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Construct Validation of the Self-Description Questionnaire II (Short Version) for Indigenous Australian Secondary School Students.

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In adherence to recent calls for the development of culturally relevant and applicable quantitative instruments for research into the educational disadvantages suffered by Indigenous Australian students, this investigation will report on the validation of the Self-Description Questionnaire II (short version) (SDQII-S) as reformulated by Marsh, Ellis, Heubeck, Parada & Richards (2005) and a researcher-devised art self-concept scale. Drawing from data obtained from the Craven, Tucker, et al. (2005) study, reliability and confirmatory factor analysis will be used to assess the psychometric properties of the 11-facets of self-concept measured by the SDQII-S and the researcher-devised art self-concept scale for Indigenous students (N=530) in comparison to their non-Indigenous peers (N=1155) drawn from 3 Australian States. The results demonstrate that the SDQII-S is a psychometrically sound and robust measure of Indigenous students' self-concepts.

The early history of educational policies, programs and attitudes targeting Indigenous Australian peoples has been identified as being a largely negative force that may have played an influential role in oppressing the diverse cultural values and teachings within Indigenous nations throughout Australia. Parbury (1999, p.64) highlights this historical position by claiming, "throughout most of the history of schooling, Aboriginal culture was seen not only as worthless but inimical to education". Arguably, it has not been until the last thirty years that many of the negative influences within the wider education system have finally begun to be reversed (Tripcony, 2001), as a more equitable integrative approach has begun to emerge. Yet despite these changes and the benefits that emerged for Indigenous students' enrolment and achievement patterns, there are still considerable inequities across all levels of schooling, ranging from pre-school to tertiary education (Department of Education, Science and Training, 2003). Recently, a new direction has emerged within the field of educational psychology that has sought to address the inequities between Indigenous Australian students and the wider Australian student population. This direction is an attempt to more accurately identify educational determinants that have traditionally escaped the limited focus of socio-demographic descriptive variables (Bin-Sallik, 2005) and is centred on the psychological well-being being of Indigenous Australian students (e.g. Craven & Marsh, 2004). Considering that the psychological focus on the educational performance of Indigenous students has, until recently, been either ignored or only briefly mentioned as an unfortunate consequence of the denigrated position of Indigenous Australians, this paper shall focus on a number of important psychological variables that may influence Indigenous Australians' educational outcomes.

Indigenous Education: A Brief History

Before examining the possible psychological influences on Indigenous students' educational outcomes, it is essential that an appreciation of the detrimental history of Indigenous education within the European context be understood (Ingram, 1981; McConnochie, 1982; Miller, 1991; Parbury, 1999; Wilson-Miller, 1999). What becomes obvious from the briefest glance at the historical educational trends is that the educational aims and the quality of education have differed drastically for Indigenous and non-Indigenous students. The embedded connotation of these differing standards was directly related to the attitudes of the non-Indigenous providers of 'education' and also the early political, social and scientific attitudes directed at Indigenous cultures as a whole (Parbury, 1999). In short, it can be argued that the education of Indigenous students by the Caucasian majority has evolved through various eras, with differing educational emphasis and goals. These eras are characterised by historians as the missionary, protectionist, assimilative and integrative periods (McConnochie, 1982; Miller, 1991; Parbury, 1999), all of which are categorized by differing educational approaches and standards directed at Indigenous Australians and all of which may be argued to have a profound impact on the psychology of Indigenous Australian students.

Briefly, the missionary era occurred shortly after first settlement and ranged from the early colonization to the 1860's (Parbury, 1999) and was largely characterized by the aim of 'Christianising and civilising' the younger generations away from their traditional cultural values (McConnochie, 1982). During this era, Indigenous nations were forcibly removed from their traditional lands and placed into missions and reserves where they were not only segregated from the white frontiers and communities, but also from the very foundation of their social, religious and ceremonial lives (Parry, 1997). What education Indigenous students received during this period sought only to prepare them for the lowest type of labour within the increasingly oppressive white hegemony (Miller, 1991; Parbury, 1999). With the standards of missionary education naturally being greeted with ambivalence and resistance from Indigenous communities, the first wave of missionary closures began around 1850. These closures were possibly representative of the next wave of 'professional' opinion that asserted that any attempt to 'civilise' Indigenous peoples from their 'savage' ways would be fruitless (Parbury, 1999). This new apathy towards Indigenous education became the centrepiece of the "protectionist" era.

The protectionist era (ranging from the 1860's until the 1940's) used the geographic and social isolation of many of Indigenous reserves to limit any opportunity Indigenous Australians may have had to control their lives within the European context (McConnochie, 1982; Miller, 1991; Wilson-Miller, 1999). At the very most, the education provided by poorly qualified teachers and administrators within the reserves was in a similar, but much poorer vein as to that during the missionary period. In addition to the lower educational standards, practices that are now well known to result in the devastating and long history of the stolen generations (see "Bringing Them Home" report, Human Rights & Equal Opportunity Commission HREOC, 1997) began to be implemented. That is, lighter skinned Indigenous Australian children were forcibly removed from their families and placed in orphanages until such a time that they were deemed suitable to be thrown into the antagonistic white society (McConnochie, 1982). Imbedded within the apathy of the protectionist era was a new model of understanding directing Indigenous education, that is the inferiority and/or pathological model that plagued educational attitudes and policy during the late 1800's and early 1900's (Ingram, 1981; McConnochie, 1982).

The third era of Indigenous education began roughly in the 1940s and although some of the educational tendencies shifted away from the segregative isolation policies of the protectionist era, the general deficit approach was still implemented. The assimilative era did, on the surface, have a slightly more 'positive' approach to education, yet deeply ingrained within this era, is what Sue et al. (1992) argued to be a cultural deprivation/deficit approach. In essence, the cultural deficit approach moves the blame away from the focus of genes and IQ and targets the blame more towards the culture of the minority group. The highly biased and prejudicial implication that was implicit with the earlier approaches to Indigenous education, suddenly took the leading role as it was thought that disadvantaged minority groups simply do not possess the 'right culture'. Characteristic of the assimilation era was the realization that past 'educational' practices were failing dismally in westernising oncoming generations of Indigenous Australians. As a result, teaching of basic literacy and numeracy skills began to take the focus along with teachings towards 'higher' and 'acceptable' behavioural and attitudinal standards characteristic of Western civilization (McConnochie, 1982). To achieve these goals, more effort was put towards increasing the quality of schooling (e.g. qualified teachers), abolishing the separate schooling system so that Indigenous students were allowed into the state schooling system, and the improvement of general school facilities with higher numbers of Indigenous students. As a result of this, by 1968 nearly all Indigenous Australian children were receiving official state schooling, at least at the primary level (Ingram, 1981; McConnochie, 1982; Parbury, 1999). Unfortunately, such enrolments did not seem to influence the attendance and achievement rates of Indigenous students.

In the late 1960s, the negative attitudes within the education system began to be reversed as the missionary, protective and assimilation era's largely proved ineffective in providing equitable and successful standards of education of Indigenous students (Ingram, 1981; McConnochie, 1982; Miller, 1991; Parbury, 1999; Sue, Arrendondo & McDavis, 1992; Wilson-Miller, 1999). As a result, the policy of assimilation was replaced with an integrative direction in education (Parbury, 1999). Although similar to the assimilative approach of seeking a greater representation of Indigenous students in the education system, policies implementing the integration ideal sought not to overtly override and demean the importance of Indigenous cultures, but rather to begin to include Indigenous cultures as an essential part of wider Australian society. Due to this new approach, numerous positive steps were taken, such as the inclusion of Indigenous consultative groups to aid in the development of Indigenous students' education, bilingual schooling and

specific Indigenous education for the teachers themselves. Although slow in its implementation, the era of integration is gradually seeing near constant and significant improvements in almost all levels of education for Indigenous Australian students (Department of Education, Science and Training, 2003). This includes significant progress in the key areas of early literacy, numeracy skills, enrolment and attendance (Department of Education Science and Training, 2003; Frigo, Corrigan, et al., 2003).

Indigenous Education: The Present

Most recent statistics on Indigenous education suggest that although substantial improvements have been made, there is still a considerable need for improvement across all levels of education for Indigenous students, ranging from preschool to higher education. This is most noticeable within the secondary schooling system.

Secondary school statistics: Disparities between Indigenous and non-Indigenous students within the secondary schooling system are apparent for levels of academic achievement but become even more distinctive for progression through the latter stages of secondary schooling. Starting with achievement, results obtained from a recent large scale Program for International Student Assessment (PISA - OECD, 2000) showed the significantly disadvantaged achievement levels of 15 year-old Indigenous Australians when compared to all student groups of the same age group. Specifically, it was found that the percentage of Indigenous Students who achieved the benchmark averages determined by the Organization Economic Co-operation and Development for literacy, mathematics and science, were considerably lower than for the total Australian sample. That is, only 30.7% of Indigenous students reached the benchmark for Reading literacy when compared to 61.8 % of all students within Australia. Similar results were achieved for mathematics (26.2% compared to 65.4%) and science (29.1% compared to 61.8%).

Moving to the transition from compulsory secondary schooling into non-compulsory schooling (years 11 and 12), a possible critical factor arises that may affect the inequities faced by Indigenous students with regard to later schooling and work opportunities; that being their very progression into the optional education setting (Commonwealth of Australia, 2002). Statistics comparing the progression rates of Indigenous and non-Indigenous students from years 8 to 12 from 1999 to 2002 have shown a repeated pattern of decline for Indigenous students. For example, when comparing the number of enrolments at each year level with the previous level, one can see that for Indigenous students there is a drastic decline in the progression rate. That is, in 2002, the progression ratio from years 8 to 9 was reasonably strong at 97.5%, but this ratio drops considerably from years 9 to 10 with the Indigenous enrolments falling to 89.6%. From years 10 to 11, the most significant drop becomes apparent with the ratio falling to 69% and 67.8% for years 11 to 12. In comparison, for non-Indigenous students, the years 11 to 12 ratio is 87.1%. These statistics suggest a 19.7% inequity in educational representation (Department of Education Science and Training, 2003).

With a complete and successful progression through secondary schooling being recognised as one of the most important determinants to opening a variety of positive future pathways, such as better employment opportunities, higher educational options and later economic stability (Commonwealth of Australian, 2003; Craven & Marsh, 2004; Lester, 2000), disparities between Indigenous and non-Indigenous secondary school achievement must not be ignored. This is especially potent considering that entry into, and successful completion of, higher university education has been found to be one of the few variables to completely nullify later occupational inequities faced by Indigenous students (Commonwealth of Australia, 2003)

Indigenous Education: The New Direction

Recently research has begun to take a new direction in attempting to more accurately identify educational determinants that have traditionally escaped the limited focus of the descriptive and statistical quagmire of educational inequities (Bin-Sallik, 2005; Bin-Sallik, Blomeley, Flowers & Hughes, 1994). This new focus is largely centred around the psychological well-being being of Indigenous students (e.g. Craven & Marsh, 2004), an area that has until recently been either ignored, or at the very most, only briefly mentioned as an unfortunate consequence of the denigrated position Indigenous Australians have traditionally and continually been subjected to within the wider society.

The impact of the myriad of psychological variables that have a negative effect on the livelihood of Indigenous Australians is quite immense and well highlighted by Swan & Raphael (1995) who cite both historical and current trials that Indigenous Australians are forced to endure. Historically speaking, European settlement resulted in a denial of the rights of Indigenous Australians that inevitably led to social disintegration within traditional Indigenous communities. This disintegration was largely 'achieved' by strategies such as: the forcible removal from traditional lands, war, introduced diseases, loss of cultural and traditional norms, loss of self-determination and the forcible removal of children from their families. The ramifications of these atrocities still echo throughout Indigenous communities today as the struggle to regain complete self-determination is still evident. Swan & Raphael (1995) argue that a key factor to achieving this self-determination is through the promotion of a sense of self into the younger generations, as a sense of belonging to the true history. Swan and Raphael further argue that in achieving this sense of self, Indigenous children must be aided in developing a strong cultural identity, a sense of self-reliance, adequate coping strategies to aid in stress management, higher self-esteem and self-confidence, the ability to achieve their full potential and have future pathways open to them.

In a comprehensive investigation into the aspirations held by Indigenous high school students, Lester (2000) highlighted numerous key links between schooling and negative psychological stressors inhibiting the processes of self-determination. As specifically named by both Indigenous students and a wider Indigenous community sample, lowered self-esteem, feelings of isolation and the enormous impact of racism were listed as salient barriers against Indigenous students' progress through the schooling system and into the wider workforce. The proposition that these psychological inhibitors may in fact be a significant contributor towards the educational inequities faced by Indigenous students is forcefully portrayed in a study by Craven and Tucker (2003) who conducted a number of semi-structured focus group discussions with representatives from a number of regional NSW Aboriginal Education Consultative Groups (AECG). The discussions were specifically aimed at clarifying the importance AECG members placed upon Indigenous students' notions of the self and how future directions may implement such a focus. The overwhelming theme to arise from the research was the need to address the issue of the enhancement of Indigenous students' self-concepts as a method of obtaining stronger schooling and post-schooling outcomes for Indigenous students. Implicit within this need was the identification of the need to target specific facets of Indigenous students' self-concepts (e.g. identity, reading, math and peer self-concept). AECG members also suggested that by acknowledging the need to address such facets, the causal impact of various components of the self-concept on important academic outcomes would also be clarified. From these suggestions, Craven and Tucker (2003, pp. 36-37) concluded there was an urgent need for "causal modelling research need[ing] to be undertaken to demonstrate the longitudinal impact of self-concept on educational outcomes valued by Aboriginal community members".

With the suggestions of Swan & Raphael (1995) and the findings of Lester (2000) and Craven and Tucker (2003), one can see the need to acknowledge the importance of Indigenous students' self-concept as a vital key in unlocking the education disparities currently existing within the Australian Education system. In considering this need though, one must also acknowledge that to pursue intervention strategies involving self-concept, a strong theoretical and empirical foundation must first be identified, for strong theoretical foundations have traditionally been lacking within Indigenous educational research and interventions. For example, Paul Hughes, has argued that the previous "range of performance indicators... lack precise accountability because they do not arise from a coherent body of research that clearly articulates the most appropriate means of addressing Indigenous educational disadvantage" (in Mellor & Corrigan, 2004, p. ii). Considering the above observation, it is essential that any research examining the self-concept of Indigenous students must also build from a strong theoretical structure of self-concept, and as a result, this paper shall focus on the multi-dimensional understanding of self-concept as advocated by Marsh and colleagues (eg. Marsh 1990; Marsh & Craven, 1997; Marsh & Shavelson, 1985).

Self-concept

Considering that a positive self-concept has long been 'understood' as a desirable motivator and outcome within numerous psychological disciplines (Marsh & Hattie, 1996; Skaalvik & Bong, 2003), it is almost surprising that one of the most pertinent issues plaguing much pre-existing self research and intervention strategies is the ambiguity of the exact nature and definition of the self-construct utilized (Marsh & Craven, 1997, 2004). Generally, the definition of self-concept has reached a consensus in explaining one's

perceptions of oneself (Shavelson, Hubner & Stanton, 1976, Shavelson & Marsh, 1986), or as more precisely defined by Ha (2002, p. 1):

Self-concept is the way individuals perceive themselves in relation to the world and the social interactions in which they are involved. It is a system of either positive or negative self-evaluation or identification and is thought to motivate and structure behaviour and future aspirations

Yet relying on definitions of self-concept without understanding its underlying structure, has proven to be the heart of many of the problems encountered by much of the traditional self-concept research (Marsh & Craven, 1997). This is especially relevant when considering the abundance of contradicting self-concept intervention research, suggesting imprecise theoretical and methodological foundations that in some cases saw self-concept interventions show detrimental rather than beneficial effects. (Hattie, 1992; O'Mara, Craven & Marsh, 2003). Considering the importance of recent advances in self-concept theory and measurement, much of which has largely sprung from what is considered to be a landmark theoretical review of self-concept research by Shavelson et al. (1976), it is necessary that any study seeking to understand or utilize the notion of self-concept must first appreciate the reason behind the chequered history of the understanding of the self.

The Uni-dimensional Conceptualisation

Following the dominance of a behaviourist movement, where some researchers argued that self-concept became 'grossly neglected' in favour of a strictly environmental and genetic approach (Hattie, 1992; Marsh Byrne & Shavelson, 1992), self-concept re-emerged to be largely understood as a uni-dimensional construct where only the general sense of self was considered to be of importance. Research emanating from this general approach has since been understood to be counter productive in that "many researchers related general self-concept to a bewildering array of other constructs apparently without any clear theoretical basis for predicting how and why the measures should be related" (Marsh & Hattie, 1996, p. 73). For example, a recent meta-analysis conducted by O'Mara et al. (2003), found that in the research analysed, when self-concept/esteem measures were specifically related to domain outcomes, substantially higher effect sizes were observed (.89 vs. .20) when compared to interventions that ignored the multi-dimensionality of self-concept (e.g. physical self-concept intervention measured using a global scale). Although numerous multi-dimensional conceptualisations of self-referent notions were in existence prior to the 1980's (as reviewed by Shavelson et al., 1976), such multi-dimensional conceptualisations were not considered nearly often enough for effective self-referent based research (Hattie, 1992; O'Mara et al., 2003). Arguably, it was not until Shavelson et al.'s (1976) detailed review of the theoretical construction of self-concept that the antecedent was set for a recent explosion in the multi-dimensionality of self-based research.

The Multi-Dimensional Self and the Self-Description Questionnaires

In a comprehensive review and extension of pre-existing self-concept theory and measurement, Shavelson et al. (1976) produced a strong theoretical foundation for future self-concept research. This paper is now recognised by some authors as a landmark study that can be credited with a shift in self-concept research towards a relatively new multi-dimensional understanding. Within Shavelson et al.'s (1976) review, the authors identified the abundance of seemingly poorly conceptualised between-construct research and the lack of within-construct research that sought to accurately identify and define various facets of self-concept. Of critical importance for this paper, Shavelson et al. (1976) highlighted the need to consider the multidimensional nature of one's self-concept, whereby each dimension plays varying roles in the categorization of the self, depending on the particular individual and their group reference.

Largely based on the multi-dimensional structure of self-concept as formulated by Shavelson et al. (1976), Marsh devised a set of Self Description Questionnaires that designed for a variety of age groups, including adolescents (SDQII- Marsh, 1992). The SDQ-II is are now acknowledged as a one of the most reliable and valid measures of self-concept currently available (Byrne, 1996; Hattie, 1992). With the measures being drawn from a strong theoretical foundation, each of the SDQ instruments captured the multidimensionality of self-concept in a reliable and stable fashion. The multiple factors tapped by the SDQ instruments include: physical abilities, physical appearance, peer relationships (only the SDQ-I), parent relationships, reading/verbal, math, school and general facets. The SDQ-II and SDQ-III also measure: opposite sex relations, same sex relations, honesty/trustworthiness and emotional stability facets, and the

SDQ-III in addition measures spiritual values/religion and problem solving facets. Of importance when considering the necessity of within-construct research, all the SDQ instruments have been found to attain strong estimates when considering reliability and unique factor loadings (Marsh, 1990a). For example, internal consistency estimates range from a minimum .74 for all three instruments and target factor loading for each facet within the instruments average around .70, with no loading falling below .44. Cross-loadings are also of little concern, ranging from -.17 to .27 for all instruments, and factor correlations are typically small (medians of .10 to .15), with the range of correlations for all three instruments varying between -.06 to .47.

Self-Concept and Achievement: Reciprocal Effects

Early research examining causal relations between self-notions and achievement generally advocated one of two competing theoretical perspectives, those being the self-enhancement and skill development models (Marsh & Craven, 1997). The self-enhancement model postulates that self-concept is a primary determiner of achievement, whereas the skill development model posits that increased skill is the primary determiner of achievement and that self-concept is simply a by-product of this increased skill and acquired achievement. Initially, this research was unable to identify unequivocal findings when examining the distinction between the skills development and self-enhancement models. For example, Shavelson & Bolus (1982) found that although achievement had no impact on self-concept, self-concept did affect subsequent achievement, thus supporting the self-enhancement model. Alternatively, Newman (1984) found no evidence for the self-enhancement model, but rather, prior achievement had a significant effect on subsequent self-concept, supporting the skills-development model. Finally, a study by Byrne (1986) found no relationship in any of the causal paths between self-concept and achievement or vice-versa. What is notable about each of these papers is that they failed to show adequate testing criteria for longitudinal self-concept research, as identified by Marsh et al. (1999).

More recently though, a long string of studies have emerged with strong methodological backgrounds, that have also offered much to settle the self-enhancement, skills development controversy. This settlement is what is known as the reciprocal effects model (Marsh, 1990b; Marsh et al., 1999; Marsh & Craven, 2004). It suggests that rather than the skills development and self-enhancement models being mutually exclusive in their relationship to each other, the influence anticipated by both models would instead occur simultaneously. That is, in looking at the causal relationship between domain specific self-concepts and achievement, "prior self-concept affects subsequent achievement, and prior achievement affects subsequent self-concept" (Marsh & Craven, 2004, p. 6).

The first study to provide clear support for the reciprocal effects model was conducted by Marsh (1990b), who used data obtained in a nationally representative (USA) study of 1,456 secondary school participants. This study stretched over 4 years with the data gathered once a year from year 10 until one year after high school. From this, Marsh (1990) was able to examine the relationship between academic self-concept, school grades and academic ability (as measured by standardised testing). Of particular importance, evidence was found to suggest that academic self-concept (year 11) was influenced by prior measurements of academic self-concept and academic ability (year 10 - but not grades). Also, year 11 grades were significantly influenced by previously measured academic self-concept and school grades (year 10). This relationship continued into the third phase of testing (year 12) with school grades being significantly influenced by both previous school grades and academic self-concept. Although academic self-concept was not measured in the third phase, the fourth phase of measurement consisted of the academic self-concept measure (1 year post school), and revealed that only phase 2 academic self-concept (year 11) had any unique influence on the final measure of self-concept. In general, the results presented by Marsh (1990) showed reasonably sound support for the reciprocal effects model, although it is suggested that the causal paths from self-concept to school grades were stronger than the causal path from school grades to self-concept (especially when considering the lack of influence school grades had on the final measure of academic self-concept; Marsh & Craven, 1997).

In a later study by Marsh & Yeung (1997a), testing high school students of Catholic schools within the Sydney metropolitan region of Australia, also found strong support for the reciprocal effects model. A unique strength of Marsh and Yeung's (1997a) study was its domain specificity, in that the relationship between academic achievement (standardized school grades) and self-concept was examined at specific

subject levels (e.g. maths self-concept and maths achievement) rather than using a general academic self-concept measure. A second strength is that measures of domain specific self-concepts and achievement were obtained on regular intervals over three years with the students ranging from years 7 to 11. In examining the causal relationships between self-concepts and achievement, Marsh and Yeung (1997a) found that all paths from achievement to self-concept (within the domains of math, English and science) were significant, clearly supporting the skill development model. With regard to the causal relationship between self-concept and achievement, considerable support was found for the self-enhancement model, with the vast majority of paths being significant (54 of a 63 possible paths). Although the authors acknowledge that self-concept to achievement paths were strongest within the domain of mathematics (cautiously explained by mathematics being a discrete and highly structured subject, thus motivational and behaviour tendencies could be more concretely related to achievement), the analysis of all subjects demonstrated an abundance of reciprocal effects. These results supported Marsh and Yeung's (1997a, p.49) criticism of previous research that "was often based on either mathematics constructs alone or "global" academic constructs that were often based on a conglomerate of different content domains that may have confounded the results of specific school subjects".

Reciprocal effects: Cross Cultural Support

With increasing evidence supporting the reciprocal effects model (Marsh, 1990; Marsh & Yeung, 1997a, 1997b, 1998), researchers have begun to take advantage of this strengthening theoretical foundation and are currently testing its ability to generalize to cultures outside the traditionally western education system (Marsh & Craven, 2004). For example, Marsh, Hau & Kong (2002) found repeatedly significant paths between prior achievement and academic self-concept on all 5 occasions that self concept was measured (although there was reasonable variation in which stages of achievement expressed a significant path to self-concept). These results were obtained even after the considerable variation explained by previous self-concept measures was controlled for. With regards to paths between academic self-concept and achievement, significant paths were also obtained after the effects of previous achievement measurements (up to three occasions) were controlled for, providing strong evidence for the unique influence self-concept has on achievement. Considering that this study was based on a large sample of Hong Kong high school students, Marsh, Hau & Kong (2002) have provided strong preliminary evidence to suggest the cross-cultural generalizability for the reciprocal effects model (see also Kong, Hau & Marsh, 2003; Marsh & Craven, 2004).

The most optimistic implication that can be drawn from the recent cross-cultural research is that the reciprocal effects model could well be a universal theory that may supersede cultural norms that result in variations in educational patterns and attitudes. As to whether such optimism is justified by the available evidence remains to be fully seen, for as Byrne (2003) rightfully suggests, the testing of instruments in one culture, that has been norm tested in another culture (such as the SDQ), carries with it considerable dangers of multiple biases that may distort the cultural relevance of the findings. This does not mean that all results must be rejected outright, for evidence suggests that such biases can be controlled. For example, in Marsh et al's (2002) study, they were able to control for the primary language used for instruction in the Hong Kong schools (Chinese, English, mixed) and although differences were found in specific self-concept and achievement scores, the reciprocal effects model was unaffected, supporting the universality of the underlying process of self-concept and achievement. If this is indeed the case, the implications for Indigenous education are of the utmost importance as the motivational properties inherent within self-measures (Bong, 2001; Ha, 2002; Marsh & Craven, 1997; Marsh et al., 2003; Marsh & Yeung, 1997; Shavelson et al., 1976) may well prove to be a significant key in understanding at least part of Indigenous Australian educational disadvantage (Craven & Marsh, 2004; Craven & Tucker, 2003; Ingram, 1981, Lester, 2000, Swan & Raphael 1995).

Self-concept: The Indigenous Experience

While the multi-dimensional self-concept is becoming understood as an increasingly potent variable for maximising human potential over the last 15 years (Craven, Marsh & Burnett, 2003), research on self-concept within the Indigenous Australian setting has been sadly lacking. Until recently, any understanding of self-concept held by Indigenous Australians could only be inferred from international research, weak theoretical suggestions, hearsay and subtle stereotypical inferences.

Currently, there are only two studies focusing on the multi-dimensional facets of the self-concept within the Indigenous Australian context. Firstly, in a study examining the motivational and self-concept patterns in Indigenous Australian (n=270) and non-Indigenous Australian (n=833) rural high school students, McInerney (2003) found little differences between the two groups. Specifically, with regard to academic self-concept, it was concluded that the “academic self-concept of Aboriginal students is very similar to that of other students” (p. 343). Interestingly, a closer inspection of the mean scores reveals a subtle pattern. That is, although the mean general academic measure of self-concept for Indigenous students (3.72) was higher than the non-Indigenous students (3.67), the domain specific mathematics self-concept of Indigenous students (3.17) was lower than that of non-Indigenous students (3.30). The English self-concept means were equal (3.49). Although, due to the small effect size differences and their lack of significance, any conclusions based on the differences should be done so with extreme caution.

A recent and extensive cross-sectional study reported on by Craven & Marsh, (2004; see also Craven Parente & Marsh, 2003; Craven et al., 2005) offers slightly stronger evidence supporting the need for a general and domain specific distinction when considering Indigenous Australians. Notably, in examining scores obtained from a shortened version of SDQ-II for 517 Indigenous and 1151 non-Indigenous high school students across three Australian states, they found numerous significant differences between the two groups. That is, when compared to non-Indigenous students, Indigenous students scored significantly higher on general, appearance, physical and art self-concepts in comparison to their non-Indigenous peers. However, non-Indigenous students’ self-concepts were significantly higher for math, school, verbal, honesty, emotional, opposite and same sex relation self-concepts in comparison to Indigenous students’ self-concepts. Looking closely at the general and academic measures, one can infer reasonable support for the need of domain specificity over domain generality when considering the Indigenous students. Observations on Indigenous students’ general self (4.88), school self (4.21), verbal self (3.81) and math self (3.60), support the possibility of a greater construct bias within more general measurements of the self. That is, Indigenous students’ general self-concept may comprise of other self-concept domains other than specific academic components. Even within the general academic (schooling) self-concept, construct bias may exist in that Indigenous students may place a greater emphasis on other aspects of school success (e.g. physical self-concepts). Hence it may be useful for future research to more fully examine whether differential effects are present for self-esteem and domain specific facets of self-concept to further elucidate whether differences between minority and majority groups are present within the education system.

Despite the promising results of Craven and Marsh (2004) and McInerney (2003) for identifying facets of the self that may act as a pivotal starting point for effective interventional strategies, little information is provided to alleviate the concerns of Byrne’s (2003) criticisms of some quantitative cross-cultural research. That is by simply comparing the means of self-concept measures without firstly testing for the equivalence of responses between groups can prove highly misleading. One method of addressing this difficulty is through tests of measurement equivalence that ultimately assesses the invariance of factor patterns and loadings for varying samples on the same instrument.

Research Aims

Considering that research has repeatedly identified self-concept as an important psychological construct for having an impact on Indigenous students’ schooling outcomes, the need to identify a valid and reliable measure of Indigenous student’s self-concept cannot be ignored. As a result, this research aims to:

1. Examine the psychometric properties of the new SDQII (shortened version) for Indigenous high school students to determine whether this instrument is a psychometrically sound measure of self-concept for Indigenous students.

Additionally, in at least partially addressing the concerns of Byrne (2003), structural equation modelling techniques will be used to partially address the issue of measurement equivalence between Indigenous and non-Indigenous students. As a result, this research aims to:

2. Test the invariance of the factor structure of self-concept for Indigenous and non-Indigenous students.

Finally, to offer a preliminary analysis of the relations various facets of the self-concept may have with schooling outcomes for both non-Indigenous and Indigenous students, this research aims to:

3. Examine the relations between multiple dimensions of Indigenous and non-Indigenous student's self-concepts with school outcomes variables such as absenteeism, school enjoyment and school aspirations.

Methodology

Participants

The data set used within this research is drawn from the Craven, Tucker, et al. (2005) study. Participants within this study were from secondary schools with similar geographic regions in the States of Western Australia, Queensland and New South Wales, thus enabling a strong matched sample design. Participants were Indigenous ($n = 530$) and non-Indigenous ($n = 1148$) secondary school students whereby the majority of participants were aged 14 years and over.

Instrumentation

A total 4 instruments were drawn from the Craven, Tucker, et al., (2005) study for the purposes of this investigation. These instruments were:

- *Self-Description Questionnaire II – short (SDQII-S)*: A shortened version of the original 102-item SDQII (Marsh, 1992) psychometrically validated by Marsh et al. (2005). This version retains all of the 11-factors of the multi-dimensional self-concept yet with only half the number of items (51 in total). The scale itself is designed for adolescents aged between 12 to 18 years, and all items are scored on a 6 point Likert scale (1 = False, 6 = True).
- *Art Self-concept*: An 8-item self-concept measure formulated by Craven, et al. (2005) focussing specifically on the domain of art. The facet of the self will be merged into the SDQII-S so that it will have a total of 12 self-concept facets.
- *School Enjoyment*: A 5-item measure identifying the extent to which students enjoy school in general (Craven, et al., 2005).
- *Self-reported absenteeism*: A single item measure identifying the number of days students reported to be absent in the previous year of school.
- *School Aspirations*: A single item measure assessing how committed students are to remaining at school in the future.

Statistical Analysis

Initial testing of the psychometric properties of the SDQII-S included an examination of the Cronbach's α for the 12 factors of the SDQII-s for both Indigenous and non-Indigenous students (using SPSS 12.0.1). The Cronbach's α estimate is an indication of the internal consistency of the factors examined, whereby a α value greater than .70 suggests an acceptable internal consistency for the items comprising of the examined factor. Additionally, confirmatory factor analysis (CFA) of the SDQII-S, including the art self-concept facet, was conducted with LISREL 8.5 using maximum likelihood estimation. Based on the advice of Marsh, Balla & Hau (1996) for goodness of fit indices, emphasis was placed upon root-mean-square error of approximation (RMSEA), Tucker-Lewis index (TLI) and relative non-centrality index (RNI). For the RMSEA, values less than .05 indicate reflect close fit, and values less than .80 reflect an acceptable fit for the model being examined. Values above .95 for the TLI and RNI represent excellent fits for the data.

It is now widely accepted that to determine whether the same instrument can be used in different populations, multi-group tests of invariance should be conducted to determine whether the factor structure of the instrument in focus is the same between sample groups (Byrne (1998). Tests of factorial variance traditionally consist of a series of four increasingly rigorous CFA models. The first model is the most relaxed in which no equality restraints are placed on the model (completely free). Within the second model, the factor loadings are held equivalent, thus testing for the invariance between groups. The third model is increasingly restrictive in that the factor loadings, variances and co-variances are restrained to be invariant between groups. Finally, within the fourth model, all parameters are held invariant between the Indigenous

and non-Indigenous samples. If the increasing restrictive models result in weakened Goodness of fit criteria (RMSEA, TLI and RNI), then any claim that the SDQII-S is invariant between the Indigenous and non-Indigenous sample groups should be treated with caution.

Finally, a correlational analysis was conducted to examine what relation different facets of Indigenous and non-Indigenous student's self-concept held with the three outcome measures of school enjoyment, absenteeism and school commitment.

Results

Descriptive Statistics and Internal Consistency Estimates

Descriptive statistics and reliability estimates are presented in Table 1 for Indigenous ($n = 530$) and non-Indigenous students ($n = 1148$). This table includes the means, standard deviations and Cronbach's α for self-concept scores, absenteeism rates, school enjoyment ratings and school commitment ratings.

Table 1: Descriptive Statistics for Indigenous and non-Indigenous students' scale scores.

Variable	Sample	Mean	Standard Deviation	α
Math	Indigenous	3.66	1.28	.76
	Non-Indigenous	3.80	1.46	.88
Appearance	Indigenous	4.13	1.35	.87
	Non-Indigenous	3.81	1.37	.91
General	Indigenous	4.89	.82	.69
	Non-Indigenous	4.77	.92	.82
Honest	Indigenous	4.12	1.03	.72
	Non-Indigenous	4.39	1.00	.71
Physical Ability	Indigenous	4.84	1.03	.63
	Non-Indigenous	4.48	1.27	.82
Verbal	Indigenous	3.82	1.27	.82
	Non-Indigenous	3.95	1.30	.89
Emotional	Indigenous	3.36	1.22	.75
	Non-Indigenous	3.70	1.26	.82
Parental	Indigenous	4.94	1.05	.70
	Non-Indigenous	4.85	1.16	.83
School	Indigenous	4.21	1.05	.64
	Non-Indigenous	4.40	1.12	.83
Opposite Sex	Indigenous	4.57	1.03	.55
	Non-Indigenous	4.68	.98	.67
Same Sex	Indigenous	4.67	1.01	.62
	Non-Indigenous	4.95	.88	.71
Art	Indigenous	4.27	1.62	.97
	Non-Indigenous	3.60	1.76	.97
School Enjoyment	Indigenous	4.51	1.23	.88
	Non-Indigenous	4.14	1.28	.89
Absenteeism	Indigenous	17.77	16.78	N/A
	Non-Indigenous	13.48	17.26	N/A
School Aspirations	Indigenous	2.56	.69	N/A
	Non-Indigenous	2.68	.67	N/A

Confirmatory Factor Analysis of the SDQII-S for the Indigenous sample

The CFA conducted for the Indigenous sample indicated an acceptable fit between the response data for the 12-facet a-priori factor structure of the SDQII-s, including the additional facet of self-concept. As can be seen in Table 2, none of the critical goodness of fit criteria reached unacceptable levels (RMSEA = .067, TLI = .90, RNI = .90). Factor loadings of individual items onto the designated factors ranged from .21 (e.g. Item 6 on the General self facet) to .93 (e.g. Item 3 on the Art self facet). Considering that factor loadings under .30 are generally considered unacceptable (Hills, 2003), specific attention should be brought to item 6 on the general self-concept (.21), Item 3 on the Physical ability self-concept (.21) and item 2 on the Same sex relations self-concept (.25). Factor correlations range from exceptionally high for the same sex and opposite sex relations (.95), to nearly non-existent for the correlation between physical abilities and emotional self-concept (.00).

Table 2: SDQII-S Factor Loadings, Factor Correlations and Goodness of Fit Criteria for Indigenous Students

Self-Concept Factor Loadings												
Variable	Math	Appear	General	Honest	Physical	Verbal	Emotion	Parent	School	Opp Sex	Same Sex	Art
1	.70	.84	.56	.30	.77	.39	.56	.68	.28	.44	.61	.91
2	.81	.93	.73	.67	.87	.78	.56	.68	.67	.39	.25	.89
3	.85	.72	.73	.63	.21	.72	.60	.76	.71	.33	.62	.93
4	.33	.69	.57	.34	.57	.83	.59	.39	.74	.70	.65	.85
5			.50	.58		.80	.77				.26	.93
6			.21	.78								.81
7												.93
8												.81

Self-Concept Factor Correlation												
	Math	Appear	General	Honest	Physical	Verbal	Emotion	Parent	School	OppSex	SameSex	Art
Math	1.00											
Appear	.28	1.00										
General	.46	.62	1.00									
Honest	.06	-.07	.13	1.00								
Physical	.21	.35	.51	-.04	1.00							
Verbal	.30	.21	.49	.15	.17	1.00						
Emotion	-.10	.03	.01	.42	.00	-.13	1.00					
Parent	.16	.24	.42	.21	.23	.26	.03	1.00				
School	.68	.32	.74	.20	.30	.78	-.13	.36	1.00			
OppSex	.04	.14	.31	.38	.09	.10	.28	.15	.11	1.00		
SameSex	-.14	.07	.15	.43	.02	-.01	.43	.15	-.02	.95	1.00	
Art	.16	.15	.30	-.03	.18	.27	-.13	.09	.26	-.02	-.12	1.00

Goodness of Fit Criteria						
Model	X ²	DF	TLI	RNI	RMSEA	90% CI
Indigenous Only	6290.46	1586	.90	.90	.075	.073 - .077

Invariance Testing for the SDQII-S between Indigenous and non-Indigenous Sample Groups

In testing for invariance across Indigenous and non-Indigenous ethnic groups, analysis began with the least restrictive model in which no invariance constraints were administered. As can be seen in Table 3, for this model, the fit indices suggest a near excellent fit to the data (RMSEA = .067, TLI = .93, RNI = .94), results that are largely reflected through all 4 models as greater invariant constraints were imposed. The final model, in which imposed complete factorial invariance between the two groups achieved a reasonable and acceptable fit to the data (RMSEA = .075, TLI = .93, RNI = .93) suggesting that the 11 faceted SDQII-S, plus the inclusion of art self-concept is reasonably robust between Indigenous and non-Indigenous groups.

Table 3: Tests of Factorial Invariance Across Indigenous and non-Indigenous Students.

Model	X ²	DF	TLI	RNI	RMSEA	90% CI
Completely Free	15234.58	3172	.93	.94	.067	.066 - .068
Invariant factor loadings	15234.58	3172	.93	.94	.067	.066 - .068
Invariant factor loadings, variance & covariance	15860.49	3238	.93	.93	.068	.067 - .069
Completely Invariant	18693.51	3297	.93	.93	.075	.074 - .076

Table 4: Correlations Between Facets of Self-Concept and School Outcomes

Indigenous Sample			
	School Enjoyment	Absenteeism	School Aspiration
Math	.24**	-.06	.11*
Appearance	.21**	-.10*	-.11*
General	.40**	-.10*	.10*
Honesty	.08	-.16**	.26**
Physical Ability	.11**	-.04	-.02
Verbal	.33**	-.11*	.13*
Emotional	-.17**	-.05	.07
Parent	.17	-.03	.10*
School	.34**	-.13**	.11*
Opposite Sex	.16**	-.07	.11*
Same Sex	.07	-.05	.15**
Art	.35**	-.03	-.00
Non-Indigenous Sample			
	School Enjoyment	Absenteeism	School Aspiration
Math	.24**	-.10**	.24**
Appearance	.29**	-.03	.06
General	.49**	-.04	.18**
Honesty	.21**	.17**	-.12**
Physical Ability	.29**	-.01	.16**
Verbal	.38**	-.04	.20**
Emotional	.02	-.02	.06
Parent	.29**	-.04	.18**
School	.50**	-.10**	.31**
Opposite Sex	.27**	.01	.07*
Same Sex	.23**	-.05	.07*
Art	.23**	.01	.06*

** significant at .01. *significant at .05

Multi-dimensional Self-Concept and School Outcomes

In analysing the relations between Indigenous and non-Indigenous students' self-concepts and schooling outcomes, a bi-variate correlational analysis was utilized and the results are presented in Table 4. A large number of correlations reached significance, but most of which were weak to negligible in that r failed to reach above .30 (Hills, 2003). For Indigenous students, significant moderate correlations were found between School Enjoyment and General self-concept ($r = .40$), Verbal self-concept ($r = .33$), School self-concept ($r = .34$) and Art self-concept ($r = .35$). Similar results were achieved for non-Indigenous students, whereby significant moderate correlations were found between School Enjoyment and General self-concept ($r = .49$), Verbal self-concept ($r = .38$), School self-concept ($r = .50$). For both Indigenous and non-Indigenous students, no correlations reached above a moderate level for the relations between Self-concepts and absenteeism or school usefulness.

Discussion

Confirmatory Factor Analysis and Invariance Testing

Of primary importance in this study was the model-fit of the SDQII-s including the extra art self-concept facet for the Indigenous secondary student sample. The a-priori CFA on this 12-faceted model achieved acceptable goodness of fit statistics (as seen in Table 1), although some of the loadings of individual items onto their designated factors were of some concern. A closer inspection of these items (e.g. item 6 of the general self-concept) revealed that *all* item factor loadings scoring under .40 were worded in a manner that was opposite to the remaining items within that factor. For example, the 6th item on the general concept (a factor loading of .21) was negatively worded whereas the remaining 5 items were positively worded. Alternatively, items 2 and 5 within the same sex relation self-concept (factor loadings of .25 and .26 respectively) were positively worded where as the remaining 3 items were negatively worded. These results indicate a response bias towards oppositely worded items for Indigenous students, which is a difficulty not previously reported in SDQ studies utilizing other Australian samples (e.g. Marsh et al., 2005). Whether this bias is representative of cognitive differences between Indigenous and non-Indigenous students, or is a result of what was a lengthy questionnaire needs to be determined by future research. Overall, with the possibility of some modification to the original items within the SDQII-s and with the addition of the art self-concept facet, the CFA results offer a promising beginning for an instrument that may capture the various facets of Indigenous students' self-concept.

A stronger test of the generalizability of the SDQII-s between the Indigenous and non-Indigenous samples is through the process of a series of CFAs whereby both the Indigenous and non-Indigenous samples are simultaneously measured with varying levels of invariance constraints placed on the model. As can be seen in Table 3, the initial model in which no invariance restraints were utilized, produced a strongly fitting model (RMSEA = .067, TLI = .93, RNI = .94) and as increasing restrictive constraints were administered in the later models, little change was evident. The final model where all parameter estimates were restricted to invariance still produced acceptable model fit (RMSEA = .075, TLI = .93, RNI = .93), suggesting that the structure factor of the SDQII-s is reasonably robust and may be generalized to Indigenous samples. That is Indigenous student's responses to the SDQII-s suggest that their notions of self-concept can be reasonably accurately separated into all 12 facets utilized within this research.

It should be noted that in a closer inspection of the item factor loadings for the Indigenous and non-Indigenous samples, no loading for the non-Indigenous sample fell below .44 (in the case item 6 of the general self-concept). This suggests that strictly within the context of this study, the response bias that was noted previously for Indigenous students did not generalize to the non-Indigenous sample.

Relations between the SDQII-s and School Outcomes

The results assessing the relations between differing facets of the SDQII-s and the three school outcome variables of school enjoyment, absenteeism and school aspirations (as seen in Table 4) produced a vast array of significant findings for both the Indigenous and non-Indigenous samples. Unfortunately, the size of a large number of these correlations were at what could be considered to be a negligible level (Hills, 2003), and this was especially the case with reported levels of school aspirations and absenteeism. This suggests that the

various facets of self-concept, at least by themselves, have little direct relation with levels of absenteeism or students' aspirations of how soon they would like to leave school and indirectly suggests that other variables may play a stronger role in such areas. With regard to school enjoyment though, numerous relations were large enough to be considered of practical importance. For both Indigenous and non-Indigenous students, school enjoyment had moderate correlations with general self-concept (as the general self-concept became more positive, so did levels of school enjoyment), verbal self-concept (as the verbal self-concept increased, so did school enjoyment) and school self-concept (as the school self-concept increased, so did school enjoyment). A notable difference though, is the relation between Indigenous and non-Indigenous students' art self-concept and school enjoyment. Although both samples' correlations revealed that as art self-concept increased, school enjoyment increased, the correlation is markedly larger for Indigenous students (.35 when compared to .23), this is in contrast to all other moderate correlations whereby the non-Indigenous r value was consistently larger. These findings are of interest in that with the exception of art self-concept, the link between school enjoyment and its relation to the self is not as strong for Indigenous students, indirectly suggesting that the school environment may not be as intrinsically tied to Indigenous students' self-notions when compared to other students. Although not reported in the results section, this reasoning is indirectly supported when examining the correlation between school enjoyment and school aspirations for Indigenous ($r(528) = .20$, $p < .001$) and non-Indigenous students ($r(1040) = .33$, $p < .001$). That is, school enjoyment has a stronger tie with future schooling aspirations for non-Indigenous students, which may arguably be aided by the closer ties of non-Indigenous students' self-concepts with enjoyment of school. This link between academic aspirations and multiple facets of the self-concept has been demonstrated in previous research with Marsh and Yeung's (1997b) finding that specific facets of academic self-concept had significant relations with both the 'will' (e.g. Will you do [subject] next year?) and 'want' (e.g. Do you want to do [subject] next year?) to do specific courses. Significant correlations between self-concept and will ranged from .26 to .43 (37 of the 39 paths reached significance). Significant correlations between self-concept and want ranged between .15 and .47 (20 of the 26 paths reached significance). What may be suggested from this current study though is the mediating role enjoyment may play in enhancing the link between self-concept and futures aspirations and even achievement. Although no conclusions can be drawn from the results regarding this issue, it certainly highlights a future direction for further research.

Overall, this study suggests that the SDQII-s may be robust enough instrument to capture the multi-faceted self-concept of Indigenous students, although future research may consider the removal of negatively worded items. With the SDQII-s acting as a reasonable foundation, future research focussing on Indigenous students must not only examine the relation multiple dimensions of the self may have with more practical educational outcomes, such as measures of academic achievement, but also seek to address these relations longitudinally so that more concrete causal inferences may be made.

About The Authors

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