



Exploring the relationship between socio-emotional resiliency and academic achievement

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ABSTRACT

Socio-emotional resiliencies play crucial roles in facilitating adolescent development and positive adjustment to education. A better understanding of this relationship using the Clover Leaf Framework (Malti & Noam, 2009) will inform school interventions and facilitate academic achievement through supporting socio-emotional foundations of learning. The aim was to examine the relationship between socio-emotional resiliencies and academic achievement in English and Maths for middle school students. The Clover Model predicted that resiliencies related to belonging will influence achievement during this developmental stage. Socio-emotional resiliency was measured using the Holistic Student Assessment (HSA), questionnaire addressing 14 resiliency measures, and the Strengths and Difficulties Questionnaire (SDQ) which addresses 5 more clinical socio-emotional factors. Standardized test scores were taken from the 2011 Massachusetts Comprehensive Assessment System (MCAS). A multiple regression was performed. Performance in English was predicted by higher scores in the resiliencies of 'Action Orientation', 'Self-Efficacy', 'Academic Motivation', and 'Relationship with Peers'. Performance in Maths was predicted by higher 'Action Orientation'. As a Belonging resiliency was predictive of achievement in ELA, this supports the Clover Model. Socio-emotional resiliencies are closely tied to achievement. More resiliencies were influential in ELA, and there was a common predictor, suggesting it is best to focus on the related resiliencies through the English curriculum for a global impact on healthy youth development.

KEY WORDS:	RESILIENCY	EDUCATION	HOLISTIC STUDENT ASSESSMENT	SOCIO EMOTIONAL	CLOVER MODEL
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Introduction

Imagine trying to stay motivated to work while living in poverty, facing serious problems at home, or having mental health difficulties. This is what many school students must endure every single day. There is a rapidly growing recognition that schools must support students' social and emotional resiliency in order to form the foundations for successful learning during the vulnerable period of adolescent development (Ashdown & Bernard, 2012). Resiliency has no fixed definition across the literature, but it is generally conceded that the term refers to healthy social and emotional development despite facing adversity (Tol, Song, & Jordans, 2013). It is with resilience that individuals overcome rather than succumb to the effects of risk (Rutter, 1987) and it is essential for success in school and later life, determining whether adolescents work to overcome everyday obstacles or give in and become passive. Resiliency is crucial for perseverance through challenging academic tasks, and in developing productive social responses, such as in facing bullying (Yeager & Dweck, 2012). Positive social and emotional development enables young people to successfully navigate their learning environments and profoundly affects later adjustment, both academically and socially.

The western education systems are facing a crisis; 8.1% of U.S. students do not graduate high school (Stillwell, Sable, & Plotts, 2011), 18% of U.K. students are terminating their education at age 16 (OECD, 2010), and over 10% of these dropouts are attributable to mental health problems (Wagner, 2005). Resiliency protects at-risk individuals from developing mental health problems, and could be a key factor in addressing these failures in healthcare and education. The presence of mental health problems in adolescents is alarmingly high; a recent large-scale survey of U.S.

adolescents ($N=10,123$) found that 22.2% suffer from a mental health disorder with severe impairment or distress (Merikangas et al, 2010) yet only 36.2% of the follow-up sample obtained treatment (Merikangas et al, 2011). An overwhelming number of distressed students slip through the cracks of the education system lacking appropriate support, leading to poor achievement and dropouts. These are the statistics for diagnosed disorders and are a bleak indicator of the support provided for adolescent students struggling with sub-clinical socio-emotional problems.

Social and emotional resiliency is the product of a multitude of factors. These can range from internal characteristics such as temperament to external, interpersonal factors such as supportive peer relationships. Resiliency across these areas protects at-risk individuals from poor adjustment and from developing mental health problems in challenging circumstances (Luthar, 1991). Many at-risk young people do not develop these problems and so are thought to be resilient; and researching into the various factors leading to this resiliency can inform interventions for positive development in at-risk youth (Wu et al, 2013). The current study hopes to identify positive resiliency factors that facilitate academic achievement, in order to inform supports for school students. Students cannot leave personal struggles outside of the classroom, and mental health difficulties stemming from adversities can compromise concentration and learning motivation levels if left unsupported, ultimately leading to decreased grades and dropouts (Adelman & Taylor, 1998). School-based support enables early intervention of mental health disorders, as working with students holistically allows professionals to detect potential problems sooner and connect students to appropriate mental health supports (Noam & Hermann, 2002). Early intervention is crucial for preventing mental health problems from developing into clinical disorders in later adolescence and adulthood, when the concern becomes increasingly significant and the treatment more costly (O'Connell, Boat, & Warner, 2009). Poor academic performance resulting from unsupported socio-emotional struggles must be addressed in order to prevent dropout and enable students to focus and persevere in their education.

U.S. federal education authorities have responded to this dropout crisis with the No Child Left Behind (NCLB) Act in 2001 (Public Law 107-110) which focuses not on supporting socio-emotional development but on reforming school infrastructure. This initiative posits that schools must be held accountable for meeting targets of annual yearly progress (AYP) levels or face funding reductions (Hamilton et al, 2007). To achieve this, schools have increased testing and reduced recreational hours (Pellegrini & Bohn, 2005). Since its birth NCLB has shown modest improvements in Maths achievement, no effect in reading (Dee & Jacob, 2009), and intense pressures on meeting AYP targets are steering resources away from the socio-emotional side of student development (Ruff, 2011). The initiative's limited progress suggests that the root of academic underachievement does not solely lie in teaching quality or curriculum structure, and shifts the focus towards socio-emotional barriers faced in the learning process currently left unaddressed. An integration of social, emotional, and academic learning is the most effective means to achieve positive youth development and educational success (Weissberg, Kumpfer, & Seligman, 2003).

Research on social-emotional development has been systematically linked to resiliency and the risk of psychopathology (Noam, 1999). A model which interconnects these aspects is the Clover Leaf Model; a research-based developmental model of resilience and psychopathology (Malti & Noam, 2009). The Clover Model describes child and adolescent development through the leaves of a four-leaf clover, whereby each leaf represents a factor of socio-emotional development essential to positive adjustment which varies in significance as the individual matures.

Figure 1
The Clover Model of Developmental Needs



The four leaves are continually engaged throughout development, but progress in dominance from young childhood to adolescence: i) Active Engagement, ii) Assertiveness, iii) Belonging, and iv) Reflection, with each leaf corresponding to particular risk and resiliency factors. 'Active Engagement' refers to the physical need for engaging with and moving the body and is most dominant during early childhood; 'Assertiveness' represents self-expression, negotiation, self-control, and making decisions for oneself and becomes more influential in pre-adolescence; 'Belonging' pertains to the need for positive peer and adult relationships, empathy, and support to create a sense of identity and is generally the most strongly influential leaf during middle childhood (the focus of the present study); and 'Reflection' is the need to evaluate oneself and one's experience in the world and becomes the dominant leaf in later adolescence. Therefore, the Clover Leaf Model provides a framework within which the broad aspects of resiliency can be organised according to salience for certain stages of development. Understanding resiliency in this developmental context informs how to support students sensitive to their needs during educational struggles to promote academic achievement. Supporting socio-emotional health and pushing for academic success should not be perceived as two mutually exclusive ideologies; in that developing one would inevitably compromise the other. Recent developments, such as the Clover Model, are urging educational professionals to integrate these approaches for positive and holistic youth development to provide students with a foundation for academic success.

A recent movement towards holistic youth support has been to incorporate Social and Emotional Learning (SEL) into the academic curriculum. SEL is a form of adolescent psycho-education aiming to reduce risk behaviours and foster core competencies in cognitive, affective, and behavioural areas of development. These enable youth to develop self-management, self-awareness, social awareness, relationship skills, and responsible decision making (CASEL, 2005). The internalization and application of social and emotional skills corresponds to the Clover Model, as developing resiliencies across the leaves is theorised to result in better social and academic adjustment. One such SEL program named 'Positive Action' is implemented in 45 schools to boost academic achievement and reduce problem behaviours. Analyses on outcomes for middle school students showed a 20.6% performance increase on national Reading tests and a 16.5% increase on Maths tests. Although increased performance over time would be expected as students learn more and progress over the year, these figures were controlled by 28 matched non-intervention schools, and so the increase is attributable to the effects of SEL (Flay & Allred, 2003). According to the Clover Model, middle school students are dominantly motivated by the Belonging leaf, and so it is expected the resiliencies linked to this construct would be most influential. However, the SEL evaluations have not differentiated between the resiliencies impacting academic achievement and thus the exact agents causing this improvement are unknown, an issue that the current study aims to address.

The previous results suggest a substantial link between socio-emotional resiliencies and academic performance, however to accurately interpret the finding the results of other programs need to be considered. A meta-analysis of 213 studies on the effects of SEL implementation ($N=270,034$ students) overall found a lower but significant 11% gain in academic performance using standardized reading, math tests, and grade point averages (Durlack, Weissberg, Dymnicki, Taylor, & Schellinger, 2011). This finding grounds the notion that students need a social and emotional skill-base to apply themselves to their education. Schools are inherently social environments; students learn as a group, socialise as peers, and interact with teachers (Zins, Bloodworth, Weissberg, & Walberg, 2004). The Clover Model posits that students need socio-emotional resiliency to successfully overcome everyday challenges in their environments such as bullying, substance abuse, and academic pressures for successful learning to take place, and evaluations of these SEL programs are supporting this direction.

The success of SEL programs reflects the notion that adolescents' relationships and emotions are key factors helping them to navigate their learning environment, and that supporting both simultaneously is not only possible, but beneficial. Evidence-based programs are essential for policy makers to determine successful methods for supporting youth holistically; however the reasons behind the discrepancy of effectiveness between different programs, and different subjects, is unclear and a more detailed understanding of which elements closely relate to academic progress are needed to tailor interventions that enable students to reach their academic potential.

Deconstructing resiliency into specific components, the Search Institute formed a framework of 40 'Developmental Assets', synonymous with resiliencies, from research in youth development, resiliency, and prevention, and developed a self-report survey to measure these assets. A series of longitudinal studies on the effects of developmental assets on later academic achievement were conducted and found that the more assets a student experienced, the higher their grade point averages (GPA) not only concurrently, but also three years later (Scales & Roehlkepartain, 2003). Specifically, students experiencing achievement motivation, school engagement, youth programs, adult relationships, and community service were 2-3 times more likely to have higher GPA's. Therefore, a quantitative increase in 'assets', or resiliencies, lead to a long-term increase in grades, and specific resiliencies had the most profound effects. Several of these resiliencies can be categorised into the Belonging leaf of the Clover Leaf framework, further suggesting a strong influence on academia in early adolescence. A limitation of this study is that the broad measure of GPA does not reveal detailed information on how assets may vary for specific subjects, as was hinted by the 'Positive Action' program evaluation in Reading and Maths. The current study expands these evaluations to investigate the relationship of specific resiliencies in specific subjects, to inform tailored interventions for school students.

Such research directly contradicts the aforementioned educational policies on improving academic achievement through increased testing at the expense of socio-emotional support. Schools can be overwhelmed by the number of independent support services offered and are often reluctant to invest in programs which do not explicitly promise to boost test scores (Furlong, Paige, & Osher, 2003). However, with evidence suggesting that socio-emotional struggles contribute significantly to academic underperformance, it is in the schools' interests to support students holistically. Even so, there are concerns that schools are inappropriate venues for mental health interventions as they reduce time spent towards educational goals (Adelman & Taylor, 1998). Nonetheless, schools are a highly influential context in children's lives, maintain long-term influences on their development, and so arguably represent a suitable environment for holistic mental health support (Atkins, Hoagwood, Kutash, & Seidman, 2010). This time removed from education would invest in better quality learning for the long-term. Socio-emotional development fundamentally impacts education and general adjustment, yet the pressures for increasing academic achievement leave minimal resources for integrating mental health services into schools for a vulnerable age group.

Although the implications of social and emotional resiliency on development, learning, and academic success are clear, there has been little empirical evidence specifically demonstrating the impact of certain resiliencies on certain academic subjects. Despite a growing recognition that social and emotional aspects of child development are a crucial foundation for subsequent learning, the empirical basis is not yet strong or clear enough to convince policy makers to make the fiscal investment in mental health support. A more specific and empirically grounded relationship between resiliency and academic achievement could further strengthen this connection and provide education authorities with the motivation to invest in school-based supports. Therefore, the present study will investigate the dynamic relationship between socio-

emotional resiliency and academic achievement, determining the extent to which they are mutually dependent and whether specific resiliency factors are predictive of achievement in English and Maths for middle school students.

The research question for the current investigation is ‘Which social and emotional resiliencies are significant predictors of academic performance in the subjects of English Language Arts and Maths in middle school students?’ The Clover Model illustrates key developmental socio-emotional needs influencing youth adjustment and academic achievement and so it is predicted that socio-emotional resiliencies will influence student performance in these core subjects. As the present study focuses on a sample within middle childhood, the Clover Model further predicts that resiliencies pertaining to the Belonging Leaf will have a dominant impact.

Method

Participants

A total of 218 students attending four K-8 public schools in Boston, Massachusetts participated in this study. Of this population, 111 were male (50.9%) and 107 were female (49.1%) and there were 6, 26, 80, 48, and 58 students in grades 4, 5, 6, 7, and 8, respectively. The participating schools have a high population of at-risk youth from low-socioeconomic backgrounds, as reflected by 195 (89.4%) of the students qualifying for the free/reduced lunch program offered by Boston Public Schools (BPS) to low-income households. The present sample also indicates the ethnic diversity of the BPS student population: 113 Black/African American, 20 Hispanic, 7 Asian, 16 White, and 30 Bi-racial students (ethnicity data were unavailable for 32 students). Furthermore, there were a total of 28 English Language Learners and 31 students in Special Education.

Data were collected from schools affiliated with the Program in Education, Afterschool, and Resiliency (PEAR). PEAR is a McLean Hospital and Harvard Medical School initiative which integrates theory and research of adolescent socio-emotional development into training school professionals to better understand and respond to their individual student’s needs.

PEAR implemented the Responsive Advocacy for Life and Learning in Youth (RALLY) program, a school based socio-emotional intervention for selected students (Noam, Winner, Rhein, & Molad, 1996), at three of the BPS sites included in the present study. Students were selected for the RALLY program based on academic needs and teacher recommendations; of the current sample, 67 students (30.7%) participated in the RALLY program throughout the 2011/2012 academic year.

Materials

Holistic Student Assessment (HSA)

The HSA is a recently developed 84-item self-report questionnaire designed to assess the socio-emotional development of adolescents in terms of resiliency, relationships, and learning and school engagement. These resiliencies are measured through 14 sub-scales of:

- i. 'Action Orientation',
- ii. 'Emotion Control',
- iii. 'Self-Efficacy',
- iv. 'Self-Assertion',
- v. 'Trust',
- vi. 'Interpersonal Sensitivity',
- vii. 'Empathy',
- viii. 'Optimism',
- ix. 'Reflection',
- x. 'Relationships with Adults',
- xi. 'Relationships with Peers',
- xii. 'Learning Interest',
- xiii. 'Academic Motivation', and
- xiv. 'School Bonding'.

Each sub-scale measure generated by the HSA is a product of 4-9 questions on the questionnaire, and students record responses to each question on a 4-point Likert scale of 0-Not at all, 1-Sometimes, 2- Often, 3-Almost Always.

Responses are averaged to generate resiliency scores for each scale. These averages are used to generate profiles of individual socio-emotional strengths and needs. This informs school staff and practitioners how to best support and respond to specific student's developmental needs.

Validity analyses of the current version of the HSA found the Cronbach Alphas to range between .59-.85, and all students within the sample completed the same version within two months.

Strengths and Difficulties Questionnaire (SDQ)

Developed by Goodman (1997), the SDQ is a validated and widely used self-report measure of adolescent psychopathology and pro-social behaviour. The tool is composed of five sub-scales measured through five items each, 25 items in total. The sub-scales are:

- i. Hyperactivity/Inattention,
- ii. Conduct Problems,
- iii. Emotional Symptoms,
- iv. Peer Problems, and
- v. Pro-Social Behaviour.

Student responses are recorded on a 3-point Likert scale from 0-Not at all, 1-Sometimes, and 2- Often. Students' responses are generated into scores through the summation of all responses for each scale.

Massachusetts Comprehensive Assessment System (MCAS)

Data on academic achievement were collected through the MCAS. BPS conducts an annual standardised MCAS assessment in Mathematics and English Language Arts (ELA) across their school sites. The results provide a scaled score within 200-280 and are assigned to one of four categories of performance: 'Warning', 'Needs Improvement', 'Proficient', and 'Advanced'.

The assessments for Maths and ELA are administered approximately 2 months apart, and students must have qualified as proficient in the English language to take the test.

Procedure

The data for the present study were collected through PEAR's socio-emotional direct service program RALLY which provides holistic school-based mental health support. When initially coordinating with the schools, principals decided whether to have the whole school population assessed using the HSA or a select population of students targeted for the RALLY intervention. After collecting consent from all participating student's parents/guardians, the administration was scheduled through booking rooms, using a checklist of attendance and consent, and coordination with teachers and administrators. MCAS data for consented students was extracted from each school's main database for the present study.

Consented students were then invited to take the HSA; as it is a voluntary assessment, completion on the part of the student is viewed as passive assent. The assessments took approximately 15-20 minutes to complete, using both paper and online versions of the HSA. English Language Learner (ELL) students had the option of completing a Spanish translation of the HSA if preferred, as this is the most common native language of students within the BPS community. Wherever possible, bilingual teachers were present to help with vocabulary difficulties. However, all students met the English proficiency level required by BPS to take the MCAS test.

The HSA was conducted by trained administrators under controlled conditions; students completed the survey independently and in silence. The demographic information was explicitly explained and completed before beginning the survey in order to avoid errors.

Ethical Considerations

As the participants of the present study were all under age 16, consent was obtained from students' parents or guardians. A letter of consent requesting permission

for the HSA administration, subsequent intervention services, and the sharing of information between PEAR and the school administration team was signed by parents/guardians of students selected for the HSA. This consent therefore permitted the school administration to share academic (MCAS) records with RALLY staff. All data were stored in a locked filing cabinet in the RALLY room of each school, and online data files were transferred using external USB flash drives to ensure security.

As English was not the native language for many of the participating students, there was a concern that students may be confused by some language content of the survey. In order to counteract this, administrators defined potentially unfamiliar words at the start, translations were available, and students were encouraged to ask for clarifications if they did not understand.

Results

The results have been divided into four main sections. Firstly, the descriptive statistics for each resiliency and academic variable are reported. Secondly, the assumptions of a multiple regression analysis are identified and addressed. Thirdly, preliminary Pearson correlations between the resiliency variables and the academic variables are reported. The fourth and final section presents the results of the multiple regression analyses.

Descriptive Statistics

Table 1

A table to show the descriptive statistics of each resiliency variable

Resiliency Variable	<i>M</i>	<i>SD</i>	Minimum	Maximum
HSA				
Action Orientation	2.13	.60	.33	3.00
Trust	1.62	.58	.25	3.00
Optimism	1.87	.64	.00	3.00
Emotion Control	1.78	.61	.00	3.00
Self-Efficacy	1.98	.49	.83	3.00
Self-Assertion	1.56	.49	.44	3.00
Reflection	1.67	.56	.27	3.00
Empathy	2.10	.72	.33	3.00
Interpersonal Sensitivity	1.89	.55	.40	3.00
Learning Interest	2.03	.67	.33	3.00
Academic Motivation	2.38	.58	.67	3.00
School Bonding	1.72	.58	.20	3.00
Relationship with Peers	2.17	.59	.40	3.00
Relationship with Adults	1.83	.57	.50	3.00
SDQ				
Peer Problems	2.20	1.64	.00	9.00
Conduct Problems	2.46	1.83	.00	13.00

Emotional Symptoms	3.46	2.42	.00	12.00
Hyperactivity/Inattention	4.00	2.14	.00	9.00
Prosocial	7.58	1.67	3.00	10.00

Table 1 shows the mean scores (M), standard deviations (SD), minimum, and maximum scores for each of the 14 HSA resiliency variables and each of the five SDQ strengths and difficulties. Each HSA variable value represents the mean of all question responses related to that variable. It is important to distinguish that each SDQ variable value represents the sum of all question responses related to that variable.

All 19 variables were measured using Likert scales; the HSA on a 4-point scale and the SDQ on a 3-point scale. The mean variable scores ranged from 1.56 – 2.38 (SD .49 - .72) in the HSA, and from 2.20 – 7.58 (SD 1.64 – 2.42) in the SDQ. The minimum scores ranged from .00 - .83 in the HSA and from .00 – 3.00 in the SDQ. The maximum score was 3.00 for all variables in the HSA and ranged from 9.00 – 13.00 in the SDQ.

Table 2
A table to show the descriptive statistics of each academic variable

Academic Variable	M	SD	Minimum	Maximum
English Language Arts	237.22	15.17	204.00	278.00
Maths	235.58	16.68	204.00	270.00

Table 2 shows the mean scores (M), standard deviations (SD), minimum, and maximum scores for each academic variable of English Language Arts (ELA) and Maths. Both ELA and Maths were measured on a scale from 200-280. The mean score for ELA was 237.22 (SD 15.17) with a minimum possible score of 204.00 and a maximum possible score of 278.00. The mean score for Maths was 235.73 (SD 16.73) with a minimum possible score of 204.00 and a maximum possible score of 270.00.

Once the spread of the data variables was established, it was then ensured that the collected data was conducive for use in hierarchical regressions through addressing the assumptions that such an analysis carries. In order to determine which HSA/SDQ variables of socio-emotional health were significantly related to academic achievement, Pearson's correlations and multiple regression analyses were conducted using SPSS Statistics Version 20.0. Before performing this analysis, it was necessary to check the assumptions of a multiple regression. These include: i) linearity between dependent and independent variables, ii) independence of errors, and iii) normal distribution of the residuals and residual homoscedasticity.

i) Linearity between dependent and independent variables

The graphs of Pearson correlations between dependent and independent variables illustrated a linear relationship, thus fulfilling the linearity assumption.

ii) *Independence of errors*

This assumption required that each data point was independent, i.e. had no effect on any other data point. The residual plot showed no discernible shape, suggesting that the data points were indeed independent of one another (see Appendix V).

iii) *Residual distribution and homoscedasticity*

A major assumption of multiple regression analyses is that the residuals of the dependent variables are normally distributed, as indicated by a normal distribution curve on data histograms and a cloud-like formation of residual plots. Normal distribution and homoscedasticity of the residuals were confirmed for the dependent variables of ELA scores and Maths scores (see Appendix V).

With all of the assumptions of a hierarchical regression met, the data could be submitted to the first step of analysis to identify which of the socio-emotional health variables are significantly correlated with ELA and/or Maths scores. These correlations were used to inform which variables would be included in the hierarchical regression analysis to determine the extent to which socio-emotional resiliency variables are predictive of academic variables.

Table 3

A table to show the zero-order correlations of HSA/SDQ variables with ELA and Math scores

Resiliency Variable	ELA	Maths
HSA		
Action Orientation	.175**	.215**
Trust	-.077	.002
Optimism	-.070	-.036
Emotion Control	.032	.045
Self-Efficacy	.155**	.130*
Self-Assertion	.050	.052
Reflection	-.095	-.090
Empathy	-.032	-.012
Interpersonal Sensitivity	.034	.026
Learning Interest	-.037	-.002
Academic Motivation	.125*	.169**
School Bonding	-.104	-.043
Relationship with Peers	.186**	.122*
Relationship with Adults	-.094	-.021
SDQ		
Peer Problems	-.206**	-.156**
Conduct Problems	-.110	-.137*

Emotional Symptoms	-.093	-.045
Hyperactivity/Inattention	.080	.075
Prosocial	.024	.050

Note. **significant, $p < .05$; *marginally significant, $p < .09$

Table 3 shows the results of the resiliency-academic correlation analysis. The variables of 'Action Orientation', 'Self-Efficacy', 'Relationship with Peers', and 'Peer Problems' were significantly correlated to ELA ($p < .05$). 'Academic Motivation' was marginally significantly correlated with ELA. The variables of 'Action Orientation', 'Academic Motivation', and 'Peer Problems' were significantly correlated to Maths ($p < .05$). 'Self-Efficacy', 'Relationship with Peers', and 'Conduct Problems' were marginally significantly correlated with Maths. Only significantly and marginally significantly correlated variables were subsequently entered into the hierarchical regression analyses.

Multiple hierarchical regression analyses were next performed to identify the extent to which these correlated resiliency variables were each predictive of ELA and/or Maths scores. Due to the level of co-linearity between the resiliency measures, the variables were entered separately into the linear regression in order to test their independent relation to ELA and/or Maths achievement scores. Only one resiliency variable and one academic variable were entered into the regression model each time. The results are presented in Table 1.4 for ELA and Table 1.5 for Maths.

Table 4

A table to show the individual standardized multiple regression coefficients of significantly correlated HSA resiliencies as predictors of ELA achievement

	B	SE (B)	β	Adjusted R Square	R Squared Change	F Change
Step 1						
Constant	233.09	7.14		.24	.26	12.09**
Gender	3.17	1.96	.11			
Grade	1.62	1.01	.11			
Free Lunch	-2.09	2.88	-.05			
ELL	-20.90	3.39	-.43**			
SPED	-10.31	2.55	-.27**			
i) Step 2						
Action Orientation	3.75	1.62	.16*	.26	.02	5.35*
ii) Step 2						
Self-Efficacy	6.21	1.99	.21*	.28	.04	9.74*
iii) Step 2						
Academic Motivation	3.97	1.75	.15*	.26	.02	5.17*
iv) Step 2						
Relationship with	4.08	1.70	.16*	.26	.03	5.78*

Peers						
v) Step 2						
Peer Problems	-.95	.62	-.11	.25	.01	2.36

Note. **significant, $p < .001$; *significant, $p < .05$

Table 4 shows the results from the independent multiple regressions used to assess the ability of the 'Action Orientation', 'Self-Efficacy', 'Academic Motivation', 'Relationship with Peers', and 'Peer Problems' resiliency variables to individually predict ELA performance. This prediction was determined while controlling for the influences of Gender, Grade, Free Lunch eligibility status (an indirect indicator of low socioeconomic status), English Language Learner (ELL) status, and Special Education (SPED) status. One regression analysis was conducted for each HSA/SDQ variable separately. For each analysis, a step-wise multiple regression was used. In step 1, the variables Gender, Grade, Free Lunch Status, ELL status, and SPED status were entered. Together these variables explained 24% of the variance in ELA scores, $F(5, 169) = 12.09$, $p < .001$. In each step 2, a single HSA variable was entered against ELA. The resiliency variables found to be significantly correlated to ELA were entered separately in order to determine their independent strengths as predictors. 'Action Orientation' was entered and the model subsequently explained 26% of the variance, $F(1, 168) = 5.35$, $p < .05$. Entering 'Self-Efficacy' into the original model explained 28% of the variance, $F(1, 168) = 9.74$, $p < .05$. Entering 'Academic Motivation' into the original model explained 26% of the variance, $F(1, 168) = 5.17$, $p < .05$. Entering 'Relationship with Peers' into the original model also explained 26% of the variance, $F(1, 168) = 5.78$, $p < .05$. Finally, the addition of 'Peer Problems' into the original model explained 1% of additional variance. This was a non-significant change, R -squared change = .01, F change (1,168) = 2.36, $p > .05$.

Table 5

A table to show the individual standardized multiple regression coefficients of significantly correlated HSA resiliencies as predictors of Maths achievement

	B	SE (B)	β	Adjusted R Square	R Squared Change	F Change
Step 1						
Constant	240.76	7.73		.25	.27	12.90**
Gender	.62	2.12	.02			
Grade	.56	1.09	.04			
Free Lunch	-2.28	3.13	-.05			
ELL	-23.23	3.45	-.46**			
SPED	-10.80	2.77	-.26**			
i) Step 2						
Action Orientation	3.55	1.76	.14	.27	.02	4.08*
ii) Step 2						
Self-Efficacy	3.71	2.17	.12	.26	.01	2.92
iii) Step 2						

Relationship with Peers	.82	1.84	.03	.25	.00	.20
iv) Step 2						
Academic Motivation	3.14	1.90	.11	.26	.01	2.74
v) Step 2						
Peer Problems	-.46	.68	-.05	.25	.00	.46
vi) Step 2						
Conduct Problems	-.02	.63	.00	.25	.00	.00

Note. **significant, $p < .001$; *significant, $p < .05$

Table 5 shows the results from the multiple hierarchical regression used to assess the ability of the 'Action Orientation', 'Self-Efficacy', 'Relationship with Peers', 'Academic Motivation', 'Peer Problems', and 'Conduct Problems' resiliency variables to predict academic performance in Maths. This prediction was determined while controlling for the influences of Gender, Grade, Free Lunch status, English Language Learner status, and Special Education status. For each analysis, a step-wise multiple regression was used. In step 1, the variables Gender, Grade, Free Lunch Status, ELL status, and SPED status were entered. Together these variables explained 24% of the variance in Maths scores, $F(5, 172) = 12.90, p < .001$. In step 2, a single HSA variable was entered against Maths. 'Action Orientation' was entered and the model subsequently explained 27% of the variance, $F(1, 171) = 4.08, p < .05$. The addition of 'Self-Efficacy' to the original model explained 1% of additional variance. This was a marginally significant change, R-squared change = .01, F change (1, 171) = 2.92, $p = .09$. The addition of 'Relationship with Peers' to the original model explained less than 1% of additional variance. This was a non-significant change, R-squared change = .00, F change (1, 171) = .20, $p > .05$. The addition of 'Academic Motivation' to the original model explained 1% of additional variance. This was a non-significant change, R-squared change = .01, F change (1, 171) = 2.74, $p > .05$. The addition of 'Peer Problems' to the original model explained less than 1% of additional variance. This was a non-significant change, R-squared change = .00, F change (1, 171) = .46, $p > .05$. Finally, the addition of 'Conduct Problems' into the original model explained less than 1% of additional variance. This was a non-significant change, R-squared change = .00, F change (1, 171) = .00, $p > .05$.

Discussion

Summary of findings

The aim of the study was to determine which socio-emotional resiliencies as measured by the Holistic Student Assessment (HSA) and Strengths and Difficulties Questionnaire (SDQ) were predictive of academic achievement in the subjects of English and Maths for middle school students. The Clover Model hypothesised that resiliencies appertaining to the Belonging Leaf would be predictive of academic performance and this is what was found for English Language Arts (ELA) attainment.

The significant predictors of performance in ELA for this sample included higher scores on the resiliencies of 'Action Orientation', 'Self-Efficacy', 'Academic Motivation', and 'Relationship with Peers'. The significant predictor of academic performance in Maths was a higher score in 'Action Orientation'. Therefore, performance in the academic subjects of ELA and Maths was predicted by different resiliencies, with ELA having four predictors compared to one predictor for Maths, and there was a common predictor of 'Action Orientation' across both subjects. A resiliency corresponding to Belonging, specifically peer relationships, was predictive of performance in ELA and thus confirms the prediction made by the Clover Model.

Explanation of findings

Although the majority of resiliencies were positively correlated with performance in ELA, only four were significant. The reason for certain resiliencies being predictive when others are not can be better understood by using the Clover Leaf Model. The sample of the present study were middle school children, a developmental period during which, hypothesised by the Clover Model, Belonging is the most dominant influence (Malti & Noam, 2009). This prediction was confirmed by 'Relationship with Peers' being a key resiliency significantly predictive of performance in ELA as this is a crucial aspect of this developmental need. 'Peer Problems' was significantly negatively correlated with ELA but was not a significant predictor. Interestingly, 'Relationship with Adults' and 'School Bonding', which are also implicated in the Belonging leaf, were not significant predictors or correlates. Supportive relationships with family members, teachers, and peers (Ryan, Stiller, & Lynch, 1994), and school connectedness in general (Niehaus, Rudasill, & Rakes, 2012), have previously been shown to predict academic achievement in adolescence. These resiliencies have not been found to be predictive in this sample, and this may be a result of differences between the measurement tools. Alternatively, it could be that for this particular sample, positive peer relationships were simply more influential on adjustment in education than supportive relationships with adults and connectedness with school. Studies have demonstrated that peers, adults, and schools provide differential support functions, and that peers have stronger influences on academic competencies (Dubow et al, 1991). As findings in this area are inconsistent (Gutman, Sameroff, & Eccles, 2002), further studies should consider individual differences within samples and measurement tools that are eliciting these contrasting results. However, for this particular sample using this particular tool at this time, HSA resiliencies connected to belonging and meaningful peer relationships were strong influences on performance in ELA. The Clover Model could further expand from this research through clarifying the differential roles in Belonging played by peers, adults, and schools in educational adjustment across various stages of development.

The resiliencies of 'Self-Efficacy' and 'Academic Motivation' were also predictive of ELA achievement and cluster together as academically-orientated resiliencies. Therefore, it is suggested that an academic mind-set in conjunction with a sense of peer belonging contributed to performance in ELA. 'Reflection' should arguably be salient in understanding for ELA but was not a significant predictor. Previous analyses conducted on the HSA have demonstrated suppression effects between certain variables;

suppression variables being variables unrelated to the target variable (i.e. ELA) but that substantially influence the predictive value of different variables through being highly related to them (Thompson & Levine, 1997). More specifically, 'Reflection' is a predictor of 'Peer Problems' (Noam, Malti, & Guhn, 2012) and so although these were not predictors of academic achievement in themselves, these resiliencies may operate through one another to impact performance. Higher reflection is associated with internalizing problems, emotional symptoms, and positively predicts 'Peer Problems' (Noam et al, 2012). 'Peer Problems' was significantly negatively correlated to academic achievement in ELA. Therefore, over-reflection may impact academic achievement through its negative influence in peer relationships. This hypothesis is supported by the negative direction of the zero-order correlations of 'Reflection' with ELA($r = -.095$) and Maths($r = -.090$) in the current sample. Therefore, engaging students in activities to support academic motivations in addition to supporting peer belonging relationships and facilitating positive reflection on their relationships will help provide students with better tools to succeed socially and academically.

The effects of suppressor variables, such as the possibility of 'Reflection' in this study, complicates multiple regression research, as they limit the number of predictions identified through acting via interaction effects that may go unanalysed (Thompson & Levine, 1997). Consequently, it is important to carefully consider the descriptive statistics and correlations of each variable to identify potential interactions. An extension of the present analysis could thoroughly investigate interaction effects for an even more detailed understanding of resiliency in education. This observation further demonstrates the notion that resiliencies are not discrete entities but are intertwined (Luthar, Cicchetti, & Becker, 2000), and so through supporting the most influential resiliency factors a more global impact across development and education can be expected.

Previous research demonstrated that fostering resiliencies leads to significant improvements in academic performance (Durlack et al, 2011), and also that a quantitatively higher number of defined resiliency constructs lead to higher overall grades (Scales & Roehlkepartain, 2003). Four resiliencies were related to performance in ELA, compared to only one resiliency for predicting achievement in Maths. A similar disparity was found in the evaluation of the Social and Emotional Learning (SEL) program 'Positive Action' (Flay & Allred, 2003); there must be a difference between the subjects of English and Maths that is eliciting these different resiliency influences on achievement. A possible reason could be that a large majority of the current sample had English as their second language, and many were the only member of their families to speak English. If ELA was a more challenging subject for which they did not receive much support at home, then peer belonging may have played a more salient role in predicting their performance. Maths, on the other hand, is a subject of logic and presumably less influenced by communication and relationship aspects than ELA. At present it can be concluded that more resiliencies were involved in predicting performance in the more communicative subject of ELA. Therefore, the difference in resiliency predictors for ELA and Maths is speculatively attributable to the fact that a large majority of the sample had English as a second language, and peer belonging fosters communication skills that are uniquely influential to ELA. It would be enlightening

to further this investigation through including a control sample of native English speakers to investigate the differential resiliencies implicated in their academic achievement. If native English students demonstrated an identical resiliency prediction, then it would confirm that the difference is not due to language difficulties but to the nature of the subject. Different subjects require different skills and so it may be that more social subjects are more greatly facilitated by peer belonging resiliencies in early adolescence.

‘Action Orientation’, the degree to which one physically engages with the environment, was a common predictor of performance in both ELA and Maths. This resiliency measure is not directly linked to academia, nor is it purely social, and so is an intriguing construct to be predictive across the subjects. In terms of the Clover Leaf Model, ‘Action Orientation’ dominates early childhood but, despite losing this dominance in later development, still plays a crucial role throughout adolescence (Malti & Noam, 2009). A possible reason for its impact on achievement is that youths with higher ‘Action Orientation’ may be healthier, as they are more active and this may facilitate learning in school through reducing stress and enabling students to focus (Efrat, 2011). Previous research has consistently linked exercise to improved executive function and academic achievement (Tompsonowski, Davis, Miller, & Naglieri, 2008). Furthermore, those with higher ‘Action Orientation’ tend to be more proactive in class, and so are more actively involved and engaged in their learning (Malti & Noam, 2009). The true underlying mechanism through which ‘Action Orientation’ impacts upon academic achievement could be understood through expanding and further specifying the scale with which it is measured. Identifying resiliencies that predict achievement across subjects is crucial for supporting achievement on a more global scale, and could lead to common threads in educational interventions.

The Clover Model of Resilience and Psychopathology

The Clover Leaf Model provides a framework for organising resiliencies according to their salience throughout development, and each leaf is also associated with risks of psychopathologies when developmental needs are not met appropriately (Malti & Noam, 2009). The current results show specifically that positive peer relationships, i.e. belonging resiliencies, fostered achievement in ELA. The Belonging need, if not met positively, is associated with internalizing symptoms in adolescents such as emotional problems and depression. The results suggest that supporting socio-emotional development through focusing on fostering the positive peer relationships component of Belonging in school, mental health difficulties could be prevented and enable a better environment for learning. Furthermore, ‘Action Orientation’ was a common predictor of both ELA and Maths, and the negative repercussions of leaving this need unsupported according to the Clover Model can increase the risk of hyperactivity and inattention problems. The results suggest that ensuring positive expression of the ‘Action Orientation’ need through school-based support would prevent externalising symptoms and provide a healthy foundation for students to focus and achieve in English and Maths. ‘Academic Motivation’ and ‘Self-Efficacy’ were also significant predictors of ELA, and although are not linked to specific psychopathologies,

engaging these resiliencies through holistic support could enable students to develop positive approaches to education to build on the socio-emotional foundations for achievement. Therefore, there is a delicate balance between resiliencies and psychopathologies, and positive support of specific developmental needs identified would enable students to reach their academic potential.

Limitations

The analysis for the present study adopted a series of multiple regressions. This technique enabled the identification of predictor variables (resiliency constructs) that were significantly predictive of the dependent variable (academic achievement). It is a measure of association, not causation, and it is important to stress that the link between resiliency and academic achievement is not as straightforward as a uni-directional relationship. For instance, the construct of 'Self-Efficacy' is defined as the degree to which the student believes they can succeed and predicts performance in ELA. A student succeeding in ELA may obtain this belief of success from past achievement, this belief then furthers success in ELA, and this success further reinforces the belief they can succeed, their self-efficacy. Therefore, although the multiple regression analysis identified significant predictors of performance, the relationship between individual resiliencies and academic achievement may be more reciprocal than this analysis will allow. This notion is further supported by the influences of suppressor variables and interaction effects in multiple regression research. In addition, it is a risk with using several variables that some will emerge as significant solely by chance. However, this analysis used isolated, successive regressions for each resiliency variable against each subject, and so the significance found is unlikely due to chance. Regardless of the exact mechanism through which resiliencies impact upon academic achievement, it is a safe assumption that supporting social and emotional development holistically can only serve to improve student adjustment and academic achievement.

This study is limited in that it can only show the value of resiliency constructs that were actually measured through the tools these constructs were measured with. Resiliency is a product of multiple factors and so there may be additional variables contributing to resiliency that are not measured by the current investigation. An example of a relevant unmeasured resiliency is the Intelligence Quotient (IQ), a construct likely to account for a substantial part of the residual variance due to its extensively researched relation to academic achievement (Elliott, 1990a). It would be interesting to determine the influence of IQ with respect to the Holistic Student Assessment (HSA) resiliencies; a more holistic analysis may be more useful for informing school intervention efforts for high and low achieving students. On the other hand, resilience is more amenable to improvement than IQ and so is a suitable focus for school intervention programs. Still, it is important to acknowledge that the HSA does not contain an exhaustive list of resiliencies implicated in academic success.

Previous research has measured resiliency using alternative tools and methods, and so it is possible that different measurements elicit contrasting results. The HSA questionnaire method holds several limitations, such as social desirability bias i.e.

answering questions in a more acceptable manner to the truth, and subjective interpretation of questions. In light of these issues, Noam et al (2012) have continually refined and evaluated the HSA to establish high internal consistency and construct validity proving it to be a reliable tool for measuring resiliencies. Although most researchers use similar scales to measure these constructs, numerous scales and structured interviews have also been developed (Baruth & Carroll, 2002). Using multiple measures in cohort, while time-consuming, may serve to provide a more detailed overview of risk and resilience experienced by a population. Furthermore, the current measurement of academic achievement used an annual assessment whereas the average performance on more frequent tests throughout the year on a broader range of subjects could provide a more consistent picture of academic performance. Despite their limitations, these tools are validated measures of resiliency and academic achievement and provide an informative window into the relationship between socio-emotional development and educational attainment.

Another consideration for the present study is that the population of the sample in the present study were not representative of the general population, and so these findings cannot be applied outside of the demographic studied. Although students were ethnically diverse, the sample had predominantly low socio-economic backgrounds, English was the second language for most students, and all were in grade 4-8. Low-income, urban youth are disproportionately affected by socio-emotional problems (Grant et al, 2004) and equally, protective factors are amplified in populations exposed to greater risk (Gutman et al, 2002). Resiliencies are more influential on positive adjustment from adverse challenges, and so the patterns found for this sample should not be extrapolated to different populations. Measuring exposure to risk and protective factors would inform whether resiliencies are differentially implicated in achievement when risk is higher. The study does show that socio-emotional resiliency is strongly involved, but the exact nature of this involvement will vary depending on the individuals under study and their stage of development.

Further work

Learning from these limitations, future research can go more in depth into this area through considering individual differences. There is a long-established gender difference in performance in English and Maths, and it would be interesting to address whether this discrepancy applies to the resiliencies implicated in that performance. Females tend to outperform males in education, however the difference is much less pronounced in Maths than in English (Machin & McNally, 2005; Skelton, 2001). Noam et al (2012), in a detailed deconstruction of the HSA resiliencies using a large-scale sample in accordance with the Clover Model, found that females are more prone to internalizing symptoms and that males are more likely to present externalising problems. The resiliency patterns implicated in supporting achievement may then vary with gender. Further analyses on the present sample are needed to determine any gender differences in resiliency and achievement in order to better inform individual socio-emotional interventions.

Additionally, more resiliencies were found to be predictive in English than in Maths, and this direction is supported by previous studies of SEL programs that improved reading more than Maths (Flay & Allred, 2003). These results suggest directing future research to differentiate between the effects of resiliency across subjects that engage unique skills such as Physical Education, Religious Studies, Art, Science, etc. More specific findings on the link between resiliency and academic achievement could further inform more individualistic interventions for students struggling in isolated subjects of their education. However, with ELA related to more resiliencies, and the existence of a common resiliency across both subjects, it may be more beneficial and cost-effective to integrate socio-emotional activities into the ELA curriculum for a more global impact on overall adjustment.

Implications

The results of the present study have broad implications for the current status of public policy in mental health and education. It has been further demonstrated that the social and emotional side of adolescent development has a profound impact on individual student's educational attainment. Crucially, this highlights that students who are struggling in their social and emotional development in response to adversities are likely to underachieve academically and potentially drop out of education altogether. Yet this issue is not currently being addressed in the western education system; the education crisis has been responded to instead through increasing testing and reducing recreation hours in the aim of maximising learning time, and long-term improvements have been modest at best (Dee & Jacob, 2009). The results from the present study identified 'Action Orientation' as a significant predictor of academic achievement, yet educational authorities have minimised, and in some cases removed altogether, the recreational time which facilitates meeting this need. Policies intent on maximising learning time may be inadvertently compromising academic performance by ignoring essential developmental needs.

With socio-emotional development inextricably linked to school adjustment, academic orientation, and performance, there is a need for school-based mental health support for all students. Early intervention of socio-emotional struggles and the building of resiliencies would protect students against the development of mental health disorders later in adolescence. Social and emotional support is imperative for maintaining positive youth development and providing students with the tools to excel in their education. The breadth of resiliencies found to be influential in the present study illustrate the need for holistic student support to integrate the individual, social, emotional, and academic components of learning.

Conclusion

In conclusion, the present findings support previous research through demonstrating that resiliencies predict academic achievement. In line with the Clover Model, belonging predicted ELA performance, with peer relationships having a greater influence than school or adult belonging. As more resiliencies were predictive of ELA

than Maths, and these subjects shared a common predictor, it would be beneficial to implement socio-emotional supports focused on peer belonging, academic orientation, and action orientation into more communicative, interpersonal subjects at this stage of development. Resiliencies are all interlinked and so focusing on building specific resiliencies will have a global impact on the students' overall adjustment. These findings inform interventions sensitive to student needs at a particular developmental stage. However, to further understand individual needs, future research should account for differences such as in IQ, gender, and exposure to risk. The Clover Model highlights the urgency to integrate social and emotional development into education in order to promote student adjustment and academic achievement. Holistic support informed by empirical studies will facilitate early intervention for mental health disorders, prevent dropout, and provide students with the means for fulfilling their academic potential. The conceptualisation of these issues in public policy must begin to recognise that socio-emotional resiliency and academic achievement are not mutually exclusive, but mutually dependent.

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