achievers refer to those who score the highest grades among their peers. It was shown that the high achievers had a higher mean GSES score (*M*=29.74, *SD*=4.12) than the non-high achievers (*M*=29.05, *SD*=4.32). However the difference was statistically not significant (*p*=0.234).

Table 5 Effects of self-efficacy on academic achievements

		Mean	**SD**	**Significance (*p* value)**
Academic achievements	High achievers	29.74	4.12	0.234
	Non-high achievers	29.05	4.32	

Discussion

Medical students in this study had a significant higher mean GSES score than the dental and optometry students, which contradicted the findings reported by Aboalshamat, Hou and Strodl,[14] in which there was no statistically significant difference in mean GSES scores between medical and dental students. However, interdisciplinary differences in the mean GSES score were observed in another study comparing medical, midwifery and nursing students, with the medical students scoring lower than midwifery students and higher than nursing students.[15] A probable explanation for the medical and dental students having a higher mean GSES score than that of the optometry students is that the medical and dental programs have higher entry requirements when compared to the optometry program. Hence, students of different self-efficacy levels might have been selected into the respectively programs. On the other hand, even though both the medical and dental programs have similar entry requirements, the nature of the programs are somewhat different. Hence, the difference in the mean GSES score between the medical and dental students may be due a difference in the characteristics and personalities of students that were being recruited into each program.

Age was found to play a role in the GSES score of medical and health sciences students in this study in which a weak, positive, and significant relationship existed between the two (r=0.20, p=0.003). This coincides with findings from a study conducted on student nurses, which reported a weak, positive and significant correlation between age and self-efficacy (r=0.233,

$p<0.01$).[18] Other than age, gender also played a role in the GSES scores of the students, with the male students scoring significantly higher than the female students. This finding is in tandem with previous studies as gender differences in self-efficacy have been commonly reported in the published literature with a male dominance in self-efficacy scores. [15, 19] It has been suggested that gender differences in self-efficacy may be due to the personality types of the students. This is because the relationship between gender and self-efficacy may not be a direct one as research has shown that gender-personality interactions play a role in gender differences in self-efficacy.[20]

Interestingly, international students demonstrated a significantly higher mean GSES score than the local students, whereas those who were not staying on campus or with their families scored higher than those staying with their families. There is a scarcity of research on the effects of nationality and accommodation on GSE of university students. Hence, it is difficult to compare findings of the current study with a previous study. One possible explanation for the observed findings is that the international students, as well as those not staying with their families or on campus are required to be more independent and self-reliant in their daily lives, which may, in turn, contribute a higher self-efficacy.

The family income of the students in this study also had a significant effect on the mean GSES scores. Those from the higher income group had a significantly higher mean score than those from the lower income group. This finding is in tandem with those from a study conducted on Chinese college students, in

which college students of low socioeconomic status scored significantly lower than their peers on general self-efficacy and subjective well-being.[21] However, another study by Çakar[6] reported no significant differences in self-efficacy and life satisfaction when comparing young adults from different levels of income (p>0.05). The influence of family income on self-efficacy may be explained by the fact that the expectations of others on the students from the higher income group and those from the lower income groups are different. This is because one's self-efficacy can be affected by the verbal persuasion of others concerning his or her competence[1].

Previous research has shown that self-efficacy is related to academic achievements,[3, 11, 19] with some studies reported a reciprocal relationship between the two. [22, 23] The finding from the present study, however, contradicts those from these studies. Although the high achievers scored higher in the mean GSES score when compared to the non-high achiever, the difference was statistically not significant. This is in tandem with findings of another study, which demonstrated a close to zero correlation between self-efficacy and observed communication skills rated by experts among medical students and young physicians. [24]

The findings generated from this study have practical implications. Knowing that there exist interdisciplinary differences in self-efficacy, the teachers who cross-teach the various disciplines can adjust their teaching strategies accordingly. Since age has been identified as a factor influencing the self-efficacy of the students, perhaps the teachers can also

adapt their teaching strategies for students in different years of study. Interventional measures such as giving frequent, focussed feedback, may be applied to the students with low self-efficacy.

Conclusions

This study concludes that 1) interdisciplinary differences existed among medical, dental and optometry students, 2) age, gender, nationality and the type of accommodation had an influence on the general self-efficacy of the students and 3) general self-efficacy had no significant effects on the students' academic achievements. As this study was limited to a small sample size and only Year 1 and Year 2 students, future research should include a bigger sample size. It should also include students from different levels of study from the beginning to the end of the course to determine if self-efficacy changes over time given the significant relationship with age observed in the present study.

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