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# Assessing Student Orientation to School to Address Low Achievement and Dropping Out

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*This study contributes to applied and theoretical research for schools and districts by helping inform programs and policies directed at school improvement, raising student achievement, and high school completion. The paper features recent results of ongoing research on student orientation to school that was assessed via a multi-dimensional Student Orientation to School Questionnaire (SOS-Q). The SOS-Q was initially used by a Canadian school district to better understand the reasons for dropping out of school. Since then the project has grown into a multi-organizational collaboration. This study demonstrates persistent associations between student orientation to school, academic achievement, and high school completion and makes the case for integrating valuable non-cognitive components within comprehensive student information and assessment systems.*

*Cette étude contribue à la recherche appliquée et théorique portant sur les écoles et les districts scolaires dans la mesure où elle pourra servir à étayer les programmes et les politiques visant l'amélioration des écoles, le rehaussement du rendement par les élèves et l'achèvement des études secondaires. Cet article présente les résultats récents d'une recherche en cours sur l'adaptation scolaire évaluée par le biais d'un questionnaire pluridimensionnel. Le questionnaire a d'abord servi d'outil pour un district scolaire canadien qui cherchait à mieux comprendre les raisons du décrochage scolaire. Depuis, le projet s'est transformé en collaboration impliquant plusieurs organisations. Cette étude révèle des associations systématiques entre l'adaptation des élèves à l'école, le rendement académique et l'achèvement des études secondaires. Elle milite en faveur de l'intégration de composantes non cognitives importantes au sein des systèmes scolaires d'information et d'évaluation.*

## Background

High school non-completion represents a serious educational and socio-economic issue in the United States and Canada (Burrus & Roberts, 2012; Richards, 2009). School dropouts experience more difficulties in entering job markets compared to other youth and could miss out on post-secondary opportunities, which are associated with notably higher lifetime earnings (Snyder, Dillow & Hoffman, 2007; U.S. Bureau of the Census, 2006). Leaving school early may perpetuate poverty in subsequent generations.

Educators need to better understand why students drop out and use comprehensive knowledge to identify at risk students early, develop effective interventions, and learn to

 

motivate all students to finish school. An Organization for Economic Cooperation and Development (OECD, 2014) report observed that ". . . drive, motivation, and confidence in oneself are essential if students are to fulfil their potential" (p. 21). Based on this observation the OECD report concluded that, "teachers and school principals need to be able to identify students who show signs of lack of engagement with school and work with them individually before disengagement takes firm root" (p. 22)

Attitudes linked to motivation can affect achievement very early in a student's school experience. In her ethnographic study of a southeastern United States kindergarten class, Hatt (2012) investigated students' evolving concept of "smartness . . . tied to notions of academic identity" (p. 439). She observed that kindergarten students were more likely to be framed as "smart" if parental expectations closely align with those of the teacher. Although Hatt's qualitative methodology does not permit generalization, it is fascinating to read an account where students' socio-economic and racial backgrounds contribute to a situation where they ". . . learn early on school is not where they belong or worth investing in, so they begin to disengage" (p. 456).

While the evidence attests to the importance of affective and coping variables for student engagement and learning (Collaborative for Academic, Social, and Emotional Learning, 2003; Durlak, Weissberg, Dymnicki, Taylor, & Schellinger, 2011), family socio-economic status (SES) has been cited among key risk factors for student disaffection from school as well as for dropping out (Christle, Jolivette, & Nelson, 2007; Hammond, Linton, Smink, & Drew, 2007; Willms, 2003). Although educators cannot directly influence SES variables, "school contexts, however, make a difference, and can diminish, if not eliminate, negative effects of poverty on student engagement" (Board on Children, Youth and Families [BOCYF], 2003, p. 33). Schools can effectively counteract adverse factors in students' lives by creating stable, safe, supportive, caring and engaging educational and social environments for all students. Experiencing positive relationships with adults and peers and having access to diversified supports, including essential guidance regarding future educational and career opportunities to inspire and focus on, is especially important for students from disadvantaged backgrounds, who often lack access to various forms of social capital (Croninger & Lee, 2001).

While education systems continue to focus on evaluating student academic and behavioral outcomes, including (observable) engagement, less attention has been directed at assessing non-cognitive motivators, antecedents or facilitators of these outcomes (Burger, Nadirova & Keefer, 2012). These, often not easily detectable facilitators, encompass various aspects of student orientation to school including social contexts with interpersonal interactions, affective experiences, self-perceptions, a sense of comfort and belonging in school, and appraisals of personal strengths and competencies (Akey, 2006; Brew, Beatty, & Watt, 2004; Cleveland, 2011; Greene, 2008; Skinner & Pitzer, 2012; Stiggins, 2001). "School-based services typically become available after risk factors manifest themselves (such as through noncompliant behavior)" (Richardson, 2008, p. 24). Identifying and understanding potential facilitators of negative outcomes, such as poor attendance, lack of interest in social and academic pursuits, a low achievement or dropping out of school, would contribute to detecting emerging issues early and taking pro-active and preventive approaches through developing customized interventions. Therefore, decision-making directed at improving student outcomes would benefit from incorporating the antecedent motivational factors into systematically collected empirical evidence.

This paper features findings of ongoing research on student orientation to school assessed

via a multi-dimensional instrument – the Student Orientation to School Questionnaire (SOS-Q), which was initially used by a Canadian school district and was tested and implemented collaboratively with educational researchers (Nadirova, Burger, Clarke, & Mykula, 2007). The SOS-Q is a carefully validated student-centered assessment and diagnostic tool that draws heavily on "grassroots" input from students. It offers comprehensive, yet succinct (user friendly and time efficient) assessment of core facilitators of student engagement and generates a solid, consistent ground for districts and schools to evaluate student orientation to school instead of relying on sporadic, anecdotal feedback. The SOS-Q is aimed at identifying at risk students at individual and cohort levels in upper-elementary and (junior and senior) high school grades and assisting with interventions based on distinct student profiles.

While one of the goals of the SOS-Q is helping disadvantaged students reflect on their school experiences to develop meaningful connection to school, it was designed to assist in creating inclusive social and academic environments conducive to advancement of all students, since students from any socio-economic background may be at risk of disengagement due to varied reasons. The SOS-Q was designed to be used to assess student orientation to school at various levels ranging from individual students to classrooms, grades, schools, or districts.

The internal measurement properties of the SOS-Q were validated in the past studies involving four pilots. For example, Burger et al. (2012) confirmed the factor structure of the instrument based on a large sample of 1,356 grades 7 and 9 students using exploratory and confirmatory factor analysis. Scores on all SOS-Q subscales measuring the seven SOS constructs had acceptable internal consistency: Cronbach's α on five subscales were in the 0.84-0.94 range, and Cronbach's α for the two remaining subscales were 0.75 and 0.72.

Descriptions and examples of specific SOS-Q items are available in Burger et al., 2012 and Burger & Nadirova, 2014. The following is a brief overview of the conceptual underpinnings of the SOS-Q.

## Conceptual Constructs

The SOS-Q conceptualizes student disengagement as a contextually related psychological process of gradual disaffection and alienation (Newmann, 1981; Seeman, 1959; Burger, 1974). The underlying premise is that students are engaged and can succeed in school when they feel that they belong there and find it meaningful (BOCYF, 2003). The SOS-Q constructs (measured by the subscales) include:

- Safe and Caring School – students' perception of how supportive the school environment is, including caring relationships with teachers;
- External Resilience – perceived ability to cope with external challenges and adversities;
- Internal Resilience – perceived ability to resist anxiety and maintain emotional balance;
- Extracurricular Activities – participation and perceived value;
- Self-Confidence – conviction of capability to be successful at school and beyond;
- Utility of School – sense of usefulness of school in relationship to future opportunities;
- Peers – ability to get along with other students and perceived friends' support.

Extracurricular Activities and Utility of School are not part of the upper-elementary version of the SOS-Q; the junior and senior high school version assesses all seven constructs. This paper

focuses on the high school version.

**Safe and Caring School**

One of the purposes of the SOS-Q is to capture the degree of students' identification with the social aspects of school, the sense of belonging, and "fit in" or a match between a student and school environment (Community Health Systems Resource Group [CHSRG], 2005). We consider the Safe and Caring School to be a foundational, "cornerstone" construct, which could precede and influence other above-mentioned student orientation to school (SOS) constructs, since school environments that are conducive to students feeling safe, understood, heard, and supported can be facilitated and affected by school staff. For example, research links a caring school culture to building student resilience. ". . . Schools build resiliency in students through creating an environment of caring personal relationships" (Henderson & Milstein, 1996, p. 17). In a qualitative study, "resilient children usually described positive relationships with their teachers, often with statements like 'teachers like me'" (Cove, Eiseman, & Popkin, 2005, p. 11).

The SOS-Q conceptualizes students' relationship with teachers to be a key constituent of the Safe and Caring Schools construct. As Schargel (2004) points out, "for many youngsters, the primary adult they speak to during the week is a teacher" (p. 22). The social capital concept focuses on the nature and quality of adult and peer-related social networks that can explain the differences in the probability of students leaving school (Croninger & Lee, 2001). Croninger and Lee contend that teachers provide an especially important source of social capital for students in considering whether to stay in school. In accord with this thesis, other research repeatedly confirmed that one of the most common school-related reasons for leaving are poor teacher-student relationships, including students' perceptions that teachers are unconcerned with their well-being and learning needs (CHSRG, 2005; Statistics Canada, 2004). The SOS-Q Safe and Caring School construct reflects students' perceptions of safety and responsiveness of school environments to their needs in a general caring sense as well as socialization with teachers around the notions of communication, respect, fairness and understanding.

**Extracurricular Engagement**

Participation in and perceived value of Extracurricular Activities was conceptualized to be another foundational construct for reinforcing students' positive attitudes and engagement that can be directly controlled by schools. Extracurricular activities supplement school day endeavors and could offer vital complementary learning (e.g., skill and competency building) along with social networks, emotional supports, and positive role modeling. Specific proven benefits from participation in school extracurricular activities and community programs include reduced rates of school failure, early dropout, and problem behaviors (Mahoney, 2000; Mahoney, Larson, Eccles, & Lord, 2005). Since schools may have only limited influence on out-of-school engagements, the SOS-Q junior-senior high version refers to predominantly school-based extracurricular activities and offers generally formulated statements that do not feature specific types of activities that may vary from school to school.

**Relationship with Peers**

Peers play a central role in the social lives of adolescents and the relationship with friends often

becomes more important than relationships with family members (Hair, Jager, & Garrett, 2001; Newmann, 1992). Relying on peers as an informal source of support was linked to resilience in youth (Werner & Smith, 1989). In their overview of associated research McGrath and Noble (2007) observed that systematic promotion and facilitation of positive relationships at school have been identified by many researchers as related to improving school culture, enhanced motivation, and improved student academic outcomes. Given the instrument size restrictions, the SOS-Q does not elaborate on peer relationship specifics, but rather, seeks to detect the general perception of peer supports in schools and ability to positively manage peer relationships.

**Resilience**

The SOS-Q also focuses on students' self-evaluation of their own essential competencies and life skills that are useful for successful functioning in and outside of school, including various aspects of resilience. The above noted positive attributes of school social contexts, including caring relationships and opportunity to participate and contribute are among key protective environmental factors positively influencing student resilience (Benard, 2000; Richardson, 2008; Stewart, Sun, Patterson, Lemerle, & Hardie, 2004). Resilience is a key coping skill and personal strength that enables a young person to navigate the environmental risks and become happier, more successful, and more balanced in his or her life. Recent research and practice proposes a shift in attention from the concept of risk to the notion of resilience as being "empowering and proactive for students and those vested in maximizing their potential" (Richardson, 2008, p. 19). Researchers define the concept of resilience as "the phenomenon of overcoming stress or adversity" (Rutter, 1999, p. 119), "a dynamic process encompassing positive adaptation within the context of significant adversity" (Luthar, Cicchetti, & Becker, 2000, p. 543), as well as the ability to persevere and adapt when things go awry (Reivich & Shatté, 2003). "It refers to those characteristics of children and their experiences in families, schools, and communities that allow them to thrive despite exposure to adversity and deficiencies in the settings of their daily lives" (Stewart et al., 2004, p. 26). "Resilient people, like all of us, feel anxious and have doubts, but they have learned how to stop their anxiety and doubts overwhelming them" (Reivich & Shatté, 2003, p. 4). Parallel to these conceptualizations, the SOS-Q relates resilience to the way students respond mentally, emotionally, and behaviorally to (adverse) situations and events. At the early stages of the SOS-Q development, the resilience construct focused on the perceived ability to withstand anxiety. At the later stages of the SOS-Q development, an additional construct was built in the instrument to distinguish between *internal* and *external* resilience. Internal resilience maintains the focus on ability to withstand anxiety and sustain internal emotional and mental balance while external resilience focuses on the ability to recover quickly from external disruptive changes or hardships without being overwhelmed or acting in dysfunctional ways, as well as the ability to cope and adapt successfully in the face of challenges, risk, or adversity (Burger & Nadirova, 2014).

Based on the research on resilience in children and youth, the SOS-Q conceptualizes resilience as a dynamic, developmental phenomenon rather than a static one. Richardson (2008) employs the ecology of human development (EHD) model by Bronfenbrenner (1979) to conceptualize students as dynamic entities influenced by their environments. Resilience as an inherent human capacity to transform and change despite the risks can be facilitated and developed, including building associated personal strengths such as social competence, a sense

of autonomy and identity and a sense of purpose and belief in a bright future (Benard, 2000).

## Self-confidence

Students' general positive beliefs about their skills, competencies, and ability to succeed constitute self-confidence, another key psychological construct incorporated in the SOS-Q. Self-confidence is defined in the SOS-Q as students' conviction that they are capable and well-positioned to be successful at school and beyond (Burger & Nadirova, 2014). We theorized that students' assurance about their capability to be successful at school and in life in general plays an important role in "navigating" school environments, feeling adjusted, motivated and bonded to school, and influences the decision whether to stay in school or leave early.

It is important to distinguish between a general construct of self-confidence incorporated in the SOS-Q and the related concept of self-efficacy, which, unlike a broader concept of self-confidence, has a domain-specific, task-specific, or situation-specific connotation (Druckman & Bjork, 1994; Pajares, 1996; Shoemaker, 2010). Bandura refers to self-efficacy as people's judgments of their capabilities to accomplish specific tasks or activities successfully (e.g., various academic tasks) (Bandura, 1977; 1986). Thus, self-efficacy can be conceptualized as "situationally specific self-confidence" (Druckman & Bjork, 1994, p. 174). It follows that the concepts of self-confidence and self-efficacy can be causally interrelated. People's beliefs in their capabilities to perform specific tasks (self-efficacy) and associated attainments, experiences and their interpretations can affect the overall self-confidence in ability to be successful in general. Alternatively, overall assurance regarding one's skills, ability to learn, perform, and other capabilities (self-confidence) would encourage self-efficacy (e.g., in mathematics course or problem solving, writing, and other specific pursuits [Pajares, 1996]), which is manifested in people tending to approach difficult tasks as challenges rather than threats (Bandura, 1994). Since the purpose of the SOS-Q is to make the instrument applicable to a broad population of students and a broad range of situations, it focuses on defining and measuring self-confidence as a general construct.

Similar to the concept of resilience, the SOS-Q conceptualizes self-confidence as a dynamic, developmental feature rather than a static, mostly innate attribute, meaning that self-confidence can be developed, stimulated, and built up. Self-confidence may be linked to school social and academic environments in ways that can be subjected to constructive modifications by teachers' and school staff actions and school policies (e.g., through generating and supporting positive student experiences).

## Utility of School

The junior-senior high school version of the SOS-Q that was used in this study incorporates the concept of Utility of School, as perceived by students. Finn and Zimmer (2012) conclude that the belief that school entails useful outcomes may be related to students' behavioral engagement and indirectly to learning. "The perceived utility of school and particular courses may be important in sustaining students' participation in school—sometimes despite frustration and failure" (p. 113). A number of studies related to perceived utility or relevance of school focus on specific school subjects or student career aspirations. For example, Kozan, Di Fabio, Blustein, & Kenny (2014) demonstrated that, consistent with North American studies, high levels of career decision-making satisfaction and involvement in career planning significantly predicted school

engagement in Italian high school students. This supports the key notion that students with clear understanding of the role of education in attaining a desirable future (i.e., perceived utility of school) are more likely to be engaged in school, and the importance of "helping students internalize the connection between school and future work options" (p. 352). Unlike these more specifically conceived studies, the purpose of the SOS-Q is capturing a broad, general sense of usefulness of school experience relative to broadly formulated current and future opportunities and outcomes, including helping in later life, helping with career plans, and providing opportunities to learn interesting things. In this respect the SOS-Q Utility of School construct is similar to the conceptual foundation of Voelkl's Students' Identification with School scale (Voelkl, 1996). Students who score high on the SOS-Q Utility of School sub-scale would tend to see value in deferred gratification, whereby their efforts in school today will be rewarded with varied anticipated future benefits.

The conceptual examination of the SOS-Q constructs points to the possibility of a variety of interrelationships. For example, as mentioned above, cultivating positive social school environments, including supportive relationships with teachers and peers (Safe and Caring School and Peers constructs) may be linked to building resilience in students. Also, support from teachers may be particularly relevant in helping students appreciate utility of school, since teachers "nearly always value school and its role in people's lives" (Kozan et al., 2014, p. 351). Therefore, while the major purpose of this study is to examine the relationships between students' orientation to school measured by the SOS-Q and student academic outcomes, it also explores the interrelationships among the SOS-Q constructs and academic achievement (see the *Objectives*).

## Objectives

While the internal measurement properties of the SOS-Q (factor structure and reliability) were refined and tested in previous studies (Burger et al., 2012; Nadirova et al., 2007), the purpose of the current paper is a detailed exploratory examination of the links between students' disposition toward school measured via the SOS-Q and academic outcomes (grade 9 achievement and subsequent high school completion by the end of grade 12). The objectives of the study are to:

- examine the direction and strength of the relationships between differently configured SOS-Q data and academic outcomes—concurrent student achievement in grade 9 and subsequent high school completion in grade 12;
- examine interrelationships among the seven high school SOS-Q constructs and academic achievement; and
- delineate future directions in research and practical applications associated with the SOS-Q.

## Method

The SOS-Q survey data sub-set on 296 grade 9 students from 13 schools analyzed in this study (156 male and 140 female) was drawn from a larger primary sample of 1,356 junior-high students who were involved in the final (fourth) pilot of the SOS-Q. Students were recruited in May/June 2007 in an Alberta suburban school district. The SOS-Q protocols were communicated to students by classroom teachers. The 57 items of the high school SOS-Q

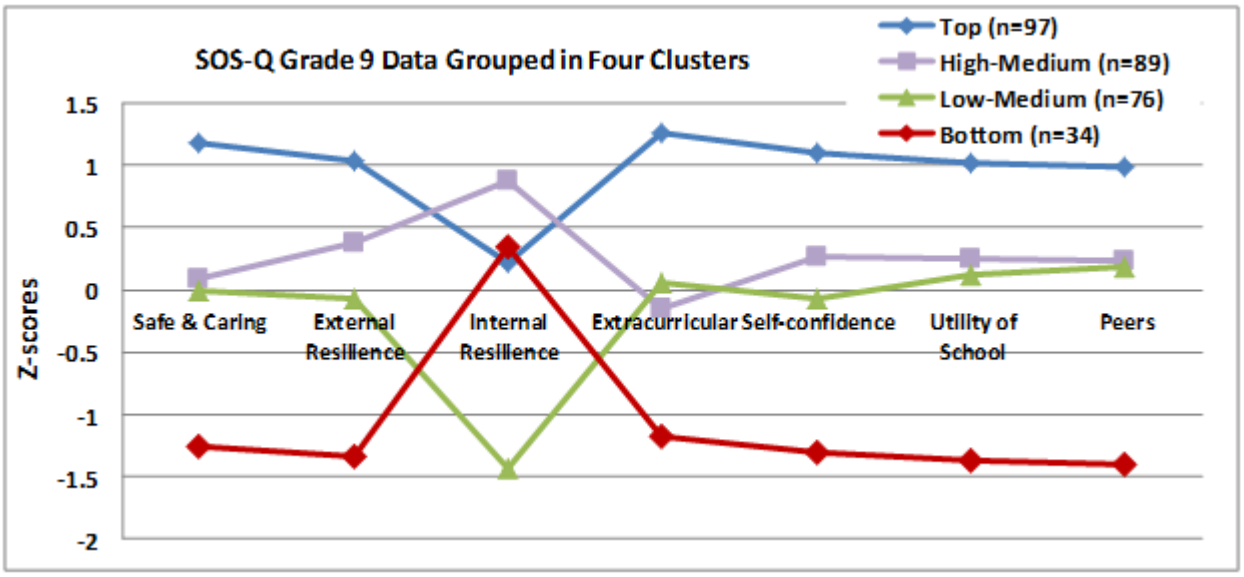


*Figure 1:* SOS-Q Grade 9 Data Grouped in Four Clusters

version (comprising seven SOS subscales) were rated on a 5-point Likert-type scale, with response options ranging from "strongly agree" to "strongly disagree."

Grade 9 achievement scores for the surveyed students originated from provincial standardized tests administered concurrently with the SOS-Q survey (June 2007), followed by high school completion data by the end of grade 12 (2010).

The current study uses both continuous and categorical SOS-Q related and student academic outcome variables. Composite mean SOS subscale scores were computed based on the seven SOS-Q constructs, with subscale mean values ranging from 1.00 to 5.00. Additionally, students were categorized into four groups (clusters) depending on their orientation to school based on the results of k-means cluster analysis: the "top" cluster was distinguished by uniformly positive disposition toward school; the "bottom" cluster conveyed uniformly negative orientation to school; and two (high and low) "medium" clusters scored mostly around average on the SOS subscales (see Figure 1).

Student achievement variables (grade 9 English Language Arts [ELA] and Mathematics) were applied in their original, continuous form (the maximum score is 100 percent) and also were generalized into the "excellent" category (equal or exceeding 81 or 83 percent on ELA or Mathematics respectively); "acceptable" category (between 49-80 or 46-82 percent on ELA or Mathematics respectively); and "below acceptable" category (at or below 48 percent in ELA and at or below 45 percent in Mathematics). The original high school completion variable comprised three categories, including completers who completed high school by grade 12; continuers who did not complete by grade 12, but were still involved with the secondary system; and leavers who left school between grades 10 and 12. The high school completion variable was also used in a dichotomous form—completers versus non-completers (including school leavers and continuers) in multiple binary logistic regression analysis.

The relationships between student orientation to school and academic outcomes were tested using SPSS. The bivariate and multivariate data analyses presented in the following sections of this paper and incorporating academic achievement and high school completion data have somewhat lower student counts than SOS student clusters depicted in Figure 1 (296 students)

due to the following reasons. Not all of these students had raw grade 9 academic achievement data (i.e., wrote the tests) and high school completion data. In addition, there were variations in the numbers of students having grade 9 academic achievement data, and grade 12 high school completion results (276 and 264 respectively), most likely due to student transfers.

Bivariate associations between student orientation to school and academic outcomes were initially examined using categorical variables: students in the top, medium, and bottom SOS clusters and grade 9 achievement categories, and between the SOS clusters and high school completion categories (chi-square test). Then multiple regressions were applied to simultaneously account for the association between the seven SOS constructs and student grade 9 academic achievement measured on a continuous 100-point scale and between the SOS constructs and high school completion measured as a dichotomous variable (multiple linear regression and binary logistic regression respectively). In addition, the interrelationships among the seven SOS constructs and grade 9 academic achievement in Mathematics (a dependent variable measured on a continuous 100-point scale) were further examined using path analysis.

## Results

### Bivariate Associations

Bivariate analyses were performed using categorical data for the sub-group of 264 grade 9 students who also had subsequent high school completion records (see Figures 2-4). Chi-square tests showed a statistically significant association between student orientation to school in grade 9 and concurrent grade 9 academic achievement and also between student orientation to school in grade 9 and following high school completion by grade 12[1].

For both grade 9 ELA and Mathematics remarkably higher percentages of students from the top SOS cluster who were very favorably attuned toward school (i.e., scored one standard deviation or more above average on most SOS constructs) were achieving at the excellent level

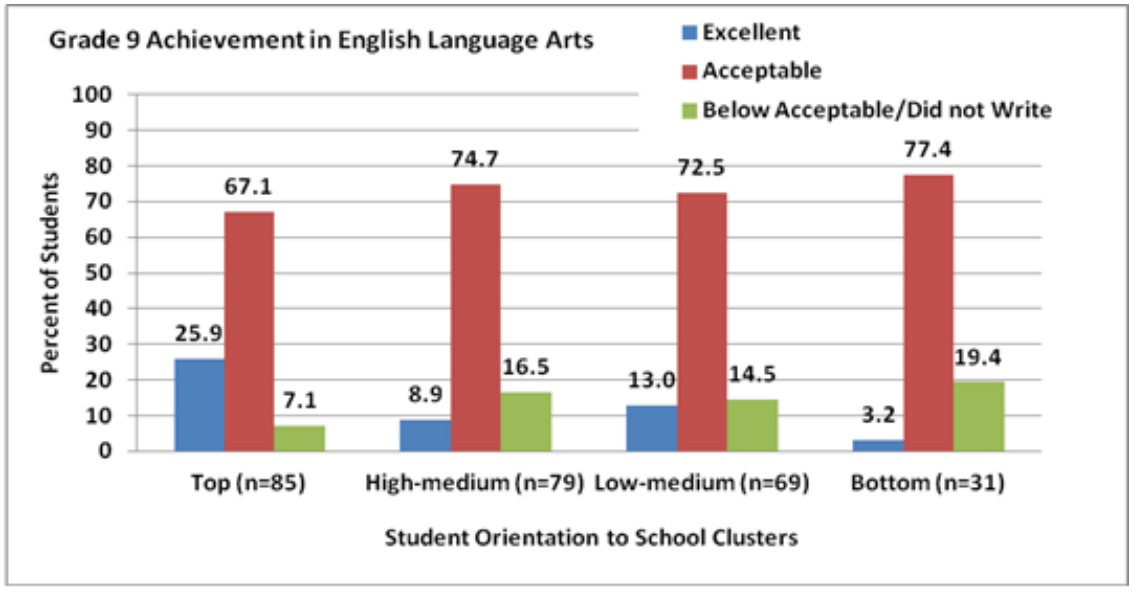


*Figure 2:* Grade 9 Achievement in ELA; Chi-square =16.426 ; df = 6; p<0.05

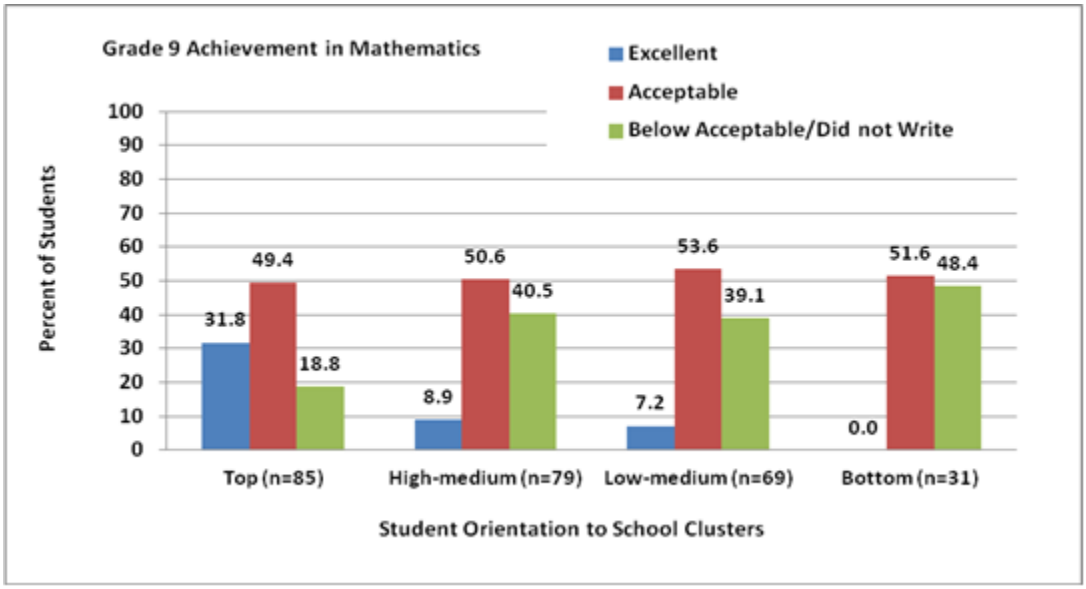


*Figure 3:* Grade 9 Achievement in Mathematics; Note. Chi-square calculation is not provided, since the Bottom SOS Cluster has zero student count in the Excellent Mathematics achievement category.

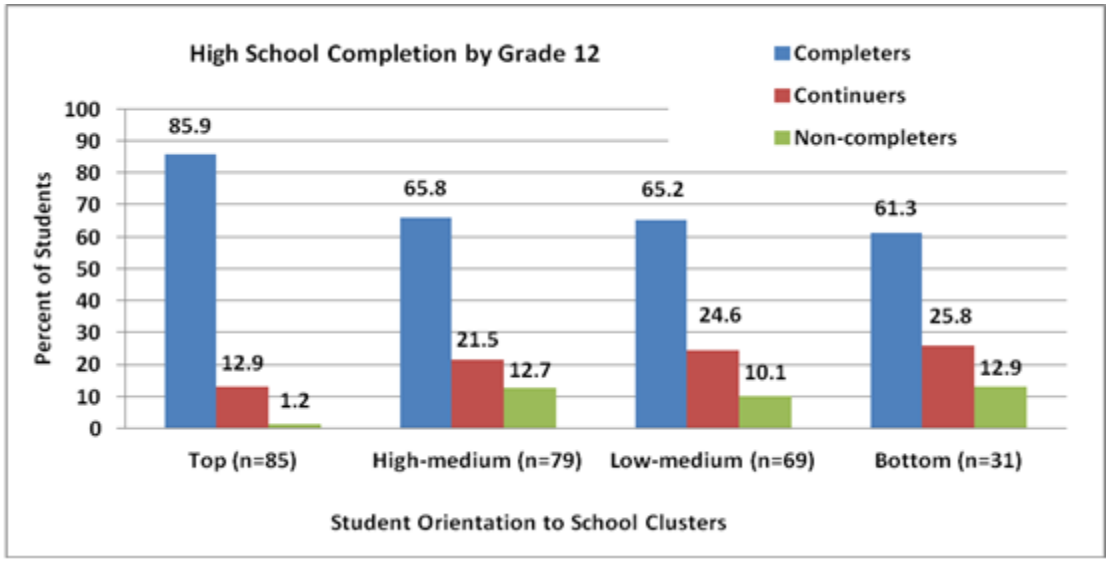


Figure 4: High School Completion by Grade 12; Chi-square =15.149 ; df = 6; p<0.05

compared to their counterparts from the medium and especially from the bottom clusters. Congruently, relatively high percentages of students from the medium and bottom clusters, who expressed more negativity toward school performed at below acceptable level (or did not write the test). The associations with high school completion were in line with the grade 9 achievement relationships. Notably higher percentages of students from the top SOS cluster (86%) completed high school by grade 12 in comparison to members of the two medium clusters (65-66 percent) and the bottom cluster (61%). The findings suggest that maintaining *highly favorable* disposition to school are beneficial for achieving positive academic outcomes. For

example, students from the two medium clusters were rather indifferent toward school than overtly negative. Their academic outcomes, however, were much lower than those of the students from the "most positive" top cluster. These results echo the concern raised by educator focus groups during the SOS-Q piloting that students scoring at a medium SOS level tend to constitute the majority of students and may be an unstable group, which could eventually lean either toward more positive or more negative school orientation. This underscores the importance, as the earlier referenced OECD study recommends, of regular monitoring of student orientation to school at the cohort and individual level to uncover both discontent and indifference and underlying reasons in a timely manner.

The results of preliminary bivariate analyses suggest a statistically significant association between student orientation to school and academic achievement in grade 9. The results also indicate that the orientation to school patterns may persist with the effects manifested later in high school completion. The follow-up multivariate analyses featured below delved further into the interrelationships between student orientation to school and academic outcomes.

## Multiple Regression Models

### Relationship between Academic Achievement and the SOS Variables

Multiple linear regression was applied to examine the relationship between the SOS variables and grade 9 academic achievement in Mathematics (a dependent variable). Table 1 shows the regression model predicting grade 9 achievement in mathematics measured concurrently with the student orientation to school (SOS) variables.

The linear regression model indicated that, after being entered into the model altogether using the forced entry method, the seven SOS-Q constructs explained about 20% of variance in grade 9 Mathematics achievement ($R^2$ and adjusted $R^2$ hovering around 0.20). When controlled for the effects of other SOS constructs, Self-Confidence emerged as the most powerful positive

Table 1

*Multiple Linear Regression: Grade 9 Student Academic Achievement in Mathematics Predicted by Student Orientation to School (SOS) Variables*

| SOS Variables | B | Standard Error | Beta(Standardized Regression Coefficient) |
|---|---|---|---|
| Safe and Caring School | -.661 | 2.324 | -.021 |
| External Resilience | -3.861 | 3.199 | -.099 |
| Internal Resilience | 1.411 | 1.400 | .056 |
| Extracurricular Activities | 5.920*** | 1.583 | .230 |
| Self-Confidence | 16.571*** | 2.781 | .495 |
| Utility of School | -3.453 | 2.222 | -.115 |
| Peers | -3.773 | 2.182 | -.110 |
| Constant | 15.337 | | |
| $R^2$ | .217 | | |
| Adjusted $R^2$ | .196 | | |

*Note*. N=276 ***p<.001

predictor of achievement, followed by Extracurricular Activities. Unstandardized regression coefficients (B) indicated that on average, controlling for other SOS variables in the model, a one point increase in self-confidence on a 5-point SOS scale would be associated with an increase of 16.6 points in achievement scores in Mathematics on a 100-point scale, and one point increase in participation in and appreciation of extracurricular activities would correspond to an increase of 5.9 points in Mathematics achievement. The remaining SOS predictor variables did not show an independent, statistically significant contribution to the model when controlled for other SOS variables.

Negative values of the regression coefficients attributed to Utility of School, External Resilience and Peers variables might be indicative of suppressor effects if these coefficients were statistically significant. Suppression may occur when an independent variable has a weak or no correlation with the outcome variable, but is correlated with other independent variables and increases the variance explained. However, the mentioned negative coefficients did not indicate significant effects. Therefore we dismissed the suppressor effects at this stage of analysis, but hypothesized that the SOS variables may be associated with each other in multiple direct and indirect ways. Exploring these interrelationships may cast further light into their association with academic achievement (see the following section).

## Path Analysis

The results of multiple linear regression prompted further investigation of whether the SOS variables are associated with student academic achievement both directly and indirectly-through mediated effects, since many SOS variables are correlated with each other (see Table 2). The variance inflation factor (VIF) and tolerance statistics indicated no multicollinearity issue.

Recursive path analysis using AMOS 21 statistical package (an added SPSS module) was applied to further analyze the hypothesized direct and indirect associations among the SOS variables and student achievement in Mathematics. The relatively small sample size (276

Table 2

*Correlations and Descriptive Statistics (N = 276)*

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. Grade 9 Mathematics | -- | .19** | .22** | .07 | .29** | .40** | .14* | .08 |
| 2. Safe and Caring School | | -- | .49** | -.02 | .39** | .57** | .59** | .37** |
| 3. External Resilience | | | -- | .14* | .36** | .70** | .54** | .48** |
| 4. Internal Resilience | | | | -- | -.07 | .10 | -.04 | .10 |
| 5. Extracurricular Activities | | | | | -- | .38** | .40** | .27** |
| 6. Self-Confidence | | | | | | -- | .55** | .45** |
| 7. Utility of School | | | | | | | -- | .37** |
| 8. Peers | | | | | | | | -- |
| Mean | 59.40 | 3.65 | 3.79 | 2.84 | 3.38 | 4.00 | 3.87 | 4.23 |
| Standard Deviation | 21.42 | .67 | .55 | .85 | .83 | .64 | .71 | .62 |

*Note*. Maximum Grade 9 Mathematics score is 100%; SOS sub-scale mean scores: max = 5.00, min = 1.00. *p<.05; **p<.01

students which had achievement scores in Mathematics) did not justify the use of latent variables with multiple indicators. However, the study met the recommended criterion of minimum 100-150 cases for conducting path analysis (Ding, Velicer, & Harlow, 1995). Therefore, at the current, exploratory stage of analysis, the subscale composite scores were used as single-item indicators corresponding to the seven SOS-Q constructs.

Path analysis is an extension of the multiple regression model assessing relative importance of various direct and indirect causal paths to the dependent variable (Garson, 2011). A path analysis can be conducted as a series of multiple regression analyses. AMOS calculates all paths simultaneously and produces general goodness of fit statistics for the whole model: the predicted regression weights are compared with the observed correlation matrix for the variables. While acknowledging the limitations of recursive path analysis, which postulates unidirectional hypothesized (causal) links among the variables with no loops or reciprocal effects, we consider it to be a useful tool to deconstruct the relationships among the variables into the direct and indirect effects by obtaining "estimates of the extent to which intervening variables account for relationships among predetermined and subsequent variables" (Wolfle, 1980, p. 185). Path analysis implies assumptions about intercausal connections among the variables and we have built the path model with a priori theoretical notions about these relationships. At the same time, we would like to emphasize the explorative nature of this exercise with the causal links requiring further examination and verification using different data sets.

The path model is described by the diagram in Figure 5 and suggests various direct and indirect (mediated) effects. Rectangles represent the seven composite SOS variables, which were computed using individual measurement items corresponding to the seven SOS sub-scales. The large rectangle at the top of the model depicts Grade 9 Mathematics Achievement (the ultimate dependent variable). The variables included in the path model are defined as *exogenous* if they have paths coming from them and none leading to them (e.g., Safe and Caring School) or *endogenous*, which have at least one path leading to them. Circles with arrows pointing to the endogenous variables represent error terms and denote the unexplained variance in the variable that is due to the factors that are not part of the model. The $R^2$ calculations are shown at the upper right corner of the rectangles depicting endogenous variables.

Maximum likelihood parameter estimation was used to estimate the path model. Path coefficients labeled at the middle of the arrows are standardized regression coefficients (beta weights) showing the effect of an independent variable on a dependent variable in the path model (Garson, 2011). The standardized path coefficient reflects the number of standard deviations the dependent variable changes when an independent variable increases one standard deviation. According to Suhr (2001), standardized path coefficients with absolute values less than 0.10 may indicate a "small" effect, values around 0.30 – a "medium" effect and values greater than 0.50 – a "large" effect. However, interpretations of the effect "magnitude" may vary. Wolfle (1980), for example, interprets a path coefficient of 0.39 as indicative of a "strong effect."

Minor post-hoc modifications were introduced to the initial path model – two non-significant paths connecting SOS variables and showing very small effects (.05-.06) were removed from the model to increase its clarity and parsimony. Their removal did not result in notable changes in other paths' estimates. At the same time, all *direct* links between the SOS variables and the academic achievement variable (including the non-significant ones) were left intact for illustrative purposes and to relate the path analysis results to the original multiple

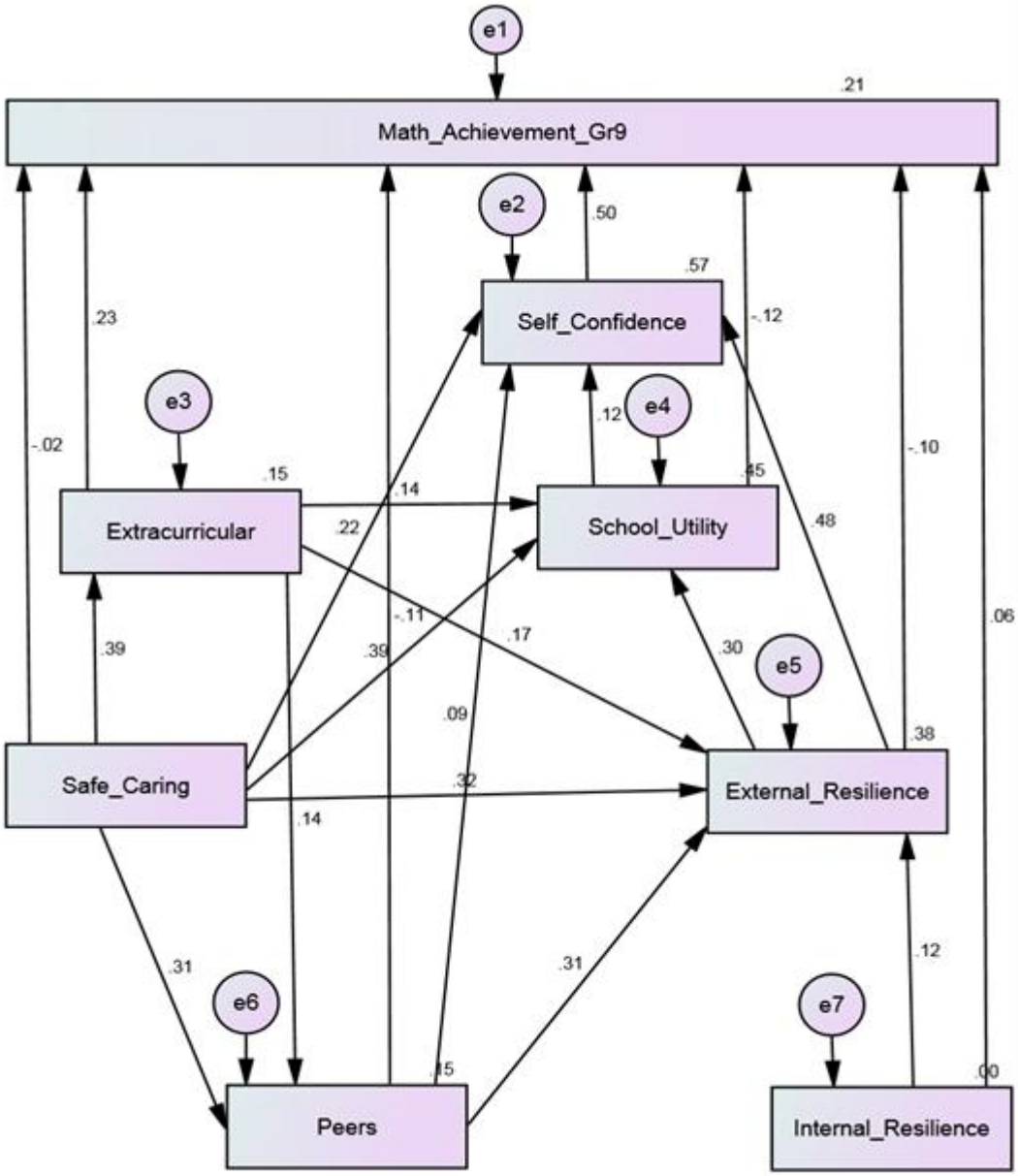


*Figure 5*: Path Diagram

regression analysis. All path coefficients indicating direct effects of each of the SOS variables on Mathematics Achievement match standardized beta coefficients obtained earlier via multiple regression (see Table 1), with Self-Confidence and Extracurricular Activities being statistically significant predictors of Mathematics Achievement controlling for other SOS variables.

A set of goodness of fit indicators was used to confirm the path model fit. We used model fit indexes with the cutoff criteria suggested by Schreiber, Stage, King, Nora, & Barlow (2006) for structural equation models (SEM) (refer to Table 3). The hypothesized path model appears to be a good fit to the data. The model chi-square test assesses the overall fit of the model. A non-significant result indicates an adequate model: model-implied covariance matrix does not differ from the observed covariance matrix. Other indexes also indicate a good fit: the CFI is .993; TLI

Table 3

*Path Model Fit Indexes*

| Indexes | Acronym/ Symbol | SOS – Math Achievement Path Model | Acceptable Fit | Model's Goodness of Fit |
|---|---|---|---|---|
| Chi-square | $\chi^2$ | Chi-square = 11.643 df=7; p=.113 (n.s.) | Non-significant | good |
| Comparative fit index | CFI | .993 | >=.95 | good |
| Tucker-Lewis index | TLI | .972 | >=.95 | good |
| Root mean square error of approximation | RMSEA | .049 | <.05 – good fit <.08 – adequate fit | good |

is .972; and RMSEA is .049.

As depicted in Figure 5, the path from Safe and Caring School to the ultimate dependent variable—Mathematics Achievement does not show a direct effect (i.e., the path coefficient is negligible and non-significant). However, we hypothesized that Safe and Caring School has to be a "cornerstone" predetermined variable, which could precede and influence other SOS variables. Creating safe and caring school environments to meet students' academic and socio-emotional needs is largely within the reach of school administrators and educators and may be conducive to positive dynamics in students' attitudes and socio-emotional competencies. The path model reflects this proposition, with a number of significant paths stemming from the Safe and Caring School variable to External Resilience, Self-Confidence, (relationship with) Peers and perceived Utility of School. However, the mentioned SOS variables may also be affected by other unknown and unmeasured factors that are not necessarily school-related (as depicted by the circular residual error variables). In all, the model demonstrates that creating a safe and caring school environment for students may not necessarily show direct immediate effects on achievement, but could have multiple positive indirect effects on achievement through a series of moderating (intervening) variables, such as Self-Confidence, Extracurricular Activities, External Resilience, Peers, and Utility of School.

The results of decomposition of the associations among the SOS variables and academic achievement into the direct, indirect, and total effects confirm the above proposition (Table 4). Although the Safe and Caring School variable was not found to have a direct effect on Mathematics Achievement, its indirect and total (positive) effects are notable by virtue of its both direct and indirect effects on variables such as Self-Confidence and Extracurricular Activities (see Figure 5), which in turn were found to be positively related to Mathematics Achievement.

Figure 5 also reveals that External Resilience and Self-Confidence appear to be "nodular" intervening variables mediating multiple associations. Self-Confidence was also found to have a significant direct effect on Mathematics Achievement whereas External Resilience, similar to Safe and Caring School, affected achievement indirectly, but was not found to have a direct significant effect on achievement.

Participation in and perceived value of Extracurricular Activities is considered to be another key independent variable that can be directly controlled by schools to engage and develop students. Extracurricular Activities appeared to depend directly on Safe and Caring School and was found to have a direct significant effect on academic achievement.

Table 4

*Decomposition of Associations for SOS Variables and Grade 9 Mathematics Achievement*

| | Effects (Standardized) on Grade 9 Mathematics Achievement | | |
|---|---|---|---|
| | Total* | Direct | Indirect |
| Safe & Caring School | .19 | -.02 | .21 |
| Self-Confidence | .50 | .50 | .00 |
| External Resilience | .13 | -.10 | .22 |
| Internal Resilience | .07 | .06 | .02 |
| Extracurricular | .24 | .23 | .01 |
| Peers | -.03 | -.11 | .09 |
| Utility of School | -.06 | -.12 | .06 |

*Note*. Total effect is a sum of direct and indirect effects. (Some discrepancies may occur due to rounding).

The Peers construct by itself was not found to be directly associated with achievement after other SOS variables were accounted for (refer also to multiple linear regression results in Table 1). However, being understandably a function of Safe and Caring Schools, Peers affected External Resilience and, ultimately, through Self-Confidence, academic achievement (Figure 5). The multiple linear regression model (Table 1), did not show an independent effect of perceived Utility of School on Mathematics Achievement controlling for other SOS variables. The path model (Figure 5) depicts Utility of School as a positive function of Safe and Caring School, External Resilience, and Extracurricular Activities and a mediator of their links to Self-Confidence, which in turn, was found to be directly linked to Mathematics Achievement. The associations around perceived Utility of School need further investigation, including the proposition that appreciation of Utility of School by itself would not necessarily facilitate student achievement. In summary, the relationships among the SOS variables and academic achievement may involve complex multivariate effects, which would go unrevealed in the absence of the effect decomposition and reasoning resultant from the path analysis.

## Relationship between High School Completion and SOS Variables

The dependent high school completion variable was dichotomous (completers versus non-completers by the end of Grade 12). Therefore, binary logistic regression was used to examine the relationship between the SOS variables and high school completion (Table 5). The forced entry method was used for this initial analysis – all of the SOS independent (predictor) variables were placed in the regression model in one block. Hosmer and Lemeshow goodness of fit test shows that the model's estimates fit the data at an acceptable level: well-fitting models show non-significance on the chi-square statistic, indicating model prediction that is not significantly different from observed values.

In line with the results of multiple linear regression analysis with grade 9 academic achievement in Mathematics as a dependent variable, Self-Confidence emerged as a significant predictor of high school completion in the logistic regression model, controlling for other SOS predictors (as indicated by Wald statistic and associated p-value).

Table 5

*Multiple Logistic Regression: Grade 12 High School Completion Predicted by Student Orientation to School (SOS) Variables*

| | B | S.E. | Wald | df | Sig. | Exp (B) |
|---|---|---|---|---|---|---|
| Safe and Caring School | -.546 | .315 | 2.994 | 1 | n.s. | .579 |
| External Resilience | .002 | .394 | .000 | 1 | n.s. | 1.002 |
| Internal Resilience | .076 | .169 | .204 | 1 | n.s. | 1.079 |
| Extracurricular Activities | .356 | .202 | 3.108 | 1 | n.s. | 1.427 |
| Self-confidence | .696* | .336 | 4.285 | 1 | p<.05 | 2.006 |
| Utility of School | -.056 | .265 | .045 | 1 | n.s. | .945 |
| Peers | .373 | .248 | 2.268 | 1 | n.s. | 1.452 |
| Constant | -2.545 | | | | | |
| Hosmer and Lemeshow Test: | Chi-square = 12.133; df = 8; p = .145 (n.s.) | | | | | |

*Note*. N=264

The results of logistic regression can be interpreted using odds ratios. Odds are the probability of an event occurring (e.g., high school completion) divided by the probability of the event not happening. The odds ratio (value of Exp [B] in Table 5) is a ratio of the odds at any two values of a predictor that are one unit apart. The odds ratio is interpreted as the factor by which the odds of success (i.e., high school completion) change for a one unit change in the predictor and reflects a *constant* effect of the predictor on the odds of success. An odds ratio greater than 1 indicates that the odds of being a high school completer increase when the predictor variable increases; an odds ratio of less than 1 indicates that the odds of being a high school completer decrease when the predictor variable increases; and an odds ratio equal to 1 indicates no change in high school completion. The odds ratio for the significant predictor Self-Confidence (Exp[B] = 2.006) indicated that, controlling for other terms, a one unit increase in self-confidence (on a 5-point SOS-Q scale) was associated with doubling the odds of completing high school (or, put another way, with a 100% increase in the odds of completing high school).

When interpreting the results of logistic regression, it is important to keep in mind that SOS-Q predictor variables could show stronger links to high school completion if SOS survey measures were taken early in grade 12, closer to the high school completion outcomes. Also, as demonstrated in the previous sections using grade 9 academic achievement, the SOS predictor variables may interact with each other and relate to academic outcomes both directly and indirectly. For example, as illustrated in Figure 5, a number of SOS variables may affect Self-Confidence–a positive predictor of academic achievement.

## Discussion and Conclusions

In summary, the results of data analyses presented in this paper support the proposition that student orientation to school assessed via the SOS-Q has a positive, consistent association with concurrent academic achievement and subsequent high school completion three years later. The results also suggest that the relationships among the student orientation to school variables and academic outcomes may be complex, including various mediating effects and possible causality

warrants further investigation.

While this study contributes to empirical substantiation of the premise that student orientation to school is clearly associated with academic outcomes and the relationship persists in time, its exploratory nature necessitates follow-up replications and further advancement of findings using more representative school district or provincial student samples reflecting a broad variety of school grades. A large-scale research program is currently underway in Rocky View Schools (Alberta, Canada) to pave the way to further applied and theoretical research around the SOS-Q, as well as to explore the associated evidence-informed programming and policy development opportunities supporting student wellness. The non-cognitive student assessment data systematically generated via the SOS-Q is well positioned to be a key component of the emerging comprehensive Student Information System.

Recent research reveals a growing focus on the concepts similar to those featured in the SOS-Q and directed at identifying and positively influencing emotional and motivational factors that affect various aspects of student behavior. As Greene (2008) has observed, "understanding why a kid is challenging is the first and most important part of helping him" (p. 11).

For example, Lopes, Mestre, Guil, Kremenitzer, & Salovey (2012) report recent promising research on students' emotional regulation and resultant motivation and adaptation to school. School-based interventions targeting emotional and interpersonal skills have yielded positive effects on student behavior. These authors argue that student-teacher interactions are important factors influencing both student and teacher achievement and well-being and conclude that, "teachers who model emotional skills should find it easier to foster socially competent behavior in students, cultivate a stronger sense of community in the classroom, and enhance students' academic performance" (p. 735). Likewise, Marcotte (2012) in a report on research with at-risk youth aged 16-24 attending Quebec adult education centers came to the conclusion that ". . . improving the psychological and social services dedicated to helping these youths, the interventions and programs aimed at increasing students' empowerment and self-knowledge, and the teacher-student relationships that foster positive reconstructions of school experiences could be the first goal of complementary services" (p. 198).

Casoli-Reardon, Rappaport, Kulick, & Reinfeld (2012) noted that interventions for students at risk for truancy require careful diagnostic assessment and observed that causes can be categorized as cultural, family-based, peer oriented, or neuropsychiatric, such as anxiety or learning disorders. The essential factor in helping meet at-risk students' needs is "developing an understanding of school avoidant behavior. . ." (p. 55), which underscores the value of attending directly to the students' affective experience of school.

Finally, Schibli, & D'Angiulli (2011) in their discussion of how poverty and its effects hold important implications for teachers' relationship to students, underscored the importance of ensuring an emphasis on empathy as opposed to pity; explaining that empathy, ". . . leads to understanding of challenges as differences and demonstrates respect. . ." (p. 18). This observation emphasizes the especial importance of reinforcing affective relationships to school among lower SES students.

Emerging research is increasingly pointing to the value and benefits of non-cognitive assessment tools such as the SOS-Q that can assist teachers and administrators in developing empirical and objective ways to define students' emotional connections to school as a means of building customized intervention strategies and comprehensive supports for at-risk students. The findings indicate that the SOS-Q can be of value in informing school improvement practices targeting student connection to school as a part of strategies directed at improved achievement

and school completion. The SOS-Q can be applied during the implementation stage of districts' and schools' programs and policies aimed at improving overall school social and academic climate, and also to assess the concurrent or subsequent outcomes, such as improvements in students' psychological and emotional states (e.g., self-confidence and resilience). The SOS-Q has an immediate practical application in students' own assessment, allowing (at-risk) students to better understand their emotional and mental state and helping them to re-focus on positive reconnection to school and achievement goals.

Ongoing applied and action research around the SOS-Q with school principals and district administrators (Burger, Cardinal, Hennig, Valerio, Ziegler, & Nadirova, 2011-2012 Winter) supports the collection of relevant student affect data leading to building comprehensive student information systems to help teachers, principals, and district staff gather and utilize evidence in a meaningful way for school improvement. A valuable direction for future research would be examining possible variations in student orientation to school and its linkages to achievement for students from different socio-economic and cultural backgrounds.

The opportunities for future research on student affect and desirable school outcomes are rich. We hope this article stimulates interest in this area of educational research.

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## Note

1 Result of the (Pearson) chi-square test, which detects whether there is a significant association between two categorical variables, was not reported for the association between student orientation to school in grade 9 and concurrent grade 9 academic achievement in Mathematics (see Figure 3), since the bottom SOS cluster had zero student count in the excellent Mathematics achievement category.

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