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An Analysis of the Predictive Validity of the Inventory of School Motivation (ISM)[1]

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This study examines the predictive validity of the Inventory of School Motivation (ISM), an instrument based on Personal Investment theory and specifically the use of eight (task, effort, competition, social power, affiliation, social concern, praise, and token) ISM factor scales as predictors of academic achievement for five cultural groups, Anglo-Australian (*n*=2,616), Migrant Australian (*n*=1,265), Aboriginal Australian (*n*=906), Navajo (*n*=1,776), and Anglo-American (*n*=884) of high school students. Multiple regression analysis was conducted to examine the relationship among the eight Personal Investment factors and school achievement criteria (Math, English and GPA) and School Attendance. Findings support the validity and usefulness of the ISM in predicting achievement outcomes and in providing a motivational profile for students from diverse cultural backgrounds in educational settings.

1. Introduction

As research on achievement goals has increased, so numbers of different measures of individual differences in goal orientations have been developed. There are many instruments designed to measure student motivation e.g. the Multidimensional Multiattributional Causality Scale (Lefcourt, Von Baeyer, Ware, & Cox, 1979); the Motivated Strategies for Learning Questionnaire (Pintrich & Garcia, 1991); the Motivation Orientation Scale (Nicholls, 1989; Nicholls, Patashnick, & Nolen, 1985); the Patterns Adaptive Learning Survey (Midgley et al., 1998); the Goal Orientation and Learning Strategies Survey (Dowson & McInerney, 2004) and the General Learning and Performance Orientation Scale (Button, Mathieu, & Zajac, 1996). Many of the theories and measuring instruments that have long dominated the psychological literature are based on Western values and research that may not be relevant to non-Western values (Bond, 1996; Enriquez, 1993; Marks & Kitaynama, 1991; Watkins & McInerney, 2003). McInerney and his colleagues (McInerney, Roche, McInerney, & Marsh, 1997) argued that motivational goals salient to Indigenous minority children within Western school settings may differ from those salient to Western children, and that these differences may serve to explain differential school performance and educational outcomes for these Indigenous minority children (see, for example, Davis & Pyatskowit, 1976; Harris, 1976; Watts, 1981; Yates, 1987; James, Chavez, Beuvais, Edwards, & Oetting, 1995; Kirkness & Bowman, 1992; Ledlow, 1992).

The Inventory of School Motivation (ISM) (McInerney & Sinclair, 1991) was formulated to measure motivational goal orientations and to be appropriate for both Western and non-Western

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students. The ISM is designed to describe motivational characteristics of individuals and groups in order to examine similarities and differences between groups; explain outcome variables, such as performance, in terms of particular individual and group characteristics and differences, and/or to predict future behavioural outcomes in terms of particular student and group characteristics.

McInerney and his colleagues (McInerney, Yeung, & McInerney, 2000, 2001; McInerney, Marsh, & Yeung, 2003) proposed a hierarchical, multidimensional model of goal orientations based on Maehr's Personal Investment Model (PIM) designed to reflect a wider range of goals relevant for both Western and non-Western students. At the base of this model are eight specific goals (task, effort, competition, social power, affiliation, social concern, praise, and token), and they are grouped into three more general goals (mastery, performance, and social), and the apex of the hierarchy is general motivation.

The aims of this research are to examine the usefulness of the Inventory of School Motivation in explaining the school achievement and performance of five cultural groups (Anglo-Australian, Migrant Australian, Aboriginal Australian, Navajo American, and Anglo-American) on two educational criteria of school motivation: academic achievement and attendance. Our research questions were:

1. Is the Inventory of School Motivation (ISM) effective in explaining variation in school performance criteria across the five groups?
2. What predictor variables are most salient for each group on each criterion variable, and are these similar across criterion variables?

2. Method

2.1 Participants

The sample of 7447 students comprised 2,616 Anglo-Australian, 1,265 Migrant Australian, 906 Aboriginal Australian, 1,776 Navajo and 884 Anglo-American drawn from Years 7 to 12 from 35 high schools. Across the full sample there were 47.8% males and 52.2% females, and their average age was 14 years. Details on the specific samples may be found in the studies cited above. Only respondents who had intact data on the core ISM items were included in this study.

2.2 Instruments

The Inventory of School Motivation (McInerney & Sinclair, 1991, 1992; McInerney et al., 1997; McInerney, Yeung, & McInerney, 2001) was designed as an exploratory instrument through which a range of motivation salient constructs drawn from Maehr's Personal Investment (Maehr, 1984; Maehr & Braskamp, 1986) model could be identified in educational settings across a diversity of groups. There is considerable empirical evidence drawn from both exploratory and confirmatory factor analytic studies for the validity and reliability of scales drawn from the ISM (see, for example, McInerney, 1992, 1995, 2002; McInerney et al., 1994a, 1994b; McInerney et al., 1997; McInerney & Swisher, 1995; McInerney et al., 2001; McInerney et al., 2003; Ali & McInerney, 2004; Ali & McInerney, 2005a; McInerney & Ali, 2005). Inventory questions relate to the perceived goals of behaviour, each of which has two elements:

Task (Mastery): Task involvement (e.g., "I like to see that I am improving in my schoolwork") and Effort (e.g., "When I am improving in my schoolwork I try even harder").

Ego (Performance): Competition (e.g., "I like to compete with others at school") and Social Power (e.g., "I work hard at school to be put in charge of a group").

Social solidarity: Affiliation (e.g., "I prefer to work with other people at school rather than work alone") and Social concern (e.g., "I like to help other students do well at school").

Extrinsic: Praise (e.g., "I want to be praised for my good schoolwork") and Token rewards (e.g., "I work best in class when I get some kind of rewards").

The students responded to each item on a 5-point scale (1 = strongly disagree to 5 = strongly agree). The responses to the items were coded such that higher scores reflected higher levels of motivation.

2.3 Predictor Variables

The predictor variables used in the multiple regression analyses were the scales drawn from the Inventory of School Motivation based on confirmatory factor analyses reported earlier (Ali & McInerney, 2004; Ali & McInerney, under review; McInerney & Ali, 2005). The appendix lists the predictor variables and the items comprising each scale. Table 1 presents descriptive statistics on each of these scales and their reliability estimates across five cultural groups.

2.4 Criterion Variables

Four criterion variables were used for the multiple regression analyses. Three of these, English and Maths achievement (Anglo-Australian, Immigrant Australian and Aboriginal Australian students) and Grade Point Average (GPA) (Navajo and Anglo-American students) were drawn from school records. The Maths and English ranks were taken from the mid-year school assessment and are presented as a five point normally distributed scale (1=very poor, 2=poor, 3=average, 4=good, and 5=excellent). The number of days absent in the school year was taken from the school records. Days absence was a continuous variable and recorded as five ranks. This variable may be a reasonable outcome measure for students in school performance.

2.5 Statistical Analysis

Multiple regression analysis is one of the most popular statistical estimation procedures in the social sciences. Multiple Regression estimates the coefficients of the linear equation, involving one or more predictor variables that best predict the value of the criterion variable (Griffiths et al., 1998; Hinkle et al., 1998). A number of multiple regression analyses were conducted to ascertain whether the predictor variables drawn from the inventory were able to predict the criterion variables. The predictor and criterion variables used in these analyses are described above. Eight predictor variables were entered into the equation using the SPSS test procedure. Table 2 presents the finding of the multiple regression equations for each of the criterion variables across the five groups studied.

To guide analyses we hypothesized that the ISM scales are able to significantly predict variation in school performance criteria across cultural groups and these motivational profiles of the diverse cultural groups are similar.

3. Results and Discussion

Initial consistency estimate Cronbach alphas were calculated for each of the scales for all group and each of the cultural subgroups (see Table 1). Reliability estimates were acceptable and varied from .67 to .82 (Mean = .76) for all groups. This average reliability of each of the eight scales is obviously higher than the target reliability of at least .70; there appears to be a reasonable balance between the brevity of some of the scales and this aspect of psychometric strength. We present the descriptive statistics as well as for each group see Table 1. The results of the multiple regressions demonstrate that the Inventory of School Motivation is effective in explaining variation in school achievement and performance criteria for the five groups.

Table 1

Means, Standard Deviation, and Reliability Estimates for Predictive Variables for the ISM Across Five Cultural Groups.

Group of Students		Task	Efft	Comp	Socp	Affl	Scrn	Prse	Tken
1. Australian	Mean	4.27	3.88	2.91	2.33	3.59	3.67	3.28	2.72
(N=2616)	SD	0.59	0.67	0.88	0.80	0.92	0.74	0.90	0.81
	Reliability	0.64	0.81	0.76	0.78	0.70	0.71	0.82	0.77
2. Migrant	Mean	4.37	4.19	3.35	2.66	3.65	3.88	3.64	3.23
(N=1265)	SD	0.59	0.63	0.95	0.95	0.91	0.71	0.87	0.93
	Reliability	0.64	0.81	0.81	0.84	0.68	0.71	0.82	0.84
3. Aboriginal	Mean	4.23	3.95	3.10	2.48	3.67	3.67	3.38	3.05
(N=906)	SD	0.67	0.71	0.88	0.88	0.87	0.79	0.86	0.89
	Reliability	0.72	0.82	0.75	0.75	0.63	0.71	0.78	0.81
4. Navajo	Mean	4.33	4.07	3.14	2.73	3.74	3.77	3.47	3.12
(N=1776)	SD	0.60	0.62	0.76	0.88	0.82	0.69	0.81	0.81
	Reliability	0.71	0.79	0.68	0.79	0.66	0.70	0.79	0.78
5. American	Mean	4.23	3.64	3.13	2.86	3.74	3.69	3.27	2.77
(N=884)	SD	0.64	0.73	0.73	0.92	1.00	0.72	0.87	0.78
	Reliability	0.63	0.80	0.63	0.79	0.79	0.72	0.81	0.76
All Groups	Mean	4.29	3.95	3.01	2.56	3.66	3.73	3.40	2.95
(N=7447)	SD	0.61	0.68	0.86	0.89	0.90	0.73	0.87	0.86
	Reliability	0.67	0.82	0.74	0.80	0.69	0.71	0.81	0.80

Note: Task = Task; Efft = Effort; Comp = Competition; Socp = Social Power; Affl = Affiliation; Scrn = Social Concern; Prse = Praise; Tken =Token

Table 2 indicates that across all the achievement criterion variables (except Attendance for the Migrant and Anglo-American groups, and Math rank for the Aboriginal group), and across the five groups, the ISM was able to explain a significant, albeit small, level of variance in the criterion variables. In general, criterion variables for which the ISM was able to explain adequate levels of variance were Maths achievement, English achievement, Grade Point Average, but fairly small level of variance in attendance. The size of R^2 within each group on each criterion variable is similar. There is some difference between groups in the level of R^2 explained ranging from .01 to .13. This range of variables is able to explain a significant but small variation in a variety of school achievement criteria for a variety of cultural groups including remote indigenous students.

We examine now the relative importance of each of the predictors drawn from the ISM in predicting school achievement and performance criteria across the five cultural groups and relate this to the theoretical assumptions based upon the earlier hypotheses. Table 2 should be referred to during this discussion. Although the prediction equations were significant they explain a relatively small amount of variance in the outcome measures. It is not unusual that this set of motivational scales would predict a low level of variance because the outcome measures used: GPA, Math and English scores, contain much variance that could not be explained by internal motivational mechanisms (goal orientations) alone. For example, GPA is a composite score of academic achievement that measures a number of things including the quality of teaching and assessment used across a range of subjects in which a student may have variable interest. Nevertheless, the multiple regressions were promising in demonstrating the heuristic values of the scales.

Table 2
Sets of Beta Weights and Multiple Regression Coefficients for Each Cultural Groups.

Groups/Criterion	Beta Weights for Predictor Variables										
	Task	Efft	Comp	Socp	Affl	Scrn	Prse	Tken	*R*	R^2	*df*
Anglo-Australian											
Math Rank	-.078*	.064	-.001	-.042	-.022	-.055	-.043	.065	0.12	0.01*	8/1299
English Rank	-.116*	.111*	-.006	-.004	.032	-.063	-.069	.070	0.14	0.02*	8/1298
Attendance	-.075*	.031	-.043	.018	.059*	-.011	.010	.089*	0.13	0.02*	8/2137
Migrant-Australian											
Math Rank	.065	.084	-.069	-.182*	-.075	-.026	.023	.004	0.24	0.06*	8/659
English Rank	-.003	.149*	-.026	-.149*	-.071	-.018	.018	-.067	0.24	0.06*	8/642
Attendance	.027	-.029	-.062	.089	.048	-.027	.001	.102	0.15	0.02	8/619
Aboriginal Australian											
Math Rank	-.065	-.058	.044	-.135	-.107	-.030	.114	-.107	0.25	0.06	8/255
English Rank	-.003	.065	.017	-.072	-.090	-.036	-.013	-.172	0.25	0.06*	8/258
Attendance	-.006	.067	-.059	.117*	.007	-.129*	.007	.154*	0.21	0.05*	8/685
Navajo-American											
Grad Point Average	-.117*	.149*	-.086*	.091*	.027	-.100*	.055	.282*	0.37	0.13*	8/1481
Attendance	-.001	-.046	.079*	-.016	.018	-.027	.002	-.160*	0.16	0.02*	8/995
Anglo-American											
Grad Point Average	-.161*	.198*	.073	-.005	-.119*	.081	.055	-.012	0.27	0.07*	8/802
Attendance	.023	.054	-.084	-.030	.013	-.014	.068	-.041	0.12	0.01	8/756

Note: * indicates a significant R^2 and significant predictor ($P < .05$).
Task = Task; Efft = Effort; Comp = Competition; Socp = Social Power; Affl = Affiliation; Scrn = Social Concern; Prse = Praise; Tken =Token

For the Anglo-Australian group task was a significant negative predictor for each criterion – the students with higher Math and English ranks were less task oriented. High task oriented students missed less school. Effort was a significant positive predictor of English rank. Affiliation was a significant positive predictor of attendance – high affiliation students missed more school. Token reinforcement was a significant positive predictor of attendance. High token oriented students missed more school. None of the other predictor variables were significant predictors. Each of the equation models was significant at the 0.05 levels.

For the Immigrant-Australian group effort was significant positive predictors for English criterion – the students with higher English rank were more effort oriented. Social-power was a significant negative predictor for Math and English achievement criterion, which indicates that students with higher Math and English ranks were less power oriented. None of the other predictor variables was a significant predictor. Each of the equation models was significant, except attendance, at the 0.05 levels.

For the Aboriginal group social power and token were significant positive predictors for attendance criterion. Social power and token oriented students missed more school. Social concern was a significant negative predictor for attendance. The result shows that high Social concern oriented students missed less school. None of the other predictor variables were significant predictors. Each of the equation models was significant at the 0.05 levels.

For the Navajo group task, competition and social concern were significant negative predictors for GPA. The students with higher GPA ranks were less task, competition and social concern oriented, while the students with higher GPA ranks were less competition oriented and missed more school. Effort was a significant positive predictor for GPA. Token reinforcement was a significant positive predictor of GPA and significant negative predictor of attendance. Students with higher GPA rank were more token oriented and missed less school. None of the other predictor variables were significant predictors. Each of the equation models was significant at the 0.05 levels.

For the Anglo-American group task and affiliation were significant negative predictors, effort was a significant positive predictor on GPA criterion. The students with higher GPA ranks were less task and affiliation oriented but more effort oriented. None of the other predictor variables were significant predictors. GPA equation model was significant at the 0.05 levels.

Apart from consistent significant positive findings for effort the impression from the analyses was that the significant predictors appeared to be variable across a variety of criteria within each cultural group. To examine the patterns of similarity and difference of the multiple regression equations across the five groups more closely, Table 3 was designed to compare across the groups within each criteria. The table is based on the size of the significant beta weights for each variable within each multiple regression equation (i.e., the largest significant beta weight was numbered 1, the second largest 2, and so on within each equation).

Table 3
Order of Importance of Significant Beta Weights across Five Cultural Groups.

Groups/Criterion	Beta Wights for Predictor Variables							
	Task	Efft	Comp	Socp	Affl	Scrn	Prse	Tken
Math Achievement								
Anglo-Australian	1(-)							
Migrant-Australian				1(-)				
Aboriginal-Australian								
Navajo-American (GPA)	3(-)	2(+)	6(-)	5(+)		4(-)		1(+)
Anglo-American (GPA)	2(-)	1(+)			3(-)			
English Achievement								
Anglo-Australian	1(-)	2(+)						
Migrant-Australian		1(+)		1(-)				
Aboriginal-Australian								
Navajo-American (N/A)								
Anglo-American (N/A)								
Attendance								
Anglo-Australian	2(-)				3(+)			1(+)
Migrant-Australian								
Aboriginal-Australian				3(+)		2(-)		1(+)
Navajo-American			2(+)					1(-)
Anglo-American								

Note: Task = Task; Efft = Effort; Comp = Competition; Socp = Social Power; Affl = Affiliation; Scrn = Social Concern; Prse = Praise; Tken =Token

4. Summary and Conclusion

The pattern of significant predictors across the five groups was variable, which probably reflects the quality of the outcome measures used. However, it does appear that effort is a consistent positive predictor for GPA and English achievement for most groups. Task, contrary to expectations, appears to be a negative predictor of achievement across groups. This counter - intuitive finding may reflect the nature of the questions used to measure task, with successful students perhaps being less likely to disclose an interest in task orientation than less successful students.

Interestingly, social power was a strong negative predictor for both English and Maths for the Migrant-Australian group, but not for any of the other groups. Finally, token reward was a strong positive predictor of GPA for the Navajo-American group, which may reflect the fact that they often receive tangible rewards for their grades. However, for the Navajo group token was a strong negative predictor of attendance – that is the students who missed school more were less token oriented. Conversely, token was a strong positive predictor for the Anglo and Aboriginal Australian, indicating that those students who were less token oriented missed less school. Clearly these results need replication with another data set, and preferably with other outcome measures, to see if more systematic patterns of predictors among the groups can be isolated.

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Appendix

Items, Alpha, Mean and Standard Deviations for Inventory of School Motivation (ISM)

Task **Alpha = .67** **Mean = 4.29** **SD = .61**

1. A4ta I like being given the chance to do something again to make it better
2. A9ta I try harder with interesting work
3. A33ta I like to see that I am improving in my schoolwork
4. A34ta I need to know that I am getting somewhere with my schoolwork

Effort **Alpha = .82** **Mean = 3.96** **SD = .68**

1. A10ef I don't mind working a long time at schoolwork that I find interesting
2. A12ef I try hard to make sure that I am good at my schoolwork
3. A56ef When I am improving in my schoolwork I try even harder
4. A68ef The harder the problem the harder I try
5. A79ef I try hard at school because I am interested in my work
6. A100ef I work hard to try to understand new things at school
7. A103ef I am always trying to do better my schoolwork

Competition **Alpha = .74** **Mean = 3.01** **SD = .86**

1. A6co Winning is important to me
2. A43co Coming first is very important to me
3. A53co I like to compete with others at school
4. A76co I work harder if I'm trying to be better than others
5. A89co I want to do well at school to be better than my classmates
6. A91co I am only happy when I am one of the best in class

Social Power **Alpha = .80** **Mean = 2.56** **SD = .89**

1. A51po I work hard at school that I will be put in charge of a group
2. A65po I want to feel important in front of my school friends
3. A71po At school I like being in charge of a group
4. A82po It is very important for me to be a group leader
5. A88po I work hard at school to because I want the class to notice me
6. A113po I often try to be the leader of a group

Affiliation **Alpha = .69** **Mean = 3.66** **SD = .90**

1. A36af I do my best work at school when I am working with others
2. A39af I try to work with friends as much as possible at school
3. A97af I prefer to work with other people at school rather than alone

Social Concern **Alpha = .71** **Mean = 3.73** **SD = .73**

1. A8soc It is very important for students to help each other at school
2. A21soc I like to help other students do well at school
3. A29soc I care about other people at school
4. A46soc I enjoy helping others with their schoolwork even if I don't do so well myself
5. A85soc It makes me unhappy if my friends aren't doing well at school

Praise **Alpha = .81** **Mean = 3.40** **SD = .87**

1. A17pr Praise from my teachers for my good schoolwork is important to me
2. A23pr Praise from my friends for good schoolwork is important to me

3. A41pr At school I work best when I am praised
4. A73pr I want to be praised for my good schoolwork
5. A114pr Praise from my parents for good schoolwork is important to me

Token **Alpha = .80** **Mean = 2.95** **SD = .86**

1. A2to I work best in class when I can get some kind of reward
2. A7to I work hard in class for rewards from the teacher
3. A14to I work hard at school for presents from my parents
4. A20to Getting a reward for my good schoolwork is important to me
5. A24to Getting merit certificates helps me work harder at school
6. A107to Praise for good work is not enough I like a reward
7. A112to If I got rewards at school I would work harder