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**Emotional Intelligence, Self-Efficacy, and Test Performance:  
An Undergraduate Thesis**

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### **Abstract**

The objective of this study was to analyze the interrelationships between emotional intelligence, self-efficacy, and test performance. The study consisted of 91 Ontario residents aged 18 to 48 (the mean age being 22.78); only 69 of these individuals completed all measures. Participants completed six primary measurement instruments: one measurement of emotional intelligence, three measures of self-efficacy (overall academics, math specific, and literacy specific), a mathematics test, and a literacy test. Four primary hypotheses were tested: (1) there would be a significant relationship between test performance and emotional intelligence; (2) test performance would be related to academic self-efficacy as well as to the respective subject-specific self-efficacy scores; (3) there would be a positive relationship between emotional intelligence and self-efficacy; and (4) those with higher emotional intelligence scores would rate their subject-specific self-efficacy in alignment with their test performance. Emotional intelligence was positively correlated with all three measures of self-efficacy. Literacy test performance was positively correlated with academic self-efficacy, whilst mathematics test performance was positively correlated with math specific self-efficacy. It was also discovered that those with average emotional intelligence scores rated their mathematics specific self-efficacy and academic self-efficacy in alignment with their test performance, whilst those with higher and lower emotional intelligence scores showed greater discrepancies between their self-efficacy and test performance.

*Keywords:* emotional intelligence (EI), academic self-efficacy, mathematics specific-self-efficacy, literacy specific-self-efficacy, subject-specific self-efficacy, test performance

## **Emotional Intelligence, Self-Efficacy, and Test Performance: Introduction**

Teachers and students alike are interested in the maximization of test scores. Numerous factors have been shown to impact test performance beyond the mere knowledge of the content such as sleep (Scullin, 2019), eating habits (Sampasa-Kanyinga & Hamilton, 2017), music (Lilley et al., 2014), and peer social acceptance (Wentzel et al., 2020). This study explored the interrelationships between emotional intelligence (EI), academic self-efficacy, and test performance. Many researchers have explored potential relationships between emotional intelligence and test performance (MacCann et al., 2020), test performance and self-efficacy (Martin et al., 2019), as well as self-efficacy and emotional intelligence (Mahasneh, 2016). However, there is limited research that has explored the relationships between these three variables simultaneously. Therefore, this study addresses the research question: In what ways do emotional intelligence, academic self-efficacy, and their interaction predict test performance?

### **Emotional Intelligence**

The concept of emotional intelligence (EI) was first discussed in the context of Thorndike's social intelligence developed in 1920 concerning one's aptitude when engaging in interpersonal interactions based on how they understand others (Santos et al., 2018, p. 296). EI is also widely recognized to influence and direct thoughts and behaviour (MacCann et al., 2020). Researchers throughout history have possessed varying opinions as to the exact proponents of EI. The two most common conceptualizations of EI being (1) ability EI, and (2) trait EI (sometimes referred to as ratings of mixed model EI) (MacCann et al., 2020). Ability EI was defined by Salovey and Mayer (1997) to encompass four main components: (1) accurately perceiving emotions, (2) using emotions to facilitate decision-making, (3) understanding emotions, and (4) managing emotions to upregulate positive emotions and down-regulate negative emotions. Moreover, scales measuring

ability EI ask questions that demand participants to exercise their knowledge or to actually process emotionally charged information and then respond (MacCann et al., 2020). Trait EI can be defined as “a distinct, stable set of emotion-related self-perceptions and adaptive emotional dispositions” (O’Connor et al., 2017, p. 304). Contrasting with ability EI, which references EI as a form of intelligence, trait EI perceives EI as a personality trait or combination of traits (Mikolajczak, 2010). Those high in trait EI might be described as optimistic and adaptable, alongside possessing interpersonal and intrapersonal skills (O’Connor et al., 2017). Measurements of trait EI are often structured as personality-style self-report questionnaires (O’Connor et al., 2017). Another notable difference between trait and ability EI is that traits are generally considered unchangeable, whereas abilities are skills that can be improved. In simplest terms, ability EI is concerned with mental capacities that are important to EI whereas trait EI views EI as a global and cohesive trait, similar to one’s personality (Santos et al., 2018). It is important to note that some researchers only believe one of these conceptualizations to be accurate, whilst others acknowledge a co-existence between both ability EI and trait EI considering them as layers in a tripartite model (Mikolajczak, 2010). This three-level model of EI differentiates between emotion-related knowledge, abilities, and dispositions (Mikolajczak, 2010).

### ***Measures of EI***

Numerous researchers have examined EI using varying scales and measurement tools, each selected in order to best fit their study. Santos et al. (2018) analyzed the relationship between EI, career decision-making difficulties, and career decision self-efficacy in the lives of university students. In their study, they utilized the Wong and Law Emotional Intelligence Scale (WLEIS) which was based upon Salovey and Mayer’s (1997) definition of EI (Santos et al., 2018). It measured self-emotion appraisal, others' emotional appraisal, regulation of emotion, and the use

of emotion (Santos et al., 2018). In a different study, Parker et al. (2004b) examined the relationship of academic achievement and EI in the context of students transitioning from high school to university. Parker et al. (2004b) employed the short-form of the BarOn Emotional Quotient Inventory (EQ-i) as a measurement for EI. Similar to the WLEIS, the EQ-i also assesses four main categories, which are intrapersonal, interpersonal, adaptability, and stress management. Petrides' (2009) Trait Emotional Intelligence Questionnaire (TEIQue) is also a common measurement for EI. This scale has been employed in numerous studies. For example, Krajniak et al.'s (2018) studied the relationships between emotional intelligence, personality disorder traits, and college adjustment. The scale measures 15 facets, global trait EI as well as four subscales of emotional intelligence, these being well-being, self-control, emotionality, and sociability. O'Connor et al. (2017) investigated the short form of the scale (TEIQue-SF) and found that it had validity greater than the Big Five traits in terms of predicting emotion focused coping. The Profile for Emotional Competence (PEC) was developed by Brasseur et al. (2013) and is a relatively recent self-report scale for ability EI. It measures how individuals identify, express, understand, regulate, and use their emotions or those of others (Brasseur et al., 2013). Despite measuring ability EI, the scale demonstrated convergent validity with the TEIQue (Brasseur et al., 2013). While some researchers debate as to whether or not ability EI can be measured through a self-report, high global PEC scores were nevertheless correlated with high scores on the TEIQue (Brasseur et al., 2013).

### **Self-Efficacy**

Self-efficacy was first coined by Albert Bandura (1977). It can be defined as an “individual's sense of confidence in their ability to organize and execute a given course of action, to solve a problem, or to accomplish a task” (Borgonovi & Pokropek, 2019, p. 268). Higher self-

efficacy is noted to be positively correlated with higher motivation, achievement, and self-regulation (Borgonovi & Pokropek, 2019). Another part of Bandura's social cognitive theory that relates to self-efficacy is reciprocal determinism; this term describes the phenomena where one's efficacy evaluation affects their behaviours and environment while simultaneously being influenced by them (Bandura, 1997). In the end, self-efficacy is a reflection of one's confidence in their ability "to exert control over one's own motivation, behavior, and social environment" (Carey & Forsyth, 2020, para. 1).

Self-efficacy itself is not necessarily an overarching term to describe one's confidence in all categories or topics; this is to say that an evaluation of self-efficacy is better represented when a certain *type* of self-efficacy is identified in order to assess one's specific perception of their ability to accomplish that single activity. That is, self-efficacy is task specific. For example, one could have a high self-efficacy with reading comprehension, but low self-efficacy with public speaking.

### ***Measures of Self-Efficacy***

**Academic Self-Efficacy.** A popular measurement of self-efficacy is the General Self-Efficacy Scale. This 10-item scale developed by Schwarzer and Jerusalem (1995) is positively correlated with emotion, optimism, and work satisfaction. It is often employed in studies analyzing behaviours particularly related to motivation, quality of life or work performance. For example, Molero et al. (2018) employed this measurement tool when they conducted a study analyzing the interrelationships between self-efficacy, self-esteem, and workload burnout in nurses. However, this scale is a less appropriate tool when measuring a specific version of self-efficacy, such as academic self-efficacy. Bandura defined academic self-efficacy as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of

[academic] performances” (Bandura, 1986, p. 391). Therefore, when measuring an individual’s self-efficacy in relation to overall academic success and standardized testing, an academic self-efficacy scale is a more suitable option as opposed to a general self-efficacy test.

Fast et al.’s (2010) academic self-efficacy scale was adapted and employed by Ye et al. (2018); however it does not seem to be a fully comprehensive measurement as it is only a four-item scale. Another potential measurement tool is an academic self-efficacy scale adapted by Rudmann (n.d.); however it tests for an alternative interpretation of academic self-efficacy which places emphasis on self-regulated learning. Another measurement of academic self-efficacy is the Academic Self-Efficacy Scale - (English Version) as created by Gafoor and Ashraf (2006). Despite having been created for secondary school students, this scale provides a comprehensive outlook on academic self-efficacy and is applicable to the work of a university student.

As previously mentioned, there is both a General Self-Efficacy Scale and an Academic Self-Efficacy Scale, however self-efficacy is not limited to just those two categories. For example, Lu et al. (2016) conducted a study in which they measured computer specific self-efficacy which Compeau and Higgins (1995) defined as “an individual’s perceptions of his or her ability to use computers in the accomplishment of a task” (p. 191). Intuitive logic confirms this, as individuals can identify they are better at certain tasks as opposed to others and thus have greater or lesser confidence in their ability to execute those tasks. In reference to many of Bandura’s works, the American Psychological Association summarized the notion that self-efficacy “refers to an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments” (Carey & Forsyth, 2020, para. 1). This brief description is of great importance as it implies that there are certain behaviours necessary to produce a specific performance in one category that may not be necessary for successful performance in another.

Thus, in a study that involves both mathematics and literacy assessments, it is necessary to measure the self-efficacy of these components separately from overall academic self-efficacy.

**Measures of Math and Literacy Specific Self-Efficacy.** Numerous studies have explored varying topics and their respective relation to mathematics specific self-efficacy; in each case, self-efficacy was operationalized in a task specific measurement scale. Gregory et al. (2019) conducted a study to analyze the influence of mathematics self-efficacy on nursing students' numeracy performance and employed the nursing self-efficacy for mathematics scale (NSE-Math) to measure self-efficacy. They found that numeracy instruction improved mathematics self-efficacy which then influenced test performance (Gregory et al., 2019). Borgonovi and Pokropek (2019) examined task exposure and its relation to the development of self-efficacy. They measured mathematics self-efficacy by providing a set of eight mathematics tasks and having the students rate how confident they would be in completing each of the tasks. They found that increased exposure to mathematics problems led to more developed mathematics self-efficacy beliefs (Borgonovi & Pokropek, 2019).

It seems that there is limited research on literacy specific self-efficacy and potential scales that relate to this variable. Celik (2019) utilized the Visual Mathematics Literacy Self-Efficacy scale (VMLSE). They found a significant difference in VMLSE perceptions based upon an individual's final grade, viewing oneself as successful in mathematics, and their ability to relate various mathematical concepts. Harper et al. (2018) tested and piloted the Teacher Sense of Efficacy for Secondary Literacy Instruction Scale. They found that it was a reliable tool for measuring teachers' literacy specific efficacy. However, neither of the scales utilized in these studies coincide with an individual rating their own literacy self-efficacy.

## **Test Performance**

In relation to self-efficacy, Bandura (1977) noted that the most influential source of efficacy information itself is one's performance accomplishments. That is, a person's sense of self-efficacy is highest for those tasks they can typically perform well. Whether it be through an individual's GPA, job performance, or score on a test, performance accomplishments can be operationally defined in unique ways. Researchers in previous studies utilized various means through which they chose to measure performance in relation with both EI and/or self-efficacy. In many of these studies, "performance" is referencing job performance. For example, Wu et al. (2019) measured the job performance of teachers through the Middle School Teachers' Classroom Teaching Strategy Scale (MSTCTSC) as well as the grades of students within their classes as a second reflection of the job performance of the teachers. They discovered while self-efficacy was clearly connected to teaching performance, EI was also related to the teachers' sense of self-efficacy. Another example of this is Bagheri et al. (2018) who conducted a study measuring self-efficacy, EI, and job performance. For their study, they employed Paterson's Job Performance Questionnaire forms (Bagheri et al., 2018) as their measurement for job performance. They found that there was a positive relationship between self-efficacy and job performance.

The discoveries made in the aforementioned studies (Wu et al., 2019; Bagheri et al., 2018) serve as examples of "performance achievement" measured by job performance. Other studies have measured "performance achievement" through test scores. For example, Martin et al. (2019) conducted a study where they researched the relationships between perceived competence (self-efficacy) and science achievement (test performance). The researchers measured test performance through each student's scores on a science test (Martin et al., 2019). The test itself was a collection of various questions from the Australian Council for Educational Research (ACER) Progressive Achievement Tests in Science (Martin et al., 2019). The test's difficulty was appropriate for a

range of students and was multiple choice format which permitted for an easy scoring process (Martin et al., 2019).

## **Relationships Between Variables**

### ***Emotional Intelligence and Test Performance***

MacCann et al. (2020) conducted a meta-analysis on EI and its association with academic performance. Specifically, they found that EI was consistently related to test performance, but this was more consistently true for ability measures than self-rated or mixed EI measures (MacCann et al., 2020). MacCann et al. (2020) found that EI was the third most important predictor following intelligence and conscientiousness. Further, they noted that ability EI more strongly predicted an individual's performance in humanities as opposed to science (MacCann et al., 2020). This might be a result of the humanities field being more closely tied to human relations and thus the perception and management of emotion. They also found that self-rated EI more strongly predicted an individual's grades than their standardized test scores (MacCann et al., 2020). Perhaps this is a result of those scoring highly in this strand of EI possessing traits of optimism and adaptability; one could adapt to multiple forms of assessments or be optimistic at improving their grade throughout the year, whereas these factors are less influential on standardized scores. Another notable finding of MacCann et al.'s (2020) analysis is the limitation that there is little evidence for a causal direction between the variables; this implies that one's EI could be influencing their academic success, that their academic success could be influencing their EI, or that it is another variable entirely that is resulting in this relationship.

Saklofske et al. (2012) examined the various associations of personality, affect, trait EI, coping style, and academic performance at the end of a school year. They also looked at relationships with stress and life satisfaction with these variables (Saklofske et al., 2012). Their

findings revealed that academic performance was explicitly predicted by four main factors including the EQ-i subscale of adaptability (Saklofske et al., 2012). In terms of EI as a predictor of academic success, EI was noted to promote positive coping strategies and emotional regulation during stress which can aid in “adaptive coping with the academic environment” (Saklofske et al., 2012, p. 256). Saklofske et al.’s (2012) results did not demonstrate a relationship between global EI and academic success. However, the facet of EI that related to planning and goal-setting skills was associated with academic success. Nonetheless, Saklofske et al. (2012) cited previous researchers that found significant correlations between all aspects of EI and academic success, at least among first year university students if not for later years (Parker et al., 2004b). Saklofske et al. (2012) explained this difference by suggesting:

For the specific situation of students making the transition into university life (which makes particular demands in terms of dealing with a new socio-emotional environment) all facets of EI are salient in promoting academic success, but do not remain so once the initial adjustment period has been successfully negotiated (p. 256).

Saklofske et al.’s (2012) results are helpful in exhibiting that EI is related to academic performance by promoting adaptability to these environments. Furthermore, this study exhibited that only the planning and goal-setting side of EI was associated with long term academic success, but the relationship between immediate test performance scores and EI that is unrelated to planning and goal-setting side warrants further exploration.

In a separate study, Parker et al. (2004a) predicted high school students’ academic achievement based upon their EI. Parker et al. (2004a) utilized the Emotional Quotient Inventory: Youth Version (EQ-i:YV) to measure EI. The EQ-i:YV had a greater predictive ability in their sample of high school students which was attributed to a larger diversity in emotional and social

competency, as opposed to the sample of university students from a different study by Parker et al. (2004b). In contrast to Saklofske et al. (2012), overall achievement *was* found to be a significant predictor of academic achievement (Parker et al., 2004a). Parker et al. (2004a) found that students with the highest academic standing had higher levels of “interpersonal, adaptability, and stress management abilities” all of which are correlated with EI (p. 1327). These findings are helpful in exhibiting the interaction between EI and test performance.

### ***Test Performance and Self-Efficacy***

Martin et al. (2019) conducted an experiment in which Australian high school students had to reflect on their science specific self-efficacy in the middle of a science test. The Motivation and Engagement Scale–High School (MES-HS) was utilized to measure perceived competence (an alternative variable to analyze self-efficacy). A collection of science questions gathered from the Australian Council for Educational Research (ACER) was employed to assess test performance (Martin et al., 2019). The researchers discovered that “(a) prior performance was significantly and positively associated with mid-test self-efficacy (skill-development), (b) prior performance was significantly and positively associated with subsequent performance (self-sustaining), and (c) mid-test self-efficacy was significantly and positively associated with subsequent performance (self-enhancement)” (Martin et al., 2019, p. 59). Thus, real-time self-efficacy may be an important part of the testing process. Further it displays that a participant’s self-efficacy was an accurate reflection of their performance during the testing process.

Howard (2019) conducted an experiment to test the influence of task performance on general self-efficacy. He fabricated a scenario in which one’s task performance would appear to increase and then he analyzed whether or not this “improvement” influenced their self-efficacy. He did this by assessing each participant's ability to “predict the future” by presenting them

multiple tasks in which they were given a list of twenty words or photos and had to randomly predict the five they believed would be on the next page (Howard, 2019). The methods used to measure this experiment were (1) a three-item scale concerning one's beliefs about the illegitimacy of predicting the future, (2) a self-assessed test of one's ability to predict the future, (3) a word prediction task, (4) a photo prediction task, (5) a self-assessed success test on their performance on the prediction tasks, and (6) a general self-efficacy test. Howard (2019) found that one's task performance did influence their general self-efficacy despite lacking an actual increase in skill to accomplish the task. He stated that these results suggested that both small successes and failures must be understood to influence general self-efficacy, even if it is only temporarily (Howard, 2019). He also discovered that the relationship between self-efficacy and task performance is bidirectional, meaning "self-efficacy influences task performance, but task performance also influences self-efficacy" (Howard, 2019, p. 4). This exhibits the benefits of introducing self-efficacy tests *prior* to a measurement of task performance to avoid the influence of one's perceived performance on their self-efficacy.

Borgonovi and Pokropek (2019) sought to understand relationships between mathematics self-efficacy, mathematics achievement, mathematics anxiety, and task exposure. Mathematics self-efficacy was measured through a scale that asked students to rate their confidence in completing specific mathematical tasks. Task exposure was measured by asking the students how often they had previously encountered certain types of mathematics problems. Since the researchers could only observe mathematics achievement for the particular math test they utilized, they considered mathematics achievement unobservable. There were also measurements for socioeconomic status and mathematics anxiety. Borgonovi and Pokropek (2019) found that exposure to varying mathematics problems and their contents can lead to a developed self-efficacy

towards mathematics. Moreover, the findings suggested that exposure shapes both individual preferences and an individuals' self-beliefs about their abilities (Borgonovi & Pokropek, 2019). This is important to consider when using test scores as a measurement for test performance because some participants may have been previously exposed to similar testing while others have not.

### ***Emotional Intelligence and Self-Efficacy***

As mentioned previously, Wu et al. (2019) explored the interaction between EI, self-efficacy, and whether or not this relationship was mediated by teaching performance in a sample of middle school teachers. EI was measured by the Middle School Teachers' Emotional Competence Scale (MSTECS), self-efficacy was measured by the Teachers' Sense of Teaching Efficacy Scale (TSTES, short version), and teaching performance was measured with MSTCTSC (Wu et al., 2019). They found that higher EI was positively associated with a higher level of self-efficacy; this relationship was only partially mediated by teaching performance. Thus, while self-efficacy was clearly connected to teaching performance, EI was also related to the teachers' sense of self-efficacy; perhaps this occurred because higher EI increases the likelihood of success as a teacher which, in turn, contributes to higher self-efficacy levels.

Mahasneh (2016) also previously examined the predictive value of EI in relation to the self-efficacy of university student teachers in Jordan, although they did not measure actual teaching performance. The researcher translated their measurement tools from English to Arabic, thus utilizing the translated versions of both the emotional intelligence scale (EIQ) and the teacher sense of self-efficacy scale (TSES) (Mahasneh, 2016). They found a significant positive correlation between EI and self-efficacy, which shows the generalizability of this finding to a different cultural context (Mahasneh, 2016).

Santos et al. (2018) explored the relationship between EI, career decision-making difficulties, and career decision self-efficacy in university students. They found a negative relationship between EI and career decision-making difficulties, a negative correlation between career decision-making difficulties and career decision self-efficacy, a positive relationship between EI and career decision self-efficacy, and that the relationship between EI and career decision-making difficulties was mediated by career decision self-efficacy (Santos et al., 2018). Most notably, Santos et al.'s (2018) findings revealed a significant positive relationship between EI and career decision self-efficacy, exhibiting that participants who had a superior ability to evaluate both their emotions as well as the emotions of those around them were more confident in their ability to make positive career-related choices. There are several reasons why EI and career decision self-efficacy might be related in this study. Perhaps higher EI is related to success in many different careers, and therefore people may be more confident of their success in any career they choose. It is also possible that higher EI could help an individual more easily identify what career is the best fit for them.

### **Current Study**

The primary goal of this study was to identify the potential relationships between EI, self-efficacy, and test performance. Based upon the results found by researchers in previous studies that investigated the relationships of the aforementioned variables, four main hypotheses were constructed for the present study.

Research on the relationship between EI and test performance has demonstrated varied results. Saklofske et al. (2012) found that EI was related to academic performance because it promoted adaptability. However, the relationship between immediate test performance scores and EI unrelated to planning was unexplored; hence leaving a gap in research that I desired to explore.

Parker (2004a) found that students with the highest overall academic standing had more traits that were associated with higher EI. However, MacCann et al. (2020) found little evidence concerning a causal direction between EI and academic success. In line with the contrasting discoveries in the research above, the following hypothesis was proposed for the present study: there will be a significant relationship between test performance and EI.

Regarding the relationship between self-efficacy and test performance, it is necessary to note that this study distinguished between different forms of self-efficacy. Specifically, in the present study, three forms of self-efficacy were measured: academic self-efficacy, mathematics specific self-efficacy, and literacy specific self-efficacy. Given the task-specific nature of self-efficacy, the most appropriate measurement for mathematics and literacy specific self-efficacy was the utilization of a single measurement tool that could be adapted to correspond to efficacy in each respective discipline. Ultimately, this study adapted the Personal Efficacy Beliefs Scale (Riggs & Knight, 1994; Bagheri et al., 2018) to correspond to both mathematics and literacy self-efficacy. In their study, Borgonovi and Pokropek (2019) found that exposure to varying mathematics problems and their contents can lead to a developed self-efficacy towards mathematics. Moreover, the findings suggested that exposure shapes both individual preferences and an individuals' beliefs about their abilities. These findings are of importance to the present study because some participants were enrolled in higher level mathematics or English courses at the time of the study and thus had a higher exposure to these tests. Furthermore, for the present study, test performance was measured based upon an individual's scores produced through a test composed of two main exams: segments of (1) the grade 10 Ontario Secondary School Literacy Test (OSSLT), and (2) the grade nine assessment of mathematics (EQAO). Most participants in the current study attended high school in Ontario and thus had already completed the EQAO and OSSLT exams a minimum

of one time (more than once if they failed it initially). Howard (2019) found that the relationship between self-efficacy and task performance was bidirectional, meaning “self-efficacy influences task performance, but task performance also influences self-efficacy” (p. 4). Based upon these results, I introduced the self-efficacy tests *before* the test was introduced to avoid the influence of one’s perceived test performance on their self-efficacy. Based on the results above, the following hypothesis was proposed: test performance will be related to academic self-efficacy as well as to the respective subject-specific self-efficacy scores.

Research on the relationship between EI and self-efficacy has produced more unambiguous evidence, indicating a positive relationship between the variables. Wu et al. (2019), Mahasneh (2016) and, Santos et al. (2018) all found results that demonstrated higher EI scores were positively related to an individual’s self-efficacy. In line with the above, the following two hypotheses were proposed for the present study: (1) there will be a positive relationship between EI and self-efficacy, and (2) those with higher EI scores will rate their subject-specific self-efficacy in alignment with their test performance.

## **Method**

### **Participants**

Participants consisted of 91 individuals; however, only 69 of them completed the survey in its entirety, due to its online nature and time commitment. Thus, the following demographics are related to those who completed the whole survey. Fifty-eight participants were students at Tyndale University in Ontario, Canada. Only one participant had never resided in Ontario, however they attended the school virtually. There were 24 males (34.8%) and 45 females (65.2%). Of the participants, 57 (82.6%) were between the ages of 18-25. Among participants, 51 (56%) were Caucasian/White, six (6.6%) were African-American, three (3.3%) were Latino/Hispanic,

five (5.5%) were Asian, and four (4.4%) preferred not to say or were in the “other” category. Fifty-four (59.3%) of the participants attended high school in Ontario. Of all participants, one attended international school, 61 attended public, catholic, or private schools, whilst the remaining seven attended online school or were homeschooled.

### **Apparatus**

Participants completed six measurement instruments: one measurement of EI, three measures of self-efficacy, one measure of test performance, and one demographic survey.

#### ***TEIQue***

In this study, the Trait Emotional Intelligence Questionnaire (TEIQue) as created by Petrides (2009) was utilized to measure participants’ EI levels (See Appendix A for a copy of the TEIQue). This scale features 153 items to measure global trait EI. Each question includes a seven-point Likert scale, ranging from completely disagree to completely agree. This scale measures 15 facets, producing scores for four main subscales: well-being (e.g. “On the whole, I am pleased with my life”), self-control (e.g. “I usually find it difficult to regulate my emotions”), emotionality (e.g. “I often pause and think about my feelings”), and sociability (e.g. “I can effectively deal with people”). Sordia et al. (2019) demonstrated an internal reliability alpha level of .88 for the global trait EI when using the TEIQue in their study. They also found the reliability of the four main subscales ranged from .68 up to .81 (Sordia et al., 2019).

#### ***Self-Efficacy Measurements***

**Academic Self-Efficacy Scale - (English Version).** This study employed the Academic Self-Efficacy Scale - (English Version) developed by Gafoor and Ashraf (2006) to measure participants’ academic self-efficacy (See Appendix B for a copy of the Academic Self-Efficacy Scale). This 40-item scale aims to measure academic self-efficacy through 12 dimensions of

academic work: learning process, reading, comprehension, memory, curricular activities, time management, teacher-student relationship, peer relationship, utilization of resources, goal orientation, adjustment, and examination. Example items include: “Irrespective of the subject, I am competent in learning” (learning process), “I cannot read and understand my text books well” (reading), “I sense that I am quick to pick the points from what I read” (comprehension), “I feel that I have no ability to remember things” (memory), “I can do my projects well” (curricular activities), “I can’t manage time efficiently for learning” (time management), “I can arrange the help of my teachers in learning” (teacher-student relationship), “I can arrange help of my peers for my learning whenever I need it” (peer relationship), “I fail to find out the necessary sources for my study” (utilization of resources), “I fail to set higher goals in my study” (goal orientation), “I can usually find out quite a few solutions when I confront with problems in my study” (adjustment), and “I can’t express ideas well while attending examinations” (examination). The original test was written in the Malayalam language and then translated to English. I adapted the wording on some of the questions to avoid double negatives and allow for better clarity. Gafoor and Ashraf (2006) found a test-retest coefficient of correlation with an alpha level of 0.85 (N=30) and a split half reliability of 0.9 (N=370) when employing the Academic Self-Efficacy Scale.

**Personal Efficacy Beliefs Scale.** To measure participants’ math and literacy specific self-efficacy, this study utilized an adapted version of the 10-item Personal Efficacy Beliefs Scale. For the math specific self-efficacy questionnaire, the word “job” was substituted by “mathematics” (See Appendix C for a copy of the Mathematics Specific Self-Efficacy Test). For the literacy specific self-efficacy questionnaire, the word “job” was substituted by “literacy tasks” (See Appendix D for a copy of the Literacy Specific Self-Efficacy Test). The unadapted version of the Personal Efficacy Beliefs Scale was originally employed by Riggs and Knight (1994) to measure

individual levels of job-specific efficacy, noting that the “personal” aspect of the scale represents the “efficacy beliefs and outcome expectancies that individuals hold concerning their own individual abilities and likely performance contingencies” (p. 756). An example question from the unadapted scale is: “I have confidence in my ability to do my job.” In the adapted scales, this question became: “I have confidence in my ability to do mathematics” (mathematics specific self-efficacy) or “I have confidence in my ability to do literacy tasks” (literacy specific self-efficacy.) In Riggs and Knight’s (1994) study, the unadapted scale demonstrated a reliability alpha level of 0.80. The adapted version of the scale has yet to be tested prior to this study.

### ***Test Performance***

To measure immediate scores and test performance, the participants completed a test comprised of two main exams: segments of (1) the grade 10 Ontario Secondary School Literacy Test (OSSLT), and (2) the grade nine assessment of mathematics (EQAO) (See Appendix E for the format of testing and sample questions from both the math and literacy sections). The OSSLT and EQAO were developed by Ontario teachers to measure “how well students have learned important knowledge and skills at key stages of their education in relation to a provincial standard articulated in The Ontario Curriculum” (Education Quality and Accountability Office, 2017b). The OSSLT specifically is an evaluation of *literacy skills* that students are expected to have learned by the end of grade nine; whereas the EQAO is an evaluation of *math skills* that students in Ontario are expected to have learned by the end of grade nine (Education Quality and Accountability Office, 2017b). The test in this study consisted of questions from sample assessments posted on the Education Quality and Accountability Office website (Education Quality and Accountability Office, 2017a). The overall test itself consisted of 40 multiple choice questions (16 mathematics questions and 24 literacy questions) to enable easy scoring and allow for an assessment of test

reliability. The mathematics test questions included equations, graphs, and tables. The literacy test questions included general grammar testing as well as small experts to read accompanied by questions concerning the text.

### ***Demographic Survey***

The survey contained general demographics questions including age, sex, and ethnicity (See Appendix F for a copy of the Demographics Survey). It also asked questions surrounding potential previous administration of the exam and exposure to these subjects (including whether or not they attended high school in Ontario, the kind of high school they attended, and whether or not they completed these tests previously). Furthermore, there were questions asking whether or not the individual was currently enrolled or had previously taken mathematics/literacy focused courses to see their level of exposure to these subjects.

### ***Informed Consent***

This form contained the purpose of the study, the implications of participation, potential benefits and risks, the implications of confidentiality, voluntary participation and withdrawal, as well as the investigator's contact information as well as a final confirmation of their agreement to participate (See Appendix G for a copy of the Informed Consent). Specifically, participants were instructed that all responses would remain confidential and would only be used for statistical purposes as well as in comparison to others' data. They were further instructed that if at any time they felt uncomfortable, they could withdraw consent and this would have no effect on their relationship with the investigator, Tyndale University or any other form of consequence.

### **Procedure**

This study was first reviewed by the Tyndale University Research Ethics board (REB). Following the approval of the study, participants were recruited through Tyndale University and

social media through the convenience sampling method, also known as availability sampling. Participants were recruited through two primary methods: (1) email announcements presented to psychology classes at the university, and (2) personal social media posts. In each of the recruitment methods, there was an announcement of compensation; those in psychology courses would earn 2% extra credit, whilst others were entered in a draw for a \$25 gift card.

Participants completed all surveys and measurements online through the platform SurveyMonkey.com; they were advised to complete the study in an area where they could focus. Prior to starting the study, participants were presented their virtual informed consent form. Participants were informed that they could withdraw at any point throughout the online survey without consequence.

Following consent, participants first completed the Academic Self-Efficacy Scale - (English Version). This was then followed by the administration of the Mathematics Specific Self-Efficacy Test and then the Literacy Specific Self-Efficacy Test. Participants then completed the mathematics and literature test; it was strongly recommended that they allocate no more than one hour (30 minutes per subject) to complete their test and would not utilize additional resources for aid. Once finished, participants verified that all answers reflected their own understanding and confirmed that they did not utilize additional resources to answer the questions. Following this, they then completed the TEIQue. Finally, they responded to the demographic survey.

## **Results**

### **Descriptive Statistics Table**

Descriptive statistics were computed for the key variables in the study and are reported in Table 1 Descriptive Statistics for Key Measures. The general academic self-efficacy mean was above the scale midpoint (3). The midpoint for the subject-specific self-efficacy tests was 3.5,

given that it fell part way between strongly disagree and strongly agree. The math and literacy self-efficacy means were on either side of this scale midpoint (3.5). The mean score on the math test was approximately 48.8%, whilst the mean score for the literacy test was 78.9%. The TEIQue mean was slightly above the scale midpoint (4).

**Table 1**

*Descriptive Statistics for Key Measures.*

Descriptive Statistics	Academic Self-Efficacy	Math Self-Efficacy	Literacy Self-Efficacy	Math Test Performance	Literacy Test Performance	Emotional Intelligence (TEIQue)
Mean	3.737	2.968	4.307	7.812 (48.8%)	18.942	4.759
Standard Deviation	.564	1.16	.927	3.643 (78.9%)	3.262	.646
N	91	91	91	69	69	69
Alpha	.942	.919	.906	.763	.718	.962

*Note.* The academic self-efficacy scale was measured on a five-point scale, where one was exactly false and five was exactly true. Math and literacy specific self-efficacy were each measured on a six-point scale, where one was strongly disagree and six was strongly agree. The math test contained 16 multiple choice questions, whereas the literacy test had 24 multiple choice questions. EI was measured on a seven-point scale, where one was completely disagree and seven was completely agree.

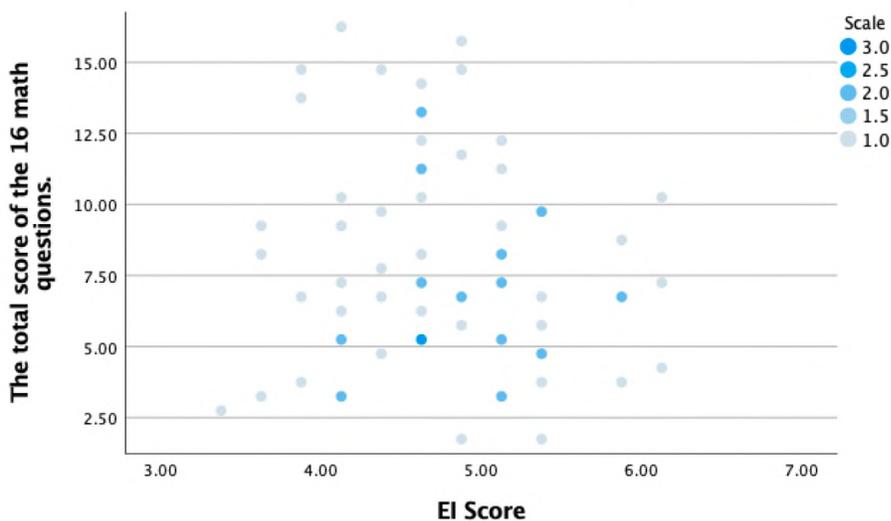
### **Hypothesis Testing**

Pearson correlations were computed to test the hypothesis that there would be a significant relationship between test performance and EI. EI was not significantly related to math test performance,  $r(n=69)=-.101$ ,  $p=.410$ , or to literacy test performance  $r(n=69)=.180$ ,  $p=.138$ . Thus, this hypothesis was not supported, as EI scores were not related to performance on either the math

or literacy test. See Figures 1 and 2 for scatterplots of the relationship between EI and test performance on each respective subject.

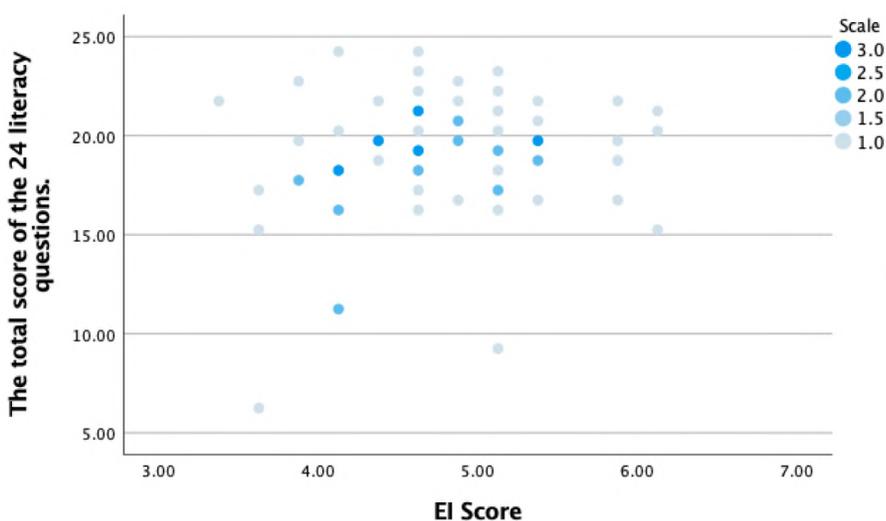
**Figure 1**

*Relationship Between EI and Mathematics Test Performance.*



**Figure 2**

*Relationship Between EI and Literacy Test Performance.*



Pearson correlations were computed to test the hypothesis that test performance would be related to academic self-efficacy as well as to their respective subject-specific self-efficacy scores.

See Table 2 for Correlations Between Efficacy Scores and Test Performance. Math test performance was not related to academic self-efficacy,  $r(n=69)=.112$ ,  $p=.292$ , however literacy test performance was related to academic self-efficacy generally,  $r(n=69)=.281$ ,  $p=.007$ . See Figures 3 and 4 for scatterplots of the relationship between academic self-efficacy and test performance for each respective subject. Math test performance was generally related to math specific self-efficacy  $r(n=69)=.400$ ,  $p<.001$ , whereas literacy test performance was not related to literacy specific self-efficacy  $r(n=69)=.083$ ,  $p=.432$ . See Figures 5 and 6 for scatterplots of the relationship between subject-specific efficacy and test performance for each respective subject. As expected, math test performance was unrelated to literacy specific self-efficacy  $r(n=69)=-.096$ ,  $p=.366$ , and literacy test performance was not related to math specific self-efficacy  $r(n=69)=.202$ ,  $p=.055$ .

**Table 2**

*Correlations Between Efficacy Scores and Test Performance.*

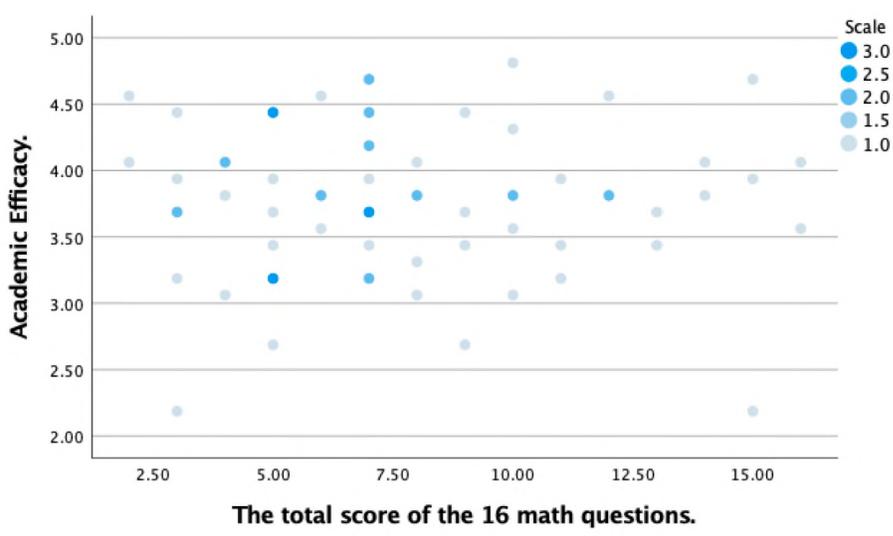
		Academic Self- Efficacy	Math Self- Efficacy	Literacy Self- Efficacy
Math Test Performance	r	.112	.400**	-.096
	n	91	91	91
Literacy Test Performance	r	.281**	.202	.083
	n	91	91	91

\*  $p < .05$

\*\*  $p < .01$

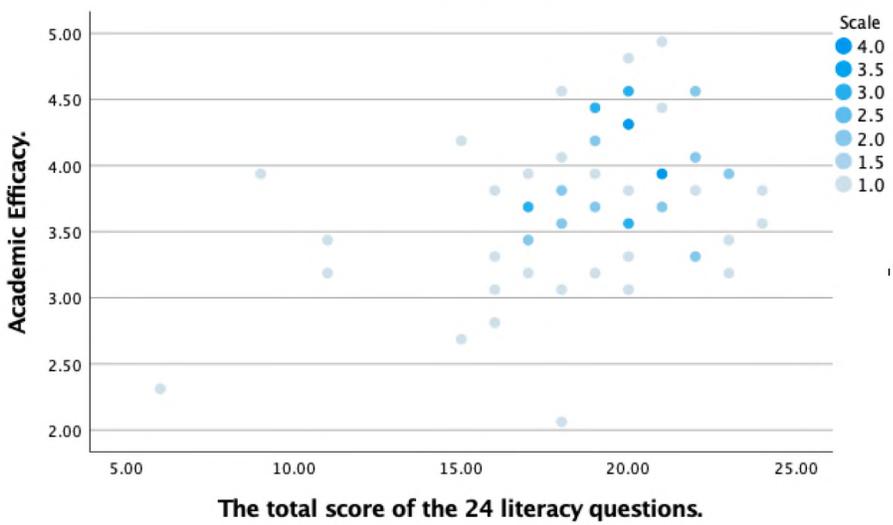
**Figure 3**

*Relationship Between Academic Self-Efficacy and Mathematics Test Performance.*



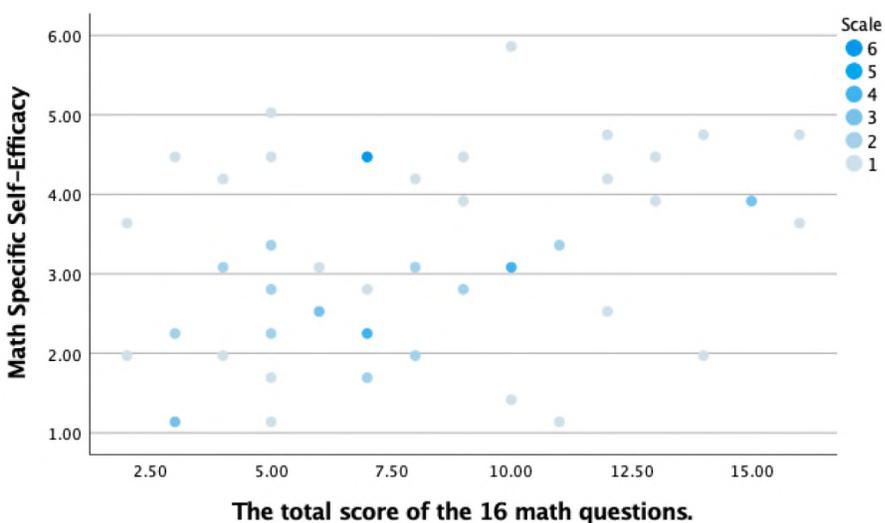
**Figure 4**

*Relationship Between Academic Self-Efficacy and Literacy Test Performance.*

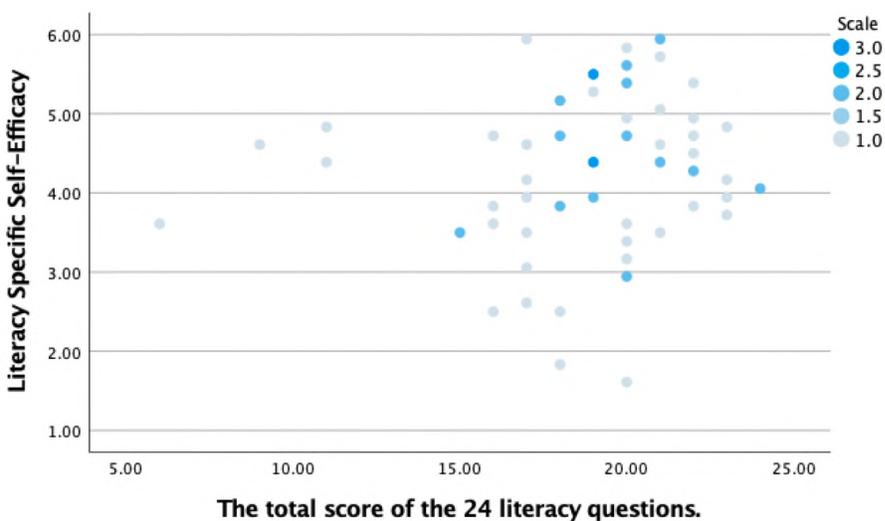


**Figure 5**

*Relationship Between Mathematics Specific Self-Efficacy and Mathematics Test Performance.*

**Figure 6**

*Relationship Between Literacy Specific Self-Efficacy and Literacy Test Performance.*



Pearson correlations were computed to test the hypothesis that there would be a positive relationship between EI and self-efficacy. See Table 3 for Correlations Between EI and Efficacy Scores. EI was related to academic self-efficacy generally,  $r(n=69)=.603$ ,  $p<.001$ , to math specific self-efficacy  $r(n=69)=.248$ ,  $p=.04$ , and to literacy specific self-efficacy  $r(n=69)=.253$ ,  $p=.036$ .

Thus, in all cases higher EI was related to higher scores in academic self-efficacy, math specific self-efficacy, and literacy specific self-efficacy. See Figures 7 through 9 for scatterplots of the relationship between EI and each measure of self-efficacy.

**Table 3**

*Correlations Between EI and Efficacy Scores.*

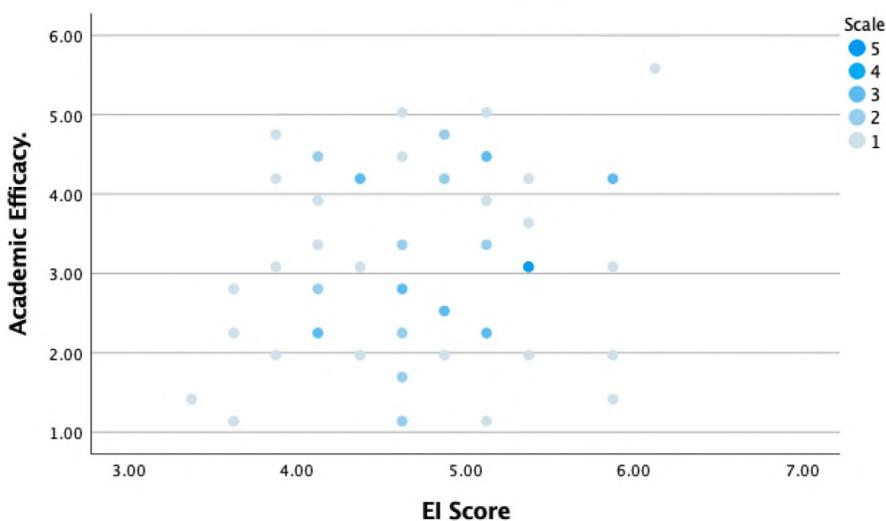
		Academic Self-Efficacy	Math Self-Efficacy	Literacy Self-Efficacy
Emotional Intelligence (TEIQue)	r	.603**	.248*	.253*
	n	69	69	69

\*  $p < .05$

\*\*  $p < .01$

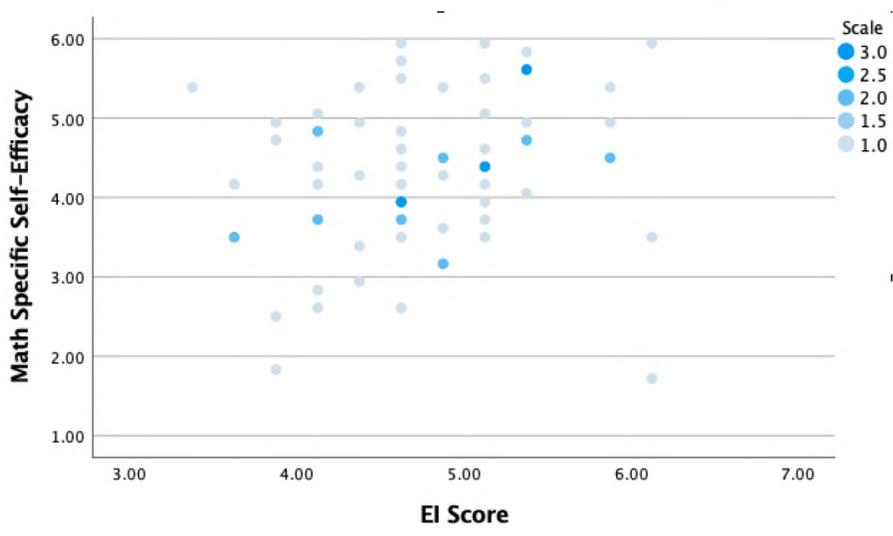
**Figure 7**

*Relationship Between EI and Academic Self-Efficacy.*



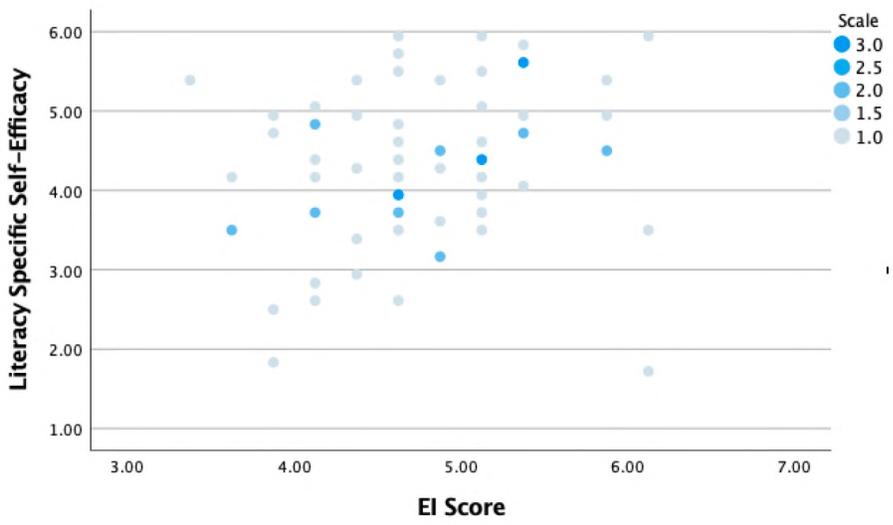
**Figure 8**

*Relationship Between EI and Mathematics Specific Self-Efficacy.*



**Figure 9**

*Relationship Between EI and Literacy Specific Self-Efficacy.*



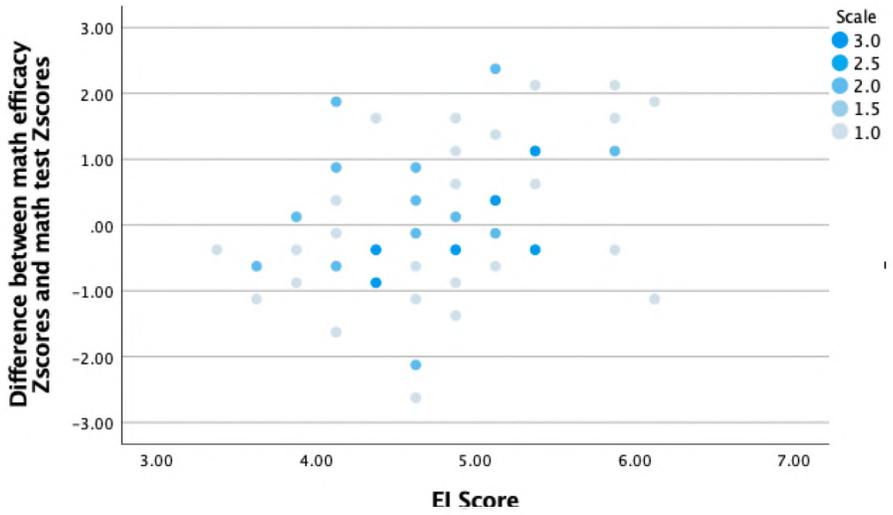
Z-scores were computed for the literacy specific self-efficacy scores, mean literacy test scores, math specific self-efficacy scores, and mean math test scores. These Z-scores display how individual participants scored in relation to the rest of the sample. Positive Z-scores indicate variation above the mean of the sample, whilst negative Z-scores indicate a variation below the

mean of the sample. The purpose for computing these Z-scores was to place efficacy and test performance on relatively comparable scales. This process allows the comparison of a participant's self-efficacy in relation to their peers with their test performance in relation to their peers. In order to create a variable displaying the discrepancy between participants' specific self-efficacy levels and actual test performance, the difference between participants' subject specific self-efficacy and test score Z-scores were computed for both subjects.

Pearson correlations were computed between the discrepancy between participants' subject-specific self-efficacy and test scores with their EI scores to test the hypothesis that those with higher EI scores would rate their subject-specific self-efficacy in alignment with their test performance. EI was related to the mathematics discrepancy variable (the difference between math self-efficacy Z-scores and math test Z-scores),  $r(n=69)=.316$ ,  $p=.008$ . EI was not related to the literacy discrepancy variable (the difference between literacy self-efficacy Z-scores and literacy test Z-scores),  $r(n=69)=.065$ ,  $p=.594$ . Thus, there was a relationship between the discrepancy variable (between participants' math specific self-efficacy and math test performance) with their EI scores. However, it is not the case that those with higher EI scores rated their subject-specific self-efficacy in alignment with their test performance, more accurately aligning their self-efficacy and performance. Instead, it appears that those with moderate EI calibrated their self-efficacy and performance best. Those with lower EI were more likely to have self-efficacy scores that underestimated their performance, and those with higher EI were more likely to have efficacy scores that overestimated their performance. See Figures 10 and 11 for scatterplots of the relationship between EI and the discrepancy between test performance and subject-specific efficacy for each respective subject.

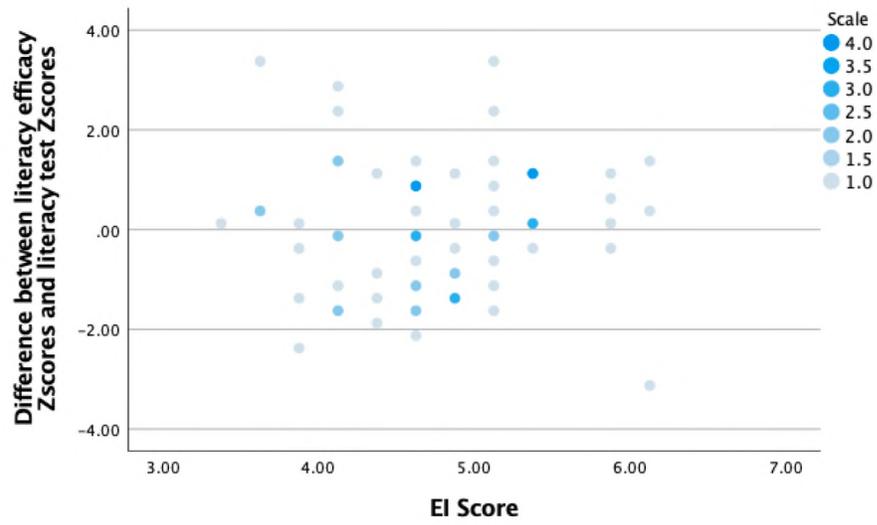
**Figure 10**

*Relationship Between EI and the Discrepancy Between Mathematics Specific Self-Efficacy and Mathematics Test Performance.*



**Figure 11**

*Relationship Between EI and the Discrepancy Between Literacy Specific Self-Efficacy and Literacy Test Performance.*



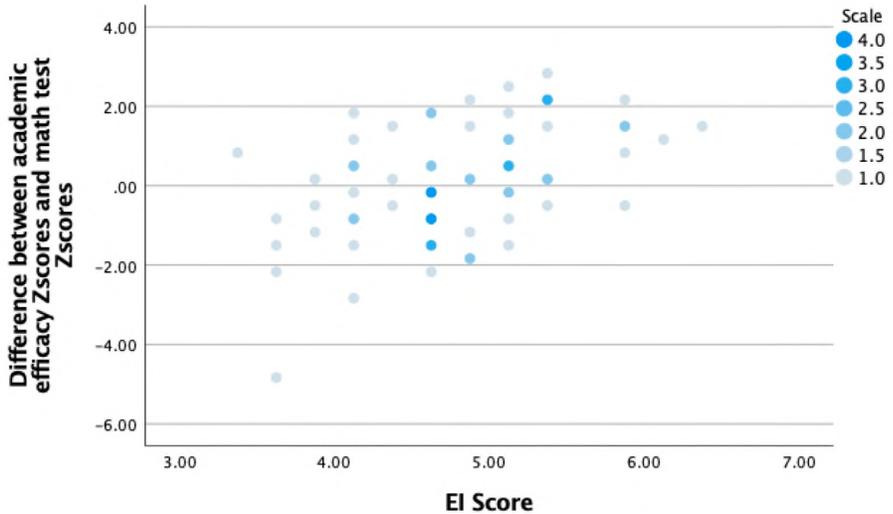
### **Additional Hypothesis Testing**

It was hypothesized that those with higher EI scores would rate their subject-specific self-efficacy in alignment with their test performance. Although not originally hypothesized, it is reasonable that a similar hypothesis can be made for overall academic self-efficacy and its alignment with test performance. With that in mind, Pearson correlations were computed to test the additional hypothesis that those with higher EI scores would rate their academic self-efficacy in alignment with their test performance. EI was related to the academic self-efficacy discrepancy variable for mathematics (the difference between academic self-efficacy Z-scores and math test Z-scores),  $r(n=69)=.594$ ,  $p<.001$ . EI was also related to the academic self-efficacy discrepancy variable for literacy (the difference between academic self-efficacy Z-scores and literacy test Z-scores),  $r(n=69)=.385$ ,  $p=.001$ . Thus, there was a relationship between the discrepancy between participants' academic self-efficacy and test performance in each subject with their EI scores. See Figures 12 and 13 for scatterplots of the relationship between EI and the discrepancy between test performance and academic self-efficacy for each subject.

**Figure 12**

*Relationship Between EI and the Discrepancy Between Academic Self-Efficacy and Mathematics*

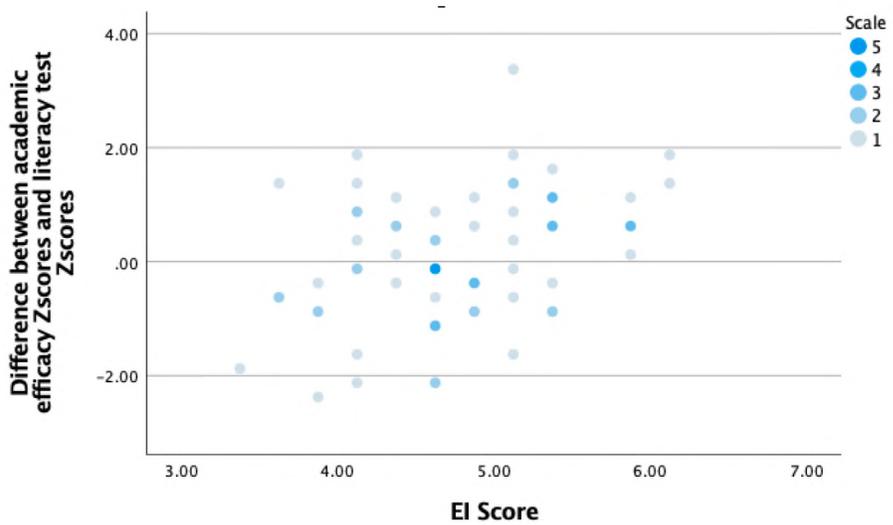
*Test Performance.*



**Figure 13**

*Relationship Between EI and the Discrepancy Between Academic Self-Efficacy and Literacy Test*

*Performance.*



## **Discussion**

In this study, the varying interactions between EI, self-efficacy, and test performance were investigated. Based upon previous research, four primary hypotheses were tested: (1) there would be a significant relationship between test performance and EI; (2) test performance would be related to academic self-efficacy as well as to the respective subject-specific self-efficacy scores; (3) there would be a positive relationship between EI and self-efficacy; and (4) those with higher EI scores would rate their subject-specific self-efficacy in alignment with their test performance.

### **Hypothesis One**

In reference to the first hypothesis, it was found that participants' EI scores and test performance on math or literacy tests were unrelated. Thus, in this sample, one's EI scores did not directly impact their test performance. Nevertheless, it seems as though there was an interaction between self-efficacy and test performance that appeared to be influenced by EI. This interaction is expanded upon in the discussion of the fourth hypothesis.

### **Hypothesis Two**

The second hypothesis, that test performance would be related to self-efficacy, was partially supported by the results found in the study. While participants' mathematics test performance was unrelated to their academic self-efficacy, it was discovered that literacy test performance was related to academic self-efficacy generally. Those with lower academic self-efficacy had lower literacy test scores, whilst those with higher levels of academic self-efficacy scores had higher literacy test scores. This result likely emerged due to two specific facets of literacy (namely reading and comprehension) being included as subscales of the academic self-efficacy test. This seems to demonstrate that the academic self-efficacy scale served to effectively measure and align with literacy test performance. Contrastingly, none of the questions or subscales

on the academic self-efficacy measure were directly connected to mathematics. Moreover, grade nine level literacy (which was tested in this study) is far more central to academic success, and hence academic self-efficacy, than grade nine level mathematics. For instance, if one were to have low academic self-efficacy it would follow that they have lower literacy test performance given that they lack a skill central to academic success as measured in this test. However, one could have extremely high academic self-efficacy, yet score poorly on the mathematics test as their notion of academic success is separate from mathematical skill (perhaps, for example, their field of study omits mathematics). Moreover, one could have low academic self-efficacy (which has been demonstrated to be related to reading and comprehension) yet score quite highly on a mathematics test, given that those skills are not crucial for math-related success, while other expertise is more central. Thus, it is reasonable that mathematics test performance was unrelated to academic self-efficacy whilst literacy test performance was significantly related to academic self-efficacy.

As for the relationships between each subject and their subject-specific self-efficacy, it was found that participants' math test performance was generally related to their math specific self-efficacy, however literacy test performance was not related to literacy specific self-efficacy. These results indicate that those with higher mathematics specific self-efficacy had higher math test performance while those with lower self-efficacy had lower test scores. Unlike literacy, which is essential to academic success in the English language, mathematics is often viewed as a more specified skill. In the case of this sample, many participants were students at Tyndale University, a liberal arts school offering minimal higher level mathematics courses. Hence, many of these students would be cognizant of the level of their mathematical aptitude given their knowledge of recent mathematics exposure or skill. If an individual has poor or immense math expertise, they appear to be readily aware of this, as reflected in the self-efficacy scores. In contrast, literacy test

performance was unrelated to literacy specific self-efficacy. It seems as though most participants scored relatively higher on literacy testing, despite their literacy specific self-efficacy. Moreover, literacy itself is more generalized, and thus grade nine level literacy could potentially be too simplistic for a sample where all participants are above the age of 18. As mentioned earlier, it is also probable that the academic self-efficacy scale served as a superior measure of literacy skill considering that it included both reading and comprehension of the English language in its items.

Although no initial prediction had been made concerning test performance on one subject and its relationship to the contrasting subject-specific self-efficacy scores, it was reasonable to expect they would not be related. Accordingly, math test performance was unrelated to literacy specific self-efficacy and literacy test performance was not related to math specific self-efficacy. Considering the task specific nature of self-efficacy, an individual's confidence in one category does not extend to skill in another. For example, there are certain skills necessary to produce a successful performance in mathematics that may not be necessary for successful performance in literacy.

### **Hypothesis Three**

In line with the third hypothesis, it was found that EI was positively related to each of the three measures of self-efficacy. First, higher EI scores were significantly related to higher academic self-efficacy. Similarly, those with lower EI scores also had significantly lower levels of academic self-efficacy. This finding confirms the relationship between EI and self-efficacy that has been demonstrated throughout literature (Wu et al., 2019; Mahasneh, 2016; Santos et al., 2018). Overall EI is recognized to influence thoughts and behaviours (MacCann et al., 2020), whilst trait EI, the facet of EI measured by the TEIQue, specifically notes one's emotion-related self-perceptions (O'Connor et al., 2017). Individuals scoring high in trait EI are often described as

possessing interpersonal skills and optimism (O'Connor et al., 2017); these characteristics can certainly lead an individual possessing high EI to additionally have high academic self-efficacy since it reflects an individual's confidence in their ability to effectively accomplish a task.

The TEIQue measures four subscales, one of which is well-being. Petrides (2001) noted that individuals with high scores on the well-being factor have generalized feelings of well-being that extend from both past achievements and future expectations of performance. This directly reflects how one might rate their academic self-efficacy, as they would be more likely to look upon both past and future academic tasks more positively. Conversely, those with low EI have lower self-regard and thus possess lower levels of confidence in their abilities to complete a task. Higher self-efficacy has also been noted to be related to higher self-regulation (Borgonovi & Pokropek, 2019), this being a variable that corresponds to the self-control factor of the TEIQue. Unfortunately, I did not have access to the scoring information for the subscales and thus was unable to test the direct relations between EI subscale scores with self-efficacy and test performance. However, it can be inferred that those with high EI scores, scored highly on both the well-being and self-control subscales. This matter is expanded upon in the discussion of the limitations of the study. Second, EI was also positively related to both mathematics and literacy specific self-efficacy. Thus, those who had higher subject-specific self-efficacy also had higher EI, whereas those who had lower subject-specific self-efficacy also had lower EI. Parallel to the aforementioned relationship between academic self-efficacy and EI, it can be inferred that the relationship between subject specific self-efficacy and EI exists for similar reasons. To reiterate, those higher in EI have higher self-regard, looking upon past and future success more favourably than their lower EI counterparts. These factors likely lead them to have higher self-efficacy, thus being more confident and optimistic toward their ability to successfully complete a task.

Ultimately, those with higher EI have significantly higher self-efficacy both for mathematics, literacy, and overall academics.

#### **Hypothesis Four**

While those with higher EI scores did not rate their subject-specific self-efficacy in alignment with their test performance, this fourth hypothesis did lead to an intriguing discovery. As previously mentioned, in order to properly compute this analysis, participants' subject-specific self-efficacy and test performance on that subject were noted to display how individual participants scored in relation to the rest of the sample. The difference between participants' self-efficacy for a particular subject and how they actually scored when tested on that subject, were compared to determine if their self-efficacy aligned with their actual performance or if there was a discrepancy between these scores. This discrepancy between self-efficacy and test scores were then compared to EI scores in order to identify whether or not EI aided in decreasing this discrepancy. While there was no relationship between discrepancies for the literacy test and EI, a significant relationship was found between this discrepancy variable on the math test and EI scores. This discovery has implications for three primary groups: (1) those with low EI, (2) those with average EI, and (3) those with high EI.

First, those with the lowest EI scores, had a large discrepancy between their self-efficacy and test scores; these individuals rated their self-efficacy lower than their actual test scores, meaning they performed better than expected. This result is likely the cause of those with lower EI possessing lower well-being scores, meaning they have low self-regard and are less confident in their abilities. This lack of optimism and self-assurance potentially can lead to an inaccurate assessment between one's self-efficacy and actual mathematical aptitude.

Second, it was found that those with average EI scores were quite effective in aligning their mathematics specific self-efficacy to their test performance; this illustrates that if a participant indicated low self-efficacy, their performance was low and if they indicated high self-efficacy, their performance was high. Participants in this group are able to accurately assess their mathematical abilities, hence illustrating self-awareness. Since they are not lacking confidence (like the lowest EI group) or exceeding in confidence (like the high EI group), they are able to provide practical assessments of their skill level with minimal discrepancies between mathematics efficacy and test scores.

Third, in opposition to the original hypothesis that inferred that those with higher EI scores would rate their subject-specific self-efficacy in alignment with their test performance, it was found that those with the highest EI levels actually had a large discrepancy between their mathematics self-efficacy and test performance. These participants rated their self-efficacy for mathematics quite high yet had lower test performance. High EI leads to feelings of well-being for past achievements and future expectations of performance. Taking this into account, the subject-specific self-efficacy scales asked participants to “Think about your ability to do mathematics. When answering the following questions, answer in reference to your own personal skills and ability to perform mathematics” (See Appendix C for a copy of the Mathematics Specific Self-Efficacy Test). Based upon this prompt, those in the high EI category likely assessed their mathematical aptitude with high self-esteem. Since these individuals possess greater optimism and self-assurance, they were likely overconfident in their personal capabilities. It seems as though individuals with higher EI struggle to harmonize their self-efficacy with actual skill given their optimistic and positive nature. However, it is important to note that it is simply possible that these participants were considering lower-level math, such as simple addition and subtraction, when

completing the mathematics specific self-efficacy test. Nevertheless, this seems unlikely given that those with average EI were able to effectively align their self-efficacy and test scores. Ultimately, these findings indicate that those with average EI are best able to rate their mathematics specific self-efficacy in alignment with their test performance, whilst those with lower or higher EI scores struggle to provide an accurate assessment of their abilities.

While there was a significant relationship between the discrepancy between one's mathematics self-efficacy and math test performance, this was not the case for the literacy test. Considering that literacy specific self-efficacy and literacy performance were unrelated and many individuals scored higher than expected, it can be inferred that this discrepancy between self-efficacy and test performance would be likewise unrelated to EI. Again, this outcome is likely a result of the ease of the literacy test. While grade nine level literacy skills are continually practiced in the following years of education, grade nine mathematics are often forgotten unless practiced. It is possible that participants rated their literacy specific self-efficacy to their age-appropriate literacy level, as opposed to grade nine level thus this leading participants' test scores to often exceed their self-efficacy. Provided that much of self-efficacy is task specific, a relationship between a discrepancy between overall academic self-efficacy and test performance with EI was not included in the original set of hypotheses. This matter was later tested and is elaborated on in the upcoming discussion of additional hypotheses.

It is widely known that those with lower EI tend to underestimate their abilities; thus, a larger discrepancy between self-efficacy and task performance is quite reasonable. Contrastingly, high EI is often coveted for its positive implications in one's daily life, intrapersonal interactions, and self-efficacy; however, based upon these findings, it seems as though overly high EI scores can evoke or influence a discrepancy between one's self-efficacy to effectively accomplish a task,

and their veritable aptitude to do so. Based upon this discovery, both those with low and high EI ought to practice various self-awareness techniques, ensuring their confidence to complete a task effectively parallels their capacity to do so. Nevertheless, excessively high self-efficacy may be beneficial, despite that it may lead one to overestimate their abilities. For example, high self-efficacy may increase an individual's level of perseverance on any given task, even if they may not possess the necessary skills or expertise for success. Moreover, they would be more likely to persevere on future tasks of this nature, despite previous performance. This correlation with EI might suggest that an accurate calibration of self-efficacy and performance may not always be as valuable as the other healthy and protective factors that accompany higher self-efficacy and EI.

### **Additional Hypothesis**

Given that the relationship between literacy test scores and literacy specific self-efficacy was not significant, it was reasonable that a discrepancy between these two variables and EI was likewise not significant. However, because there was a significant relationship between academic self-efficacy and literacy scores, an additional round of discrepancy-related hypothesis testing was conducted to ensure this lack of relationship was not a result of the literacy specific self-efficacy scale.

This analysis was computed in the same manner as described for the fourth hypothesis. Participants' academic self-efficacy and test performance scores were scored in relation to the rest of the sample. Then the difference between participants' academic self-efficacy and their test score were compared to determine if their self-efficacy aligned with their actual performance or if there was a discrepancy. This discrepancy between academic self-efficacy and test scores on each respective test were then compared to EI. It was found that there was a significant relationship between the discrepancy variable for both subjects and EI. These results roughly paralleled the

findings for hypothesis four. Those scoring lowest on EI had a large discrepancy between their academic self-efficacy and test scores; these individuals rated their academic self-efficacy lower than their actual test performance, meaning they scored better than expected. Those with average EI scores were successful in calibrating their academic self-efficacy to their test performance. Thus, if a participant indicated low self-efficacy, their performance was low and if they indicated high self-efficacy, their performance was high. Again, in opposition to the original hypothesis that assumed those with higher EI scores would rate their academic self-efficacy in alignment with their test performance, these individuals had a large discrepancy between their academic self-efficacy and test performance. Those scoring highest in EI also scored high on academic self-efficacy, yet their test performance scores did not reflect this and were lower than expected. The potential explanation for these findings were discussed previously whilst highlighting the same findings for the fourth hypothesis. In sum, those with average EI are best able to accurately assess their abilities, rating their academic self-efficacy in alignment with their test performance, whilst those with lower or higher EI scores struggle to do so.

Given that literacy test scores were related to academic self-efficacy, a significant relationship between these variables was expected. However, the relationship between the discrepancy for academic self-efficacy and test scores with EI was significant for *both* subjects, rather than literacy testing alone. Since math test scores were unrelated to overall academic self-efficacy, it is interesting that the discrepancy between math and academic self-efficacy with EI was nevertheless significant. This seems to indicate that EI indirectly influences academic self-efficacy, despite subject. This is reasonable, given that EI was most strongly related to academic self-efficacy out of all the variations of self-efficacy measured in the study. Thus, whether it is

with mathematics or literacy testing, one's EI nonetheless influenced if an individual rated their academic self-efficacy in alignment with their test performance.

### **Limitations**

There were several limitations in this study. First, based upon the online format of the surveys, several participants noted that they had begun the questionnaires, completed several sections but had to restart because they lost internet connection. This indicates the possibility that several participants completed parts of the survey more than once, potentially causing them to rush through the second time. It is also possible that participants may have skipped through questions, simply responding without fully comprehending or reading the question (whether on the self-report questionnaires or the marked tests).

Second, it is possible that participants utilized external resources, or perhaps cheated on the mathematics or literacy test. Given the online format of the study, this necessitated that the mathematics and literacy tests were likewise conducted virtually. Prior to beginning the test, there was a notice informing participants that it was crucial they did not search for the answers electronically or use any form of external aid. They were alerted that following test completion they would be asked to verify that their test responses reflected their own understanding. Despite these warnings, it is nevertheless possible that participants' test performance was not an honest or accurate representation of their test performance. Nonetheless, the average performance on the math test was substantially lower than that of the literacy test; thus, if widespread cheating had occurred, it would be likely that the average score on both tests might be much higher.

Third, given the task-specific nature of self-efficacy, it could have been beneficial for the mathematics and literacy specific self-efficacy testing to have been clearer as to *what* level or type of math and literacy was being observed. For instance, self-efficacy regarding mathematics testing,

as opposed to just overall mathematics. Moreover, noting the grade level of the test in the efficacy scale could have served to provide a more accurate analysis of participants' self-efficacy regarding these subjects. For instance, self-efficacy regarding grade nine level literacy skills, as opposed to overall literacy. Ultimately, I would not recommend the use of the EQAO or OSSLT tests as the measurement of math and literacy test performance unless analyzing an entirely high school aged sample.

Fourth, I was unable to gain access to the TEIQue subscale and facet scoring information. As a result, potential correlations between certain variables and these facets remained unexplored. Recommendations to counteract some of these limitations are expanded upon in the upcoming description of areas requiring further research.

### **Future Research**

For potential recreations of this study, I recommend utilizing separate measurement scales, for test performance and EI scoring. In particular, with literacy testing the test difficulty ought to accurately correspond to participants' respective education level, bearing in mind that literacy skills are employed and practiced on a daily basis. For example, in a sample of university students, a university literacy test ought to be employed. This process ought to be implemented with mathematics testing, on the condition that participants have higher mathematical exposure. For example, in a sample of STEM university students, a university level math test ought to be employed. Conversely, in a sample of liberal arts university students, a high school level math test may be more appropriate. In terms of EI testing, the TEIQue is suitable provided that you have full access to the scoring information and subscales. If these resources are unattainable, the use of the Profile for Emotional Competence (PEC) developed by Brasseur et al. (2013) is an alternative and reliable measure of EI. However, it is possible that the use of this scale could provide slightly

varied results given that it measures ability EI as opposed to trait EI. Nevertheless, high global PEC scores were correlated with high scores on the TEIQue (Brasseur et al., 2013).

Future research regarding EI, self-efficacy, and test performance, beyond what has been conducted in this study would be highly beneficial. It would be intriguing to observe if these findings can be reproduced when the test performance variable shifts from mathematics and literacy testing, to a more specified stream (perhaps testing specific to an individual's school major or field of work). It could also be advantageous to see if similar results are replicated when measuring ability EI as opposed to trait EI given that these competences can be learned (Brasseur et al., 2013).

The relationship between discrepancies between self-efficacy, test performance, and EI require further exploration; particularly, the finding that both individuals with low *and* high EI struggle to align their self-efficacy to their actual test performance. Research analyzing the potential reasoning behind this correlation would be highly advantageous. Due to the fact that the TEIQue subscales and facets remained unexplored in the present study, the analysis of aforementioned discrepancy relationship, as well as all the distinct interactions mentioned throughout the study, through the TEIQue subscale and facets information would be profitable. In particular, the self-motivation, emotion regulation, happiness, self-esteem, optimism, adaptability, and stress management facets are of greatest benefit. Analyzing the aforementioned correlations with the well-being subscale would also be of great interest.

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## Appendix A

### TRAIT EMOTIONAL INTELLIGENCE QUESTIONNAIRE

**Author:** Petrides (2009)

**Instructions:** Please complete this questionnaire on your own and in quiet conditions. Please answer each statement below by putting a circle around the number that best reflects your degree of agreement or disagreement with that statement. There are no right or wrong answers. Do not think too long about the exact meaning of the statements. Work quickly and try to answer as accurately as possible. There are seven possible responses to each statement ranging from ‘Completely Disagree’ (number 1) to ‘Completely Agree’ (number 7).

		1	2	3	4	5	6	7
		<b>Completely Disagree</b>						<b>Completely Agree</b>
1.	I'm usually able to control other people	1	2	3	4	5	6	7
2.	Generally, I don't take notice of other people's emotions	1	2	3	4	5	6	7
3.	When I receive wonderful news, I find it difficult to calm down quickly	1	2	3	4	5	6	7
4.	I tend to see difficulties in every opportunity rather than opportunities in every difficulty	1	2	3	4	5	6	7
5.	On the whole, I have a gloomy perspective on most things	1	2	3	4	5	6	7
6.	I don't have a lot of happy memories	1	2	3	4	5	6	7
7.	Understanding the needs and desires of others is not a problem for me	1	2	3	4	5	6	7
8.	I generally believe that things will work out fine in my life	1	2	3	4	5	6	7
9.	I often find it difficult to recognize what emotion I'm feeling	1	2	3	4	5	6	7
10.	I'm not socially skilled	1	2	3	4	5	6	7
11.	I find it difficult to tell others that I love them even when I want to	1	2	3	4	5	6	7
12.	Others admire me for being relaxed	1	2	3	4	5	6	7
13.	I rarely think about old friends from the past	1	2	3	4	5	6	7
14.	Generally, I find it easy to tell others how much they really mean to me	1	2	3	4	5	6	7
15.	Generally, I must be under pressure to really work hard	1	2	3	4	5	6	7
16.	I tend to get involved in things I later wish I could get out of	1	2	3	4	5	6	7
17.	I'm able to "read" most people's feelings like an open book	1	2	3	4	5	6	7
18.	I'm usually able to influence the way other people feel	1	2	3	4	5	6	7
19.	I normally find it difficult to calm angry people down	1	2	3	4	5	6	7
20.	I find it difficult to take control of situations at home	1	2	3	4	5	6	7
21.	I generally hope for the best	1	2	3	4	5	6	7
22.	Others tell me that they admire me for my integrity	1	2	3	4	5	6	7
23.	I really don't like listening to my friends' problems	1	2	3	4	5	6	7
24.	I'm normally able to "get into someone's shoes" and experience their emotions	1	2	3	4	5	6	7
25.	I believe I'm full of personal weaknesses	1	2	3	4	5	6	7

26.	I find it difficult to give up things I know and like	1	2	3	4	5	6	7
27.	I always find ways to express my affection to others when I want to	1	2	3	4	5	6	7
28.	I feel that I have a number of good qualities	1	2	3	4	5	6	7
29.	I tend to rush into things without much planning	1	2	3	4	5	6	7
30.	I find it difficult to speak about my intimate feelings even to my closest friends	1	2	3	4	5	6	7
31.	I'm not able to do things as well as most people	1	2	3	4	5	6	7
32.	I'm never really sure what I'm feeling	1	2	3	4	5	6	7
33.	I'm usually able to express my emotions when I want to	1	2	3	4	5	6	7
34.	When I disagree with someone, I usually find it easy to say so	1	2	3	4	5	6	7
35.	I normally find it difficult to keep myself motivated	1	2	3	4	5	6	7
36.	I know how to snap out of my negative moods	1	2	3	4	5	6	7
37.	On the whole, I find it difficult to describe my feelings	1	2	3	4	5	6	7
38.	I find it difficult not to feel sad when someone tells me about something bad that happened to them	1	2	3	4	5	6	7
39.	When something surprises me, I find it difficult to get it out of my mind	1	2	3	4	5	6	7
40.	I often pause and think about my feelings	1	2	3	4	5	6	7
41.	I tend to see the glass as half-empty rather than as half-full	1	2	3	4	5	6	7
42.	I often find it difficult to see things from another person's viewpoint	1	2	3	4	5	6	7
43.	I'm a follower, not a leader	1	2	3	4	5	6	7
44.	Those close to me often complain that I don't treat them right	1	2	3	4	5	6	7
45.	Many times, I can't figure out what emotion I'm feeling	1	2	3	4	5	6	7
46.	I couldn't affect other people's feelings even if I wanted to	1	2	3	4	5	6	7
47.	If I'm jealous of someone, I find it difficult not to behave badly towards them	1	2	3	4	5	6	7
48.	I get stressed by situations that others find comfortable	1	2	3	4	5	6	7
49.	I find it difficult to sympathize with other people's plights	1	2	3	4	5	6	7
50.	In the past, I have taken credit for someone else's input	1	2	3	4	5	6	7
51.	On the whole, I can cope with change effectively	1	2	3	4	5	6	7
52.	I don't seem to have any power at all over other people's feelings	1	2	3	4	5	6	7
53.	I have many reasons for not giving up easily	1	2	3	4	5	6	7
54.	I like putting effort even into things that are not really important	1	2	3	4	5	6	7
55.	I always take responsibility when I do something wrong	1	2	3	4	5	6	7
56.	I tend to change my mind frequently	1	2	3	4	5	6	7
57.	When I argue with someone, I can only see my point of view	1	2	3	4	5	6	7
58.	Things tend to turn out right in the end	1	2	3	4	5	6	7
59.	When I disagree with someone, I generally prefer to remain silent rather than make a scene	1	2	3	4	5	6	7
60.	If I wanted to, it would be easy for me to make someone feel bad	1	2	3	4	5	6	7
61.	I would describe myself as a calm person	1	2	3	4	5	6	7
62.	I often find it difficult to show my affection to those close to me	1	2	3	4	5	6	7
63.	There are many reasons to expect the worst in life	1	2	3	4	5	6	7
64.	I usually find it difficult to express myself clearly	1	2	3	4	5	6	7
65.	I don't mind frequently changing my daily routine	1	2	3	4	5	6	7
66.	Most people are better liked than I am	1	2	3	4	5	6	7
67.	Those close to me rarely complain about how I behave toward them	1	2	3	4	5	6	7

68.	usually find it difficult to express my emotions the way I would like to	1	2	3	4	5	6	7
69.	Generally, I'm able to adapt to new environments	1	2	3	4	5	6	7
70.	often find it difficult to adjust my life according to the circumstances	1	2	3	4	5	6	7
71.	I would describe myself as a good negotiator	1	2	3	4	5	6	7
72.	I can deal effectively with people	1	2	3	4	5	6	7
73.	On the whole, I'm a highly motivated person	1	2	3	4	5	6	7
74.	I have stolen things as a child	1	2	3	4	5	6	7
75.	On the whole, I'm pleased with my life	1	2	3	4	5	6	7
76.	I find it difficult to control myself when I'm extremely happy	1	2	3	4	5	6	7
77.	Sometimes, it feels like I'm producing a lot of good work effortlessly	1	2	3	4	5	6	7
78.	When I take a decision, I'm always sure it is the right one	1	2	3	4	5	6	7
79.	If I went on a blind date, the other person would be disappointed with my looks	1	2	3	4	5	6	7
80.	I normally find it difficult to adjust my behaviour according to the people I'm with	1	2	3	4	5	6	7
81.	On the whole, I'm able to identify myself with others	1	2	3	4	5	6	7
82.	I try to regulate pressures in order to control my stress levels	1	2	3	4	5	6	7
83.	I don't think I'm a useless person	1	2	3	4	5	6	7
84.	I usually find it difficult to regulate my emotions	1	2	3	4	5	6	7
85.	I can handle most difficulties in my life in a cool and composed manner	1	2	3	4	5	6	7
86.	If I wanted to, it would be easy for me to make someone angry	1	2	3	4	5	6	7
87.	On the whole, I like myself	1	2	3	4	5	6	7
88.	I believe I'm full of personal strengths	1	2	3	4	5	6	7
89.	I generally don't find life enjoyable	1	2	3	4	5	6	7
90.	I'm usually able to calm down quickly after I've got mad at someone	1	2	3	4	5	6	7
91.	I can remain calm even when I'm extremely happy	1	2	3	4	5	6	7
92.	Generally, I'm not good at consoling others when they feel bad	1	2	3	4	5	6	7
93.	I'm usually able to settle disputes	1	2	3	4	5	6	7
94.	I never put pleasure before business	1	2	3	4	5	6	7
95.	Imagining myself in someone else's position is not a problem for me	1	2	3	4	5	6	7
96.	I need a lot of self-control to keep myself out of trouble	1	2	3	4	5	6	7
97.	It is easy for me to find the right words to describe my feelings	1	2	3	4	5	6	7
98.	I expect that most of my life will be enjoyable	1	2	3	4	5	6	7
99.	I am an ordinary person	1	2	3	4	5	6	7
100.	I tend to get "carried away" easily	1	2	3	4	5	6	7
101.	I usually try to resist negative thoughts and think of positive alternatives	1	2	3	4	5	6	7
102.	I don't like planning ahead	1	2	3	4	5	6	7
103.	Just by looking at somebody, I can understand what he or she feels	1	2	3	4	5	6	7
104.	Life is beautiful	1	2	3	4	5	6	7
105.	I normally find it easy to calm down after I have been scared	1	2	3	4	5	6	7
106.	I want to be in command of things	1	2	3	4	5	6	7
107.	I usually find it difficult to change other people's opinions	1	2	3	4	5	6	7
108.	I'm generally good at social chit-chat	1	2	3	4	5	6	7
109.	Controlling my urges is not a big problem for me	1	2	3	4	5	6	7
110.	I really don't like my physical appearance	1	2	3	4	5	6	7
111.	I tend to speak well and clearly	1	2	3	4	5	6	7
112.	On the whole, I'm not satisfied with how I tackle stress	1	2	3	4	5	6	7

113.	Most of the time, I know exactly why I feel the way I do	1	2	3	4	5	6	7
114.	I find it difficult to calm down after I have been strongly surprised	1	2	3	4	5	6	7
115.	On the whole, I would describe myself as assertive	1	2	3	4	5	6	7
116.	On the whole, I'm not a happy person	1	2	3	4	5	6	7
117.	When someone offends me, I'm usually able to remain calm	1	2	3	4	5	6	7
118.	Most of the things I manage to do well seem to require a lot of effort	1	2	3	4	5	6	7
119.	I have never lied to spare someone else's feelings	1	2	3	4	5	6	7
120.	I find it difficult to bond well even with those close to me	1	2	3	4	5	6	7
121.	consider all the advantages and disadvantages before making up my mind	1	2	3	4	5	6	7
122.	I don't know how to make others feel better when they need it	1	2	3	4	5	6	7
123.	I usually find it difficult to change my attitudes and views	1	2	3	4	5	6	7
124.	Others tell me that I rarely speak about how I feel	1	2	3	4	5	6	7
125.	On the whole, I'm satisfied with my close relationships	1	2	3	4	5	6	7
126.	I can identify an emotion from the moment it starts to develop in me	1	2	3	4	5	6	7
127.	On the whole, I like to put other people's interests above mine	1	2	3	4	5	6	7
128.	Most days, I feel great to be alive	1	2	3	4	5	6	7
129.	I tend to get a lot of pleasure just from doing something well	1	2	3	4	5	6	7
130.	It is very important to me to get along with all my close friends and family	1	2	3	4	5	6	7
131.	I frequently have happy thoughts	1	2	3	4	5	6	7
132.	I have many fierce arguments with those close to me	1	2	3	4	5	6	7
133.	Expressing my emotions with words is not a problem for me	1	2	3	4	5	6	7
134.	I find it difficult to take pleasure in life	1	2	3	4	5	6	7
135.	I'm usually able to influence other people	1	2	3	4	5	6	7
136.	When I'm under pressure, I tend to lose my cool	1	2	3	4	5	6	7
137.	I usually find it difficult to change my behaviour	1	2	3	4	5	6	7
138.	Others look up to me	1	2	3	4	5	6	7
139.	Others tell me that I get stressed very easily	1	2	3	4	5	6	7
140.	I'm usually able to find ways to control my emotions when I want to	1	2	3	4	5	6	7
141.	I believe that I would make a good salesperson	1	2	3	4	5	6	7
142.	I lose interest in what I do quite easily	1	2	3	4	5	6	7
143.	On the whole, I'm a creature of habit	1	2	3	4	5	6	7
144.	I would normally defend my opinions even if it meant arguing with important people	1	2	3	4	5	6	7
145.	I would describe myself as a flexible person	1	2	3	4	5	6	7
146.	Generally, I need a lot of incentives in order to do my best	1	2	3	4	5	6	7
147.	Even when I'm arguing with someone, I'm usually able to take their perspective	1	2	3	4	5	6	7
148.	On the whole, I'm able to deal with stress	1	2	3	4	5	6	7
149.	I try to avoid people who may stress me out	1	2	3	4	5	6	7
150.	I often indulge without considering all the consequences	1	2	3	4	5	6	7
151.	I tend to "back down" even if I know I'm right	1	2	3	4	5	6	7
152.	I find it difficult to take control of situations at work	1	2	3	4	5	6	7
153.	Some of my responses on this questionnaire are not 100% honest	1	2	3	4	5	6	7

## Appendix B

### ACADEMIC SELF-EFFICACY SCALE

**Authors:** Gafoor & Ashraf (2006). Adapted by Coulter (2020).

**Note:** I adapted the wording of some of the questions to allow for better clarity and to avoid double negatives.

**Directions:** Some statements concerning your beliefs about learning are given below. Five responses are given to each statement. 1. Exactly false, 2. Nearly False, 3. Neutral, 4. Nearly True and 5. Exactly true. Carefully read each statement and decide to what extent it is true in your case. Then circle the number in the column that corresponds to your case.

<b>Exactly False</b>	<b>Nearly False</b>	<b>Neutral</b>	<b>Nearly True</b>	<b>Exactly True</b>
1	2	3	4	5

In describing me, this statement is...	Exactly False	Nearly False	Neutral	Nearly True	Exactly True
1. Irrespective of the subject, I am competent in learning.	1	2	3	4	5
2. I cannot read and understand my text books well.	1	2	3	4	5
3. I sense that I am quick to pick the points from what I read.	1	2	3	4	5
4. I feel that I have no ability to remember things.	1	2	3	4	5
5. I can do my projects well.	1	2	3	4	5
6. I cannot manage time efficiently for learning.	1	2	3	4	5
7. I can arrange the help of my teachers in learning.	1	2	3	4	5

8. I fail to find the necessary resources for my assignments and studies.	1	2	3	4	5
9. I can arrange the help of my peers for my learning whenever I need it.	1	2	3	4	5
10. I fail to set higher goals in my study.	1	2	3	4	5
11. I can usually find out quite a few solutions when I am confronted with problems in my study.	1	2	3	4	5
12. I can't express ideas well while attending examinations.	1	2	3	4	5
13. It is difficult for me to read and understand the textbooks in English language.	1	2	3	4	5
14. During examinations, I can recollect what I have learnt.	1	2	3	4	5
15. Often I fail to comprehend the actual meaning of what I study.	1	2	3	4	5
16. If taught, I can prepare my class notes neatly.	1	2	3	4	5
17. I fail to find out time for learning in the midst of sundry (definition: various) chores.	1	2	3	4	5
18. I can't arrange the resources of my study from my relatives, neighbours, etc.	1	2	3	4	5
19. I am assured that I have a few friends who would be helpful in my studies.	1	2	3	4	5

20. I may not clarify my doubts to my teachers while in class, even if I reach higher level classes.	1	2	3	4	5
21. I can accomplish my aims in learning.	1	2	3	4	5
22. I can't answer essay questions well.	1	2	3	4	5
23. I experience that I am weak in understanding the classes of my teachers.	1	2	3	4	5
24. I can develop the reading skill required to learn school subjects.	1	2	3	4	5
25. When I study a new concept, I can't recall the related knowledge from the earlier classes.	1	2	3	4	5
26. I utilize the available library facility well for my study.	1	2	3	4	5
27. I often fail to prepare my seminars and assignments in time.	1	2	3	4	5
28. If I miss some classes for some reason, I can compensate for the loss fairly well.	1	2	3	4	5
29. I fail to develop a healthy relationship with my teachers.	1	2	3	4	5
30. I am confident that I can perform well in competitive examinations.	1	2	3	4	5
31. I can't deal efficiently with the unexpected problems in my study.	1	2	3	4	5
32. I can be calm at time of exam as I am	1	2	3	4	5

conscious of my ability to learn.					
33. I can't complete the homework myself without any help from guidebooks, previous notes etc	1	2	3	4	5
34. I can usually handle the difficult situations/questions in homework.	1	2	3	4	5
35. If a sudden test is conducted for us without prior notice, I can answer it well.	1	2	3	4	5
36. If I try, I can become one of the good grade holders.	1	2	3	4	5
37. I can't answer the questions which teachers ask me.	1	2	3	4	5
38. I can score well in the short answer type questions.	1	2	3	4	5
39. I can't accomplish challenging tasks and problems in my studies.	1	2	3	4	5
40. However twisted the question is I can answer them.	1	2	3	4	5

## Appendix C

### MATH SPECIFIC SELF-EFFICACY TEST

**Authors:** Riggs & Knight (1994). Adapted by Coulter (2020).

**Directions:** Think about your ability to do mathematics. When answering the following questions, answer in reference to your own personal skills and ability to perform mathematics. Respond with one of the six responses given to each statement.

<b>Strongly Disagree</b>	<b>Somewhat Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Somewhat Agree</b>	<b>Strongly Agree</b>
1	2	3	4	5	6

	<b>Strongly Disagree</b>	<b>Somewhat Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Somewhat Agree</b>	<b>Strongly Agree</b>
1. I have confidence in my ability to do mathematics.	1	2	3	4	5	6
2. There are some tasks required by mathematics that I cannot do well.	1	2	3	4	5	6
3. When my performance is poor, it is due to my lack of ability.	1	2	3	4	5	6
4. I doubt my ability to do my mathematics.	1	2	3	4	5	6
5. I have all the skills needed to perform mathematics very well.	1	2	3	4	5	6
6. Most people can do mathematics better than I can.	1	2	3	4	5	6
7. I am an expert at mathematics.	1	2	3	4	5	6

8. My future in mathematics is limited because of my lack of skills.	1	2	3	4	5	6
9. I am very proud of my mathematics skills and abilities.	1	2	3	4	5	6
10. I feel threatened when others watch me do mathematics.	1	2	3	4	5	6

## Appendix D

### LITERACY SPECIFIC SELF-EFFICACY TEST

**Authors:** Riggs and Knight (1994). Adapted by Coulter (2020).

**Directions:** Think about your ability for literacy skills. When answering the following questions, answer in reference to your own personal skills and ability to perform literacy tasks (reading, writing, grammar etc.). Respond with one of the six responses given to each statement.

<b>Strongly Disagree</b>	<b>Somewhat Disagree</b>	<b>Disagree</b>	<b>Agree</b>	<b>Somewhat Agree</b>	<b>Strongly Agree</b>
1	2	3	4	5	6

	Strongly Disagree	Some- what Disagree	Disagree	Agree	Some- what Agree	Strongly Agree
1. I have confidence in my ability to do literacy tasks.	1	2	3	4	5	6
2. There are some tasks required by literacy tasks that I cannot do well.	1	2	3	4	5	6
3. When my performance is poor, it is due to my lack of ability.	1	2	3	4	5	6
4. I doubt my ability to do my literacy tasks.	1	2	3	4	5	6
5. I have all the skills needed to perform literacy tasks very well.	1	2	3	4	5	6
6. Most people can do literacy tasks better than I can.	1	2	3	4	5	6
7. I am an expert at literacy tasks.	1	2	3	4	5	6

8. My future in literacy is limited because of my lack of skills.	1	2	3	4	5	6
9. I am very proud of my literacy skills and abilities.	1	2	3	4	5	6
10. I feel threatened when others watch me do literacy tasks.	1	2	3	4	5	6

## Appendix E

### TEST

#### **Message Given to Participants Prior to the Testing Period**

You will now be completing a math and literacy test.

This math test contains 16 multiple choice questions (you may use a calculator). The literacy test contains 24 multiple choice questions (divided into four parts).

Please spend *no more than 30 minutes* on each test (a maximum of one hour total). If you run out of time, you will need to guess to the best of your ability, as no question can be left blank.

It is crucial to this research that you *DO NOT search for the answers* electronically or ask anyone for help. Please answer all questions to the best of your own personal knowledge.

Remember, your scores will never be analyzed individually, only in larger correlational analysis (therefore your answers are confidential).

At the end of the test, you will be asked to verify that you did not cheat/use additional electronic resources and that all answers represent your own knowledge.

You are now ready to start.

### **PART 1: MATH QUESTIONS**

#### **Message Given to Participants Prior to the Math Test**

Instructions Reminder:

You may use a calculator and two formula sheets are provided for you below.

This math test contains 16 multiple choice questions.

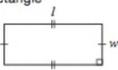
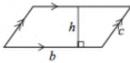
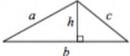
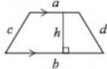
It is crucial to this research that you *DO NOT search for the answers* electronically or ask anyone for help. Answer all questions to the best of your own personal knowledge.

Please spend no more than a maximum of 30-45 minutes on this test.

You are now ready to start.

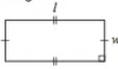
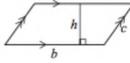
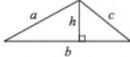
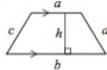
## Formula Sheet #1

**Formula Sheet**  
**Grade 9 Academic**

Geometric Shape	Perimeter	Area
Rectangle 	$P = l + l + w + w$ or $P = 2(l + w)$	$A = lw$
Parallelogram 	$P = b + b + c + c$ or $P = 2(b + c)$	$A = bh$
Triangle 	$P = a + b + c$	$A = \frac{bh}{2}$ or $A = \frac{1}{2}bh$
Trapezoid 	$P = a + b + c + d$	$A = \frac{(a + b)h}{2}$ or $A = \frac{1}{2}(a + b)h$
Circle 	$C = \pi d$ or $C = 2\pi r$	$A = \pi r^2$

## Formula Sheet #2

**Formula Sheet**  
**Grade 9 Academic**

Geometric Shape	Perimeter	Area
Rectangle 	$P = l + l + w + w$ or $P = 2(l + w)$	$A = lw$
Parallelogram 	$P = b + b + c + c$ or $P = 2(b + c)$	$A = bh$
Triangle 	$P = a + b + c$	$A = \frac{bh}{2}$ or $A = \frac{1}{2}bh$
Trapezoid 	$P = a + b + c + d$	$A = \frac{(a + b)h}{2}$ or $A = \frac{1}{2}(a + b)h$
Circle 	$C = \pi d$ or $C = 2\pi r$	$A = \pi r^2$

**Examples of Mathematics Questions Utilized:**

1. What is the value of this expression when  $x = -5$  and  $y = -3$ ?

$$\frac{2}{3}x^3y^2$$

- a. -750
- b. -60
- c. 60
- d. 750

2. Cereal comes in two different-sized boxes.

- Box A costs \$5.25 for 250 g.
- Box B costs \$4.50 for 375 g.

Which box is cheaper per gram, and how much cheaper per gram is it?

- a. Box B, \$0.009 per gram
- b. Box B, \$0.75 per gram
- c. Box A, \$0.033 per gram
- d. Box A, \$35.71 per gram

3. Which of these expressions is equivalent to  $(3x - 4y) - (-5x + y)$ ?

- a.  $8x - 5y$
- b.  $8x - 3y$
- c.  $-2x - 5y$
- d.  $-2x - 3y$

4. Information from linear relationships are shown in three of the tables below.

One table shows information from a non-linear relationship.

Use first differences to determine which option shows information from a non-linear relationship.

a.

$q$	$V$
1	5
2	7
3	9
4	11

b.

$q$	$V$
1	9
2	5
3	1
4	-3

c.

$q$	$V$
1	-3
2	-3
3	-3
4	-3

d.

$q$	$V$
1	-1
2	2
3	6
4	11

## **PART 2: LITERACY QUESTIONS**

### **Message Given to Participants Prior to the Literacy Test**

Instructions Reminder:

This literacy test contains 24 multiple choice questions and is divided into four parts (Section A, B, C & D).

It is crucial to this research that you **DO NOT** search for the answers electronically or ask anyone for help. Answer all questions to the best of your own personal knowledge. If multiple answers seem correct, choose the best possible answer.

Please spend no more than a maximum of 30-45 minutes on this test.

You are now ready to start.

### **Message Given to Participants Following Both the Mathematics and Literacy Tests**

Test Completion and Academic Honesty

1. Please check the boxes below.
  - I verify that all answers in the mathematics and literacy test reflected my own understanding.
  - I confirm that I did not utilize any additional electronic resources or ask for external aid to answer the questions.

**Examples of Literacy Questions and Readings Utilized:****Section A: Writing****Multiple-Choice Questions**

1. Which sentence does not belong in the following paragraph?

(1) Include mosquito prevention when planning outdoor summer fun. (2) Remove standing water where mosquitoes can breed. (3) Plant citronella and rosemary, which mosquitoes dislike. (4) Wear pants and long sleeves, especially in the evening. (5) Blackflies can be an even bigger nuisance. (6) Taking these steps will keep these pesky bugs from ruining your fun.

- a. sentence 2
- b. sentence 3
- c. sentence 4
- d. sentence 5

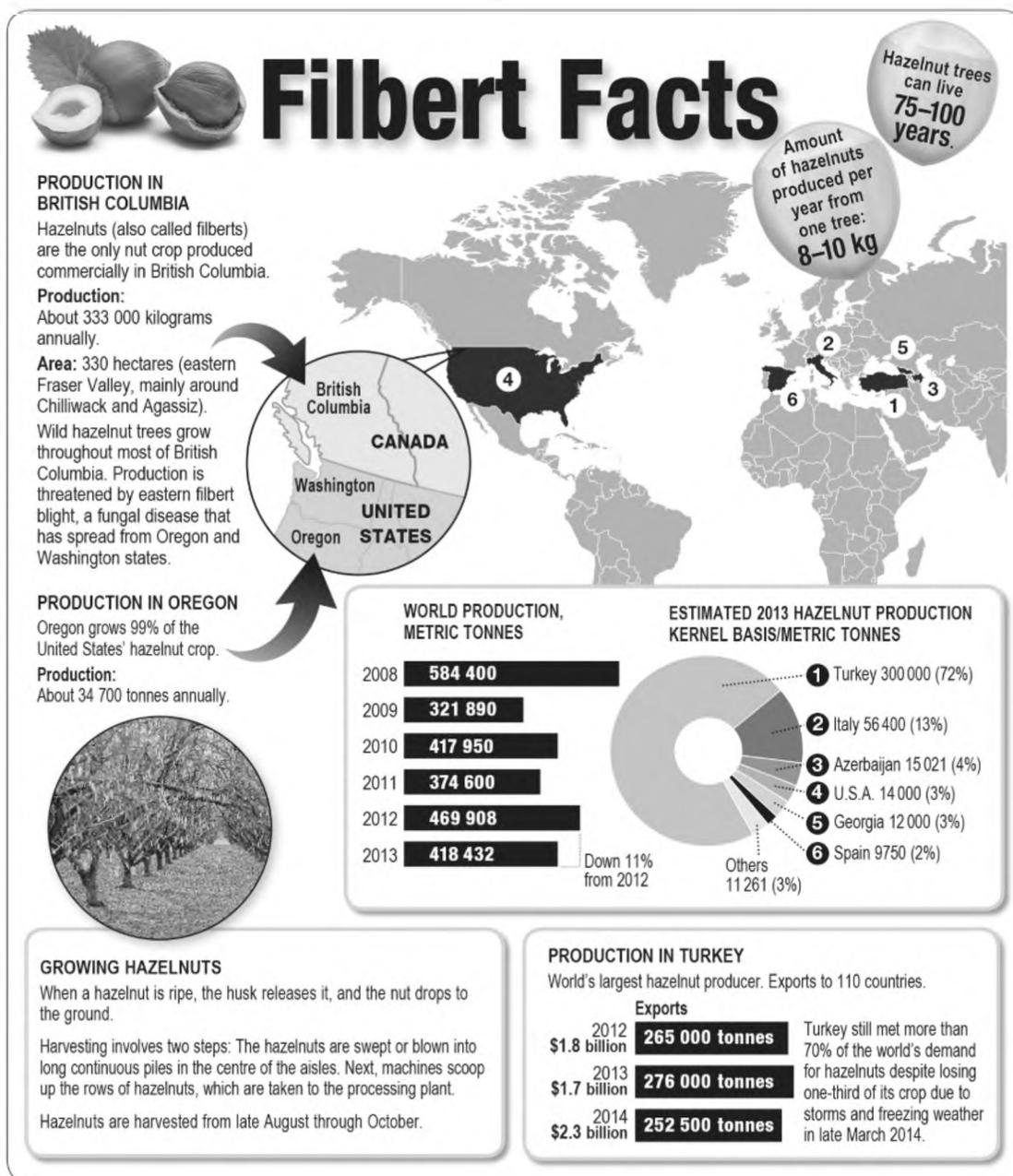
2. Choose the correct pronouns to complete the following sentence:

When the little boy grabbed the toy train, \_\_\_\_\_ wheel broke off in \_\_\_\_\_ hand.

- a. its / his
- b. it's / his
- c. its / he's
- d. it / one's

## Section D: Reading

Read the selection below and answer the questions that follow it.



**Section D****Multiple-Choice Questions**

- 1. According to the selection, what is eastern filbert blight?**
  - a. It is a crop disease.
  - b. It is an isolated incident.
  - c. It is a production decrease.
  - d. It is a severe weather condition.
  
- 2. What information links the two hazelnuts at the top right corner of the page?**
  - a. the size of the hazelnut orchard
  - b. the production rate of hazelnut trees
  - c. the worldwide locations of hazelnut production
  - d. the geographic relationship between Canada and the United States
  
- 3. In which section can you find information about wild hazelnuts?**
  - a. Production in Oregon
  - b. Production in British Columbia
  - c. World Production, Metric Tonnes
  - d. Estimated 2013 Hazelnut Production

**Appendix F**  
**DEMOGRAPHIC SURVEY**

Please fill out this survey with the responses that best describes you.

2. How old are you? \_\_\_\_\_
3. What is your sex?
- Male
  - Female
  - I prefer not to say
  - Other: \_\_\_\_\_
4. Are you currently a student at Tyndale University?
- Yes
  - No
5. What is your ethnicity?
- Caucasian (White)
  - African-American
  - Latino or Hispanic
  - Asian
  - Indigenous
  - I prefer not to say
  - Other: \_\_\_\_\_
6. Did you attend high school in Ontario?
- Yes
  - No
  - Yes, but not all four years
  - Other: \_\_\_\_\_
7. What kind of high school did you attend?
- Public High School
  - Catholic High School
  - Private High School
  - Homeschooled/Online School
  - Other: \_\_\_\_\_
8. Did you complete the grade nine EQAO (Education Quality and Accountability Office) Math examination?
- Yes

- No
- I cannot recall
- Provide any additional comments you would like to clarify your answer above:

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**9. Did you complete the grade 10 OSSLT (Ontario Secondary School Literacy Test) exam?**

- Yes
- No
- I cannot recall
- Provide any additional comments you would like to clarify your answer above:

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**10. If you answered yes to (7), what year were you in grade nine (e.g. 2013/2014)?**

- Please write your answer: \_\_\_\_\_

**11. If you answered yes to (8), what year were you in grade 10 (e.g. 2014/2015)?**

- Please write your answer: \_\_\_\_\_

**12. Have you taken or are you currently enrolled in a course involving mathematics while in university/college?**

- Yes
- No

**13. If you answered yes to (11), what course(s)?**

- Please write your answer: \_\_\_\_\_

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**14. Have you taken or are you currently enrolled in a course involving literature while at in university/college?**

- Yes
- No

**15. If you answered yes to (13), what course(s)?**

- Please write your answer: \_\_\_\_\_

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## Appendix G

### INFORMED CONSENT

You are being invited to participate in a research study. Please read this consent form so that you understand what your participation will involve. Please ask questions to the investigator if you need any clarification.

#### **EMOTIONAL INTELLIGENCE, SELF-EFFICACY, AND TESTS**

**INVESTIGATOR:** This research study is being conducted by Avery Coulter and will be supervised by Dr. Nancy Ross from the department of psychology at Tyndale University.

**PURPOSE OF THE STUDY:** This research study is designed to explore the relationship between emotional intelligence (EI), self-efficacy, and test performance. I will be collecting data on individuals 18 or older and currently live in Ontario, Canada.

**WHAT PARTICIPATION MEANS:** If you volunteer to participate in this study, you will be asked to do the following:

You will be asked to complete a survey on Academic Self-Efficacy (Gafoor & Ashraf, 2006) as well as two questionnaires on mathematics and literacy specific self-efficacy (Riggs & Knight, 1994). Then you will take a multiple choice test containing mathematics and literacy questions. You will then be asked to complete the Trait Emotional Intelligence Questionnaire (TEIQue) (Petrides, 2009). You will finalize your participation by filling out a brief demographic survey.

Your participation is expected to take between an hour and a half and two hours (1.5 hours - 2 hours).

**POTENTIAL BENEFITS:** This study could help you to understand yourself better by thinking about different aspects of your personality. You may learn more about how you handle your emotions, the emotions of others and your perception of social events. Moreover, the study can aid in expanding your understanding of your mathematics or literacy skills and abilities. The investigator is also looking to improve psychology's understanding of the relationship between EI, self-efficacy, and test performance. This may also have potential benefits for teachers and professors in maximizing the test scores of their students.

**POTENTIAL RISKS:** The potential risks for this study are low. It could be emotionally upsetting for you as you consider various aspects of your personality. It could cause discomfort or unpleasant emotions while reflecting on any negative personality traits you may possess. There is also the potential stress or discomfort from math and literacy testing.

**CONFIDENTIALITY:** All surveys and scales will be kept confidential. Your responses and scores will be given a randomly assigned number for organizational purposes, and your name will not be attached to any of the documents. Your information will only be used for statistical purposes and in comparison to others' data. It will not be isolated for any purpose.

**COMPENSATION:** If you are currently enrolled in a psychology class at Tyndale University you will be compensated with two percent extra credit. All other participants will be compensated with one entry in a draw for a gift card.

**VOLUNTARY PARTICIPATION AND WITHDRAWAL:** You are not required to participate in this study. Your participation is entirely voluntary and you do not need to respond to any or all questions. You may decide to stop at any time and you may choose whether your data will be used in this research study or not. Your withdrawal will not have any consequences and will not affect your relationship with any of the investigators or Tyndale University.

**LEGAL RIGHTS:** Your consent to this study does not mean that you are giving up any of your legal rights.

**QUESTIONS ABOUT THE STUDY:** If you have any questions about the research now, please ask. If you have questions later about the research, you may contact any or all of the following:

Avery Coulter: ☎ \_\_\_\_\_  
 Nancy Ross: [nross@tyndale.ca](mailto:nross@tyndale.ca)

This study has been reviewed by the Tyndale University Research Ethics Board. If you have questions regarding your rights as a participant in this study please contact:

Research Ethics Board: [reb@tyndale.ca](mailto:reb@tyndale.ca)

**FOLLOWING PARTICIPATION:** There are no plans to contact you again, nor is there any form of follow-up session or subsequent related study you are required to participate in. At the end of the Winter semester in 2021, there will be an opportunity to observe a presentation containing the results of this study if you desire to attend. While the investigator intends to publish this study, no formal connections have been made to do so and it is thus unknown as to whether or not this will occur.

**SECONDARY USE OF DATA:** If you approve, your data may be reanalyzed for future use. All of your results will remain confidential. Do you consent to having your data potentially reanalyzed for further use by other researchers for other purposes? Please indicate below:

- Yes, I consent to the potential secondary use of my data.
- No, I do not want my data to be analyzed outside of this particular study.

**CONFIRMATION OF AGREEMENT:** Your signature below indicates that you have read and understood the information in this agreement. Your signature indicates that you agree to participate in the study and have been told that you can ask questions, change your mind and withdraw your consent to participate at any time. Moreover, you have indicated consent to your research participation by signing this research consent form. You have been given a copy of this agreement. You have been told that by signing this consent agreement you are not giving up any of your legal rights.

\_\_\_\_\_  
 Name of Participant (please print)

---

Signature of Participant

---

Date