

# Academic Achievement, Academic Self- Concept, and Academic Motivation of Immigrant Adolescents in the Greater Toronto Area Secondary Schools

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A significant number of children and youth immigrate to Canada each year. In 2001, there were about 310,000 immigrant school children between the ages of 5 and 16 (Statistics Canada, 2001). Suddenly, schools all over the country are experiencing a large influx of children speaking in more than 100 different languages from all over the world (Bramadat, 2005). Indeed, immigrant children are the fastest growing sector in the Canadian child population. Children of immigrants account for nearly one in five

# Summary

The pattern of immigration in the last few decades coupled with the tendency for ethnic differences in educational attainment that persist over subsequent immigrant generations has led to an increasing gap in academic achievement between immigrant children, who have received little or none of their education in Canada, and nonimmigrant children, who have received all of their education in Canada. Educators tend to stress the socioeconomic and cultural factors affecting immigrant adolescents' academic achievement to the exclusion of the psychological factors that are also at play in the lives of immigrant adolescents. Therefore, this study examined the impact of psychological indicators, such as academic self-concept and academic motivation, on the academic achievement of immigrant and nonimmigrant adolescents in the Greater Toronto Area secondary schools. The immigrant adolescents in this study performed as well as their nonimmigrant counterparts in English and overall school performance. The immigrant adolescents outperformed their nonimmigrant counterparts in mathematics. The immigrant adolescents had higher levels of math and school self-concepts as well as higher intrinsic and extrinsic motivation than their nonimmigrant counterparts. Math self-concept was the only predictor of math GPA for both immigrant and nonimmigrant adolescents. However, both verbal self-concept and school self-concept were the best predictors of English GPA for both immigrant and nonimmigrant adolescents. While school self-concept was the only predictor of overall GPA for nonimmigrant adolescents, the additional factors of math self-concept and extrinsic motivation-external regulation were the best predictors for immigrant adolescents.

of all Canadian school children, and it is projected that by 2017 one in three children will fit this description (Badets, 2003).

Most of the parents of these children arrived in Canada from Asian, Latin American, and Caribbean countries. Although these newcomers have settled in all parts of Canada, the majority of immigrants have concentrated in Toronto, Vancouver, and Montreal (Citizenship and Immigration Canada, 2005). These three Census Metropolitan Areas (CMAs) attract in excess of 70% of all migrants to Canada (Statistics Canada, 2005), with Toronto alone the destination of more than 4 out of 10 (43% in 2001) newly arriving immigrants (Schellenberg, 2004). Therefore, the integration of immigrant children—both children who immigrated with their parents and those born in Canada to parents who immigrated—into the Greater Toronto Area (GTA) schools is an important issue for educators (Statistics Canada, 2004).

Furthermore, given the numbers involved, how these children adapt and the educational pathways they take will clearly have profound implications for Canadian society (Anisef & Kilbride, 2003). In sharp contrast to the large volume of research examining the gap in performance between racial/ethnic groups in Canada, there is scant quantitative research examining disparities between immigrants and native-born students to complement the rich qualitative, ethnographic studies of immigrants from specific regions or countries. Furthermore, considering the size and ubiquity of immigrant populations in the schools across Canada, relatively little research has examined the academic motivation, academic self-concept, and academic achievement of these children. Hence, more theoretically and methodologically diverse empirical research is needed to construct a more sophisticated understanding of the motivational psychology for immigrant children in the Canadian school setting.

The purpose of this research was to provide a better understanding of the academic achievement of immigrant and nonimmigrant adolescents in the GTA secondary schools through the study of two key psychological factors: academic self-concept and academic motivation. The research questions were:

1. To what extent do immigrant adolescents differ from their nonimmigrant counterparts in terms of their self-reported academic achievement?
2. To what extent do immigrant adolescents differ from their nonimmigrant counterparts in terms of their self-reported academic self-concept and academic motivation?
3. How well do self-reported academic self-concept and self-reported academic motivation predict immigrant and nonimmigrant adolescents' self-reported academic achievement in school?

## Theoretical Framework

Academic achievement is an important indicator of immigrant adolescent adjustment for a number of reasons. First, immigrant students with higher levels of achievement during adolescence are more likely to complete high school and to attend and complete college than their peers with lower levels of achievement (Schnepf, 2006). Second, high school test scores predict later success in the job market in terms of higher wages (Joppke & Morawska, 2003). Finally, lower levels of education and skills are associated with lower levels of economic success, including a greater likelihood of living in poverty and receiving government assistance (Eurydice, 2004). In short, immigrant adolescents' academic achievement is important because it promotes their later success in life. Therefore, it is vital to understand the academic achievement of immigrant adolescents.

Several variables may affect the academic achievement of immigrant children, including cultural familiarity with the educational system (Deyhle & Swisher, 1997), linguistic proficiency (Lansford, Deater-Deckard, & Bornstein, 2007), socioeconomic resources (Fuligni & Fuligni, 2007), parental involvement in education (Fuligni, 1997), parental aspirations (Taylor & Krahn, 2005), family obligation (Fuligni, 2001), academic self-concept (Cokley & Patel, 2007), and academic motivation (Fuligni,

2001). Of these variables influencing achievement, the latter two seem to have the most potential of direct influence by the regular classroom teacher and therefore should be of primary concern in policy development for secondary schools seeking the integration of immigrant adolescents within the Canadian school system.

Furthermore, educators tend to stress the socioeconomic and cultural factors affecting immigrant adolescents' academic achievement to the exclusion of the psychological factors also at play in the lives of immigrant adolescents. Educational initiatives in Canada emphasize the distal factors (i.e., socioeconomic and cultural factors) at the expense of psychological factors, which are proximal. Recent research in social psychology, however, has demonstrated that achievement gaps may be a product of a more general cognitive process that may, as a result, be more amenable to intervention than previously thought (Steele, Spencer, & Aronson, 2002). Specifically, this kind of research has suggested that individuals may suffer negative performance outcomes (lower standardized test scores and less engagement with academics) because they are burdened by the prospect of confirming cultural stereotypes impugning their intellectual and academic abilities (Good, Aronson, & Inzlicht, 2003). Therefore, it is imperative to examine the impact of psychological indicators, such as academic self-concept and academic motivation, on the academic achievement of immigrant adolescents.

### *Academic Self-Concept*

Academic self-concept research is considered an important component of academic motivation research (Cokley, 2003, 2007). Academic self-concept is comprised of a set of attitudes, beliefs, and perceptions held by students about their academic skill sets and performance (Lent, Brown, & Gore, 1997). Academic self-concept, according to Cokley (2000a), also encompassed a comparative component in which students assessed their academic attitudes and skills in comparison with other students. Academic self-concept has been strongly linked to academic achievement

(Marsh, 1990). Previous research (Marsh, Trautwein, Ludtke, Koller, & Baumert, 2005) in the context of education has considered academic self-concept as an important psychological construct because “it has been found to be both a cause and an effect of academic achievement” (Cokley, 2007, p. 2). A higher academic self-concept has been associated with greater academic achievement among students (Marsh, 1990).

There has been a consistent effort on the part of self-concept researchers to develop several models to effectively explain and operationalize the construct of academic self-concept. Historically, self-concept measurement, theory, research, and application emphasized a largely atheoretical and global component of self-concept. However, the most recent models of academic self-concept have been based in a domain-specific perspective that supports a multidimensional view of self-concept. Self-concept had been viewed as a one-dimensional construct until Shavelson, Hubner, and Stanton (1976) propounded a multidimensional, hierarchical model of self-concept, which was based on the early theories of James and Cooley (Byrne & Gavin, 1996). The Shavelson model is comprised of a global self-concept, which is divided into academic (e.g., math, verbal, science) and nonacademic (e.g., social, physical, emotional) components, suggesting that self-concept is multifaceted, is hierarchically organized, and becomes increasingly differentiated with age. Recently, Guay, Marsh, and Boivin (2003) corroborated that as children become older, the rating of academic self-concept becomes more reliable and more stable. This claim was based on developmental psychological theory suggesting that, as children become older, they have an increased awareness of themselves and the world around them.

Furthermore, the Shavelson model posited that individuals' perceptions of self are developed in response to their perceptions of others' reactions toward them and that these perceptions of self and subsequent self-concepts are built on a hierarchy. Hence, self-concept correlates most strongly with academic self-concept, followed by subject-specific self-concept, and least with subject-specific achievement. Although the multidimensional,

hierarchical model of self-concept has been well supported by self-concept researchers, the relationship between academic self-concept domains and academic achievement cannot be fully understood if those investigating this topic rely only on global estimates of self-concept (Marsh & Hau, 2004).

The math and verbal self-concepts have been virtually uncorrelated within the multidimensional framework of academic self-concept (Marsh, 1986). An adolescent's math self-concept can differ significantly from his or her verbal self-concept; therefore, a high math academic self-concept does not necessarily predict a high verbal academic self-concept. Because this finding was in contrast to the Shavelson model, Marsh (1986, 1990) developed the Internal/External frames of reference model (I/E model) to explain the difference between virtually uncorrelated math and verbal academic self-concept scores. Within the internal frame of reference, students evaluate their own performance in any particular school subject in relation to their performance in other school subjects. Therefore, a hierarchy of academic self-concept is created by the individual in reference to the individual's ability in all other school subjects. Within the external frame of reference, students compare their self-perceived performance in any particular school subject with the perceived performance of other students in the same school. This external reference serves as a basis for students' math and verbal self-concepts. For example, if a student's verbal achievement is higher than his or her classmates' achievement, then his or her verbal self-concept tends to be higher as well. Because achievements in math and verbal school subjects are typically positively correlated, these social comparisons lead to the expectation that domain-specific math and verbal self-concepts are positively correlated as well. The two frames of reference work in opposition to each other. This explains why math and English self-concept are often uncorrelated with each other.

Unfortunately, academic self-concept has not received a significant amount of attention in the study of immigrant adolescents' academic outcomes. Therefore, research on the academic self-concepts of immigrant adolescents remains scarce. In one

of the first studies to investigate academic self-concept in immigrant students, Cokley and Patel (2007) found that academic self-concept was positively correlated with grade point average. In summary, there was a positive and reciprocal relationship between academic self-concept and academic achievement. Given the importance of academic self-concept to academic achievement and the extraordinary amount of attention that has been given to immigrant students' academic achievement, it seemed worthwhile to more closely examine the academic self-concept of immigrant adolescents in comparison to their non-immigrant counterparts.

*Academic Motivation:  
A Self-Determination Theory Perspective*

Various theoretical approaches have been used to define and operationalize motivation. Researchers have used motivational approaches, such as expectancy-value theory (e.g., Berndt & Miller, 1990), goal theory (e.g., Meece & Holt, 1993), and self-efficacy theory (e.g., Zimmerman, Bandura, & Martinez-Pons, 1992) to examine the relationship between academic motivation and academic achievement. Another perspective that appears promising and pertinent for the study of academic achievement is Deci and Ryan's (1985, 1991, 2000) motivational approach—the Self-Determination Theory (SDT). Indeed, this theoretical perspective has generated a considerable amount of research in the field of education (see Deci, Vallerand, Pelletier, & Ryan, 1991) and has been used recently to better understand educational outcomes.

SDT is an approach to human motivation that highlights the importance of the psychological need for autonomy (Ryan, Kuhl, & Deci, 1997). Autonomy implies that individuals experience choice in the initiation, maintenance, and regulation of their behaviors (Deci & Ryan, 1985, 2000). Central to the theory is the distinction between autonomous and controlled motivation. Autonomous motivation involves acting with a full sense of volition and choice, and it encompasses both intrinsic motivation and



well-internalized (i.e., integrated) extrinsic motivation (Deci & Ryan, 1985, 2000). Controlled motivation, in contrast, involves acting with a sense of pressure or demand and includes regulation by external contingencies and by contingencies that have been partially internalized (i.e., introjected; Deci & Ryan, 1985, 2000). Only autonomously motivated behaviors are considered fully self-determined because these motivations are either innate to the active organism—that is, are part of the inherent, core self—or have been fully assimilated with the core self through the process of organismic integration (Deci & Ryan, 2002).

SDT proposes that humans have an innate desire for stimulation and learning from birth, which is either supported or discouraged within their environment (Deci & Ryan, 1985, 2000). The degree to which this natural drive, or intrinsic motivation, is realized is contingent on the fulfillment of one's psychological needs. Therefore, SDT delineates three types of psychological needs: the need for competence, the need for autonomy, and the need for relatedness (Deci & Ryan, 1985, 2000). The need for competence is the need to experience satisfaction in improving one's abilities (Deci & Ryan, 1985, 2000), and competence is a facilitator of intrinsic motivation. The need for autonomy is the need to engage in self-directed behavior (Deci & Ryan, 1985, 2000), and it is also a facilitator of intrinsic motivation. Finally, the need for relatedness, another facilitator of intrinsic motivation, is the need to feel related to significant others (Deci & Ryan, 1985, 2000). All in all, the satisfaction of these three psychological needs is indispensable for facilitation of self-determined motivation.

Furthermore, the multidimensional motivation orientation encompasses three global types of motivation: intrinsic motivation, extrinsic motivation, and amotivation. While applying SDT to academic motivation, intrinsic motivation and extrinsic motivation are the two primary types of motivated academic behavior (Cokley, 2003). Intrinsic motivation is the drive to pursue an activity simply for the pleasure or satisfaction derived from it (Deci, 1975). Therefore, intrinsic motivation is the most self-determined form of motivation (Vallerand & Ratelle, 2002). For

instance, students who enjoy doing their homework are intrinsically motivated. Initially, theorists argued that intrinsic motivation was unidimensional in nature. Later, Vallerand and his colleagues (Vallerand, 1993; Vallerand, Blais, Briere, & Pelletier, 1989; Vallerand et al., 1992) proposed a tripartite taxonomy of intrinsic motivation: intrinsic motivation to know, intrinsic motivation to accomplish, and intrinsic motivation to experience stimulation. Intrinsic motivation to know refers to the desire to perform an activity for the enjoyment one receives while exploring, learning, and understanding new things (Vallerand, 1997). Intrinsic motivation to accomplish refers to the desire to perform an activity for the pleasure and satisfaction that one receives from accomplishing or creating new things. Finally, individuals who participate in an activity for the pleasure and satisfaction derived while experiencing pleasurable intellectual or physical sensations are intrinsically motivated to experience stimulation.

Extrinsic motivation, on the other hand, “refers to a broad array of behaviours having in common the fact that activities are engaged in not for reasons inherent in them, but for instrumental reasons” (Vallerand & Ratelle, 2002, p. 42). SDT also posits different types of extrinsic motivation (i.e., extrinsic motivation-external regulation, extrinsic motivation-introjected regulation, and extrinsic motivation-identified regulation), which vary in the degree of self-determination of the behavior, where more internalized or more integrated behaviors produce a greater sense of self-determination (Deci & Ryan, 1985, 1991). In other words, SDT maintains that these types of behavioral regulation can be situated along a self-determination continuum, with external regulation representing a complete lack of self-determined motivation and intrinsic motivation representing the fullest type of self-determined motivation (Deci & Ryan, 1985, 1991, 2000, 2002).

Extrinsic motivation-external regulation, the least self-determined type of extrinsic motivation, refers to behavior that is determined through means external to the individual. In other words, rewards and constraints regulate these behaviors. For example, a student who performs an activity to satisfy external demands (e.g., a tangible reward or punishment) or social

contingency is externally regulated. Next along the autonomy continuum is the construct of extrinsic motivation-introjected regulation. These behaviors are controlled in part by the environment but also by internal reward/punishment contingencies (e.g., ego enhancement, guilt, shame, or obligation). An example is students who perform their schoolwork because they do not want to let their parents down. Hence, introjected regulation encompasses a moderately low degree of self-determination. Further along the self-determination continuum, extrinsic motivation-identified regulation refers to behaviors that are performed by choice because the individual judges them to be important. For instance, a student with identified regulation engages in a particular behavior as long as she or he perceives the usefulness or instrumental value of doing so. In contrast to introjected regulation, identified regulation encompasses a moderately high degree of self-determination. Therefore, identified regulation is a relatively autonomous form of extrinsic motivation.

The final concept posited by SDT is amotivation, the lowest level of autonomy on the self-determination continuum, which relates to the lack of intentionality and, therefore, refers to the relative absence of intrinsic as well as extrinsic motivation (Guay, Mageau, & Vallerand, 2003). When individuals are amotivated, they do not perceive a contingency between their behaviors and outcomes (Vallerand et al., 1992). "A highly probable consequence of academic motivation is to quit the activity toward which the individual is amotivated" (Vallerand & Ratelle, 2002, p. 43). Because the students who are amotivated are neither intrinsically motivated nor extrinsically motivated, they may decide to drop out of school. Considerable research in the educational realm (Black & Deci, 2000; Deci et al., 1991; Noels, Clement, & Pelletier, 2001; Vallerand et al., 1993) suggests that positive indices of student functioning are associated with high levels of autonomous motivations, whereas negative indices are associated with high levels of controlled motivations and amotivation (see Deci & Ryan, 2000, for a review).

The conspicuous absence of an instrument to evaluate all aspects of the self-determination continuum encouraged

Vallerand et al. (1992, 1993) to propose an integrative theoretical framework for the multidimensional estimation of motivation within SDT. As a result, Vallerand et al. (1992, 1993) developed the Academic Motivation Scale (AMS) to assess all three dimensions of motivation that range from least to most determined by the self. The AMS includes three intrinsic motivation factors (knowledge, accomplishment, and stimulation), three external motivation factors (external, introjected, and identified), and an amotivation factor. Indeed, the AMS is one of the most frequently used scales to measure intrinsic and extrinsic academic motivation (Grouzet, Otis, & Pelletier, 2006). Researchers have integrated the AMS into empirical models, which include both the determinants and consequences of academic motivation (e.g., Guay & Vallerand, 1997; Lavigne, Vallerand, & Miquelon, 2007; Pelletier, Séguin-Lévesque, & Legault, 2002; Vallerand, Fortier, & Guay, 1997), providing support for its construct and predictive validity (Grouzet et al., 2006).

Although academic motivation based on SDT has received little attention in the study of immigrant adolescents' academic outcomes, recent research based on SDT suggests that self-determined motivation is closely related to important behavioral outcomes (see Cokley, 2003; Vallerand & Ratelle, 2002). Undoubtedly, students who are more intrinsically motivated are more likely to stay in school than students who are less intrinsically motivated (Deci & Ryan, 2002). Much research substantiates that intrinsic motivation is linked to positive academic performance (Deci et al., 1991; Vallerand et al., 1993), more enjoyment of academic work and more satisfaction with school (Vallerand et al., 1989), greater conceptual learning (Benware & Deci, 1984), and higher self-esteem (Deci, Schwartz, Sheinman, & Ryan, 1981). On the other hand, students who are more extrinsically motivated experience greater anxiety and a poorer ability to cope with failures (Deci & Ryan, 2000). In addition, a variety of both correlational and experimental research (see Reeve, Deci, & Ryan, 2004, for an overview) has documented the advantages of autonomous compared with controlled motivation for studying among school student populations. These include higher well-being (Levesque,

Zuehlke, Stanek, & Ryan, 2004), deep-level learning (Grolnick & Ryan, 1987), higher grades (Black & Deci, 2000), greater persistence with learning a second language (Noels et al., 2001), and lower dropout rates (Hardre & Reeve, 2003).

In summary, on one hand, prior research has indicated that academic self-concept is positively correlated with grade point average (GPA). On the other hand, research based on SDT suggests that promoting greater self-determination, specifically intrinsic motivation, is related to more positive academic and psychological outcomes. Therefore, the present study investigated the academic achievement, academic self-concept, and academic motivation of immigrant adolescents in comparison to their nonimmigrant peers in the GTA secondary schools in Canada.

## Method

### *Participants*

The final sample consisted of 573 (270 male, 303 female) grade 11 and 12 students from two public secondary schools in the GTA whose enrollment reflected the communities from which their students were drawn and varied in terms of ethnic composition. The age of the participants ranged from 16 to 19 years, with a mean age of 16.91 years ( $SD = .89$ ). Participants were categorized as nonimmigrant ( $n = 307$ ) and immigrant ( $n = 266$ ), according to their country of origin. Students who had been born in Canada were classified as nonimmigrant adolescents (138 male, 169 female). Students who had been born in other countries were grouped as immigrant adolescents (132 male, 134 female). The immigrant adolescents were born in South Asia ( $n = 135$ , 23.6% of the total sample), African-Caribbean countries ( $n = 51$ , 8.9%), East Asia ( $n = 28$ , 4.9%), Europe ( $n = 28$ , 4.9%), and the Middle East ( $n = 24$ , 4.2%). The mean age of nonimmigrant adolescents was 16.83 years ( $SD = .86$ ), and that of immigrant adolescents 17.00 years ( $SD = .93$ ).

## *Procedures*

After obtaining clearance from the university research ethics board, we contacted the principals of three secondary schools with high proportions of immigrant adolescents and three secondary schools with high proportions of nonimmigrant adolescents (based on a school district demographics report). The schools were all in the same working-class/lower-middle-class area within the Greater Toronto Area. Two of the six schools agreed to participate in the study. One had a large proportion of immigrant students, and the other had a high proportion of nonimmigrant students. Approximately 67% of the students in the school with high proportions of immigrant adolescents were immigrant students, whereas only 42% of the students in the school with high proportions of Canadian-born/nonimmigrant students were immigrant students. The principals of these two schools allowed us to contact grade 11 and 12 teachers in the respective schools. Teachers from 14 classes in the immigrant majority school and 17 classes in the immigrant minority school agreed to allow us to explain the study to their students and hand out letters of information (800 in total, 400 at each school). Of the students given letters of information, 72.6% (65.8% from the immigrant majority school [ $n = 263$ ] and 79.5% [ $n = 318$ ] from the immigrant minority school) agreed to participate in the study.

The participating students completed the research measures in the classroom setting; teachers removed students who elected not to participate to other areas. Students were told that all of their answers would be confidential and that they did not have to answer any of the questions if they did not wish to. Participants were seated at individual tables to ensure privacy while they completed the measures. All participants were given time to complete each measure before the next one was introduced. Each data collection session took approximately 20 minutes and included all of the measures. The order of administration was as follows: demographic information, academic motivation measure, and academic self-concept measure.

### *Instruments*

*Demographic questionnaire.* The demographic questionnaire asked respondents to report their age, gender, country of origin, and current grades in school. Academic achievement was measured by three questions on self-reported grade point average (English, Math, and Overall). The three academic subtests (English, Math, and School) of the Self-Description Questionnaire II (Marsh, 1992) used in this study had several items measuring math self-concept, verbal self-concept, and school self-concept. Hence, we made the decision to include three items based on English, math, and overall GPA in the demographic questionnaire. Participants were asked to report their GPA on a 5-point scale ranging from 1 = *A (Mostly 90s)* to 5 = *F (Mostly 50s)*. The scale was later reverse scored such that higher scores indicate higher grades.

*Academic Motivation Scale—High School version.* Academic motivation was measured with the Academic Motivation Scale—High School version (AMS; Vallerand et al., 1992). The AMS is the English translation of the *Echelle de Motivation en Education* (Vallerand et al., 1992, 1993). Based on SDT, this 28-item instrument was divided into seven subscales, reflecting one subscale of amotivation, three ordered subscales of extrinsic motivation (external, introjected, and identified regulation), and three distinct, unordered subscales of intrinsic motivation (intrinsic motivation to know, to accomplish things, and to experience stimulation). The items were rated on a scale ranging from 1 = *does not correspond at all* to 7 = *corresponds exactly*. Each subscale consisted of four items; thus, subscale scores could range from 4 to 28. A high score on a subscale indicated high endorsement of that particular academic motivation. Several empirical studies investigating issues related to motivation have used both the French (e.g., Guay, Mageau, et al., 2003) and English (e.g., Cokley, 2000b) versions of the AMS scale.

Furthermore, several studies have explored the measurement properties of the AMS (Barkoukis, Tsorbatzoudis, Grouios, &



Sideridis, 2008; Cokley, 2000b; Cokley, Bernard, Cunningham, & Motoike, 2001; Fairchild, Horst, Finney, & Barron, 2005; Grouzet et al., 2006; Miller, 2007; Nunez, Martin-Albo, & Navarro, 2004; Vallerand et al., 1992, 1993). Vallerand et al. (1992) reported that Cronbach's coefficient  $\alpha$  for the subscales ranged from .83 to .86, with the exception of the identified subscale of extrinsic motivation, which had an internal consistency of .62. In addition, internal consistency for the subscales ranged from .60 to .86 with another English-speaking sample (Vallerand et al., 1993). Vallerand and his colleagues hypothesized that a simplex pattern would be revealed among the ordered subscales of the AMS as one moved along the motivation continuum. Examination of correlations of the subscales and correlations between the subscales and motivational antecedents and consequences provided support for construct validity (Vallerand et al., 1993, as cited in Cokley et al., 2001). Although Cokley (2000b) and Fairchild et al. (2005) found limited support for the simplex structure of the AMS, Cokley et al. (2001), consistent with Vallerand et al.'s (1992) findings, found support for the seven factor structure of the AMS. Whereas Cokley et al.'s (2001) findings provided only partial support for the construct validity of scores from the AMS, Fairchild et al.'s (2005) study reported adequate model fit for the seven factor model and adequate reliability for the seven subscales ( $.77 \leq \alpha \leq .90$ ). Recently, Barkoukis et al. (2008) reproduced the seven factor structure proposed by Vallerand et al. (1992). Moreover, Barkoukis and his colleagues found sufficient evidence to support the reliability and the construct and concurrent validity of the AMS.

In the present study, we obtained the following alpha levels for each subscale: Amotivation (.83), Extrinsic Motivation-External Regulation (.75), Extrinsic Motivation-Introjected (.83), Extrinsic Motivation-Identified Regulation (.79), Intrinsic Motivation to Know (.83), Intrinsic Motivation to Experience Stimulation (.79), and Intrinsic Motivation to Accomplish (.84). Reliabilities were similar across immigrant and nonimmigrant



groups. The alpha coefficients were consistent with the range given in Vallerand et al. (1992, 1993).

*Self-Description Questionnaire II.* We measured academic self-concept using items drawn from the Self-Description Questionnaire II (SDQ-II; Marsh, 1992). The SDQ-II was developed for junior high and high school students in grades 7–10; however, it is appropriate for students in grades 7–12. The SDQ-II contains 102 items to measure self-concept in adolescents using 11 subscales. The three academic subscales are Mathematics, Verbal, and General School; the seven non-academic subscales are Physical Ability, Physical Appearance, Opposite-Sex Relations, Same-Sex Relations, Parent Relations, Honesty-Trustworthiness, and Emotional Stability. The SDQ-II also contains one General Self-Concept subscale. All 102 items are measured on a 6-point Likert-type scale (*false, mostly false, more false than true, more true than false, mostly true, and true*; Marsh, 1992). Half of the items for each subscale are negatively worded; these items are intended to reduce positive response bias. In the present study, all negatively worded items were reverse scored. Moreover, for the purposes of the present study, we collapsed the SDQ-II into a 30-item scale, which consisted of three academic subscales: Mathematics (10 items), Verbal (10 items), and General School (10 items). We made this decision because we were primarily interested in nonimmigrant and immigrant adolescents' academic self-concept.

Marsh (1992) reported measures of internal consistency for SDQ-II scores for a sample of 5,494 students in grades 7–12. Internal consistency ranged from .83 to .91 for scores on all 11 subscales (Marsh, 1992). The following alpha levels were obtained for each subscale in this study: Math Self-Concept (.92), Verbal Self-Concept (.85), and School Self-Concept (.86). Reliabilities were similar across immigrant and nonimmigrant groups. The alpha coefficients were comparable to those reported by other researchers.

## Results

### *Correlational Analyses*

We computed the means, standard deviations, and bivariate correlations among all of the variables separately for nonimmigrant and immigrant groups (see Tables 1 and 2). While English GPA was moderately correlated with overall GPA ( $r = .58$ ) and verbal self-concept ( $r = .51$ ) for the nonimmigrant group, overall GPA ( $r = .57$ ) alone was moderately correlated with English GPA for the immigrant group. Math GPA was moderately correlated with math self-concept for both the nonimmigrant ( $r = .66$ ) and immigrant ( $r = .70$ ) groups. The overall GPA was moderately correlated with school self-concept ( $r = .50$ ) for the immigrant group. Furthermore, there were weak correlations between academic achievement and academic motivation variables for both the nonimmigrant and immigrant groups.

There were only small to moderate correlations among the academic self-concept variables for both the nonimmigrant and immigrant groups. Amotivation, for nonimmigrant as well as immigrant groups, was negatively correlated with all of the other statistically significant academic motivation variables. There were small to moderate correlations between extrinsic motivation-external regulation and all of the other motivational variables for both the groups. In addition, extrinsic motivation-introjected regulation was moderately correlated with extrinsic motivation-identified regulation and intrinsic motivation variables in both groups. While extrinsic motivation-identified regulation was moderately correlated with all of the intrinsic motivation variables for the immigrant group, extrinsic motivation-identified regulation was only moderately correlated with intrinsic motivation to accomplish and intrinsic motivation to know for the nonimmigrant group. Moreover, for both the groups, there were only moderate correlations among the intrinsic motivation variables. In short, none of the variables in the study were strongly correlated ( $r \geq .80$ ).

Table 1  
Bivariate Correlations Among the Study Variables (Nonimmigrant Group, *n* = 307)

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 English GPA	—												
2 Math GPA	.20**	—											
3 Overall GPA	.58**	.42**	—										
4 VSC	.51**	-.17*	.21**	—									
5 MSC	.00	.66**	.16*	-.22**	—								
6 SSC	.39**	.23**	.48**	.47**	.26**	—							
7 AMOT	-.15*	-.04	-.16*	-.21**	-.10	-.44**	—						
8 EMER	.05	.04	.05	.12	.10	.28**	-.16*	—					
9 EMIN	.04	.00	.06	.11	.12	.17*	-.17*	.52**	—				
10 EMID	.14	.03	.14	.18*	.05	.26**	-.34**	.56**	.58**	—			
11 IMTK	.09	-.01	.19*	.19*	.03	.28**	-.24**	.32**	.58**	.49**	—		
12 IMTA	.09	.06	.16*	.11	.15*	.25**	-.15*	.38**	.77**	.50**	.71**	—	
13 IMES	.06	-.02	.09	.06	.09	.16*	-.08	.15*	.55**	.35**	.62**	.66**	—
<i>M</i>	3.50	2.80	3.24	4.48	3.22	4.42	2.30	5.48	4.37	5.36	4.51	3.80	3.49
<i>SD</i>	.93	1.10	.80	.98	1.19	.92	1.40	1.24	1.51	1.16	1.25	1.28	1.37

Note. VSC = verbal self-concept, MSC = math self-concept, SSC = school self-concept, AMOT = amotivation, EMER = extrinsic motivation (external), EMIN = extrinsic motivation (introjected), EMID = extrinsic motivation (identified regulation), IMTK = intrinsic motivation to know, IMTA = intrinsic motivation to accomplish, and IMES = intrinsic motivation to experience stimulation. \* *p* < .01. \*\* *p* < .001.

Table 2  
Bivariate Correlations Among the Study Variables (Immigrant Group,  $n = 266$ )

	1	2	3	4	5	6	7	8	9	10	11	12	13
1 English GPA	—												
2 Math GPA	.39**	—											
3 Overall GPA	.57**	.62**	—										
4 VSC	.35**	-.01	.18*	—									
5 MSC	.13*	.70**	.39**	-.01	—								
6 SSC	.39**	.34**	.50**	.49**	.38**	—							
7 AMOT	-.20*	-.22**	-.33**	-.30**	-.21**	-.45**	—						
8 EMER	.01	.00	.16*	.08	.01	.18*	-.13	—					
9 EMIN	-.10	-.06	.01	.06	.04	.17*	.01	.53**	—				
10 EMID	-.02	-.03	.11	.16*	.06	.29**	-.22**	.63**	.66**	—			
11 IMTK	.03	.08	.20*	.20*	.19*	.35**	-.11	.43**	.61**	.62**	—		
12 IMTA	.04	.04	.19*	.09	.19*	.30**	-.03	.44**	.70**	.62**	.75**	—	
13 IMES	.01	.12	.20*	.08	.20*	.26**	.00	.36**	.60**	.51**	.75**	.74**	—
<i>M</i>	3.36	3.28	3.38	4.27	3.95	4.67	2.20	5.77	4.93	5.60	5.03	4.45	4.15
<i>SD</i>	.92	1.19	.84	.95	1.32	.88	1.40	1.17	1.50	1.23	1.32	1.34	1.42

Note. VSC = verbal self-concept, MSC = math self-concept, SSC = school self-concept, AMOT = amotivation, EMER = extrinsic motivation (external), EMIN = extrinsic motivation (introjected), EMID = extrinsic motivation (identified regulation), IMTK = intrinsic motivation to know, IMTA = intrinsic motivation to accomplish, and IMES = intrinsic motivation to experience stimulation. \* $p < .01$ . \*\* $p < .001$ .

### *Cross-Cultural Comparisons of Academic Achievement*

To examine the variability of scores with regard to English, math, and overall GPA in the case of both immigrant and non-immigrant adolescents, we conducted descriptive discriminant analysis (DDA) in lieu of multivariate analysis of variance because DDA is sufficient to indicate both that group differences exist and precisely where they exist among the variables (Sherry, 2006).

The variables entered were English, math, and overall GPA. Groups were nonimmigrant and immigrant. Because the grouping variable in this study had only two categories, there was only one discriminant function. The overall Wilks' lambda,  $\lambda = .94$ ,  $\chi^2(3, N = 573) = 37.61$ ,  $p < .001$ , indicated that the two groups were statistically significantly different and the resulting discriminant function would be statistically significant. However, the canonical correlation of .25 suggested only a small degree of association between the two groups and the discriminant function. Group membership accounted for only 6% of the variance in the discriminant function. The classification procedure revealed that 59% of the original group cases were correctly classified.

Interestingly, only one variable—math GPA,  $F(1, 571) = 25.11$ ,  $p < .001$ —differentiated the two groups. The structure (loading) matrix of correlations between predictors and discriminant function (see Table 3) suggested that the best predictor for distinguishing between nonimmigrant and immigrant groups was math GPA (.80). Loadings less than .40 were not interpreted. The group centroids indicated that the discriminant function maximally separated the immigrant group (.28) from the nonimmigrant group (-.24). In other words, the discriminant function separated the immigrant group from the nonimmigrant group on math GPA, with higher scores characterizing the immigrant adolescents ( $M = 3.28$ ,  $SD = 1.19$ ) and lower scores characterizing the nonimmigrant adolescents ( $M = 2.80$ ,  $SD = 1.10$ ).

**Table 3**

Standardized Discriminant Function and Structure Coefficients  
for the Two Groups

Variable	Coefficient	$r_s$	$r_s^2$
English GPA	-.72	-.30	09.00%
Math GPA	.87	.80	64.00%
Overall GPA	.29	.32	10.24%
Verbal self-concept	-.47	-.34	11.56%
Math self-concept	.71	.91	82.81%
School self-concept	.44	.44	19.36%
Amotivation	-.11	-.13	01.69%
Extrinsic motivation-external regulation	.26	.44	19.36%
Extrinsic motivation-introjected regulation	.01	.68	46.24%
Extrinsic motivation-identified regulation	-.41	.38	14.44%
Intrinsic motivation to know	.03	.73	53.29%
Intrinsic motivation to accomplish	.64	.90	81.00%
Intrinsic motivation to experience stimulation	.49	.86	73.96%

### *Cross-Cultural Comparisons of Academic Self-Concept*

To examine the differences between immigrant and non-immigrant adolescents in terms of their self-reported academic self-concepts, we performed a DDA using three academic self-concept variables: verbal self-concept, math self-concept, and school self-concept. Groups were nonimmigrant and immigrant. The overall Wilks' lambda was statistically significant,  $\lambda = .91$ ,  $\chi^2(3, N = 573) = 56.14$ ,  $p < .001$ , indicating that self-concept variables differentiated between the two groups. The canonical

correlation of .31 suggested a moderate degree of association between the two groups and the discriminant function. In other words, the correlation between the grouping variable and the self-concept variables accounted for approximately 10% of the variance. The overall classification rate was 64%.

Two variables—math self-concept,  $F(1, 571) = 48.89, p < .001$ , and school self-concept,  $F(1, 571) = 11.54, p < .01$ —were statistically significant in differentiating the two groups. There was no statistically significant difference between the two groups on verbal self-concept. The structure matrix of correlations between predictors and discriminant function (see Table 3) suggested that the best predictor for distinguishing between nonimmigrant and immigrant groups was math self-concept (.91), followed by school self-concept (.44). Math self-concept accounted for 82.81% of the variance in scores on the discriminant function, followed by school self-concept with 19.36%.

The group centroids indicated that the discriminant function maximally separated the immigrant group (.35) from the nonimmigrant group (-.30). In short, the discriminant function separated the immigrant group from the nonimmigrant group on math self-concept and school self-concept, with higher scores characterizing the immigrant adolescents ( $M = 3.95, SD = 1.32$ ;  $M = 4.67, SD = .88$ ) and lower scores characterizing the nonimmigrant adolescents ( $M = 3.22, SD = 1.19$ ;  $M = 4.42, SD = .92$ ).

### *Cross-Cultural Comparisons of Academic Motivation*

To examine the differences between immigrant and non-immigrant adolescents in terms of their self-reported academic motivation, we conducted a DDA to determine whether the seven academic motivation variables could account for group differences. The motivational variables were amotivation, extrinsic motivation-external regulation, extrinsic motivation-introjected regulation, extrinsic motivation-identified regulation, intrinsic motivation to know, intrinsic motivation to accomplish, and intrinsic motivation to experience stimulation. Groups were nonimmigrant and immigrant. The overall Wilks' lambda was

statistically significant,  $\lambda = .93$ ,  $\chi^2(7, N = 573) = 41.86$ ,  $p < .001$ . Nevertheless, the canonical correlation of .27 indicated only a small degree of association between the two groups and the discriminant function. Only 7% of the variance in the discriminant function was accounted for by group membership. The overall classification rate was 60%.

Five variables differentiated nonimmigrant and immigrant groups: extrinsic motivation-external regulation,  $F(1, 571) = 8.31$ ,  $p < .01$ ; extrinsic motivation-introjected regulation,  $F(1, 571) = 20.27$ ,  $p < .001$ ; intrinsic motivation to know,  $F(1, 571) = 23.50$ ,  $p < .001$ ; intrinsic motivation to accomplish,  $F(1, 571) = 35.61$ ,  $p < .001$ ; and intrinsic motivation to experience stimulation,  $F(1, 571) = 32.25$ ,  $p < .001$ . The structure (loading) matrix of correlations between the motivational variables and discriminant function (see Table 3) suggested that the best variable for distinguishing between nonimmigrant and immigrant groups was intrinsic motivation to accomplish (.90), followed by intrinsic motivation to experience stimulation (.86) and intrinsic motivation to know (.73).

The group centroids suggested that the discriminant function separated the immigrant group (.30) from the nonimmigrant group (-.26). In sum, the discriminant function separated the immigrant group from the nonimmigrant group on extrinsic motivation-external regulation, extrinsic motivation-introjected regulation, intrinsic motivation to know, intrinsic motivation to accomplish, and intrinsic motivation to experience stimulation with higher scores characterizing the immigrant adolescents and lower scores characterizing the nonimmigrant adolescents (see Tables 1 and 2).

### *Prediction of Academic Achievement*

We split the entire sample on the basis of status (nonimmigrant and immigrant) and performed simultaneous multiple regression analyses to determine if academic motivation and academic self-concept were predictive of academic achievement for nonimmigrant and immigrant adolescents. The purpose of



running separate multiple regression analyses was to determine whether the predictor variables predicted academic achievement differentially for immigrant and nonimmigrant students. Academic achievement variables (English, math, and overall GPA) were the dependent variables, and academic motivation and academic self-concept variables were the independent variables. We entered the predictor variables into the regression equation simultaneously. This approach allowed us to identify the unique contribution of each predictor to the designated outcome variable (Cohen, Cohen, West, & Aiken, 2003).

The simultaneous multiple regression analyses produced statistically significant models for both the nonimmigrant and immigrant groups (see Table 4). Verbal self-concept (nonimmigrant,  $\beta = .443, p < .001$ ; immigrant,  $\beta = .252, p < .001$ ) and school self-concept ( $\beta = .194, p < .01$ ;  $\beta = .269, p < .01$ ) were the only statistically significant predictors of English GPA for both the nonimmigrant and immigrant adolescents. In contrast, math self-concept (nonimmigrant,  $\beta = .629, p < .001$ ; immigrant,  $\beta = .648, p < .001$ ) was the sole statistically significant predictor of math GPA for nonimmigrant as well as immigrant adolescents. Although school self-concept ( $\beta = .504, p < .001$ ) was the only statistically significant predictor of overall GPA for nonimmigrant adolescents, math self-concept ( $\beta = .191, p < .01$ ), school self-concept ( $\beta = .370, p < .001$ ), and extrinsic motivation-external regulation ( $\beta = .197, p < .01$ ) were statistically significant predictors of overall GPA for immigrant adolescents.

## Discussion

A necessary component of informed immigration policy development is a thorough understanding of the well-being and performance of not only immigrants who arrived as adults but also their children (Worswick, 2004). Often the attention is on immigrants themselves, and their integration into the Canadian economic, social, and political systems is an important concern of governments (Anisef & Kilbride, 2003). Equally important, but

Table 4  
Predictors of Academic Achievement

	English GPA		Math GPA		Overall GPA	
	Nonimmigrant (n = 307)	Immigrant (n = 266)	Nonimmigrant (n = 307)	Immigrant (n = 266)	Nonimmigrant (n = 307)	Immigrant (n = 266)
	$\beta$		$\beta$		$\beta$	
VSC	.443**	.252**	-.088	-.086	-.008	-.039
MSC	.053	.094	.629**	.648**	.047	.191*
SSC	.194*	.269*	.153	.149	.504**	.370**
AMOT	.033	-.002	.076	-.060	.088	-.141
EMER	-.083	.096	-.056	.092	-.139	.197*
EMIN	-.082	-.194	-.090	-.053	-.099	-.202
EMID	.118	-.129	.095	-.118	.101	-.153
IMTK	-.103	-.108	-.007	-.005	.090	-.034
IMTA	.083	.193	.077	-.122	.109	.125
IMES	.024	-.017	-.119	.106	-.071	.131
R <sup>2</sup>	.305	.243	.475	.541	.265	.359
F	13.01**	8.20**	26.80**	30.02**	10.65**	14.31**

Note. MSC = math self-concept, VSC = verbal self-concept, SSC = school self-concept, AMOT = amotivation, EMER = extrinsic motivation (external regulation), EMIN = intrinsic motivation (introjected regulation), EMID = extrinsic motivation (identified regulation), IMTK = intrinsic motivation to know, IMTA = intrinsic motivation to accomplish, and IMES = intrinsic motivation to experience stimulation. \* $p < .01$ . \*\* $p < .001$ .

often neglected, are immigrant children and youth who face the challenge of integration into the Canadian educational system as much as their parents face the challenge of integration into the Canadian economic system (Ma, 2003). Most research on immigrant adaptation has focused on immigrant adults, but children of immigrants often represent their parents' greatest hopes of upward mobility (Worswick, 2004). Therefore, the purpose of this study was to examine the academic achievement, academic self-concept, and academic motivation of immigrant adolescents in comparison to their nonimmigrant peers.

### *Academic Achievement*

Although there were no differences between nonimmigrant and immigrant adolescents with respect to their English performance and overall school performance, the immigrant adolescents outperformed their nonimmigrant peers in mathematics. These findings are consistent with previous research (Hansen & Kucera, 2003; Organization for Economic Cooperation and Development [OECD], 2006; Worswick, 2004), which found that immigrant children perform as well as or better than their nonimmigrant counterparts in Canada.

The surprising academic success of these immigrant adolescents despite the unique challenges that they face presents a compelling question for social scientists to answer. Their family background may help to explain their academic performance. The parents of some immigrant families (e.g., parents from Asian countries) received high levels of education in their home countries and have come to Canada seeking greater professional opportunity (Anisef et al., 2005). It is likely that the high socioeconomic status of some immigrant families plays a role in the academic performance of their children (Fuligni & Hardway, 2004). However, the success of other immigrant families who face economic hardship suggests that socioeconomic factors alone cannot explain why many children from immigrant families adjust successfully to schools in Canada.

Previous research (e.g., Fuligni & Hardway, 2004; Fuligni & Pedersen, 2002) suggests that regardless of their socioeconomic background, many immigrant students find themselves in a family environment that is strongly supportive of achievement. Immigrant parents typically place a great importance on the academic success of their children (e.g., Chrispeels & Rivero, 2001; Golan & Petersen, 2002; Louie, 2001). They believe education to be the most significant way for their children to improve their status in life. Many parents encourage their children to overcome the difficulties they may face in school because the educational opportunities in Canada are superior to those available in their home countries (Anisef et al., 2005). The encouragement and aspirations of immigrant parents may be the most important influence on immigrants' children's education (Kao & Tienda, 1995). Therefore, "immigrant parents believe in the importance of doing well in school and attempt to instill such an attitude in their children" (Fuligni & Fuligni, 2007, p. 236).

### *Academic Self-Concept and Academic Motivation*

Although the immigrant adolescents reported higher levels of math and school self-concepts than their nonimmigrant counterparts, there were no differences between nonimmigrant and immigrant adolescents with regard to their self-reported verbal self-concepts. The findings with respect to math and school self-concepts are congruent with the PISA 2003 results, in which immigrant students had higher levels of math and school self-concepts compared to their nonimmigrant peers across the OECD case countries (OECD, 2006). Furthermore, contrary to the results of this study, the PISA 2000 results found that non-immigrant students scored higher in verbal self-concept than their immigrant peers (OECD, 2003).

Results of the study also indicate differences between non-immigrant and immigrant adolescents in terms of their academic motivation. The immigrant adolescents had higher intrinsic motivation to know, intrinsic motivation to accomplish, intrinsic motivation to experience stimulation, extrinsic moti-

vation-external regulation, and extrinsic motivation-introjected regulation than their nonimmigrant peers. However, there were no differences between nonimmigrant and immigrant adolescents in terms of their extrinsic motivation-identified regulation. Previous research conducted in the United States (e.g., Fuligni & Tseng, 1999) suggests that students with immigrant parents have higher academic motivation than students with native-born parents. Furthermore, mediation analyses indicated that students from immigrant families share a common sense of family obligation, and this obligation partly accounts for their greater academic motivation (Fuligni & Tseng, 1999; Fuligni, Tseng, & Lam, 1999). Moreover, among immigrant families, educational pursuits are an important way for youths to fulfill their lifelong obligations to assist their families and to repay their immigrant parents for their investments and sacrifices (Tseng, 2001).

### *Prediction of Academic Achievement*

The results of this study suggest that academic self-concept is a critical factor in nonimmigrant and immigrant adolescents' academic achievement. While verbal self-concept and school self-concept are the best predictors of English performance of nonimmigrant and immigrant adolescents, math self-concept is the sole predictor of mathematics performance for nonimmigrant as well as immigrant adolescents. The best predictors of overall school performance for immigrant adolescents are math self-concept, school self-concept, and extrinsic motivation-external regulation. On the other hand, school self-concept is the sole predictor of academic achievement for nonimmigrant adolescents. The results of this study indicate that there is a positive relationship between academic self-concept and academic achievement for both nonimmigrant and immigrant adolescents.

Previous research has shown a strong positive correlation between academic self-concept and academic achievement (Cokley & Patel, 2007). In addition, consistent with previous research (Marsh, Trautwein, Ludtke, Koller, & Baumert, 2004), we found correlations between matching areas of achievement

and self-concept (e.g., verbal self-concept and English achievement; math self-concept and math achievement), although they are only moderately correlated. Furthermore, congruent with previous research (Marsh & Yeung, 1998), math and verbal self-concepts exhibited moderate or near zero correlations. According to Marsh (1990), the relative strength of each frame of reference explains the low correlations between math and verbal self-concepts that have been observed in empirical research. This is because internal comparison leads to math/verbal self-concept correlations that are substantially lower than the correlations between math and verbal achievement levels. Although math GPA is negatively correlated with verbal self-concept of nonimmigrant adolescents, English GPA is not negatively correlated with math self-concept for immigrant adolescents. In contrast to the relationship between English GPA and math self-concept in the study, Marsh's (1986) I/E model predicts negative direct effects of verbal achievement on math self-concept.

Finally, the motivational variables in the study tended not to predict academic achievement across immigrant and non-immigrant groups. While none of the intrinsic and extrinsic motivation subscales were predictive of academic achievement of nonimmigrant adolescents, extrinsic motivation-external regulation (behaviors that are not self-determined) was the sole motivational predictor of academic achievement of immigrant adolescents. Although extrinsic motivation-external regulation was correlated with overall GPA for immigrant adolescents and intrinsic motivation to know as well as intrinsic motivation to accomplish was correlated with overall GPA for nonimmigrant adolescents, the correlations were not substantial. Contrary to Vallerand et al.'s (1993) hypotheses and in line with previous research (Cokley et al., 2001), the results of the study indicate that the three intrinsic motivation subscales and the three extrinsic motivation subscales are not correlated with English and math GPA for both nonimmigrant and immigrant adolescents. The failure to find a relationship between academic motivation and academic achievement in the study may be related to the inconsistencies found in previous research (Cokley, 2000a, 2001)

with respect to construct validity of the AMS. Hence academic motivation, as operationalized by the AMS, warrants further psychometric and empirical examination.

## **Limitations and Implications for Future Research**

There are three limitations of this research. First, although the sample size used in this study was adequate, the use of a larger sample size would have allowed for more subgroup analyses, including the ability to conduct multiple regression analyses on the basis of ethnicity. According to Tabachnick and Fidell (2001), a rule of thumb for testing beta coefficients is to have sample size equal to or greater than 104. In addition, as the sample size of some ethnic groups in the study is very small, we did not examine differences in academic achievement, academic motivation, and academic self-concept across ethnic groups. This inability to conduct appropriate statistical tests with respect to ethnicity is unfortunate as “modern education needs cross cultural psychology” (Triandis, 2001, p. 1) to understand how all students function in today’s multiethnic schools. Earley and colleagues (Earley, 1994, 1999; Earley, Gibson, & Chen, 1999) found that people respond differently to training and instruction depending on their cultural background. Future cross-cultural exploration of psychological constructs such as academic self-concept and academic motivation might profitably examine the processes through which different ethnic groups acquire the self-understanding and motivational beliefs of the majority group by accessing larger sample sizes than the present study.

Second, the measure of academic achievement in the study is based on student self-reports. The use of self-reported GPA instead of school-record GPA with immigrant and minority students has been shown to influence results (Zimmerman, Caldwell, & Bernat, 2002). Specifically, students who overreport their GPA also tend to report more positive characteristics of

themselves. Various authors have alluded to the possibility of systematic differences in response styles between populations defined in terms of culture (e.g., Johnson & van de Vijver, 2003). Response bias is “a systematic tendency to respond to a range of questionnaire items on some other basis than the specific item content” (Paulhus, 1991, p. 17). Future research should be directed to a determination of the reasons and implications for this form of self-evaluation bias among immigrant and minority students. Also future research should collect grades from school records.

Finally, no single strategy is likely to explain the nuanced interplay of factors at work in immigrant adolescents' school experiences. Qualitative and quantitative approaches together may lead to a closer approximation of truth than would be possible using only one of these methodologies (Suarez-Orozco, 2001). Although cross-sectional research is often the only affordable approach in terms of both financial and time investment, it remains inherently limited. Fuligni (2001) argued that longitudinal research is an essential research strategy if we are to understand the assimilation patterns of immigrant adolescents. Yet, to date, only a handful of such studies have been conducted. Fuligni offered a methodological plea for longitudinal research that follows the same children as they encounter and negotiate differences in the cultural traditions of the motherland and the new society. He noted that a series of cross-sectional studies established a seemingly “disconcerting effect of acculturation” (p. 568). These studies have led many to conclude that the longer adolescents of immigrant origin are in the new context, the worse they seem to perform academically. Fuligni eloquently delineated the limitations of cross-sectional research with this population and concluded that only with longitudinal research can acculturative changes be separated from normative developmental shifts. Therefore, more longitudinal research, such as Fuligni is conducting, would prove beneficial.



## Educational Implications of the Study

Canada is one of the few immigrant-receiving countries where the nonimmigrant and immigrant children do not differ substantially in terms of their background characteristics (OECD, 2006). Hence, immigrant students in this study performed as well as or better than their nonimmigrant counterparts. The comparatively positive situation of immigrant students in Canada may, in part, be a result of selective immigration policies resulting in immigrant populations with greater wealth and education. Immigrant students in the current study report higher levels of math and school self-concepts and academic motivation than their nonimmigrant peers. The results of this study suggest that adolescents who are motivated to achieve and who have high academic self-concepts are more likely to achieve in the educational domain. Therefore, appropriate programs must be tailored to positively influence these psychological indicators of educational well-being of nonimmigrant adolescents.

Furthermore, the performance of nonimmigrant adolescents in mathematics is clearly not as good as in other school subjects. The Organization for Economic Cooperation and Development (OECD, 2007) opined:

The performance of a country's best students in mathematics and related subjects may have implications for the role that the country will play in tomorrow's advanced technology sector, and for its overall international competitiveness. Conversely, deficiencies among lower-performing students in mathematics can have negative consequences for individuals' labour market and earnings prospects and for their capacity to participate fully in society. (p. 323)

Therefore, school boards, schools, parents of nonimmigrant adolescents, and their math teachers must identify mathematics as a priority for improvement. No doubt, addressing the increasing demand for mathematical skills requires excellence throughout education systems (OECD, 2007). However, the disparities

in student performance in mathematics, evident from the findings of the present study, suggest that excellence throughout education systems still remains a remote goal and that schools in the GTA need to serve a wide range of student abilities, including those who perform exceptionally well and also those most in need. Schools and teachers need “to be able to engage constructively with heterogeneity not only in student abilities but also in their characteristics as learners and their approaches to learning” (OECD, 2004, p. 154). In addition, it may be essential to monitor how well schools in the GTA provide nonimmigrant students with fundamental mathematical skills.

Although parents of nonimmigrant children generally agree that parental involvement in children’s education is important, few parents may be effectively involved in their children’s education (Eccles & Harold, 1996). Despite the poor performance of nonimmigrant children in mathematics, parental satisfaction with their children’s performance in mathematics is relatively high (Crystal & Stevenson, 1991). The information that parents of nonimmigrant children have about their children’s competency in mathematics biases them to perceive their children as more mathematically proficient than they actually are (Pezdek, Berry, & Renno, 2002). Therefore, schools may take appropriate measures to inform the parents of nonimmigrant adolescents about their children’s actual mathematical competency in specific domains, which in turn may help parents to change their wrong perceptions pertaining to their children’s mathematical competency.

Because academic motivation is important in children’s learning process, mathematics teachers may devise ways of arousing students’ interest in mathematics, showing its relevance and giving students feedback in order to raise their expectancy of success (Burden, 1995). They may improve children’s satisfaction in learning mathematics by being friendly and sensitive to the needs of their students (Good & Brophy, 1995), which will lead to higher levels of achievement (Hemke, 1990). Mathematics teachers also may devise appropriate interventions in their mathematics instruction to raise these children’s math self-concept

and motivation to learn mathematics. In sum, to raise nonimmigrant students' mathematics achievement, teachers and parents may aim to foster positive attitudes toward mathematics at school and at home.

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