Opening the Blind Eye: Causal Modelling of Perceived Discrimination and Academic Disengagement for Indigenous Students

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The issue of minority groups showing patterns of disassociation from the academic environment has received considerable attention within both national and international psychological and educational literature. At the national level, some research has focused on Indigenous Australian students dissociating from academia, however to date, such research has either been circumstantial and/or has been based on small samples of Indigenous Australian students. The purpose of the study reported in this paper was to quantitatively explore the academic disengagement, anxiety, uncertain control, and self-sabotage of Indigenous students through the use of a longitudinal structural equation modelling techniques. Specifically, utilising self-report surveys from a sample of Indigenous Australian high-school students ($n = 271$), home socio-economic resources (SER), and perceived racial discrimination were examined to explore their causal rtelations. While SER was found to causally predict lower levels of self-sabotage, perceived discrimination causally predicted both higher levels of disengagement and low control. These findings suggest that future interventions need to focus not only upon socio-demographic factors, but also the psycho-social variables that may play a strong role in influencing Indigenous students' engagement or disengagement within the schooling system.

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There is a long standing tradition within educational research whereby academic achievement is scrutinized with regard to racial and ethnic differences (e.g. Cokley, 2002; Department of Education and Training [DET], 2005; Osborne, 1997; Steele & Aronson, 1995). Although such research does well to highlight inequities in academic outcomes between selected ethnic or cultural groups, considerable caution must be taken in interpreting the face-value of such results. For example, Rowe (2003; Jonas, 2003) cites early educational research which placed too strong an emphasis on both ethnic and socio-economic variables as dominant determinants of students' educational performance (Mellor & Corrigan, 2004). Rowe argued that the implications of these potentially conceptually flawed findings arguably produced considerable doubt as to whether effective interventions could be produced within the schooling environment, as the blame was firmly placed on the background of the students themselves. Indeed, Rowe cited a number of prominent studies that advocated this very attitude, for example, Coleman et al. (1966, p. 3) argued that "schools bring little influence to bear on a child's achievement that is independent of his background and general social context."

Conclusions such as Coleman et al.'s (1966) exemplify what is now the much maligned cultural deficit approach to education (Eckerman, 1987; Gibson, 1984; Parbury, 1999). This approach, according to Ackerman, was centred on assumptions that minority group students were deprived of early childhood experiences that would facilitate educational success (e.g., exposure to the majority group language, the negative effects of poverty, poor parental skills, identity issues), and that they also suffered from varying levels of genetic inferiority. A classic example of such a cultural deficit approach (or possibly one of the antecedents to it) can be found in early 20th century intelligence testing research targeting Indigenous Australians. For example, Porteus (1933) in one study of Indigenous Australian adults concluded that after a barrage of so-called intelligence tests that the Indigenous males had the mental age of 10.48 years, and the females held a mental age of 8.22 years. Despite criticisms as to the validity of such measures, Porteus held onto his reasoning that the period of cognitive growth for Indigenous Australians was substantially shorter than that of non-Indigenous Australians (Kearney, 1973). Even when Porteus later obtained evidence to suggest that Indigenous Australian adults held a substantially higher mental age then in his previous study (Porteus & David, 1963 – mental age ranging from 14.3 to 14.9 years), the discrepancy was explained not in terms of higher levels of acculturation, nor unreliability of the intelligence testings, but rather selective survival due to the more arid living conditions of the later sample Kearney, (1973).

Despite early recognition that such intelligence testing was not applicable, or at the very least non-comparable between Indigenous Australian and non-Indigenous participants (Kearney, 1973; McElwain & Kearney, 1973), the taint of the cultural deficit approach still remained strong. For example, McElwain & Kearney wrote that "what we are arguing is that there is an inferiority of environmental experience which debars Aborigines from taking full advantage of the formal schooling they are offered" (p. 51). Implicit within this line of thinking is the assumption that Indigenous children would fail in education due to their cultural upbringing, and that schooling, in essence, was there to 'save' Indigenous children (Parbury, 1999).

Although the cultural deficit approach showed a strong tendency to linger within Indigenous psychological and educational research, a new integrative and inclusive perspective began to emerge as early as the late 1960's (Parbury, 1999). This approach sought a greater representation of Indigenous Australian students within the education system through policies that attempted to no longer override and demean the importance of Indigenous cultures, but rather to begin to include and even emphasise Indigenous cultures as an essential part of wider Australian society and its education system. Today, the

integrative/inclusive approach is recognised as one of the strongest factors that may increase the engagement of Indigenous students towards the education system (Craven, 2007; Lester, 2000; Mason, Perry & Dockett, 2007; McRae, et al., 2000; New South Wales Aboriginal Education Consultative Group [NSWAECG] & New South Wales Department of Education and Training [NSWDET], 2005; Schwab, 2001).

Despite the potential promise of the integrative and inclusive educational approaches, and arguably due to its slow implementation, in the last decade, little improvement has been noted with regard to overall participation and retention rates of Indigenous students across most levels of education (DET, 2006). With a growing number of studies showing more individual school-level improvements in Indigenous student engagement from inclusively orientated interventions (e.g., McRae, et al., 2007; Merrotsy, 2006), recognition must be given to factors that may impinge upon the effectiveness of such interventions. For example, Lester (2000) found that in a series of focus group discussions with Indigenous community members, the single largest obstacle identified as inhibiting career expectations and aspirations for Indigenous students was that of racism existing both within and beyond the schooling system. These fears are also reflected in group discussions with prominent Aboriginal Education Consultative Group members (Craven & Tucker, 2003), who highlighted difficulties in peer relationships for Indigenous students, largely stemming from racist attitudes directed towards them. In addition to this, more subtle indications of covert racism were alluded to in the unfair expectations and misconceptions with which Indigenous students are forced to deal. These concerns have not only been identified by community members and Indigenous representatives, but also by the students themselves. In a qualitative study aimed at identifying Indigenous high school students' future aspirations and perceived barriers to these aspirations, of the 83 Indigenous students interviewed, Parente et al. (2003) found that all students identified racism as a major barrier to achieving their life goals. Another qualitative analysis of 52 Indigenous adolescents by Howard (2002) highlighted the extreme impact experiences and expectations of discrimination may have, with overt discrimination cited as a key reason leaving school altogether.

International research has also identified the negative impact of racism on educational outcomes for minority groups. For example, in a study set in the Netherlands by Verkuyten and Brug (2003), it was found that for 204 minority students of Surinamese, Turkish, and Moroccan backgrounds, perceived discrimination significantly contributed to levels of disengagement from the academic environment, independent of the students' self-reported grades or the extent to which they perceived their performance at school to be representative of their ability.
The negative effects of discrimination within the realm of academia were also highlighted by Wong, Eccles, and Sameroff (2003), who explored how discrimination emanating from peers and teachers impacted upon 629 African American adolescents' academic motivation and achievement. Even after controlling for the affects of gender and socio-economic status, peer and teacher discrimination was associated with significantly lower levels of perceived importance of school (-.16 for both peer and teacher discrimination), ratings on the utility of school (-.27 and -.30 respectively), and self-perceived academic competence (-.15 and -.13 respectively).

However, overall, studies attempting to quantitatively address the impact of racial discrimination on Indigenous Australians are scarce. One exception to this can be found in the work of Larson, Gillies, Howard, and Coffin (2007) who examined the perceptions of discrimination of 183 Indigenous Australian adults and 441 non-Indigenous Australian adults within a selected West Australian town. They found that Indigenous Australians were 3.6 times more likely to experience racism, with such discrimination being significantly associated with poorer levels of physical and mental health (see also Mellor, 2003, 2004 for

strong qualitative analyses of racism experienced by Indigenous Australians). Unfortunately, little directed research has examined the impact of perceived discrimination over educational outcomes for Indigenous Australian students, despite researchers (e.g., Howard, 2002; Parente et al., 2003) identifying discrimination's potential detrimental influence.

It is the purpose of this investigation to address this limitation within the Indigenous educational literature by utilising a robust sample of Indigenous Australian students, strict statistical methodologies that will help determine the potential effects of discrimination upon Indigenous students' reported levels of academic disengagement, academic anxiety, academic uncertain control, and academic self-sabotage. As a result, this study will have two primary aims:

1. To identify and establish the psychometric properties of the instruments utilised within this investigation; and
2. To implement a full SEM causal modelling analysis to clarify how perceived discrimination may causally influence variables associated with academic disengagement, independent of access to home socio-economic resources and prior measures of the disengagement variables.

Method

Participants

Four secondary public schools across rural and urban localities within the state of NSW participated in the present investigation. Given each school was of a public/government funded nature, a number of organisations and monitoring bodies were consulted prior to the recruitment of the schools themselves. These included the NSW Department of Education and Training and the University of Western Sydney Human Ethics Committee, which were consulted with regard to ethnical consideration and the appropriateness of the survey design. Additionally, considering that this investigation sought schools with a representative sample of Indigenous Australian school students, the State and regional representatives of the NSW Aboriginal Education Consultative Group were also consulted as to issues of cultural sensitivity of the investigation and recommendations as to which schools to contact. This investigation was funded by the Australian Research Council under a Strategic Partners Industry Linkage Grant scheme, with contributions of funding, resources, and valued advice from the D'harawal Traditional Descendants' and Knowledge Holders' Council, the Aboriginal Education Council (NSW) Inc., and the Self-concept Enhancement and Learning Facilitation (SELF) Research Centre, University of Western Sydney.

For the purposes of this investigation, a total of 271 Indigenous secondary school students were drawn from the larger data set of Indigenous and non-Indigenous participants. Of the 271 Indigenous student responses utilized for this study, 49.4% identified as being male and 50.6% identified as being female. Ages ranged from 11 to 16 years, with the mean age being 13.39 years (SD = 1.16).

Materials

The Personal Discrimination Measure (drawn from the PGDD - Bodkin-Andrews, Craven, & Martin, 2006). This five-item measure was designed to assess an individual's experiences of racial discrimination at the personal (direct contact) level. All items are

measured on a 6-point Likert scale, with higher scores indicating greater levels of agreement to experiencing perceived discrimination.

Academic Disengagement, Anxiety, Uncertain Control and Self-Sabotage (drawn from the Student Motivation and Engagement Scale, SMES; Martin, 2004). Each of the above mentioned factors were designed to capture negative motivational tendencies. They were drawn from the larger 44-item SEMS (4 items per factor), which was designed to measure a total of 11 motivational factors. Students respond on a seven-point Likert response scale ranging from 1 = Strongly Disagree to 7 = Strongly Agree.

Socio-Economic Resources (SER, Craven et al., 2005). The SER is a self-report measure containing a list of 16 resources found within the home environment. Students simply answered 'yes' or 'no' as to whether they had access to such resources at home, and a total score was computed for analysis.

Table 1
Summary Description of Items Utilised

Factor	Description	Sample Items
Personal Discrimination	Perceptions of verbal, emotional, and physical racial discrimination emanating from personal interactions	"People have called me nasty names based on the culture I come from"
Anxiety	A student's uneasiness when considering school based outcomes and also a fear about not doing well in such school outcomes	"I worry about school and school work"
Uncertain Control	Where a student is unsure about how to do well or how to avoid doing poorly in their school work	"When I don't do well at school I don't know how to stop that happening next time"
Self-Sabotage	The extent to which students engage in activities that reduce their chances of success at school	"Sometimes I don't try hard at school so I can have a reason if I don't do well"
Disengagement	When students feel like giving up in a particular school subject or school in generally	"Each week I'm trying less and less at school"
SER	Homes resources that may aid in the study habits of students	"a room of one's own, a desk to study on Computer",

Procedure

The survey was administered in school halls under exam conditions. To control for varying literacy levels, the survey was read aloud by the researchers using a microphone. Participants received the full survey and for the most part were requested to circle the correct response. Upon completion of the materials, participants were fully debriefed and thanked for their time. This procedure was repeated following a 6 month delay.

Statistical Software

All data obtained for this investigation was entered and screened in SPSS v.15.0 and all statistical analysis techniques were undertaken in SPSS 14.0 and LISREL 8.72 (Joreskog & Sorbom, 2004).

Statistical Analyses

With the exception of identifying mean values and reliability estimates for designated factors, the majority of analyses undertaken employed the statistical procedures of structural equation modelling (SEM) and confirmatory factor analyses (CFAs) which compare the goodness-of-fit between a sample covariance matrix and an a-priori hypothesised model. More specific applications of these analysis techniques will now be summarised.

Reliability analyses. A series of reliability analyses were conducted separately for each of the multi-item subscales. The traditional method for measuring the internal consistency reliability of a scale is Cronbach's alpha (Cronbach & Shavelson, 2004). Cronbach's alpha is calculated through an estimation of the average intercorrelation between a single item and a set of items drawn from the same factor. Cronbach's alpha values range from 0 to 1, where 0 corresponds to complete unreliability and 1 means perfect reliability. In general, there is a consensus within the literature that the arbitrary value of .70 or above be deemed as an acceptable strength for the Cronbach's Alpha (Hills, 2005; Tabachnick & Fidell, 2007). Given this general consensus, this investigation utilised the .70 level of acceptability to deem whether an acceptable level of internal consistency was achieved.

Confirmatory Factor Analyses (CFA). Once adequate reliability estimates for each factor were identified, a CFA was conducted to validate the instruments' factor structure. CFAs test the extent to which indicator items reflect the theoretical a-priori underlying factor structure (Byrne, 2001). In any one CFA, the tested models represent a combination of the factor loadings, factor variances/covariances, and unique errors in the measured variables. Within the CFA model for this investigation, a total of 43 directly measured indicator items were specified to represent a total of 13 factors (one measure of SER, and two time-waves of personal discrimination, academic disengagement, academic anxiety, academic uncertain contro,l and academic self-sabotage). As a condition set within all CFA analyses in this investigation, each indicator item is only set to load upon its designated latent factor, and no correlations of uniqueness are allowed.

For this investigation, the iterative method known as maximum likelihood estimation was used to estimate the parameters in the specified models (Kaplan, 2000). This procedure is robust with respect to violations of normality that can potentially affect parameter estimates and goodness-of-fit indices (Hu, Bentler, & Kano, 1992; Joreskog & Sorbom, 1993; Muthen & Kaplan, 1985). Goodness-of-fit indices obtained for any one CFA model assess either the discrepancy between a model's implied variance-covariance matrix and a sample variance-covariance matrix or compare the fit of a hypothesised model with a specified factor structure, to the data when compared to a model with no hypothesised factor structure (i.e., a uni-factor or 'null'model). Although there is a vast number of goodness-of-fit criteria available, based on the advice of Coote (2004) and Marsh, Balla, and Hau (1996), the following goodness-of-fit indices were emphasised in the current study: the Root Mean-Square Error of Approximation (RMSEA), the Non-Normed Fit Index (NNFI; also known as the Tucker Lewis Index), and the Comparative Fit Index (CFI). Generally speaking, RMSEA values less than .08 and .05 are deemed to reflect a reasonable fit and close fit respectively, and values greater than .90 and .95 for the NNFI and CFI reflect reasonable and excellent fits to the data respectively (Browne & Cudeck, 1993; Marsh et al., 1996).

Structural Equation Modelling (SEM) Causal Ordering. Although traditional path analyses and regression techniques can offer a sense of how much predictive power or how

strong an association any number of variables may have over other variables within a single time wave of data, this should not be confused with causal terminology (Schumacker & Lomax, 1996). Conversely, if a researcher has access to longitudinal data with repeated measures of the constructs, an SEM technique known as causal ordering is possible (Marsh, Byrne & Yeung, 1999). That is, by utilising repeated measures, and extending upon the simple path analysis framework, one can assess the degree to which a predictor variable at Time 1 may cause a separate outcome variable at Time 2, once the predictive power of that outcome variable upon itself (from Time 1 to Time 2) has been accounted for.

Results and Discussion

Descriptive Statistics and Internal Consistency Estimates

Descriptive statistics and reliability estimates are presented in Table 1 for Indigenous student responses to both the first and second times-wave variables. This table includes means, standard deviations and Cronbach's alpha for the factors utilised within this study. Due to the SER variable being a directly observed measure, the Cronbach's alpha could not be computed. As can be noted, all multi-item variables produced sound reliability estimates, all above the .70 criteria (Hills, 2005).

Table 2

Descriptive Statistics for Indigenous student Responses

Variable	Mean	Standard Deviation	α
T1 SER	6.44	2.20	--
T1 Personal Discrimination	2.59	1.35	.88
T1 Academic Disengagement	2.77	1.35	.75
T1 Academic Anxiety	4.02	1.50	.75
T1 Academic Low Control	4.12	1.42	.77
T1 Academic Self-sabotage	3.56	1.44	.75
T2 Personal Discrimination	2.71	1.35	.87
T2 Academic Disengagement	2.82	1.44	.80
T2 Academic Anxiety	4.04	1.48	.77
T2 Academic Low Control	3.92	1.35	.72
T1 Academic Self-sabotage	3.41	1.38	.75

In examining the absolute mean scores, it can be noted that on average, the Indigenous students disagreed to experiencing personal discrimination and disengaging from school, which in itself is a promising finding. However, the majority of Indigenous students within this sample reported experiencing academic anxiety, academic low control, and academic self-sabotage.

Full CFA of Instrumentation

A full CFA simultaneously testing both Time 1 and Time 2 factors was run with the additional condition that the correlated uniqueness of matching Time 1 and Time 2 items were freed (e.g. between item 1 of Time 1 Personal Discrimination and item 1 of Time 2 Personal Discrimination). According to Marsh, Byrne and Yeung (1999) and Marsh and Hau (1996), this is done to reduce halo effect biases. Table 3 offers the results for this full CFA model.

As can be seen from Table 3, the full CFA produced sound fit indices with the RMSEA, CFI and NNFI all producing strong results (cf. Marsh et al., 1996). In addition, all

item-to-factor were significant and well above the minimum fit strength of .30 (Hills, 2005). In addition, a number of significant factor relations were noted across the factors, such as larger correlations between matching Time 1 and Time 2 variables, which offer a preliminary indication of the test-retest strength of these factors. In consideration of the two indicator variables within this study, SER was negatively related to disengagement, anxiety, low control, and self-sabotage, whereas perceived personal discrimination is positively related to the same variables. The moderate to high correlations between Time 1 disengagement and self-sabotage and Time 1 anxiety and low control are of some concern as they may indicate multicollinearity biases within the causal modelling. As a result of these high correlations, the advice of Billings and Wroten (1978) and Grewal Cote and Baumgartner (2004) will be considered, whereby logical restrictions will be placed on the analyses to avoid multicollinear effects.

Table 3
Factor Loadings, Factor Correlations, and Goodness of Fit Criteria of the Measuremnt Instruments

Factor Loadings*										
Variable	SER	T1-PD	T1-DIS	T1-Anx	T1-LC	T1-SS	T2-PD	T2-DIS	T2-Anx	T2-LC	T2-SS
1	1.00	.76	.52	.72	.62	.46	.76	.64	.74	.47	.57
2		.77	.69	.70	.69	.77	.77	.67	.75	.63	.68
3		.74	.63	.49	.70	.75	.68	.74	.64	.63	.68
4		.79	.80	.72	.69	.64	.74	.80	.59	.78	.69
5		.80					.83				

Factor Correlations*										
SER	1.00										
T1-PD	-.17	1.00									
T1-DIS	-.27	.38	1.00								
T1-Anx	.02	.17	.24	1.00							
T1-LC	-.06	.25	.34	.61	1.00						
T1-SS	-.16	.55	.67	.24	.51	1.00					
T2-PD	-.18	.54	.31	.25	.34	.43	1.00				
T2-DIS	-.27	.31	.66	.12	.19	.48	.37	1.00			
T2-Anx	-.09	.19	.09	.57	.28	.09	.34	.17	1.00		
T2-LC	-.14	.29	.40	.43	.61	.43	.41	.49	.60	1.00	
T2-SS	-.25	.31	.46	.09	.31	.60	.45	.74	.27	.54	1.00

Goodness of Fit Criteria				
X^2	DF	NNFI	CFI	RMSEA
1246.88	785	.95	.96	.047

Note: SER = Socio-Economic Home Resources, T1 = Time 1, T2 = Time 2, PD = Personal Discrimination, DIS = Disengagement, Anx = Anxiety, LC = Low Control, SS = Self-Sabotage, X^2 = Chi-Squared, DF = Degrees of Freedom, NNFI = Non-Normed Fit Index, CFI = Comparative Fit Index, RMSEA = Root Mean Squared Error of Approximation. Bolded values indicate
*any factor loading or factor relation value at .16 or above reached significance at *p* < .05

SEM Causal Modelling of SER, Personal Discrimination, and the Disengagement Variables

As noted above, the correlations between disengagement and self-sabotage and low control and anxiety may be problematic in that multicollinearity may emerge. Marsh et al, (2004) suggest that multicollinearity is a "ubiquitous problem that can produce strange, misleading, or uninterpretable results when a set of highly related independent variables is used to predict a dependent variable" (p. 518). Although some researchers suggest a general rule of thumb which suggests that multicollinearity will only exist if the predictor variables have a correlation of .80 or more (e.g., Hills, 2005; Billings & Wroten, 1978), this assumption can be misleading as multicollinearity occurs in varying degrees of severity whenever predictor variables are correlated (Grewel et al., 2004; Nachtigall et al., 2003). As a result, one method of avoiding multicollinearity is to split sections of the analysis into separate bocks whereby the correlated variables are assessed independently of each other (Billings & Wroten, 1978). As a result, rather than running a fully forward reciprocal effects causal model as recommended by Marsh et al. (1999), where all Time 1 variables are correlated and predict all Time 2 outcomes, a partial reciprocal effects causal model will be conducted instead. Within this model (see Figure 1), although Time 1 personal discrimination and SER will be correlated with each other and all the Time 1 disengagement variables (disengagement, anxiety, low control, and self-sabotage), the Time 1 disengagement variables will not be correlated with each other, and they will only predict their matching Time 2 factor and Time 2 personal discrimination (there is no Time 2 SER measure). Essentially, this model individually tests the reciprocal causal effects between personal discrimination and each disengagement variable, independent of the effects of Time 1 SER.
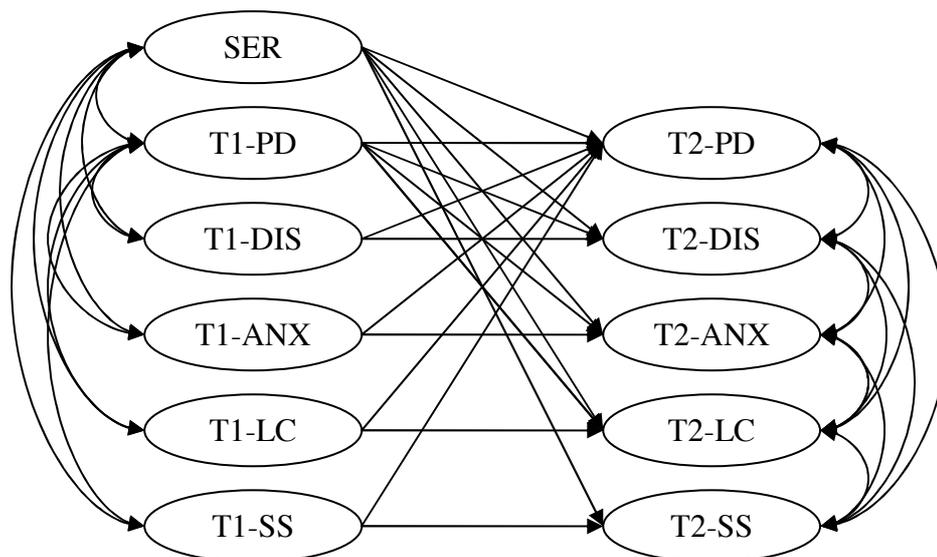

Figure 1. Partial Reciprocal effects model for SER, Personal Discrimination and the Disengagement Variables.

Note: SER = Socio-Economic Home Resources, T1 = Time 1, T2 = Time 2, PD = Personal Discrimination, DIS = Disengagement, Anx = Anxiety, LC = Low Control, SS = Self-Sabotage.

Table 4 summarises the results for the partial reciprocal effects causal model, and as can be seen, this model produced relatively strong fit indices, with the RMSEA, NNFI, and CFI producing acceptable estimates (Marsh et al., 1996). As can be seen within Table 4, none of the beta paths are outside the bounds of the respective correlations obtained by the original

CFA (see Table 3). This suggests that the efforts made to avoid multicollinear biases were successful (Maassen & Bakker, 2001).

With regard to the specified causal beta paths presented in Table 4, of the 18 potential paths, only nine causal paths were significant. Consistently and predictably, the strongest paths were the test-retest variables (e.g. Time 1 personal discrimination causing Time 2 personal discrimination) which made up five of the nine significant results. The remaining significant causal paths are of considerable theoretical and practical interest.

Table 4

Partial Reciprocal Effects Causal Factor Loadings, Factor Correlations and Goodness of Fit Criteria of the Measurement Instruments

Factor	SER		T1-PD		T1-DIS		T1-Anx		T1-LC		T1-SS	
	B	%VE	β	%VE	β	%VE	β	%VE	β	%VE	β	%VE
T2-PD	-.09	--	.44*	22.81	-.01	--	.10	--	.13*	1.40	.11	--
T2-DIS	-.12	--	.14*	2.94	.52*	.29.82						
T2-Anx	-.09	--	.09	--			.53*	27.62				
T2-LC	-.08	--	.18*	3.2					.57*	31.75		
T2-SS	-.18*	3.69	-00	--							.57*	29.21

Goodness of Fit Criteria				
X^2	DF	NNFI	CFI	RMSEA
1499.79	803	.94	.94	.057

Note: SER = Socio-Economic Home Resources, T1 = Time 1, T2 = Time 2, PD = Personal Discrimination, DIS = Disengagement, Anx = Anxiety, LC = Low Control, SS = Self-Sabotage, X^2 = Chi-Squared, DF = Degrees of Freedom, NNFI = Non-Normed Fit Index, CFI = Comparative Fit Index, RMSEA = Root Mean Squared Error of Approximation. B = Completely standardised Beta path, %VE = Significant percentage of variance explained. * significant at $p < .05$

Firstly, SER held a significant causal relation with self-sabotage, suggesting that as a student had more resources at home that may aid in the completion school-work, the less likely these students would engage in behaviours that might be harmful to their performance at school (e.g., watching T.V. the night before an exam). With regard to perceived personal discrimination, causal relations were found with disengagement and feelings of low control. Essentially, this indicates that as Indigenous students report higher levels of personal discrimination, the greater their feeling of not knowing how to succeed at school (low control) and distancing one's self from the school environment altogether (disengagement). Of considerable importance was that a significant reciprocal effect was also found between Time 1 low control and Time 2 personal discrimination, in that the more uncertainty Indigenous students felt on knowing how to achieve at school, the more likely they would report higher levels of personal discrimination. Although seemingly a nonsense result, some literature suggests that attributions of discrimination may act as a protective mechanism to buffer one's self-esteem against negative feedback (Dion, 2001). In other words, perhaps Indigenous students who feel more uncertain at school, may more readily perceive negative feedback as discriminatory in nature, thus unrepresentative of their actual abilities. This is a very tentative conclusion though, and requires further research.

Discussion

With the reliabilities and factor structure of the instruments established, and the longitudinal causal analysis not only producing sound fit indices but also avoiding multicollinearity issues, it can be argued that that the two primary aims of this study were addressed. More specifically, it was found that heightened levels of personal discrimination causally predicted heightened levels of academic disengagement and low control, independent of the test-retest stability of these constructs. These results suggest that the need to consider racial discrimination as a pertinent factor that acts to the detriment of Indigenous students' engagement within the school system warrants considerable recognition and attention. This finding is supported by research stressing the need to acknowledge the impact of racial discrimination for Indigenous Australian students (Bodkin-Andrews, Ha & Craven, 2006; Brennan, 1999; Howard, 2002; Lester, 2000; Parente, et al., 2003). Considering that these results were achieved not in a simple cross-sectional/ correlational design, but rather over a longitudinal causal modelling framework (e.g., Byrne, 1984; Marsh et al., 1999), a much greater level of confidence can be attributed the causal inferences of the findings. As a result, recent calls for a stronger quantitative approach towards Indigenous education issues have been met (e.g., Craven et al., 2005; Mellor & Corrigan, 2004; Walter, 2005). In addition, this paper has provided strong evidence to refute concerns that quantitative research methodologies and self-report measures may not be suitable for Indigenous youth (e.g, Fraillon, 2004; Tchacos & Vallance 2005).

This is not to state past quantitative (and possibly future) quantitative research is innocent of misrepresenting Indigenous Australians, as has been highlighted earlier within this paper with regard to early intelligence based research. Indeed, historically, quantitative researchers are responsible for creating a distinct level of mistrust through being intrinsically linked to the oppressive and culturally insensitive policy approaches within the missionary, protectionist, and assimilation eras of Indigenous education (McConnochie, 1982; Parbury, 1999; Sue et al., 1992; Wilson-Miller, 1999). Despite this mistrust which is well summarised by Walter (2005), she moves on to argue that the concepts behind the more oppressive eras within Indigenous education have now largely been rejected within the social sciences, including from more quantitatively orientated perspectives. As a result of this, Walter states that:

> Discussion with my Indigenous social research colleagues suggest that, for many, quantitative research still embodies all that is wrong with research per se from an Indigenous perspective. This seemingly unshakable reputation, however, is, I contend, largely built around a misplaced understanding of current quantitative research practices (p. 28).

It must be noted that considerable progress has been made with regard to quantitative cross-cultural research (Byrne, 2003; Parker, Dowson, & McInerney, in press), as new and precise quantitative procedures are increasingly being implemented to ensure that data and results do represent the diversity of samples and constructs they are meant to tap.

Although the quantitative implications of these findings are important, a number of limitations must be addressed. In examining multi-dimensional perceived discrimination scales currently in existence, a multitude of factors have been identified which move beyond the single factor of discrimination utilized within this study, such as institutional discrimination (Fisher, Wallace, & Fenton, 2000; Utsey & Ponterotto, 1996), educational discrimination (Fisher, et al., 2000; Wong et al., 2003), personal cultural denigration (Utsey & Ponterotto, 1996), and group or macro discrimination (Taylor et al., 1996). The implication here is that experiencing varying types of discrimination may lead to considerably differing

effects within the psyche of any individual, suggesting that to more completely understand the negative impact of discrimination, one must attempt to understand and measure the diversity of sources discrimination may emanate from.

A more general limitation of perceived discrimination research, especially with the use of self-report measures, is that if non-significant findings have emerged with other psychological and outcome measures, it does not mean discrimination was not harmful to the targeted group (Fisher & Shaw, 1998). Rather a myriad of other factors may be intervening (e.g., willingness to attribute discrimination, cultural identity), or the scales themselves may be an inappropriate device for capturing the severity and diversity of perceiving and experiencing discrimination. Hence, arguments suggesting that discrimination has no relation with academic anxiety and self-sabotage must be treated with caution.

Despite the limitations of this paper, one cannot ignore the finding that at least one level of racial discrimination has been identified within this paper as having a causal influence in contributing to Indigenous students' reports of higher levels of academic disengagement and uncertainty on how to achieve within school. This result reflects the sad truth that Indigenous Australians have been, and still are one of the most, if not the most stereotyped and discriminated against groups within Australian society (Brennan, 1998). Even if by some miracle, such stereotyping and discrimination was to suddenly cease to exist, the legacy of the negative effects of past discrimination will continue for generation to generation to come (Tripcony, 2000). What is needed is for schools and researchers not to turn a blind eye on racism and discrimination, or to stop at simple acknowledgment of its existence but to actively seek to address and reduce discrimination to ensure optimal opportunities for all students. This does not mean, in the words of Szalacha et al. (2003) that perceived discrimination research should:

> …be erroneously misread to assume that the solution lies in helping people to not perceive discrimination… The goal is to eradicate racism, not to "protect" the people from perceiving it. In fact, the more it is perceived, the more urgent it is that social forces must be galvanized to work again racism. (p. 432)

Indeed, if Indigenous and other minority students become aware that Australia, the education system, schools, teachers and even other students are united in their opposition to discrimination, a new perception may emerge that is closely linked to zero tolerance of prejudicial attitudes. That is, in identifying and promoting egalitarian values, an individual must break the habit of accessing cognitions that simply reflect inaccurate group stereotypes (Devine, 1995; Devine & Monteith, 1993). In essence, prejudice reduction techniques must aim to promote perceptions of individuals as individuals, with the additional respect to the uniqueness of varying cultures and their values. Looking at the reverse side of the coin, if Indigenous students become aware that their school and community is united against racism and discrimination, it is possible that when they are inevitably forced to endure discriminative taunts or behaviours in the future, they too will see that the act of the prejudicial individual is exactly that, a negative act from an individual, not an accurate representation of the wider community, or Australia as a whole. With this in mind, respecting our unique first Australians' culture and the nature of Australia as a multicultural society is even more important, for here we may have the very foundation for healing the ongoing and future wounds of discrimination.

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