World Journal of Educational Research
ISSN 2375-9771 (Print) ISSN 2333-5998 (Online)
Vol. 7, No. 2, 2020
www.scholink.org/ojs/index.php/wjer

Original Paper

The Relationship between Motivation and Academic Performance in Chiropractic Students

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Received: March 26, 2020 Accepted: April 22, 2020 Online Published: April 26, 2020

doi:10.22158/wjer.v7n2p50 URL: http://dx.doi.org/10.22158/wjer.v7n2p50

Abstract

This study aimed to investigate the relationship between motivation and academic performance in chiropractic students. This was a cross-sectional study. Three hundred and sixty-two students were recruited from the 1st and 3rd quarters during the 2017-2018 academic year. Out of 362 students, 305 completed the Inventory of School Motivation (ISM). Total scores from the 1st quarter General Anatomy course and the 3rd quarter Immunology/Endocrinology course were used to measure the 1st quarter and 3rd quarter academic performance, respectively. The mean total motivation score for all students was 28.40 ± 3.79 (mean ± SD). There was no significant difference in total motivation score between students in the two quarters ($p > .05$). The mean of the 1st quarter praise scores was statistically significantly higher than those of the 3rd quarter ($p < .05$). The means of three motivation subscale scores for females were significantly higher than that for males (task, effort, and praise, $p < .05$) while the mean competition score for males was significantly higher than that for females ($p < .01$). The linear analysis demonstrated a weak but statistically significant correlation of task ($r = .11$, $p < .05$) and effort ($r = .13$, $p < .05$) with academic performance indicating that task and effort were minor predictors of academic outcome ($p < .05$).There was a weak, but statistically significant positive correlation between the three motivation subscales and academic performance. Female students scored significantly higher on three motivation subscales while males scored higher on one.

Keywords

chiropractic, education, performance, motivation, learning

1. Introduction

There are four factors that affect motivation: situation, mood, goal, and tool (Yousefy et al., 2012). Humans require sufficient motivation to accomplish their goals, needs, and instincts. Academic motivation is particularly important to students. Only with adequate motivation and stimulation can students successfully complete their assignments, achieve goals, or a certain degree of qualification in their professions (Mohamadi, 2006).

Motivation is multidimensional and highly correlated with learning as well as academic accomplishments (Mohamadi, 2006). There are various definitions of motivation depending on the literature. Educational motivation, in particular, is a three-dimensional concept encompassing one's beliefs about his or abilities, intentions, and emotional responses (Hassanzadeh & Amuee, 2001). Experts have also made distinctions between intrinsic and extrinsic motivation. An individual is influenced by both intrinsic motivation which provides the incentive for completing a task as well as extrinsic motivation that drives one to undertake a specific activity (Mohamadi, 2006).

Many studies have identified motivation to be highly influential in learning and academic success (Vansteenkiste et al., 2004, 2005; Hustinx et al., 2009; Almalki, 2019). Higher motivation (Moulaert et al. 2004), specifically higher intrinsic motivation (Sobral, 2004), has been found to correlate with better academic outcomes in both pre-clinical (Sobral, 2004) and clinical years. In one study, researchers found that motivation was a significant predictor of performance (Webb et al., 1997). In another study conducted by Hoschl and Kozeny, it was found that the strength of motivation is predictive of GPA in the third year, but not the first 2 years, of medical study (Hoschl & Kozeny, 1997). In tutorial groups, productivity was significantly higher in the groups comprised of students with higher motivation when compared to those with lower motivation (Dolmans et al., 1998; Carlo et al., 2003). However, there are studies that have failed to find a meaningful relationship between the two. A Netherlands based study, for example, found no significant correlation between motivation and academic success (Hulsman et al., 2007). Neither extrinsic nor intrinsic motivation was significantly correlated with academic performance in a second study conducted in the UK (Popovic, 2010).

The importance of motivation in learning behavior and education is well-researched and proven in general education and some medical schools, but much less so in chiropractic education. In this study, we examine the relationship between the indicators of academic motivation and academic performance in our chiropractic training program. We hypothesized that: 1) there were differences in the motivation scales among demographic categories such as gender, age, ethnicity, marital status, presence or absence of children, and undergraduate major, 2) there was a positive relationship between academic motivation, as measured by task, effort, complication, social power, affiliation, social concern, praise, and token, and the academic performance of chiropractic students, and 3) the motivation subscales, alone or in combination, would predict student academic outcome.

2. Materials and Method

2.1 Student Participants

The study protocol was reviewed and approved by the Institutional Review Board.

Three hundred and sixty-two (237 1st quarter and 125 3rd quarter) students in 2017 fall, 2018 summer, and 2018 fall classes participated in this cross-sectional study. The participants were grouped into two cohorts based on their academic term. The cohort 1 included the 1st quarter students enrolled in an Anatomy course and cohort 2 included the 3rd quarter students enrolled in a Physiology course as part of a 13-quarter chiropractic training program. The participants in two cohorts were required to complete the Inventory of School Motivation (ISM) (Ali & McInerney, 2005) and a 6-item demographic survey during the 9th week of the term. Students unwilling to participate and those with incomplete questionnaires were excluded from the study.

2.2 Instrument

The instrument utilized in this study was the Inventory of School Motivation (ISM) proposed by Ali and McInerney (Ali & McInerney, 2005). The ISM consists of 43 questions in Likert 5-point scale. For each question, there are five choices ranging from strongly disagree to strongly agree (rated 1–5). The inventory investigates eight dimensions, namely task (4 items), effort (7 items), competition (6 items), social power (6 items), affiliation (3 items), social concern (5 items), praise (5 items), and token (7 items). The responses were coded so that higher scores represented higher motivation. The reliability of the tool had been validated by several past studies (McInerney & Sinclair, 1991, 1992; McInerney et al., 1997; McInerney et al., 2001) as well as Cronbach's α estimates vary from 0.67 to 0.82 (mean = 0.76) (McInerney & Sinclair, 1991).

2.3 Academic Performance Assessment

Total scores from the cohort 1 General Anatomy course and the cohort 2 Immunology/Endocrinology course, based on a 100% scale, were collected from their respective course directors.

2.4 Data Analysis

Data were analyzed using SPSS version 22 (IBM, Chicago). Statistical test assumptions were verified and standardized effect sizes as well as the 95% confidence levels were calculated. Study hypotheses were evaluated at a .05 family-wise alpha level.

One-way analysis of variance (ANOVA) and independent *t*-test were utilized to explore statistical differences in the motivation subscale scores among demographic categories. Two demographic variables, age and undergraduate major, were coded into categories for the purposes of analysis of variance between categories. Age was divided into 1) less than 30 years old, 2) 30 years old or older. Undergraduate majors were categorized into 7 areas: 1) biological or life sciences, which included biology, zoology, physiology, etc.; 2) biochemistry and chemistry; 3) mathematics, engineering, and computer science; 4) social sciences, such as psychology and anthropology; 5) language, humanities, arts, and religion; 6) business; and 7) other. (Hypothesis 1)

Pearson's correlation was used to identify the association between subscales and academic performance.

(Hypothesis 2)

A multiple linear regression was performed to analyze the motivation subscales, alone or in combination, as predictors of academic performance. (Hypothesis 3)

3. Results

3.1 Demographic Information

Demographic data are summarized in Table 1. A number of 305 of 362 total students in both cohorts completed and returned the questionnaire; giving an overall response rate of 84%. In our sample, there was a slightly greater number of males. Marital status, age, and ethnicity were skewed substantially in favor of single, less than 30 years of age, and Caucasians, respectively. This sample of convenience included 139 females and 166 males, with ages ranging from 20 to 50 years (24.59 ± 3.91 years, mean ± SD).

Table 1. Demographic Data for All Students (n = 305)

Demographics	Group	N (%)
Gender	Male	166 (54)
	Female	139 (46)
Age, years	<30	278 (91)
	≥30	27 (9)
Ethnicity	Caucasian	218 (71)
	Hispanic	38 (13)
	African American	17 (6)
	Other	32 (10)
Marital Status	Married	43 (14)
	Single	262 (86)
Children	Presence	27 (9)
	Absence	278 (91)
Undergraduate major	Biology science	101 (33.1)
	Chemistry	2 (0.7)
	Math/engineering/computer science	4 (1.3)
	Social science	11 (3.6)
	Language/humanities/art/religion	6 (2.0)
	Other health professions	105 (34.4)
	Business	17 (5.6)
	Other	19.3)

3.2 Motivation Assessment

The mean total motivation score for all students was 28.40 ± 3.79 (mean ± SD). There was no significant difference in total motivation score between students in two cohorts (mean ± SD [cohort 1] = 28.86 ± 3.91; mean ± SD [cohort 2] = 27.98 ± 3.58, p =.13). The mean and SD of all students for eight motivation subscales were as following: task (4.66 ± .50), effort (4.35 ± .55), competition (3.24 ± .95), social power (2.69 ± 1.01), affiliation (3.40 ± .93), social concern (4.17 ± .68), praise (3.36 ± .96), and token (2.53 ± .92). Only the mean praise scores of cohort 1 was statistically significantly higher than those of cohort 2 (see Table 2).

Table 2. Comparison of the Motivation Subscale Scores between Two Quarters (n = 305)

Subscale of motivation	Cohorts		*p* value
	1 (mean ± SD)	2 (mean ± SD)	
Task	4.67 ± .47	4.66 ± .56	.13
Effort	4.37 ± .58	4.32 ± .51	.86
Competition	3.25 ± .96	3.21 ± .92	.73
Social power	2.76 ± 1.11	2.59 ± .83	.17
Affiliation	3.41 ± .94	3.37 ± .91	.71
Social concern	4.17 ± .69	4.17 ± .67	.97
Praise	3.45 ± .94	3.21 ± .97	.04*
Token	2.58 ± .96	2.44 ± .85	.19

*$p < .05$

3.2 Hypothesis Testing

Hypothesis 1: The means of three motivation subscale scores for females were significantly higher than those for males (task: 4.73 ± .35 vs. 4.59 ± .59, p = .01, effort: 4.43 ± .51 vs. 4.25 ± .56, p = .01, and praise: 3.48 ± .90, p = .03) while the mean "competition" score for males (3.38 ± .89) was significantly higher than that for females (3.05 ± .98, p = .002).

No statistically significant differences were found based upon age, ethnicity, marital status, undergraduate major, and children for motivation subscales.

Hypothesis 2: The eight motivation subscales as a group (total motivation score) did not relate statistically to academic performance. Academic performance had the strongest correlation with "effort" and the weakest correlation with "social concern". The linear analysis showed a weaker, but statistically significant, correlation of "task" (r = .11, p = .04) and "effort" (r = .13, p = .02) with academic performance was observed (Table 3).

Table 3. Correlation Coefficient between Academic Performance and the Subscales of Motivation (n = 305)

Variable	1	2	3	4	5	6	7	8	9
1. Achievement	-	.11*	.13*	.09	.10	-.06	-.04	-.05	-.06
2. Task		-	.52**	.08	.003	.21**	.31**	.08	.003
3. Effort			-	.11	.15**	.21**	.41**	.14*	.06
4. Competition				-	.54**	.14*	-.03	.27**	.36**
5. Social power					-	.12*	.03	.34**	.39**
6. Affiliation						-	.38**	.29**	.28**
7. Social concern							-	.29**	.17**
8. Parise								-	.51**
9. Token									-

*$p < .05$, 2-tailed; ** $p < .01$, 2-tailed.

Hypothesis 3: Effort and task were two minor albeit statistically significant predictors of the academic performance ($p < .05$). In the first step, effort explained 1.7 percent of changes in academic performance. In the second step, by adding the subscale of task, an aggregate of 2.0 percent of the changes in academic performance were significantly predicted (Table 4).

Table 4. Multiple Regression for Motivation Components Predicting Academic Achievement (n = 305)

Variable	B	SE	95% CI	β	*p* (2-Tailed)
Step 1					
Constant	78.92	2.97	-		.000
Effort	1.56	.67	.23 to 2.90	.13	.021
Step 2					
Constant	76.82	3.74			.000
Effort	1.18	.79	-.37 to 2.74	.10	.137
Task	.80	.87	-.91 to 2.52	.06	.355

Step 1, R^2=.017; Step 2, R^2=.02.

4. Discussion

The primary purpose of this study was to test the relationship between motivation and academic performance in chiropractic students. In the present study we measured learning motivation using the Inventory of School Motivation (ISM) (McInerney & Sinclair, 1991). The ISM was designed to describe motivational characteristics of individuals and groups, to examine similarities and differences

between groups, and to explain outcome variables such as performance. It measures four types of achievement goals: mastery (task and effort), performance (competition and social power), social (affiliation and social concern), and extrinsic goals (praise and token) (McInerney & Sinclair, 1991).

In this study, "effort" and "tasks" were used to measure one type of achievement goal, namely mastery. Our results demonstrated that "effort" and "task" have a weak, but statistically significant, correlation with academic performance. These findings were generally consistent with reports by others. For example, Sulimon and McInerney (2003) found that task and effort goal was a strong predictor of science and English achievements in Lebanese students and non-Lebanese students alike living in Australia, however, social power, competition, social concern, praise and token goals in both groups were not (Sulimon & McInerney, 2003). Broussard (2002) also stated that higher levels of mastery motivation were found to be related to high achievement in first and third graders (Broussard, 2002). Similarly, McInerney and Sinclair (1991) showed that mastery goals were the strongest predictors of intention to complete high school education among all groups including Aboriginal, migrant, and Anglo Australians (McInerney & Sinclair, 1991). In another study, McInerney (2008) found that mastery goals were positively associated with well-being in school, while performance, social, and extrinsic goals were not significantly correlated with well-being (McInerney, 2008). Our result was also partial in accordance with a study by Ali (2005) which showed that effort was a consistent positive predictor for GPA and English achievement for most groups in their study (Ali & McInerney, 2005). In Bernardo's study (2008), both mastery and performance goals were positively associated with academic achievement, personal performance standards, and parent-oriented achievement motivation (Bernardo, 2008).

Contrary to our expectations, besides effort and tasks, none of other motivation subscales were significantly correlated to academic performance; therefore, they might not be good predictors for academic performance. It is possible that students' academic performance could also relate to other attributes such as the quality of teaching and assessment used across a range of subjects in which a student might have variable interest.

In the current study, we also looked at the differences in motivation scores stratified by the demographic categories, including age, gender, ethnicity, marital status, children, and undergraduate major, etc. Unexpectedly, with the exception of gender, no differences were found in other demographic categories. With regards to gender differences, our results suggested that female motivation scores were significantly higher on three subscales (task, effort, and praise) in comparison to the scores of their counterparts ($p < .05$) while only the competition scores for males was significantly higher than that for females ($p < .01$). We examined past literatures that investigated the gender differences in motivation and the results were inconclusive. A study by Yousefy and colleagues found that task and competition motivation for boys was higher than that for girls (Yousefy et al., 2012). However, Ayub (2010) and Vallerand et al. (1992) noted in their study that females had higher motivation than males. A third Turkey-based study revealed that both extrinsic motivation level and

intrinsic motivation level of male undergraduates were higher than those of female undergraduates. Greene et al. (1999) also found few evidences of gender differences in reported goal orientations. Findings indicated greater tendency for males than females in required coursed to focus on performance goals, while females in elective courses were more likely than males to focus on learning goals. Lastly, a study conducted by Ariogul (2009) showed no significant differences in academic motivation between male and female pre-service English teachers. The discrepancy of the gender in motivation may indicate that gender may play a less critical role in determining motivation.

As mentioned above, the result of the current study revealed that although "mastery" was a weak but positive predictor for academic performance. Some researchers explained that the achievement motivation theory related motivation to competence and classify goal orientation as either mastery or performance (Perrot et al., 2001). Performance-oriented students like to be praised or rewarded for demonstrating their competence or ability. These students will likely choose easy tasks in order to ensure success. On the other hand, mastery-oriented students choose to become more competent by engaging in new content. These students are more likely to choose challenging assignments and are willing to make mistakes in order to increase their knowledge (Archer, 1994; Elliot and Dweck, 1988). Mastery-oriented students demonstrate the skills required for life-long learning (Perrot et al., 2001). Chiropractic students should be motivated to develop the same life-long learning habits if they are to maintain professional competence as practitioners. Medical knowledge is evolving at a fast pace and students should engage in continuing education throughout their careers. Chiropractic education, like any other professional school, should help students develop such skills to become life-long learners.

5. Conclusion

Academic performance is related to some, but not all, factors of motivation. This study revealed a weak, but statistically significant positive correlation between the three motivation subscales and academic performance, as well as the gender difference. Understanding motivational factors may aid instructors to more efficiently guide students to becoming lifelong learners. Understanding motivational factors may aid students' academic performance.

Acknowledgement

We thank Ruina He, MMed. for comments that greatly improved the manuscript.

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