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An International Comparison Study of Pharmacy Students' Achievement Goals and their Relationship to Assessment Type and Scores.

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Objectives: To 1) identify pharmacy students' preferred achievement goals in a multi-national undergraduate population; 2) investigate achievement goal preferences across comparable degree programs; 3) identify the relationships between achievement goals, academic performance and assessment type.

Methods: The Achievement Goal Questionnaire was administered to second year students in four universities in Australia, New Zealand, England and Wales. Academic performance was measured using total scores, multiple choice questions (MCQ) and written answers (short essay).

Results: A total of 486 second year students participated. Students showed an overall preference for the Mastery-Approach goal orientation across all sites. The predicted relationships between goal orientation and MCQ, and written answers scores, were statistically significant.

Conclusion: This study is the first of its kind to examine pharmacy students' achievement goals at a multi-national level, and to differentiate between assessment type and measures of achievement motivation. Students adopting a Mastery-Approach goal are more likely to gain high scores in assessments that measure understanding and depth of knowledge.

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INTRODUCTION

The quality of student learning and motivation is of great interest to tertiary educators, and considerable effort is currently devoted to evaluating that quality, and seeking ways to enhance it. Research that seeks to understand the relationships between student motivation and their academic performance is essential to this endeavor.

Achievement goal theory has been an important framework used to study undergraduate students' motivation. Achievement goal theorists posit that students pursue one of two broad types of goals when they face any academic activity. They either try to understand this activity as much as possible (mastery goal) or they try to compete with each other (performance goal).¹ Gaining competence is the main reason for pursuing either goal.² Competence is viewed differently by students depending on their goal orientations. Students who adopt the mastery goal believe that competence can be gained by understanding the task at hand as thoroughly as possible and seeking help when they need it.³ They use self-referential standards to differentiate between success and failure.³ Students who adopt a performance goal, on the other hand, believe competence is gained by outperforming their peers and appearing talented in front of their teachers.⁴ These students adopt their teachers' standards of success and failure.⁵

These two types of achievement goals are further subdivided into four types: (1) mastery-approach (M-AP), where the individual is motivated to learn or improve skills; (2) mastery-avoidance (M-AV), where the individual is motivated to avoid learning failures or declines in skill; (3) performance-approach (P-AP), where the individual is motivated to outperform others; and (4) performance-avoidance (P-AV), where the individual is motivated to avoid doing worse than others.^{6,7}

Research conducted with undergraduate students from disciplines such as psychology, sociology, business, biology and art has investigated the impact of achievement goals on students' interest in academic activities, academic achievement (for example, scores), anxiety, surface learning

(for example, memorizing), and help seeking.^{4, 8, 9} The results regarding M-AV and P-AV are consistent in terms of their negative effects on students, such as poor scores, low interest in the subject, anxiety, and cheating.¹⁰⁻¹²

In contrast, the M-AP goal has been linked to many positive attributes, such as deep learning strategies,¹³ high interest in the subject,¹⁴ and seeking help when needed.¹⁵ From the teacher's perspective, this goal orientation is highly valued. Despite these positive effects, however, empirical research has to date found no significant relationships between this goal and academic achievement.⁴ Adopting a P-AP has been linked to mixed outcomes. For example, students who adopt this goal have been found to use surface learning strategies such as memorization and to be more anxious.¹⁶⁻¹⁸ Other studies have found that students adopting this goal orientation achieve higher scores in their exams.^{3, 19}

What is currently missing from the research literature on goals and academic performance is an exploration of the types of examination undertaken. In universities, different types of assessments are intended to assess students' knowledge, such as oral, essay and multiple choice question (MCQ) exams. Each of these exam types has its own advantages and disadvantages. For example, an advantage of essay style exams is their capacity to assess deep understanding and critical thinking, while a disadvantage is its relative subjectivity when marking.²⁰ MCQ exams, however, address this subjectivity by limiting the answer to "one correct" answer, yet this method promotes surface approaches to learning.²¹ Goal theory would suggest that students who are strongly performance oriented (and thus more likely to use surface learning and memorization) are expected to perform better on multiple choice questions, whereas students who are more mastery oriented are more likely to be able to demonstrate their deeper understanding and thus perform better on essay style questions.^{21, 22}

Whilst the research to-date provides us with valuable knowledge about the relationships between students' motivation and key outcome indicators of their learning, the unexplored counterpoint to the study of student achievement motivation is to examine this construct from a teacher-focused perspective. Doing so raises the following questions: (1) what do we currently know about students' preferred achievement goal orientation(s) and what can we learn from this?; (2) to what extent is student achievement goal motivation generalizable across comparable degree programs

and educational settings?; and (3) to what extent are the theoretical underpinnings of achievement goal orientations predictive of different types of academic assessments?

There is a dearth of published research conducted in higher education settings regarding these questions. Moreover, very little is known about the achievement goal motivations of pharmacy students, their relationship to academic performance, or how they are expressed in the pharmacy education environment. To our knowledge, only two studies have been conducted to investigate pharmacy students' achievement goals. Gavaza et al,²³ found in their cross-sectional study that second year Pharm D. students adopt the P-AV goal more than first year students in the same program. In addition, Alrakaf and colleagues²⁴ found that adopting the P-AP goal correlated positively with academic achievement and adopting M-AV and P-AV goals correlated negatively with academic achievement for a sample of undergraduate pharmacy students at a single Australian university. To our knowledge, no studies have been undertaken to compare pharmacy students' achievement goals, across comparable degree programs, in different countries.

The current study sought to investigate these issues by conducting an international comparative study across four universities from Australia, New Zealand, Wales and England. Based on achievement goal theory and research to date, the following hypotheses are proposed:

1. In light of the performance-based learning environment characteristic of higher education settings, we hypothesize that pharmacy students preferred achievement goal(s) will be performance oriented rather than mastery oriented.
2. In the absence of previous research, we adopt the null-hypothesis that there will be no differences in comparable pharmacy degree programs (e.g. similar degree structure and language) in terms of achievement goal orientations.
3. In light of achievement goal theory we hypothesize that examination format, academic performance, and goal orientation will be related: students with high scores on MCQ examinations will be more strongly performance-approach goal oriented, and students with high scores on essay-style examinations will be more strongly mastery-approach oriented.

METHODS

Ethical approval was granted by human ethics committees at the four participating universities as follows:

- 1- Human Research Ethics Committee, The University of Sydney (Protocol No: 14741/ 17-04-2012), Australia.
- 2- Human Ethics Committee, University of Otago (Protocol No: D13/032), New Zealand.
- 3- Cardiff SPPS Research Ethics Committee, Cardiff University (Protocol No: SPPS 1213-25), Wales.
- 4- Faculty of Science Ethics Committee, Nottingham University (Protocol No: 14741/22-01-13). England.

Sample and procedures

The study was initiated in August/September of 2012. All participants were second-year undergraduate pharmacy students enrolled in the Bachelor of Pharmacy program in universities in Australia (The University of Sydney) and New Zealand (the University of Otago), or the Master of Pharmacy program in England (Nottingham University) and Wales (Cardiff University).

The researchers at each university invited students to participate in the study during normal lecture or tutorial periods. They were advised that participation was voluntary and, if they chose to participate, they could withdraw from the project at any time. In addition, students were advised that their decision to participate would not affect their academic results or influence their student-teacher relationships. Researchers approached the students as a group and not individually. A validated achievement goal questionnaire²⁴ was administered to students in paper form by the researchers. Completion of the questionnaire took approximately ten minutes. The locations for data collection were selected by the first and last authors, who contacted researchers from the countries of interest at pharmaceutical conferences. The four locations were purposively chosen, for comparability in terms of degree program structure and primary

language (i.e. all universities degree programs are for a period of four years and all locations are English speaking countries).

At the end of the teaching period, students' scores from second-year units of study were collated from the four participating universities - Pharmacy Practice (PHAR2822) (Sydney), Biopharmaceutical Chemistry (PHCY256) (Otago), Clinical and Professional Pharmacy (PH2110) (Cardiff) and Professional Skills2 (B32C10) (Nottingham). Every unit of study had a final examination, but with varying formats, enabling a comparison to be made between examination type. MCQ and short essay scores, and the total mark were compiled from New Zealand and Australia. Short essay scores and the total mark were compiled from all four participating universities.

Measures

Following an international validation study,²⁵ in a pharmacy education setting, of two well-known and regularly used achievement goals questionnaires in undergraduate settings—the Achievement Goal Questionnaire (AGQ)²⁶ and the Revised Achievement Goal Questionnaire (AGQ-R)⁷ - the AGQ (Appendix 1) was used to measure pharmacy students' goal orientations. The questionnaire contains 12 items intended to measure the four types of achievement goals (P-AP, P-AV, M-AP, and M-AV) on a seven-point Likert scale (ranging from 1 = “Not at all true of me” to 7 = “Very true of me”). Socio-demographic data included gender, age, and student identification number (SID). SID numbers were used only for matching students' scores with their achievement goal orientations. Individual participants could not be identified in the analysis.

To ensure participants' anonymity and confidentiality the following steps were taken:

- 1- All data entry was carried out by the first author who had no contact with the participants.
- 2- Each participant was allocated a unique identifying code which was matched to the SID; the codes/SIDs were stored in a password-protected file accessible only to the first author.
- 3- Once each returned survey form is received, the first author wrote the relevant code onto the survey form, then detached the page containing the SID and stored them separately from the questionnaires.

4- All analyses were based on group data and not individual data.

Analysis

SPSS 21 (SPSS Inc., Chicago, Illinois), was used for all statistical analyses. Descriptive statistics regarding gender and age are reported. One-way repeated measures ANOVA was used to compare each type of achievement goal in each university. Mauchly's test indicated that the assumption of sphericity had been violated in the Cardiff, Otago and Sydney samples, $\chi^2(5) = 19.37, p < 0.05$, $\chi^2(5) = 16.35, p < 0.05$, $\chi^2(5) = 14.80, p < 0.05$ respectively. Therefore, degrees of freedom were corrected using Huynh-Feldt estimates of sphericity ($\epsilon = 0.93, \epsilon = 0.93, \epsilon = 0.96$) for Cardiff, Otago and Sydney samples respectively.

One-way analysis of variance (ANOVA) was used for multiple comparisons of each type of achievement goal between universities. Mean scores of achievement goals were used in all analyses. All mean difference analyses were subjected to post hoc tests (Bonferroni and Tukey HSD tests).

Multiple regression procedures were performed to determine the extent to which achievement goals contributed to total, short essay and MCQ scores in each university. As gender has been found to be a predictor of achievement goal orientation and academic performance in a previous study²⁰, this variable was included in the model. Forced Entry Method was used to examine the odds ratios of all variables, even if not significant. A p value of less than 0.05 was considered significant for all analyses.

RESULTS

Demographics

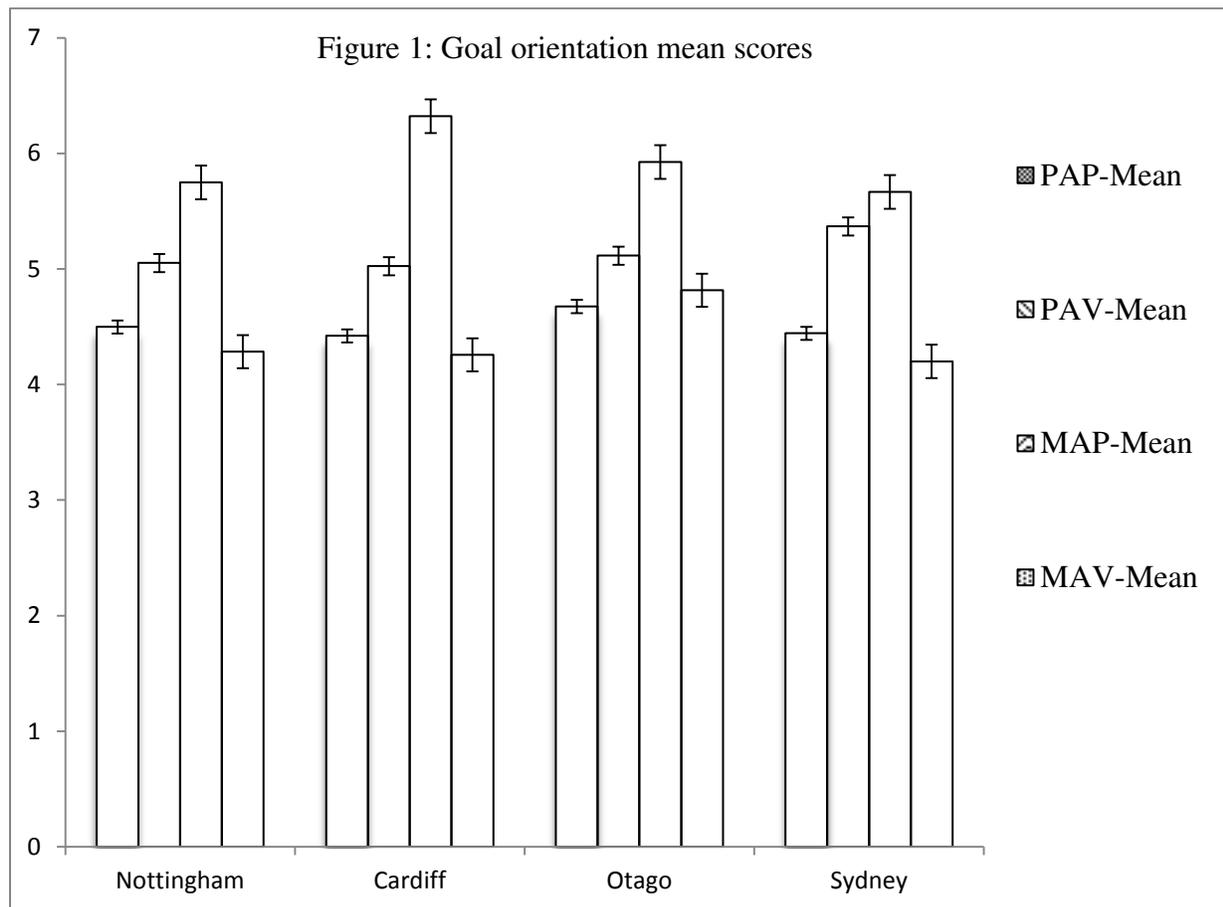
A total of 486 students with a mean age of 20 years, participated in this study. Descriptive statistics for the countries' participants are reported in Table 1.

Table 1. Characteristics of all participants

Country	Response rate	Age (mean/SD)	Gender (female/male)	Total N = 486
Australia	87.00%	20/1.46	121 (69.50%) / 52 Unspecified: 1	174
New Zealand	60.81%	19/1.26	51 (56.70%) / 39	90
Wales	78.18%	20/1.40	65 (75.6%) / 21	86
England	70.84%	20/1.69	87 (64.0%) / 49	136

Contrary to expectations, hypothesis 1 was not supported; the overall preferred goal orientation across all four universities was the Mastery-Approach (M-AP) goal (Figure 1/Table 2).

A one-way repeated measures ANOVA test and post-hoc comparisons of the main effect using Bonferroni adjustment revealed that students at three of the four universities reported significantly higher scores for the M-AP goal than the other three goal orientations (Otago: $F = 17.35$, $p < 0.01$, $\eta^2 = 0.16$; Cardiff: $F = 42.47$, $p < 0.01$, $\eta^2 = 0.34$; Nottingham: $F = 37.12$, $p < 0.01$, $\eta^2 = 0.22$ respectively). At the fourth university, Sydney, a significant effect for achievement goals ($F = 56.80$, $p < 0.01$, $\eta^2 = 0.25$) and Bonferroni adjustment revealed that students in this sample reported significantly higher M-AP goal than Performance-Approach (P-AP) and Mastery-Avoidance (M-AV) goals, but no significant difference between M-AP and Performance-Avoidance (P-AV) goals.



Regarding hypothesis 2, an overall similarity in students' goal orientations were evident in the pattern of results as displayed in Figure 1, however some *within group* variations were apparent for each goal orientation. Differences were also identified *between groups* for each of the goal orientations: One-way ANOVA results reveal statistically significant differences between groups in M-AP ($F = 8.98, P = 0.000$) and M-AV ($F = 3.44, P = 0.017$), but not P-AP and P-AV goals. Tukey post-hoc comparisons of the four groups indicate that Cardiff students ($M = 6.32, SD = 0.80$) pursued the M-AP goal significantly more strongly than their peers in Sydney ($M = 5.67, SD = 1.07$), Otago ($M = 5.93, SD = 1.04$), and Nottingham ($M = 5.75, SD = 0.99$). Tukey post-hoc comparison outcomes revealed that Otago students, ($M = 4.81, SD = 1.40$) pursued the M-AV goal significantly more strongly than other groups (Table 2).

Table 2. Universities' differences in mean scores of goal orientations

Goals	Sydney University <i>n</i> = 174	Otago University <i>n</i> = 90	Cardiff University <i>n</i> = 86	Nottingham University <i>n</i> = 136
Performance Approach	<i>M</i> = 4.44 ^a <i>SD</i> = 1.47	<i>M</i> = 4.67 ^a <i>SD</i> = 1.45	<i>M</i> = 4.42 ^a <i>SD</i> = 1.52	<i>M</i> = 4.50 ^a <i>SD</i> = 1.35
Performance Avoidance	<i>M</i> = 5.37 ^a <i>SD</i> = 1.34	<i>M</i> = 5.11 ^a <i>SD</i> = 1.53	<i>M</i> = 5.02 ^a <i>SD</i> = 1.45	<i>M</i> = 5.05 ^a <i>SD</i> = 1.45
Mastery Approach	<i>M</i> = 5.67 ^a <i>SD</i> = 1.07	<i>M</i> = 5.93 ^a <i>SD</i> = 1.04	<i>M</i> = 6.32 ^b <i>SD</i> = 0.80	<i>M</i> = 5.75 ^a <i>SD</i> = 0.99
Mastery Avoidance	<i>M</i> = 4.28 ^a <i>SD</i> = 1.47	<i>M</i> = 4.81 ^b <i>SD</i> = 1.40	<i>M</i> = 4.26 ^a <i>SD</i> = 1.53	<i>M</i> = 4.28 ^a <i>SD</i> = 1.35

Note: Means in the same row that do not share the same superscript differ significantly at $p \leq 0.05$

In order to test the third hypothesis, three multiple regression procedures were conducted to test the extent to which goal orientation (M-AP; M-AV; P-AP; P-AV) and gender contribute to the variance in students' (i) total scores; (ii) MCQ scores; and (iii) short essay scores. With respect to total scores, whilst the full model was significant ($F = 2.50, p = 0.03$), only gender made a contribution (Beta=0.18; $t=3.31; p=0.001$; CI: 1.57-6.15), indicating that females overall attained higher total scores than males.

With respect to predicting the relationship between goals and MCQ scores, the full model containing all predictors was statistically significant, $F = 4.04$, $p = 0.002$. As shown in Table 3, only two of the independent variables made a unique statistically significant contribution to the model (M-AV, and P-AV goals). The strongest predictor of MCQ was M-AV goal (beta = 0.18), $p = 0.01$. This indicated that students who strongly pursued the M-AV goal were significantly more likely to gain high scores than those who did not pursue this goal, controlling for all other factors in the model. The P-AV goal also made a significant contribution, whereby students with a strong P-AV goal orientation were likely to achieve lower MCQ scores (beta = -0.14), $p = 0.02$.

Table 3. Multiple regression predicting MCQ scores

Predictor Variables	B	t	p	95% C.I. for EXP(B)	
				Lower	Upper
PAP	0.05	0.84	0.39	-1.46	3.67
PAV	-0.14	-2.28	0.02*	-5.45	-0.40
MAP	0.06	0.87	0.39	-2.02	5.19
MAV	0.18	2.84	0.01*	1.13	6.28
Gender	-0.11	-1.79	0.07	-14.60	0.67

*significant contribution at $P < 0.05$

In predicting the relationship between goal orientations and written exams (short essay), the full model containing all predictors was statistically significant, $F = 4.20$, $p = 0.001$. As shown in Table 4, three of the independent variables made a unique statistically significant contribution to the model (P-AV, M-AP goals and gender). The strongest predictor of the written exam scores was P-AV goal (beta = -0.14), $p < 0.01$. This indicated that students who strongly pursued the P-AV goal were likely to gain lower scores than those who did not pursue this goal, controlling for all other factors in the model. The M-AP goal was a significant positive predictor of higher scores in the short answer essays, (beta = 0.13), $p = 0.01$, meaning that the more strongly students pursued this goal the higher their scores were. Gender also had a significant relationship

with the written exam scores, ($\beta = 0.10$), $p = 0.03$, indicating that females achieved higher scores compared to males.

Table 4. Multiple regression predicting short essay scores

Predictor Variables	B	t	p	95% C.I. for EXP(B)	
				Lower	Upper
PAP	0.04	0.87	0.39	-0.52	1.34
PAV	-0.14	-2.90	0.00*	-2.26	-0.44
MAP	0.13	2.63	0.01*	0.44	3.05
MAV	0.00	0.02	0.99	-0.92	0.94
Gender	0.10	2.19	0.03*	0.32	5.85

*significant contribution at $P < 0.05$

DISCUSSION

For more than three decades, achievement goal theory has been used to investigate students' learning and academic achievements across a range of disciplines, but there remains a paucity of research on student motivation in pharmacy education. This study has revealed important and useful information for pharmacy educators regarding student achievement goal motivation and provides pointers to future research. By adopting a teacher-focused lens, a number of messages can be taken from the findings of this study, which should be of assistance to pharmacy educators. Comparative studies have the benefit of enabling teaching academics to compare and contrast between different educational settings in order to borrow successful practices from each other^{27, 28}.

Our aims in this international comparison study were threefold and were based on theoretical and empirical considerations. The first was to test the hypothesis that pharmacy students' preferred achievement goal orientations would be performance oriented rather than mastery oriented. The second was to examine the extent to which the goal orientations of pharmacy students are similar across comparable university pharmacy degree programs. The third was to examine the extent to which goal orientations are related to examination format in each university.

The finding that the predominant goal adopted by pharmacy students across all four universities was M-AP is unexpected. Universities by their nature base student progression on successful demonstration of competence. This demonstration is usually examination based, and the evidence to date suggests that a P-AP goal orientation is associated with higher scores^{3,4,19}. Furthermore, western cultures are characterized as highly individualistic, competitive and materialistic²⁹⁻³¹ and there is evidence that students in such cultures are inclined towards adopting the P-AP goal³². In addition, a previous study conducted by Smith and colleagues³³ found that second year students were more inclined towards the P-AP goal and preferred external directions from their teachers.

Whilst this finding was unexpected it was certainly pleasing. Students across all universities, regardless of subject studied or place of learning, were clearly M-AP oriented. This indicates a preference for deep learning and interest in the subject matter. Previous research indicates that M-AP develops not only competence but also confidence^{29,30}, attributes which foster life-long learning. This finding should be of reassurance to teaching academics that their teaching practices encourage students to adopt productive approaches to their learning. Research evidence also suggests that students who are strongly M-AP oriented are taught by teachers who themselves adopt the M-AP goal and encourage their students to adopt this type of achievement goal.³⁴ Recently published research proposes that teachers who adopt the M-AP goal can inspire their students to pursue this goal as well.³⁵

The results of the second aim of our study show that there is very little difference in the *pattern* of students' goal orientations, across the university degree programs. With one exception, a pattern indicating a strong preference for the M-AP goal orientation, followed by P-AV, P-AP and finally M-AV orientations was evident. The exception was the Otago cohort indicating a stronger preference for M-AV, however this was not significantly different from the two performance goals. Of concern however is the finding that a preference for the P-AV goal amongst the student cohorts was also consistently evident, and its negative influence on performance was demonstrated in this study. As this goal orientation is the most maladaptive and unproductive of the four, teachers could explicitly focus on classroom practices which mitigate against it, such as introducing activities which foster confidence, reduce test anxiety and encourage questions. These practices could include encouraging students to ask any type of

question regardless of its simplicity, ensuring students' learning tasks are incremental and achievable, encouraging team work and giving regular feedback on their performance in terms of both mastery and achievement.

Identifying the relationships between achievement goals and academic achievement also revealed interesting results. Total scores can be an imprecise indicator of the approaches students may take to their learning, and this was borne out in the results of this study. Apart from gender, there were no significant relationships between students' achievement goals and their total scores. In contrast, when a finer grained analysis is undertaken a more instructive picture emerged. Participants in our study indicating a preference for a P-AV goal orientation were more likely to achieve lower scores in both MCQ and short essay examinations. This is in line with theory, whereby the primary motivation behind the P-AV goal is avoidance.³⁻⁵ These students, lacking confidence, strive to avoid appearing incompetent to their teachers and peers, and tend to experience test anxiety.⁴ From the students' perspective they view the P-AV goal as a means of developing competence, however empirical testing of the theory shows that this approach is a recipe for attaining low scores, that is, the P-AV attributes are incompatible with acquiring and demonstrating competence. High scores in the MCQ format, on the other hand, were positively associated with the M-AV goal orientation. Like the P-AV goal, this goal orientation is characterized by 'avoidance' motivations, but in this case it manifests as striving to avoid a decline in skills or a failure to learn. It is possible that these unproductive attributes lend themselves to performance on test formats such as MCQs. As this is a novel finding further research is needed to fully understand the mechanisms behind the mastery-avoidance construct and academic achievement.

Significant positive relationships were also found between goal orientation and achievement in the short essay examination format, whereby students with a preference for the M-AP goal orientation were more likely to achieve high scores. As short essay examinations are mainly written to assess understanding, application, depth of knowledge, reasoning and problem-solving skills of the examinees³⁶, this finding is entirely consistent with theory and confirms our hypothesis that high scores on essay-style examinations will be strongly associated with the M-AP goal.²⁰ Students who adopt the mastery-approach goal demonstrate positive attributes such as deep learning, confidence and usually have a low level of test anxiety.⁴

Although MCQ exams have the benefits of providing relatively fast feedback and freedom from marking bias,³⁷ their disadvantages can include giving pointers to the correct answer³⁸ and testing memory rather than understanding.²⁰ Thus we posited that adoption of P-AP goal, which is associated with the use of superficial strategies such as memorization¹⁸, would share a significant relationship with high scores in this type of test. However our hypothesis was not supported. In fact, this achievement goal was not an orientation preferred by any of the cohorts in this study, and did not emerge as a predictor of academic achievement.

Two challenges thus present themselves to pharmacy educators: firstly, to maximize the benefits of MCQ formats without compromising learning fidelity or promoting unproductive approaches to learning; secondly to foster productive and adaptive approaches to learning whilst rewarding deep understanding with high scores.

LIMITATIONS

Not conducting a parallel qualitative study with our samples is a limitation of this study. However, this study might open a door for qualitative studies that can clarify some of our results. Longitudinal analysis to track changes in student achievement goals as they progress through their degree would be of benefit.

FUTURE DIRECTIONS

Future research in pharmacy education could usefully focus on a deeper exploration of the impact of the mastery-avoidance on students' learning, their academic performance, and teacher practices. Investigating teachers' goal orientations is also warranted. Interventions testing novel teacher practices which enhance the mastery approach goal are recommended. Future research might also explore our preliminary findings that students with a preference for the M-AP goal are often taught by teachers with the same preference.³²

CONCLUSION

Pharmacy students representing a multi-national multi-site population show a preference for the productive M-AP goal orientation more strongly than any other goal. The MCQ examination

format shows clear relationships with both avoidance goal orientations, whereas the essay-style format showed clear relationships with positive and productive approach goal orientations.

To our knowledge, this is the first study to clearly differentiate between examination formats and their relationship with achievement goals. This study has demonstrated both the inadvisability of using a global measure of student academic performance, as well as the advantages of separating out overall scores into their individual components, in order to assess the motivational mechanisms behind how students learn.

REFERENCES

1. Senko C, Durik AM, Patel L, Lovejoy CM, Valentiner D. Performance-approach goal effects on achievement under low versus high challenge conditions. *Learn Instr.* Feb 2013;23:60-8.
2. Elliot AJ, Dweck CS. Competence and Motivation: Competence as the Core of Achievement Motivation. In: Elliot AJ, Dweck CS, eds. *Handbook of Competence and Motivation*. New York: The Guilford Publications Inc.; 2005:3-12.
3. Hulleman CS, Senko C. Up round the bend: forecasts for Achievement Goal Theory and research in 2020 In: Urdan TC, Karabenick SA, eds. *The decade ahead: theoretical perspectives on Motivation and Achievement*. Vol 16A. Bingley, UK: Emerald Group Publishing Limited; 2010:71-104.
4. Hulleman CS, Schrage SM, Bodmann SM, Harackiewicz JM. A Meta-Analytic Review of Achievement Goal Measures: Different Labels for the Same Constructs or Different Constructs With Similar Labels?. *Psychol Bull.* 2010;136(3):422-49.
5. Senko C, Hulleman CS, Harackiewicz JM. Achievement Goal Theory at the Crossroads: Old Controversies, Current Challenges, and New Directions. *Educ Psychol.* 2011;46(1):26-47.
6. Elliot AJ, Thrash T. Achievement goals and the hierarchical model of achievement motivation. *Educ Psychol Rev.* Jun 2001;13(2):139-56.
7. Elliot AJ, Murayama K. On the Measurement of Achievement Goals: Critique, Illustration, and Application. *J Educ Psychol.* 2008;100(3):613-28.
8. Senko C, Hulleman CS. The Role of Goal Attainment Expectancies in Achievement Goal Pursuit. *J Educ Psychol.* 2013;105(2):504-21.
9. Lieberman DA, Remedios R. Do Undergraduates' Motives for Studying Change as They Progress through Their Degrees? *Br J Educ Psychol.* 2007;77(2):379-95.
10. Baranik LE, Barron KE, Finney SJ. Examining specific versus general measures of achievement goals. *Human Performance.* Apr 2010;23(2):155-72.
11. Baranik LE, Stanley LJ, Bynum BH, Lance CE. Examining the construct validity of mastery-avoidance achievement goals: A meta-analysis. *Human Performance.* 2010;23(3):265-82.

12. Linnenbrink-Garcia L, Middleton MJ, Ciani KD, Easter MA, O'Keefe PA, Zusho A. The Strength of the Relation between Performance-Approach and Performance-Avoidance Goal Orientations: Theoretical, Methodological, and Instructional Implications. *Educ Psychol.* 2012;47(4):281-301.
13. Diseth A. Self-Efficacy, Goal Orientations and Learning Strategies as Mediators between Preceding and Subsequent Academic Achievement. *Learn Individ Differ.* 2011;21(2):191-5.
14. Harackiewicz JM, Barron KE, Pintrich PR, Elliot AJ, Thrash TM. Revision of Achievement Goal Theory: Necessary and Illuminating. *J Educ Psychol.* 2002;94(3):638-45.
15. Roussel P, Elliot AJ, Feltman R. The Influence of Achievement Goals and Social Goals on Help-Seeking from Peers in an Academic Context. *Learn Instr.* 2011;21(3):394-402.
16. Huang C. Achievement Goals and Achievement Emotions: A Meta-Analysis. *Educ Psychol Rev.* 2011;23(3):359-88.
17. Vrugt A, Oort FJ. Metacognition, achievement goals, study strategies and academic achievement: pathways to achievement. *Metacogn Learn.* 2008;3(2):123-46.
18. Elliot AJ, McGregor H, Gable S. Achievement goals, study strategies, and exam performance: A mediational analysis. *J Educ Psychol.* 1999;91(3):549-63.
19. Harackiewicz JM, Barron KE, Tauer JM, Elliot AJ. Predicting Success in College: A Longitudinal Study of Achievement Goals and Ability Measures as Predictors of Interest and Performance from Freshman Year through Graduation. *J Educ Psychol.* 2002;94(3):562-75.
20. Biggs J, Tang C. *Teaching for Quality Learning at University* 3rd ed. Berkshire, UK: Open University Press; 2007.
21. Scouller K. The influence of assessment method on students' learning approaches: Multiple choice question examination versus assignment essay. *Higher Education.* 1998;35(4):453-72.
22. Struyven K, Dochy F, Janssens S. Students' perceptions about evaluation and assessment in higher education: A review 1. *Assessment & Evaluation in Higher Education.* 2005;30(4):325-41.

23. Gavaza P, Muthart T, Khan GM. Measuring Achievement Goal Orientations of Pharmacy Students. *Am J Pharm Educ.* 2014;78(3):1-6.
24. Alrakaf S, Sainsbury E, Rose G, Smith L. Identifying Achievement Goals and their Relation to Both Academic Achievement and Ethnicity in Undergraduate Pharmacy Students: A Comparative Cross-Sectional Study. *Am J Pharm Educ.* In Press.
25. Alrakaf S, Abdelmageed A, Kiersma M, et al. An international validation study of two student achievement goal questionnaires In: Aslani P, ed. *Australasian Pharmaceutical Science Association Conference* Dunedin, New Zealand: APSA; 2013.
26. Elliot AJ, McGregor H. A 2*2 achievement goal framework. *J Pers Soc Psychol.* 2001;80:501-19.
27. Bray M, Adamson B, Mason M. *Comparative education research: Approaches and methods.* Vol 19: Springer; 2007.
28. Broadfoot P. Culture, Learning and Comparative Education. Editorial. *Comp Educ.* 2001;37(3):261-66.
29. Elliot AJ, Chirkov V, Kim Y, Sheldon K. A cross-cultural analysis of avoidance (relative to approach) personal goals. *Psychol Sci.* Nov 2001;12(6):505-10.
30. Remedios R, Kiseleva Z, Elliott J. Goal Orientations in Russian University Students: From Mastery to Performance? *Educ Psychol.* 2008;28(6):677-91.
31. Astin AW. The Changing American College Student: Thirty-Year Trends, 1966-96. *Rev High Ed.* 1998;21(2):115-35.
32. Ku L, Dittmar H, Banerjee R. Are Materialistic Teenagers Less Motivated to Learn? Cross-Sectional and Longitudinal Evidence From the United Kingdom and Hong Kong. *J Educ Psychol.* 2012;104(1):74-86.
33. Smith L, Saini B, Krass I, Chen T, Bosnic-Anticevich S, Sainsbury E. Pharmacy Students' Approaches to Learning in an Australian University. *Am J Pharm Educ.* 2007;71(6):120-8.
34. Kaplan A, Middleton MJ, Urdan T, Midgley C. Achievement goals and goal structures. In: Midgley C, ed. *Goals, goal structures, and patterns of adaptive learning.* Mahwah, NJ: Erlbaum.; 2002:21-54.
35. Shim SS, Cho Y, Cassady J. Goal structures: The role of teachers' achievement goals and theories of intelligence. *J Exp Educ.* 2013;81(1):84-104.

36. Dathe D, O' Brien K, Loacker G, Matlock M. Learning from the assessment of problem solving. In: Swanson DB, Case SM, van der Vleuten CP, eds. *The challenge of problem based learning*. London, UK: Kogan Page Limited; 1991:260-73.
37. Welsh AL, Saunders P. Essay questions and tests. In: Walstad WB, Saunders P, eds. *Teaching undergraduate economics: A handbook for instructors*. New York: McGraw-Hill; 1998:305-18.
38. Chan N, Kennedy PE. Are multiple-choice exams easier for economics students? A comparison of multiple-choice and "equivalent" constructed-response exam questions. *South Econ J*. 2002:957-71.

Appendix 1. Elliot and McGregor AGQ.

1	2	3	4	5	6	7						
Not at all true of me						very true of me						
1- It is important for me to do better than other students.						1	2	3	4	5	6	7
2- It is important for me to do well compared to others in this class						1	2	3	4	5	6	7
3- My goal in this class is to get a better grade than most of the other students.						1	2	3	4	5	6	7
4- I worry that I may not learn all that I possibly could in this class.						1	2	3	4	5	6	7
5- Sometimes I'm afraid that I may not understand the content of this class as thoroughly as I'd like.						1	2	3	4	5	6	7
6- I am often concerned that I may not learn all that there is to learn in this class.						1	2	3	4	5	6	7
7- I want to learn as much as possible from this class.						1	2	3	4	5	6	7
8- It is important for me to understand the content of this course as thoroughly as possible.						1	2	3	4	5	6	7
9- I desire to completely master the material presented in this class.						1	2	3	4	5	6	7
10- I just want to avoid doing poorly in this class.						1	2	3	4	5	6	7
11- My goal in this class is to avoid performing poorly.						1	2	3	4	5	6	7
12- My fear of performing poorly in this class is often what motivates me.						1	2	3	4	5	6	7