

**The Social and Emotional Experience of Having a Learning Disability  
in High School**

**by**

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## **ABSTRACT**

### **The Social and Emotional Experience of Having a Learning Disability in High School**

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Research investigating the social and emotional difficulties of individuals with LDs has found many of them continue to describe their life negatively, despite improvements in our understanding of LDs and in accommodations. In our previous research, university students with LDs often retrospectively reported their experience in high school, using various descriptors, as one of feeling alone and alienated, frustrated, hopeless, scared and anxious, embarrassed, and inferior to others. By using the descriptors they themselves provided, we created a self-report survey that we hoped addressed a breadth of feelings concerning the LD experience in high school. In the current study, university students reflected upon their high school experience on this newly developed social emotional survey. Additionally, each participant was given a demographic questionnaire and asked to self-rate their academic competence in a variety of skill areas. The results revealed that our questionnaire contained four factors reflecting feelings of alienation and isolation, anxiety and depression, anger and hatred, and embarrassment and shame. Overall, participants with LDs reported a significantly more negative social emotional experience of high school than participants without LDs, especially for feelings of alienation, anxiety, and embarrassment. In addition, participants reported greater feelings of frustration and inadequacy. Unsurprisingly, participants with LDs reported significantly lower perceived academic abilities. We found that self-reported math and science skill correlated with each social emotional factor, with lower self-reported math and science skill associated with increasingly negative social emotional experiences of high school. The results also showed that nearly double

the proportion of individuals with LDs (29%) obtained more negative social emotional scores averaged across all four factors compared to those without LDs (16%). This highlights a serious need for increased efforts to help individuals with LDs feel more supported and accepted, and less ashamed, anxious, isolated, inadequate, and frustrated, as well as increased education for individuals who interact with adolescents with LDs, to increase empathy and understanding about what it is like to experience an LD.

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## Table of Contents

<b>List of Tables</b> .....	viii
<b>List of Figures</b> .....	x
<b>Introduction</b> .....	1
Previous Research on the Social Emotional Functioning of Individuals with LD .....	2
Learning Disability Experience .....	5
The Present Study .....	7
<b>Part 1: Scale Creation</b> .....	9
<b>Method</b> .....	9
Initial Item Selection .....	9
Q-sort Procedure .....	9
Selection of Items from Q-sort .....	9
Participants .....	12
Survey Completion .....	14
Analytic Procedures .....	15
Exploratory Factor Analysis of Survey .....	15
Extraction .....	16
Rotation .....	16
Number of factors .....	17
Confirmatory Factor Analysis of Survey .....	17
<b>Results</b> .....	18
Determining the Factor Structure .....	18
First model .....	19
Second model .....	19
Final model .....	20
Exploratory Analysis of Fit .....	23
Six-factor model .....	23
Four-factor model .....	24
The Four Factors .....	26
Alienated factor .....	26
Anxious factor .....	27

Angry factor .....	27
Embarrassed factor .....	27
Factor correlations .....	28
<b>Summary</b> .....	28
<b>Part 2: Comparison of Individuals with and without Learning Disabilities</b> .....	29
<b>Method</b> .....	29
Multiple Regressions .....	30
<b>Results</b> .....	30
Comparing Gender and Learning Disability .....	30
Controlling for demographic variables .....	33
Proportion of Participants with Elevated Average Scores on each Factor .....	34
Comparison of LD and Non LD Groups on Survey Items within each Factor .....	36
Alienated factor .....	36
Anxious factor .....	37
Angry factor .....	38
Embarrassed factor .....	39
Inadequacy factor .....	40
Remaining items .....	41
Academic Abilities .....	42
Academic Factor Analysis .....	45
First model .....	45
Final model .....	46
Two factors .....	47
Structural equation modeling .....	48
Comparing Academic Factors by Learning Disability .....	49
Proportion of participants with elevated average scores on each factor .....	50
Proportion of participants with lower average scores on each factor .....	51
Concentration, memory, and spelling by social emotional factors .....	52
Learning Disability as a Moderator of the Relationship Between the Academic and Socio- Emotional Factors .....	53
Regression model and assumptions .....	54

Alienated factor .....	55
Anxious factor .....	57
Angry factor .....	58
Embarrassed factor .....	60
Across all factors combined .....	62
<b>Discussion</b> .....	<b>64</b>
Scale Construction .....	65
Factor structure .....	66
Factors .....	66
Social Emotional Differences Between Individuals With and Without Learning Disabilities .....	67
Feelings of alienation .....	68
Feelings of anxiety and depression .....	69
Feelings of anger .....	70
Feelings of frustration .....	71
Feelings of embarrassment .....	73
Feelings of inadequacy .....	74
Proportion of participants with elevated mean scores across all factors .....	75
Differences in Ratings of Academic Skills between Individuals With and Without Learning Disabilities .....	76
The Relationship Between Social Emotional Factors and Academic Skills .....	78
LD as a moderator of the relation between academic and social emotional factors .....	79
Limitations of the Current Study .....	80
Generalizability of Results .....	82
Future Research .....	82
Concluding Comments .....	83
<b>References</b> .....	<b>86</b>
<b>Appendix 1</b> .....	<b>94</b>
<b>Appendix 2</b> .....	<b>97</b>
<b>Appendix 3</b> .....	<b>105</b>
<b>Appendix 4</b> .....	<b>106</b>

### List of Tables

Table 1. The agreement on the number of items the 6 participants sorted into six descriptor categories. ....	10
Table 2. The percentage of agreement of items the six participants originally sorted into the Acceptance categories separated by Acceptance from Others and Self-Acceptance .....	11
Table 3. Breakdown of the participants' demographics. ....	13
Table 4. The 13 survey items that were removed from the factor structure due to communalities lower than .4.....	19
Table 5. Principal Axis Factoring obliquely rotated loadings for each of the 48 survey items.....	21
Table 6. The fit indices for the six-factor structural equation model.....	23
Table 7. The modification indices for a six-factor model.....	23
Table 8. Factor loadings of the nine items that were removed from the six-factor model .....	24
Table 9. The modification indices for a four-factor model.....	25
Table 10. The fit indices for the four-factor structural equation model.....	25
Table 11. The correlations between the four factors.....	28
Table 12. The sample size, means, and standard deviations for each of the four factors organized by group (LD vs. Non-LD) and gender (male vs. female).....	31
Table 13. The proportion of participants with and without learning disabilities whose average score on each factor was one standard deviation above the mean on each factor .....	35
Table 14. The proportion of participants with and without learning disabilities whose average score on each factor was greater than a rating of three.....	36
Table 15. The correlations between the eight academic skills.....	45
Table 16. The communalities for the eight academic abilities factor model .....	46
Table 17. Principal Axis Factoring Varimax rotated loadings for each of the five academic ability items.....	47
Table 18. The correlations between items within the Language Skills factor .....	48
Table 19. The fit indices for the two-factor structural equation model for the five academic skill .....	49
Table 20. The proportion of participants with and without learning disabilities whose average score on each factor is one standard deviation above the mean .....	51

Table 21. The proportion of participants with and without learning disabilities whose average score on each factor is greater than a rating of four.....	51
Table 22. The proportion of participants with and without learning disabilities whose average score on each factor was one standard deviation below the mean.....	52
Table 23. The proportion of participants with and without learning disabilities whose average score on each factor was less than a rating of two.....	52
Table 24. The correlations between items that failed to load onto the academic factors with the social emotional factors Language Skills factor .....	53
Table 25. The correlation of the academic skills and socio-emotional factors along with means and standard deviations.....	53
Table 26. The regression model summary with Science and Math Skills as the predictor variable, the Alienation factor as the outcome variable, and the presence of an LD as the moderator.....	55
Table 27. A summary of the regression coefficients for the Alienation factor.....	55
Table 28. The regression model summary with Science and Math Skills as the predictor variable, the Anxiety factor as the outcome variable, and the presence of an LD as the moderator.....	57
Table 29. A summary of the regression coefficients Anxiety factor .....	57
Table 30. The regression model summary with Science and Math Skills as the predictor variable, the Angry factor as the outcome variable, and the presence of an LD as the moderator .....	59
Table 31. A summary of the regression coefficients Angry factor.....	59
Table 32. The regression model summary with Science and Math Skills as the predictor variable, the Embarrassed factor as the outcome variable, and the presence of an LD as the moderator ....	61
Table 33. A summary of the regression coefficients for the Embarrassed factor.....	61
Table 34. The regression model summary with Science and Math Skills as the predictor variable, the mean score across all factors as the outcome variable, and the presence of an LD as the moderator .....	63
Table 35. A summary of the regression coefficients for the mean score across all factors.....	63

## List of Figures

Figure 1. The scree plot for the Principal Axis Factor extraction with an oblique rotation including the means and 95 <sup>th</sup> percentile results from the parallel analysis of 48 items.....	21
Figure 2. Four factor structural equation model for the 36 survey items .....	26
Figure 3. The mean (+/- SEM) factor score reported by participants with and without learning disabilities and by gender.....	31
Figure 4. The mean (+/- SEM) scores on each factor as reported by participants with and without learning disabilities for each of the four factors .....	32
Figure 5. The mean (+/- SEM) scores on each factor as reported by male and females for each of the four factors .....	33
Figure 6. A comparison of participants with and without LDs on the 13 items that load onto the Alienated factor sorted by their hypothesized category.....	37
Figure 7. A comparison of participants with and without LDs on the nine items that load onto the Anxious factor sorted by their hypothesized category.....	38
Figure 8. A comparison of participants with and without LDs on the seven items that load onto the Angry factor sorted by their hypothesized category .....	39
Figure 9. A comparison of participants with and without LDs on the seven items that load onto the Embarrassed factor sorted by their hypothesized category.....	40
Figure 10. A comparison of participants with and without LDs on the items projected to originally be in the Inadequacy Category. Most of these items loaded onto the sixth factor, which was eliminated while assessing model fit.....	41
Figure 11. A comparison of participants with and without LDs on the seven items that failed to load onto any of the factors sorted by their hypothesized category.....	42
Figure 12. The mean (+/- SEM) Average Academic Ability reported by participants with and without learning disabilities.....	43
Figure 13. The mean (+/- SEM) Academic Ability reported by participants with and without learning disabilities in eight different academic skills.....	44
Figure 14. The scree plot for the Principal Axis Factor extraction with a Varimax rotation including the means and 95 <sup>th</sup> percentile results from the parallel analysis of the five academic rating items.....	47
Figure 15. The structural equation model for each of the two academic factors.....	49

Figure 16. The mean (+/- SEM) score on each factor reported by participants with and without learning disabilities for each of the two academic factors .....	50
Figure 17. The predicted value of the Alienated factor by the Science and Math factor (represented by the solid line) and by LD.....	56
Figure 18. The predicted value of the Anxious factor by the Science and Math factor (represented by the solid line) and by LD .....	58
Figure 19. The predicted value of the Angry factor by the Science and Math factor (represented by the solid line) and by LD .....	60
Figure 20. The predicted value of the Embarrassed factor by the Science and Math factor (represented by the solid line) and by LD.....	62
Figure 21. The predicted value of the mean score across all factors by the Science and Math factor (represented by the solid line) and by LD .....	64

## **The Social and Emotional Experience of Having a Learning Disability in High School**

Over the past 10 years, the diagnosis, understanding, and conceptualization of learning disabilities (LDs) have greatly improved. Additionally, as technological advancements evolved, so did the quality and quantity of various assistive resources and accommodations that are available for children with LDs (Fletcher, Lyon, Fuchs, & Barnes, 2007; Ganschow, Coyne, Parks, & Antonoff, 1999). These advancements have, in theory, greatly improved the quality of life for many individuals with LDs. However, many of them continue to describe their life negatively. Although accommodations are available to them to help cope with their academic difficulties in these subjects, little is typically done to help with any social emotional difficulties that might come as a result of their academic difficulties, or even as a result of receiving the accommodations themselves. For example, students might feel isolated, singled out, or embarrassed if they need to write tests in a different room or format. They could worry in class about having to read out loud or about making a mistake. Even those who excel in most subjects could feel inferior to others if they struggle with one aspect of learning, such as pronouncing words. Such individuals might not present as clinically anxious or depressed. However, while in school, they may feel paralysing anxiety and sadness, especially if at some point they were teased for their academic difficulties. Efforts need to be made to better understand the LD experience and what can be done to help students with LDs to have a better high school experience.

Through my previous MA research (Noble & Evans, 2013), the “LD experience” in high school was retrospectively reported as one of feeling alone and alienated, frustrated, depressed and hopeless, scared and anxious, embarrassed, and inferior to others (see also Raskind, Margalit, & Higgins, 2006). However, research on whether individuals with LDs experience a

greater prevalence of clinical disorders, such as depression and anxiety disorders, is inconclusive (Gregoire & Desoete, 2009, Maag & Reid, 2006). What is clear is that the overall LD experience appears negative, especially for high school students. To our knowledge, there are not currently any self-report measures that allow one to capture the breadth of feelings individuals with LDs experience during adolescence and no research that has directly compared this breadth of social emotional experience between adolescents with and without LDs. Each of these gaps motivated this research. In addition it sought to determine 1) the intensity or magnitude of this negativity and 2) some factors that might contribute to such negativity despite improvements in understanding of LDs and assistive technology.

### **Previous Research on the Social Emotional Functioning of Individuals with LD**

Many researchers have investigated the relation between LDs and social emotional well-being. Research has demonstrated that individuals with LDs struggle in a variety of social-emotional areas. Behaviourally, school-aged individuals with LDs are much more likely to experience externalizing problems, and twice as likely to fit the criteria for behavioural disorders compared to individuals without LDs (Yu, Buka, McCormick, Fitzmaurice, & Indurkha, 2006). Individuals with LDs are also more likely to feel isolated, rejected, and lonely (Estell et al., 2008; Kuhne & Wiener, 2000; Noble & Evans, 2013; Sabornie, 1994), an effect that appears to be more pronounced in high school (Goldberg, Higgins, Raskind, & Herman, 2003). Students with LDs also report having less social support (Martinez, 2006), and are more likely to experience social difficulties and have lower levels of social status than children without academic difficulties (Estell et al., 2008; Nowicki, 2003). Martinez (2006) also found that the greater the severity of LD difficulties, the lower the self-reported feelings of social support, further

suggesting a relationship between the severity of academic difficulties and social emotional experiences.

It appears this relationship between social emotional functioning and LDs in school-aged children with LDs is related to academic performance, as research that compares self-concept between individuals with and without LDs is typically inconclusive, often revealing little to no differences. However, when academic self-competence is taken into account, individuals with LDs typically report significantly lower academic self-concept compared to those without LDs, despite having similar global self-concepts (Huntington & Bender, 1993). Further, students with LDs report much lower academic self-efficacy despite whether they receive similar grades to students without LDs (Hen & Goroshit, 2014, Lackaye, Margalit, Ziv, & Ziman 2006). Even children as young as 8-years-old with LDs report lower academic confidence compared to those without LDs (Boersma & Chapman, 1981; Boersma & Chapman, 1990; Chapman, 1988; Chapman & Boersma, 1979). Thus, collectively, these findings suggest that the social emotional well-being of students with LD is likely impacted by their academic struggles, supporting the importance of considering the relationship between academics and social emotional experiences in the current study.

Given the above findings, it is not surprising that research suggests a relation between LDs and internalizing symptoms, as a lack of social support, feelings of loneliness and rejection, and experiences of bullying and academic difficulties individually, let alone collectively, are often associated with internalizing symptoms. That is, individuals with LDs report experiencing increased levels of anxiety, depressive symptoms, and social difficulties (Gregoire & Desoete, 2009; Newcomer, Barenbaum, & Pearson, 1995; Sideridis, 2007), a relationship further supported by meta-analyses of the literature (Maag & Reid, 2006; Nelson & Harwood, 2011).

Nelson and Harwood's 2011 meta-analysis of school-aged individuals with LDs revealed that 70% of students with LDs report higher levels of anxiety compared to those without an LD, suggesting that the majority of individuals with LDs experience elevated levels of anxiety. More specifically, compared to their peers, individuals with LDs have reported increased levels of worry and rumination (Whitaker Sena, Lowe, & Lee, 2007), especially about looking stupid in class and being criticized (Dollinger, Horn, & Boarini, 1988). Students with LDs also report worrying about falling behind or keeping up with their coursework in the future, especially as work gets harder, as many students reported they were already working as hard as possible (Lackaye et al., 2006). Students with LDs also report much greater levels of procrastination than those without LDs (Hen & Goroshit, 2014). In addition, Lackaye and colleagues (2006) found that students with LDs rated their mood more negatively and reported greater feelings of hopelessness compared to students without LDs, despite controlling for academic performance, further suggesting that something more than simply current academic performance contributes to lower overall social emotional well-being.

It might be thought that a greater prevalence of clinically significant internalizing disorders contributes to lower social emotional well-being. However, as mentioned earlier, research on the prevalence of clinical depression and anxiety is contradictory (Gregoire & Desoete, 2009, Maag & Reid, 2006; Newcomer, Barenbaum, & Pearson, 1995; Wilson, Armstrong, Furrie, & Walcot, 2009). Thus, it appears many individuals with LDs might experience higher levels of anxious and depressive symptoms, but overall, not warrant a clinical diagnosis, highlighting the great importance of measuring anxiety and depression dimensionally in individuals with LDs.

However, most research presented above typically focused on only one social emotional dimension, rather than the collective LD experience. This approach fails to capture the collective and exponential effect multiple negative experiences can have on one's emotional functioning, likely underestimating the overall social emotional impact of what it feels like to live with an LD during school-aged years.

**Learning Disability experience.** A few studies have looked at the broad LD experience by qualitatively examining participants' reports about their experience of living with an LD. Raskind, Margalit, and Higgins (2006) found that when elementary students with LDs are given a chance to discuss their LD on a website designed for children with LDs, they typically discussed their various academic difficulties and the many negative emotions and experiences associated with having an LD. They described feelings of frustration, sadness, inferiority, anxiety, and isolation, while reporting very few positive descriptors. Similarly, Goldberg and colleagues (2003) found that adults with LDs continued to report negative emotions, such as depressive symptoms, anxiety, and stress throughout their life. However, they felt that their childhood was the most difficult time to have an LD, as adulthood allowed for more freedom to choose careers and courses in which they excelled. Unfortunately, for students with LDs, the high school curriculum in most schools in Ontario requires credits in courses in which many students with LDs struggle, and does not allow for much niche-picking.

Our previous research investigated how it felt to have an LD both retrospectively in high school and presently in university (Noble & Evans, 2013). University students were asked to list the feelings they experienced in high school related to their LD, and again for university. From the words and phrases they offered, 17 conceptual descriptor categories were identified that captured their description of their LD experience. These 17 categories included the following

nine negative categories. Sample adjectives and phrases provided by the participants in each category appear in parentheses: 1) Alienation (isolated, different, lonely, segregated, rejected); 2) Anger (angry, mad, pissed off, hate[ful], hostile, bitter); 3) Frustration (frustrated, stuck, “studied so much but the results didn’t reflect it”); 4) Anxiety (fearful, worried, concerned, nervous, scared, afraid); 5) Poor Coping (unfocused, confused, overwhelmed, difficulty with change, disorganized); 6) Inadequate (slow, less intelligent, dumb, stupid, incompetent); 7) Embarrassed (ashamed, embarrassed, didn’t want to admit I had an LD, trying to hide their LD, only telling close friends about their LD); 8) Negative Mood and Self-Image (depressed, hopeless, upset, never happy, ugly, low self-esteem); and 9) Pressure (tight for time, pressure, stress, tense). There was one neutral category that included participant’s feeling their LD “didn’t affect them,” and feeling fine and indifferent.

The seven positive categories that emerged included the following: 1) Determination (persevering, determined, making people change perceived opinions about them, needing to prove their intelligence); 2) Positive Mood and Self-Image (happy, hopeful, high self-esteem, feeling better about themselves, excited); 3) Capable (smart, not stupid, educated, and confident); 4) Acceptance (proud, never ashamed of their LD, more belonging, more open about their LD, better understanding, describing their LD as part of who they are); 5) Helpful Environment (professors are helpful, professors are more willing to spoon feed when they had a problem, teachers advocate for them); 6) Good Coping (optimistic, less pressure, more prepared, self-advocacy); and 7) Socially Integrated (lots of friends, supported, overjoyed/loved, outgoing).

Overall, participants reported a higher frequency of negative descriptors than positive for both their high school and university experience. However, high school consisted of very few positive descriptors, with participants reporting significantly more descriptors reflecting

alienation, anger, inadequacy, embarrassment, negative mood and self-image, and poor coping strategies in high school compared to university. Additionally, frustration was reported often in both high school and university; it was by far the most frequently reported descriptor.

What is interesting to note is how alarmingly negative these students with LDs reported their experience of high school, and that these reports did not differ across our 10 years of data collection, despite improvements in accommodations and understanding of LDs. Positive descriptors were reported so infrequently in high school that categories derived from them did not provide any meaningful information when identifying subclasses of students in this sample. As a result, latent class analysis revealed two negative subclasses of students — a negative class (69.3% of the sample) and extremely negative class (30.7%) — and no positive one. In addition, about a third of the sample had very high probabilities of reporting descriptors in nearly all of the negative categories. While this study revealed the variety of feelings experienced, it did not attempt to measure the intensity or magnitude with which each descriptor was felt. Additionally, there was not a baseline comparison to the non-LD experience in high school. Therefore, it was unknown if high school is reported negatively by many students, regardless of whether they have an LD, or whether this negatively was specific to individuals with LDs.

### **The Present Study**

The present study is an extension on the qualitative research by Noble and Evans (2013). We developed a questionnaire to compare the high school experience of students with and without LDs, using the descriptors that students most frequently provided in Noble and Evans (2013) to describe their LD experience. By doing so, we hoped to capture the breadth of their experience. Secondly, by collecting the responses to this questionnaire from students with and without an LD, we hoped to identify any distinctions between the two groups and the intensity of

feelings. Finally, by also collecting demographic and self-reports of the type of disability, we hoped to provide further understanding of what factors might contribute to making an LD in high school such a negative experience. For example, is it influenced by particular academic difficulties and/or greater severity of difficulties? Is it influenced by socioeconomic status or any other demographic variables? Identifying different subgroups of individuals may help teachers and administrators better understand and identify what type of accommodations, sensitivity, and care is needed to help particular students.

Thus, the goal of the present research was threefold. First, in Study 1, we developed a self-rating questionnaire using descriptors previously generated by students with LDs. Second, using this questionnaire in Study 2, we compared the LD and non-LD high school experience as reported by these two groups of participants to determine whether their experiences was more negative than that of their peers. We hypothesized that participants with LDs would report a more negative high school experience overall, and especially more feelings of embarrassment, frustration, inferiority, anxiety, depression, and alienation. Third, given that LDs differ in the severity and number of areas of difficulty, which Martínez and Semrud-Clikeman (2004) reported to directly affect the severity of their social emotional difficulties, we examined whether particular academic difficulties were associated with more negative high school experiences. We hypothesized that those individuals with greater severity of academic difficulties would report more negative high school experiences. Further, since language and reading are critical components of learning in most academic subjects, we hypothesized that students with difficulties in these areas would report more negative factors in high school than those with difficulties that are more specific to one subject (e.g., mathematics).

## Part 1: Scale Creation

### Method

**Initial item selection.** After reviewing all the descriptions provided in Noble and Evans (2013), 111 of the most commonly reported descriptors were selected and sorted by participants using a Q-sort procedure.

**Q-sort procedure.** After selecting these 111 items, a q-sort task was used to objectively reduce the number of items in the survey to a more reasonable number. Each participant completing the q-sort was tested individually and blind to other participant's results. Six clinical doctorate students, two male and four female, were presented with all 111. Items were presented to participants on separate pieces of paper (see Appendix 1 for full list of 64 survey items and 47 subsequently excluded items). The following eight conceptual categories thought to best capture the 111 items, along with their operational definitions (see introduction for discussion on definitions), were displayed in separate columns on a large table: 1) Social Support; 2) Coping Strategies; 3) Mood and Self-Image; 4) Acceptance; 5) Adequacy; 6) Anger; 7) Frustration; and 8) Anxiety.

Participants physically placed each item under the category they felt was the best fit. If participants were unsure where to sort any item, then they could sort the item into an additional ninth "other" category. Participants were given as much time as needed to complete the sorting task. Participants were able to ask clarification questions, and move items freely between groups until the task was finalized and their results were recorded.

**Selection of items from Q-sort.** The items that received the most agreement between participants completing the Q-sort were included in the survey to be presented to undergraduate

participants with and without LDs. We required each item to receive agreement between at least three of the six participants, with the exception of a couple of items discussed below.

For six of the categories, we chose the eight items that received the highest percentage of agreement for a total of 48 items. Table 1 presents the number of items in each category receiving each level agreement, as well as for the total scale in the last two columns.

*Table 1.* The agreement on the number of items the 6 participants sorted into six descriptor categories.

<b>Percentage Agreement</b>	<b>Adequacy</b>	<b>Anger</b>	<b>Anxiety</b>	<b>Frustration</b>	<b>Mood and Self-Image</b>	<b>Social Support</b>	<b>Total Scale</b>	<b>Total Scale (%)</b>
<b>100</b>	0	4	6	1	3	4	18	38
<b>83</b>	3	3	1	1	4	4	16	33
<b>67</b>	3	0	1	2	0	0	6	13
<b>50</b>	2	1	0	3	1	0	7	15
<b>33</b>	0	0	0	1	0	0	1	2

Participants had difficulty sorting items into the two remaining categories of Acceptance and Coping Strategies. The Coping Strategies category was removed from the survey due to poor sorting within this category. However, some items that had been thought to reflect Coping Strategies were sorted with agreement into different categories and thus were included in the survey in the relevant category.

With respect to items that had been thought to reflect acceptance, participants reported that it was difficult to distinguish between whether the Acceptance category referred to “acceptance of one’s self” or about receiving “acceptance from others.” Half of the participants sorted items reflecting “acceptance of others” into the Social Support category, while the other half sorted them into the Acceptance category. Alternatively, half of participants sorted items

reflecting “self-acceptance” as Mood/Self-Image, while the other half sorted these items into the Acceptance category (see Table 2).

*Table 2.* The percentage of agreement of items the six participants originally sorted into the Acceptance categories separated by Acceptance from Others and Self-Acceptance.

<b>Percentage Agreement</b>	<b>Acceptance from Others</b>	<b>Self-Acceptance</b>
<b>100</b>	0	0
<b>83</b>	1	0
<b>67</b>	3	1
<b>50</b>	3	6
<b>33</b>	1	1

As a result of the feedback from participants, it was decided to divide the Acceptance category into the two categories of Acceptance from Others and Self-Acceptance. The top eight items reflecting each of these were identified and included in the final scale. These items were not re-sorted with a new set of participants, as we felt that on the basis of the agreement in the q-sort conducted, that these items placed into Acceptance from Others would fall into either this new category or the Social Support category, and the items placed in Self-Acceptance would fall into either this new category or a Mood/Self-Image category.

Lastly, three items were included that had only 33% agreement. Two of these items (“I felt embarrassed about myself” and “People do not understand me”) were chosen for inclusion into the new Acceptance categories (one in each), because they were reported at a high frequency by students with LDs in Noble and Evans (2012) and because of the confusion around the original operational definition of this Acceptance category. A further rationale for their inclusion is that, both items did end up sorting into factors (see factor analysis section of results), and ultimately neither of these items compromised the internal consistency of the respective factor

scale, as their removal did not affect its reliability. Also, their strong factor loadings further supported their inclusion in the study.

The other item, “I study so much and the results do not reflect it” was included in the Frustration category because we felt it was an item that nicely described the frustration that students with LDs often experience. This item had been most commonly sorted into either the Frustration or Adequacy categories. However, as it turned out, this item did not load on any factor and was subsequently examined as a single item for interest.

Therefore, the final scale included 64 items, eight items in each of the following eight categories: Acceptance from Others, Adequacy, Anger, Anxiety, Frustration, Mood and Self-Image, Self-Acceptance, and Social Support. See Appendix 1 for complete survey breakdown.

**Participants.** The participants were 494 undergraduate students who completed an online survey. First year university courses were targeted for participants since participants were more likely to have recently attended high school and thus, more likely to provide stronger retrospective accounts of their high school experience than would older students. The sample consisted of 81% first year students, 11% second year, 3% third year, 2% fourth year, and 2% other, with similar proportions of participants with and without LDs in each of the year groups.

Participants were recruited in the following three ways: 1) as part of the course prerequisite for a first year undergraduate psychology research pool (468 participants); 2) as an optional module in an first year introductory course for students with LDs (18 participants); and 3) as recruited paid participants with LDs at the University of Guelph, Wilfrid Laurier University, and the University of Waterloo through posters and pamphlets (five participants). Paid participants and participants from the participant pool self-disclosed having been formally identified with an LD as part of completing the demographic portion of the survey. In order to

enrol in the LD course, students needed to have a formal LD diagnosis and be registered with the university.

When determining the factor structure of the scale, the complete sample was randomly divided into two different groups. The first sample group was a smaller group ( $n = 208$ ) chosen to first explore the factor structure of the scale, and a second group ( $n = 281$ ) was used to confirm the factor structure. Both groups contained equal percentages of participants with and without LDs, and equal numbers of LD participants from all three data collection procedures (i.e., psychology LD course, participant pool, and paid participants; see Table 3).

Additionally, both groups contained roughly similar numbers of each gender and ethnicity. The majority of the sample reported their ethnicity as white. The number of participants within non-white ethnicities was very small and not a large enough sample size to allow for group comparison. Thus, non-white ethnicities were combined to see if there were any differences between samples in ethnicity. However, we did not find any significant differences between the different ethnicities for any of the social emotional factors or academic ratings.

*Table 3.* Breakdown of the participants' demographics.\*

<b>Participants</b>	<b>Small Sample</b>	<b>Large Sample</b>	<b>Total Sample</b>
<b>Learning Disability</b>			
Yes	31 (14.9%)	42 (14.9%)	73 (14.9%)
No	177 (85.1%)	239 (85.1%)	416 (85.1%)
<b>Gender</b>			
Male	26 (12.9%)	53 (19.4%)	79 (16.7%)
Female	175 (87.1%)	220 (80.5%)	395 (83.3)
<b>Ethnicity</b>			
White	150 (76.5%)	222 (82.5%)	371 (80%)
Other	46 (23.5%)	47 (17.5%)	93 (20%)
Aboriginal	6 (3.1%)	5 (1.9%)	11 (2.4%)
Black	10 (5.1%)	10 (3.7%)	20 (4.3%)
Arab	2 (1.0%)	7 (2.6%)	9 (1.9%)
South Asian	7 (3.6%)	10 (3.7%)	17 (3.7%)
Latin	5 (2.6%)	6 (2.2%)	11 (2.4%)
South East Asia	14 (7.1%)	10 (3.7 %)	24 (5.2%)

West Asian	2 (1.0%)	0 (0%)	2 (.4%)
<b>Father's Highest Level of Education</b>			
Some High School	11 (5.5%)	10 (3.7%)	21 (4.5%)
Completed High School	41 (20.6%)	51 (18.8%)	92 (19.6%)
Apprenticeship Training and Trades	7 (3.5%)	9 (3.3%)	16 (3.4%)
College/University	32 (16.1%)	52 (19.1%)	84 (17.9%)
Completed College/University	75 (37.5%)	113 (41.5%)	187 (39.8%)
Some Graduate Education	2 (1.0%)	1 (.4%)	3 (.6%)
Completed Graduate Education	13 (6.5%)	20 (7.4%)	33 (7.0%)
Professional Degrees	18 (9.0%)	16(5.9%)	34 (7.2%)
<b>Mother's Highest Level of Education</b>			
Some High School	7(3.6%)	11 (4.0%)	18 (3.9%)
Completed High School	26 (13.3%)	39 (14.3%)	65 (13.9%)
College/University	65 (33.2%)	94 (34.6%)	159 (34.0%)
Apprenticeship Training and Trades	4 (2.0%)	5 (1.8%)	9 (1.9%)
Some Graduate Education	5 (2.6%)	15 (5.5%)	20 (4.3%)
Completed Graduated Education	66 (33.7%)	79 (29.0%)	144 (30.8%)
Professional Degrees	23 (11.7%)	29 (10.7%)	52 (11.1%)
<b>Total Sample Size</b>	208	281	489

\*Note: some information is unknown from some participants. Additionally, for mother's education, the "Completed College/University" icon failed to work in the survey. Therefore, the "Some College/University" icon would include both University groups

**Survey Completion.** All participants completed the survey using the University of Guelph's online survey system, Qualtrics. The survey was anonymous and took approximately 10 minutes to complete. All participants completed the following three survey sections: 1) demographic section (including information about gender, age, SES, and whether they have been identified as an exceptional student with an LD); 2) a section where participants rated their abilities in different academic areas (math, reading, etc.); and 3) a section with the 64 items of

the social emotional survey (see Appendix 2 for complete online survey). There was no time limit to complete the survey and participants were instructed to take as long as needed.

For the academic rating section, participants were asked to rate their ability in each academic skill on a 5-point likert scale (1-Very Poor, 2-Poor, 3-Average, 4-Good, 5-Very Good). For the social emotional survey, participant rated how true each phrase described their experience of high school on a 4-point likert scale from 1 (Never true about me) to 4 (Often true about me (see Appendix 2).

As reported above, the survey included 64 items, eight in each of the following eight categories: Acceptance from Others, Adequacy, Anger, Anxiety, Frustration, Mood and Self-Image, Self-Acceptance, and Social Support. The items' content reflected the eight descriptor themes revealed in Noble and Evans (2013). Many of these themes identified through the Noble and Evans (2013) study were opposing feelings and located on the same scale to allow for some reverse scored items (e.g., I was happy, I felt sad).

### **Analytic Procedures**

***Exploratory Factor Analysis of Survey.*** Factor analysis was performed using the statistical software SPSS to identify the different factors in the survey and contributions the various social emotional items made to the factors, as well as to explore the academic ratings. For the exploratory factor analysis (EFA) on the academic items, the entire data set was used since this factor structure was largely unknown and more exploratory than the social emotional factors, which had a hypothesized factor structure. In contrast, for the social emotional items, the data were randomly split into two sets, one being a smaller sample for EFA, and the other a larger sample for confirmatory factor analysis (CFA). Completing both EFA and CFA on a split data set was suggested as the preferable procedure if the sample size is large enough (Fabrigar,

Wegener, MacCallum, & Strahan, 1999). Costello and Osbourne (2005) noted that the required sample size for EFA depends on the quality of the data. The smaller group was deemed appropriate for EFA since smaller sample sizes should be sufficient to complete an EFA as long as several item factor loadings are above .80 and factors contain very few cross-loadings. This proved to be the case with the data set (see Table 5 in results). Items that made poor contributions (i.e., communalities below .40 or factor loadings below .32) were discarded in attempts to obtain a reliability of at least .7, since this is a suggested minimum internal consistency for newly developed factor scales (Cortina, 1993; Fabrigar, Wegener, MacCallum, & Strahan, 1999; Costello & Osbourne, 2005; Tabachnick and Fidell, 2013).

*Extraction.* Principal Axis Factoring (PAF) extraction was used since our goal was to assess the factor structure and examine the shared variance of potential latent variables rather than on data reduction, such as in Principal Component's Analysis (Osborne & Costello, 2009). Since some of the factors violated the assumption of multivariate normality, PAF was used over other factor extraction techniques, such as Maximum Likelihood, as PAF is recommended under these circumstances in EFA (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Costello & Osbourne, 2005).

*Rotation.* Since we suspected that some of the proposed scales would overlap, possibly be combined, and likely correlate with each other, EFA was completed using oblique rotations to allow the factors to correlate. Fabrigar and colleagues (1999) noted that there is not a preferred method of oblique rotation, further suggesting that both rotations available on SPSS, Promax and Direct Oblimin, tend to produce similar results. Both rotations were explored, but ultimately Promax was used and reported in the results.

*Number of factors.* The number of factors was decided through a combination of Horn's parallel analysis, Kaiser's eigenvalue-greater-than-one-rule, and an examination of the scree plot. Ultimately, the results of the parallel analysis was used since research has found this to be the most accurate methodology (O'Connor, 2000; Velicer, Eaton, & Fava, 2000). Fabrigar and colleagues (1999) noted that parallel analysis compares the eigenvalues of randomized data to those of the EFA. When the eigenvalues of the randomized data become greater than those of the EFA, then the following factors are less meaningful than those created by random data, providing an objective cut-off point to determine the number of factors. Glorfeld (1995) noted that it was more accurate to use the eigenvalues of the 95th percentile as the cut-off while using parallel analysis. Although, both values were considered, ultimately the 95<sup>th</sup> percentile was used to determine the number of factors.

Lastly, Fabrigar and colleagues (1999) discussed how model fit indices, such as Root Mean Square Error of Approximation (RMSEA), could be considered in conjunction with the EFA to determine the factor structure, suggesting that these fit indices would be helpful to accurately determine the number of factors in EFA. Therefore, structural equation modeling (SEM) was performed to assess the EFA model's fit and to help determine the factor structure.

***Confirmatory Factor Analysis of Survey.*** The SPSS module, Analysis of a Moment Structures (Amos), was used to conduct a structural equation modelling to help determine the number of factors and complete the CFA. A collection of fit indices were used to assess the EFA and CFA models fit, including Chi-square, RMSEA, comparative fit index (CFI), and standardized root mean square residual (SRMR), since there is strong agreement in the literature that this is best practice while determining model fit in SEM (Iacobucci, 2009).

According to Hu and Bentler (1999), an ideal model would contain a non-significant Chi-square and CFI greater than .95. In addition, Fabrigar and colleagues (1999) noted that an ideal model fit would have a RMSEA below .05. However, a RMSEA of .05 to .08 is an acceptable fit, whereas .08 to .10 a marginal fit and greater than .10 is a poor fit. RMSEA fit is influenced by model complexity, and at times should be interpreted with caution (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Chi-square is greatly influenced by sample size and highly likely to be significant in our sample (Hu & Bentler, 1998). In contrast, CFI is not as strongly affected by smaller sample sizes (Hu & Bentler, 1998; Iacobucci, 2009).

Briefly, CFI is a “goodness-of-fit” measure ranging from 0 to 1, where higher values represent a stronger model fit by comparing the difference between a hypothesized model and the data, while adjusting for sample size (Iacobucci, 2009). Hu and Bentler (1998) and Iacobucci (2009) reported that CFI demonstrated strong “power and robustness” when tested in a wide variety of circumstances (e.g., model complexity and sample sizes). Thus, CFI will be given strong consideration given our sample. However, model fit judgements will be determined through an assessment of all fit indices.

## **Results**

### **Determining the Factor Structure**

Recall that in order to determine the factor structure of the scale, the sample was randomly divided into two different groups. The smaller group was used to first explore the factor structure of the scale. Initially, the factor structure was assessed using all 64 survey items, and Principal Axis Factor (PAF) extraction method with SPSS software. Since this was an attempt at exploring the factor structure, both oblique rotations (Promax and Oblimin) were considered as we expected our proposed factors to be conceptually related and likely to correlate.

After exploring each rotation, Promax was used for the final rotation. Each of these two oblique rotations reported the same factor structure, but in a different order. The Promax factor structure was used because its structural equation model for the final model had stronger fit indices compared to the factor structure of Oblimin. Thus, the process of exploring the factor structure will be described below for the Promax rotation.

**First model.** After the first attempt at defining the factor structure, all items with communalities below 0.4 were removed since this is recommended as best practice while conducting an EFA (Costello & Osbourne, 2005). See Table 4 for full list of items removed. On this first attempt, the proposed factors did correlate, so further attempts continued to extract using oblique rotations (Note: Correlations between factors will only be reported for the final model).

*Table 4.* The 13 survey items that were removed from the factor structure due to communalities lower than .4.

Survey Item	Communalities
I felt like I was the only one like me	.21
I felt like I was constantly spinning my wheels	.29
I was inferior to others	.33
I felt like others took me seriously	.34
I worried about what others thought	.36
I was defensive	.36
I got jealous	.37
I studied so much but the results did not reflect it	.38
Other students were smarter than me	.38
My friends were helpful	.38
I felt scared at school	.38
I tried to hide in class	.39
I was different	.39

**Second model.** The second attempt at producing a factor structure converged in ten iterations with 10 factors with an eigenvalue above one. Parallel analysis was performed to

determine the exact number of factors, which suggested that the data contained six meaningful factors. (Note: only the final models parallel analysis will be reported).

**Final model.** Next, a third and final attempt was completed. Since our factor structure was exploratory, we excluded items that failed to load onto the first six factors in the previous model, rather than forcing them to load onto one of the top six factors. The items “I felt happy,” “I felt stuck,” and “I felt judged” were excluded because they failed to load onto any of the first six factors.

For this model, a Principal Axis Factor with Promax (oblique) rotation was conducted on the remaining 48 survey items. An analysis of the Kaiser-Meyer Olin, a measure of sampling adequacy, suggested that this sample was factorable since it was above .6 (KMO=.929). Additionally, and Bartlett’s test of sphericity was significant [ $\chi^2 (1128) = 6353.98, p < .00$ ], suggesting the factor model is appropriate. This model produced a factor structure that converged in nine iterations with six factors with an eigenvalue above one. The six factors were also reconfirmed by the results of an updated parallel analysis (see Figure 1). See Appendix 3 for factor correlations between the 6 factors. The fifth and sixth factors eigenvalues were only slightly above the 95<sup>th</sup> percentile and mean of the parallel analysis. This suggests that this factor might not be meaningful and should be looked at closely while assessing the model fit using structural equation modelling (see SEM section below). The factor loadings for each item below .32 were suppressed since Tabachnick and Fidell (2011) suggest this as a good minimum loading to consider for each factor in EFA (see Table 5).

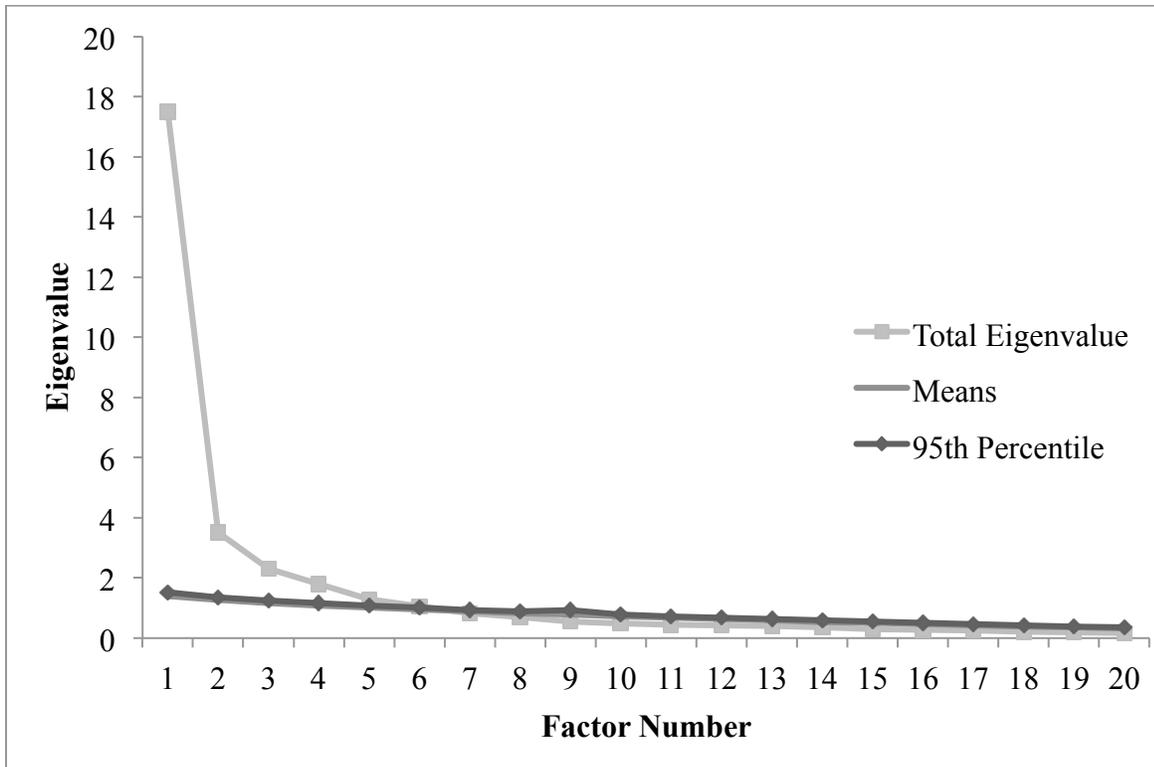


Figure 1. The scree plot for the Principal Axis Factor extraction with an oblique rotation including the means and 95<sup>th</sup> percentile results from the parallel analysis of 48 items.

Table 5. Principal Axis Factoring obliquely rotated loadings for each of the 48 survey items.\*

Survey Items	Factor Loadings					
	1	2	3	4	5	6
I felt left out	.89					
I felt like I belonged (Reverse)	.87					
Other students did not accept me	.84					
Other students rejected me	.82					
I felt loved (Reverse)	.78					
I had lots of friends (Reverse)	.77					
I felt accepted (Reverse)	.77					
I was lonely	.71					
I was all alone	.65					
I felt isolated	.57					
People did not understand me	.53					
I did not feel a part of the class	.51					
I felt helpless	.40					
I felt stressed		.76				
I felt nervous		.72				

I was anxious		.71				
I felt tense		.68				
I felt overwhelmed		.67				
I felt frustrated		.56				
I worried about my future		.48				
I felt sad		.40				
I felt depressed		.33				
People made me mad			.86			
I got angry			.75			
I had a bad temper			.70			
I got annoyed at others			.67			
I was bitter			.58			
I felt irritable			.58			
I hated others			.53			
I was hostile			.50			
I hated who I was				.91		
I was proud of who I am (Reverse)				.80		
I was worthless				.78		
I was ashamed of who I was				.71		
I liked myself (Reverse)				.70		
I felt embarrassed about myself				.65		
I was confident (Reverse)				.54		
I was determined (Reverse)					.63	
I felt prepared (Reverse)					.62	
I was optimistic (Reverse)					.62	
I felt in control (Reverse)					.49	
I felt supported (Reverse)					.41	
I was not smart enough to go to university						.67
I felt stupid						.61
I felt like I was getting no where						.60
I felt confused in class						.54
I studied so much but the results did not reflect it		.38				.54
I felt like something was constantly blocking me from being able to learn						.38
Eigenvalues	17.82	3.87	2.67	2.20	1.65	1.39
Percentage of total variance	36.28	7.11	4.64	3.56	2.54	2.01
Number of test items	13	9	8	7	5	6

\*Loadings=>.32

## Exploratory Analysis of Fit

**Six-factor model.** The six-factor and 48 survey item model fit was explored using the computer graphical software AMOS. The original model fit indices suggested the model was not the best fit with a CFI below .9 (see Table 6). The modification indices' were explored and several conceptually related errors, most of which were within our original hypothesized factor structure and within each factor, were co-varied to increase the models fit (see Table 7). However, the model fit was still fairly weak with a CFI slightly below .9. Next, we explored removing the item with the lowest loading in the model until the CFI reached .9. In the end, nine items were removed, all containing factor loadings below .55 (see Table 8).

Table 6. The fit indices for the six-factor structural equation model.

<b>Model</b>	<b>CFI</b>	<b>RMSEA</b>	<b>Chi-Square</b>	<b>Df</b>	<b>p-Value</b>
<b>6-Factor Model</b> <sup>1</sup>	.82	.07	2150.83	1065	.00
With error co-varied	.87	.06	1812.52	1044	.00
After cutting items	.90	.06	116.23	634	.00
<b>CFA for 6-Factor Model</b> <sup>2</sup>	.88	.07	1534.41	634	.00

<sup>1</sup> First data set  $n = 208$ ; <sup>2</sup> Second data set  $n = 281$

Table 7. The modification indices for a six-factor model.

<b>Error Covariances</b>		<b>Modification Indices</b>
Angry	Bad temper	54.618
Left out	Rejected	30.354
Belonged	Accepted	27.259
Stressed	Overwhelmed	26.372
Accepted	Rejected	25.639
Sad	Depressed	23.909
Determined	Prepared	20.276
Loved	Accepted	17.45
Nervous	Anxious	15.523
Stressed	Depressed	14.7
Stressed	Worried	12.337
Accepted	Isolated	10.797

Ashamed	Embarrassed	10.677
Proud	Liked myself	10.609
Belonged	Loved	10.505
Ashamed	Confident	9.863
Lonely	Isolated	9.686
Stressed	Sad	9.176
Loved	Isolated	8.73
Belonged	Isolated	7.023
Lots of friends	Accepted	6.939
Rejected	Alone	6.918

Table 8. Factor loadings of the nine items that were removed from the six-factor model.

Item	Factor	Factor Loadings
Bad temper	Anger	.46
Studied so much	Inadequacy	.49
Determined (Reverse)	Pessimistic	.51
Confused	Inadequacy	.53
Rejected	Social Support	.55
Not smart enough	Inadequacy	.55
Getting nowhere	Inadequacy	.55
Optimistic (Reverse)	Pessimistic	.55
Stressed	Anxiety	.55

Unfortunately, as a result of removing these nine items, only two Inadequacy (6<sup>th</sup> factor) and three Pessimistic (5<sup>th</sup> factor) items remained. Also recall from Figure 2 that the results of the parallel analysis showed that factor five and six were only slightly above the mean for the parallel analysis of random data. Thus, it was decided to remove these two factors and the four-factor model was explored since rotated factors should have at least three variables and those with fewer should be interpreted with caution (Tabachnick & Fidell, 2007).

**Four-factor model.** A four-factor and 36 survey item model fit was explored using the computer graphical software AMOS. The 11 items from the Pessimistic and Adequacy factors were removed, and all other items previously removed in the six-factor model were placed back

into the model (see Table 8). The initial model had moderate fit indices that greatly improved once the modification indices were taken into account (see Table 9 and 10).

Table 9. The modification indices for a four-factor model.

Error Covariances		Modification Indices	Par Change
Left out (e1)	Accepted (e7)	28.914	0.121
Belonged (e2)	Rejected (e4)	28.433	0.136
Overwhelmed (e18)	Stressed (e14)	28.374	0.134
Unaccepted (e3)	Rejected (e4)	24.327	0.119
Sad (e21)	Depressed (e22)	20.207	0.105
Loved (e5)	Accepted (e7)	18.447	0.095
Nervous (e15)	Anxious (e16)	14.608	0.104
Proud (e32)	Liked myself (e35)	14.088	0.072
Worried (e20)	Stressed (e14)	13.67	0.116
Belonged (e2)	Loved (e5)	11.351	0.066

Table 10. The fit indices for the four-factor structural equation model.

Model	CFI	RMSEA	Chi-Square	Df	p-Value
<b>4-Factor Model<sup>1</sup></b>	.87	.07	1166.57	588	.00
With error co-varied	.93	.05	908.98	568	.00
<b>CFA on 4-Factor Model<sup>2</sup></b>	.90	.06	1287.74	568	.00

<sup>1</sup> First data set  $n = 208$ ; <sup>2</sup> Second data set  $n = 281$

Once errors were co-varied, the model had an acceptable fit with a CFI of .93 and RMSEA of .05. Additionally, the results of the CFA on the larger data set had acceptable fit indices as well (see Table 10). The SEM is shown in Figure 2

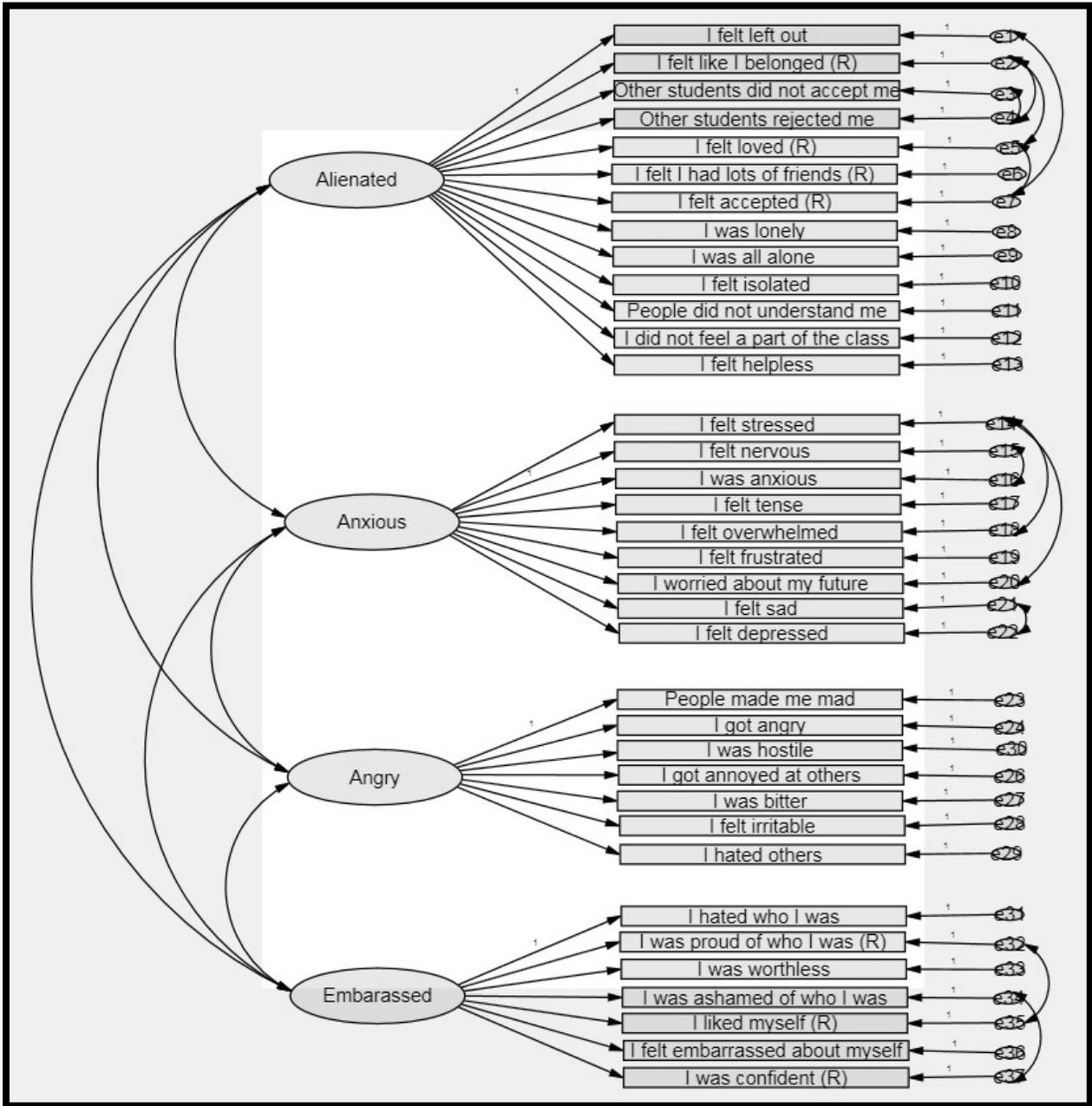


Figure 2. Four factor structural equation model for the 36 survey items.

### The Four Factors

**Alienated factor.** The first factor appears to represent mostly a combination of 12 items predicted to be in the Social Support and Acceptance from Other’s categories. An additional item (“I felt helpless”) with the lowest factor loading had initially been hypothesized to load onto the

Mood and Self-image factor. This factor will be referred to as feeling Alienated reflecting feelings of a lack of social support, acceptance from others, and isolation.

Reliability analysis showed that the Alienated factor had excellent reliability ( $\alpha = .95$ ), mean of 2.0 on the four-point scale, and all inter-item correlations demonstrated a moderate to strong positive linear relationship.

**Anxious factor.** The second factor contained six items from the hypothesized Anxiety category, one from the Frustration category, and the two with the lowest loadings from the Mood and Self-Image category. Thus, this factor was referred to as representing feelings of anxiety.

Reliability analysis showed that the Anxious factor had good reliability ( $\alpha = .89$ ), mean of 2.9 on the four-point scale, and all inter-item correlations demonstrated a moderate to strong positive linear relationship.

**Angry factor.** The third factor consists of five items from the hypothesized Anger category and two from the Frustration category. In the original sorting task, these two Frustration items both had been sorted into the Anger category. Specifically, “I got annoyed at others” was sorted by 50% of the participants into the Anger category, while the remaining 50% sorted it into the Frustration category. For the item “I felt Irritable,” 33% of participants sorting were in the Anger category. Thus, conceptually, it appears the third factor is describing items that reflect anger.

Reliability analysis showed that the Angry factor had good reliability ( $\alpha = .88$ ), mean of 2.2 on the four-point scale, and all inter-items correlations were moderate positive linear relationships.

**Embarrassed factor.** The fourth factor consists of five items from the Self-Acceptance category and two from the Mood and Self-Image category. The two items from the Mood and

Self-Image category were “I felt worthless” and the reversely coded item “I felt confident.” Thus, this factor appears to include items reflecting one’s happiness with and acceptance of oneself. Therefore, we kept this factor called “Embarrassed” to reflect feelings of embarrassment and discomfort about oneself.

Reliability analysis showed that the Embarrassed factor had excellent reliability ( $\alpha = .92$ ), mean of 1.9 on the four-point scale, and all inter-item correlations ranged from moderate to strong positive linear correlations.

**Factor correlations.** Each of the four factors’ correlations were analyzed using Pearson correlations. As hypothesized, the factors correlated, justifying the use of an oblique rotation during the factor analysis. Factor correlations ranged from moderate to strong positive linear relationships (see Table 11).

*Table 11.* The correlations between the four factors.

	<b>Alienated</b>	<b>Anxious</b>	<b>Angry</b>	<b>Embarrassed</b>
<b>Alienated</b>	1	-	-	-
<b>Anxious</b>	.634*	1	-	-
<b>Angry</b>	.523*	.542*	1	-
<b>Embarrassed</b>	.733*	.699*	.435*	1

\* Correlation is significant at the .01 level.

## Summary

From the 111 items that were q-sorted by independent sorters, 64 items fell into six social emotional categories. The results of the exploratory factor analysis on a subset of participants initially suggested the presence of six factors that reflected feeling alienated (factor 1), anxious (factor 2), angry (factor 3), embarrassed (factor 4), inadequate (factor 6), and a collection of reversely coded positive items (factor 5; see Table 5). Factors 5 and 6 had eigenvalues only slightly better than the predicted factor structure of random data, leading to a four-factor model. A confirmatory factor analysis on a second subset of participants favoured this four-factor

model. The four factors (Alienated, Anxious, Angry and Embarrassed) had strong reliability ranging from  $\alpha = .88$  for the Angry factor to  $\alpha = .95$  for the Alienated factor. Thus, these four factors, having a total of 48 items, displayed in Figure 2, were used first to compare the responses of participants with and without learning disabilities.

## **Part 2: Comparison of Individuals with and without Learning Disabilities**

### **Statistical Method**

The comparisons on each factor were conducted using the computer statistical package SPSS.

All comparisons between participants with and without LDs were performed using SPSS using a variety of MANOVAS, MANCOVAS, and t-tests. These analyses were completed using the complete data set (see Table 1 in methods for a breakdown on participant demographics) and were performed to help identify descriptors that are specific to the LD experience, as well as their intensity, compared to those who do not have an LD. Thus, they were used to identify any group differences, as well as an additional set of analyses controlling for age and sex.

To determine the average score on each factor, ratings for the items pertaining to each respective factor were averaged for each participant. In addition the average score across the four factors (i.e., mean score across factors) was calculated. Prior to the analyses, the existence of multivariate outliers was checked through checking the Mahalanobis Distances among the participants. Three multivariate outliers in the control group were removed prior to completing the analyses. Additionally, the assumption of an absence of multicollinearity was met. That is, all factors were moderately correlated. The data violated the assumption of normality (i.e., some factors Shapiro-Wilk and Kolmogorov-Smirnov tests of normality were significant). However, violations of normality are typically acceptable with larger sample sizes (Lumley, Diehr,

Emerson, & Chen, 2002). Nonetheless, all tests were performed with non-parametric analyses and the same results were observed.

A second set of analyses looked at whether certain academic scores were different for individuals with and without LDs. We expected that perceived academic abilities will be lower in those with LDs compared to those without LDs. For example, we expected that individuals with LDs would have lower perceived English ratings compared to individuals without LDs.

**Multiple regressions.** Regressions were used to assess whether having a LD moderated the relationship between the social-emotional factors and the academic factors. Each multiple regression was performed using the statistic software SPSS. For each regression, the academic factor was the predictor variable, the outcome variable was each social emotional factor tested individually, and the presence of an LD was the moderator. The theory behind this methodology was adapted from Aguinis (2004; see the results section for more detail how each regression model was set-up).

## **Results**

### **Comparing Gender and Learning Disability**

A two (Learning Disability; Yes vs. No) x two (Gender; Male vs. Female) MANOVA was performed to compare scores on the four survey factors between each group. A conservative  $\alpha < .01$  was used to reject the null hypothesis. The Box's M value of 42.78 was associated with a  $p = .11$ , which was interpreted as non-significant and thus, the multivariate homogeneity of variance-covariance matrices assumption was met. Additionally, Levene's test of equality of error variances was not significant for all four factors and thus, the assumption of homogeneity of variance was achieved and the groups have approximately equal variances. Table 12 provides the means and standard deviations by group (LD vs. non-LD) and gender (males vs. females).

Table 12. The sample size, means, and standard deviations for each of the four factors organized by group (LD vs. Non-LD) and gender (male vs. female).

		<u>Alienated Factor</u>			<u>Anxious Factor</u>			<u>Angry Factor</u>			<u>Embarrassed Factor</u>		
		N	SD	Mean	N	SD	Mean	N	SD	Mean	N	SD	Mean
<b>Male</b>	LD	13	.73	2.35	14	.78	2.78	14	.87	2.24	14	.85	2.11
	Non-LD	63	.69	1.89	64	.63	2.48	62	.63	2.12	63	.62	1.65
<b>Female</b>	LD	39	.75	2.32	39	.52	3.25	39	.69	2.36	39	.78	2.30
	Non-LD	341	.68	1.98	347	.60	2.90	344	.64	2.16	347	.72	1.94

There was a significant main effect for both Learning Disability and Gender [ $F(4,438) = 3.49, p = .01$ , partial  $\eta^2 = .031$  and  $F(4,438) = 7.64, p = .00$ , partial  $\eta^2 = .065$ , respectively].

Female participants reported significantly higher scores compared to males and individuals with LDs reported significantly higher scores compared to those without LDs (see Figure 3).

Additionally, there was not a significant interaction between gender and LD.

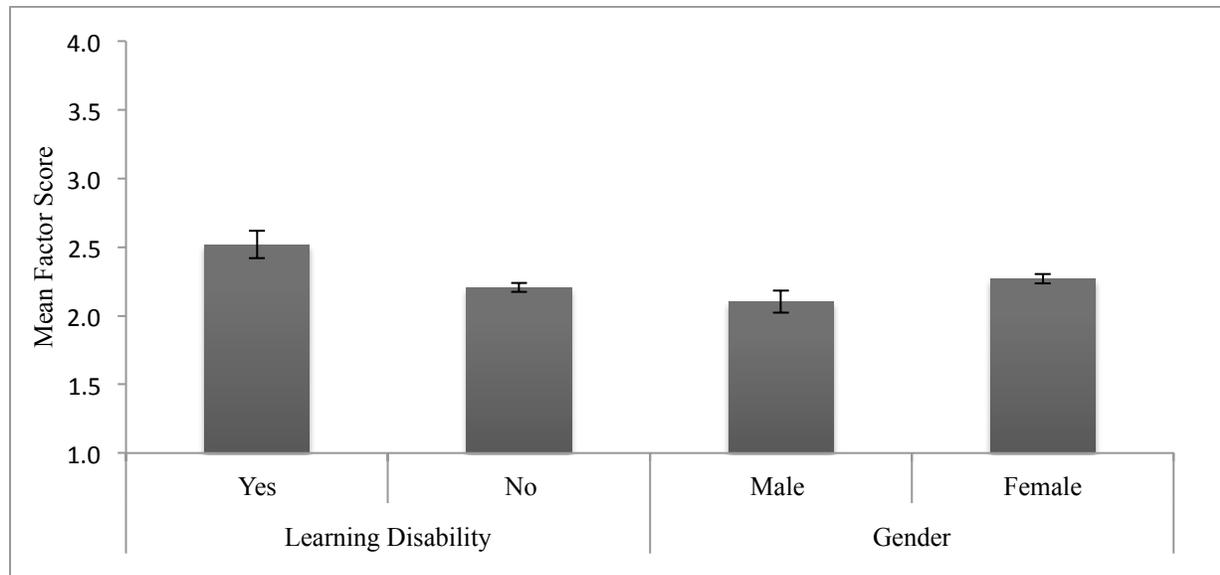


Figure 3. The mean (+/- SEM) factor score reported by participants with and without learning disabilities and by gender.

More specifically, individuals with LDs reported significantly higher scores on the Alienated, Anxious, and Embarrassed factors [ $F(1,441) = 11.03, p = .001, \text{partial } \eta^2 = .024$ ;  $F(1,441) = 10.07, p = .002, \text{partial } \eta^2 = .022$ ;  $F(1,441) = 12.02, p = .001, \text{partial } \eta^2 = .027$ ; respectively; see Figure 4]. Although participants with LDs reported higher scores on the Angry factor compared to those without LDs, this difference was not significant. Although males tended to report lower mean scores than females across all factors, this difference was only significant for the Anxious factor. Females reported significantly higher anxiety scores compared to males [ $F(1,441) = 17.73, p = .000, \text{partial } \eta^2 = .039$ ; see Figure 5).

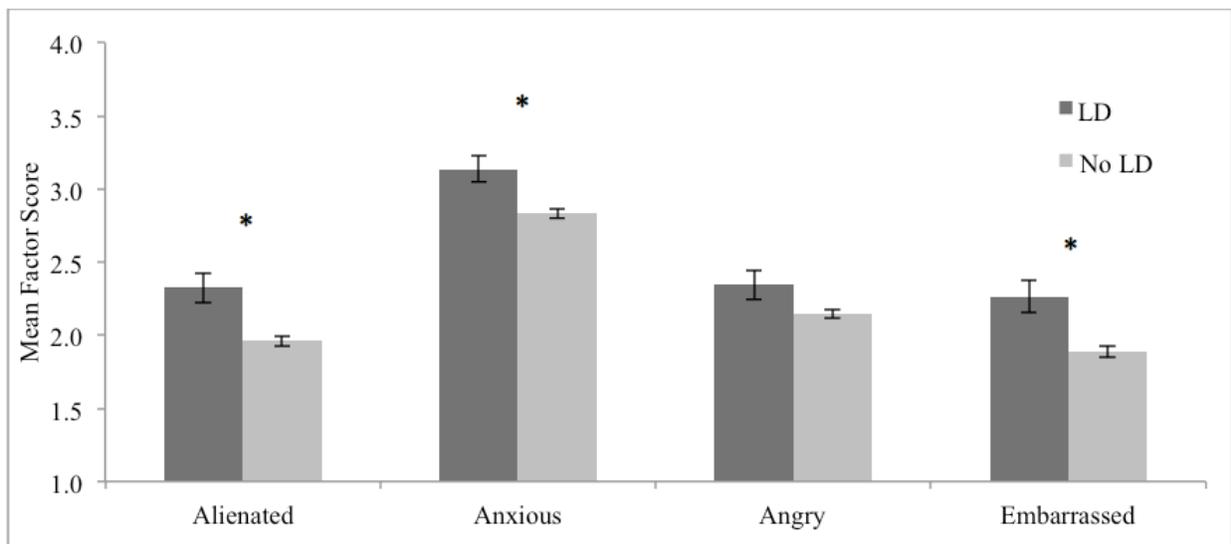


Figure 4. The mean (+/- SEM) scores on each factor as reported by participants with and without learning disabilities for each of the four factors. \* Significant at  $p < .002$

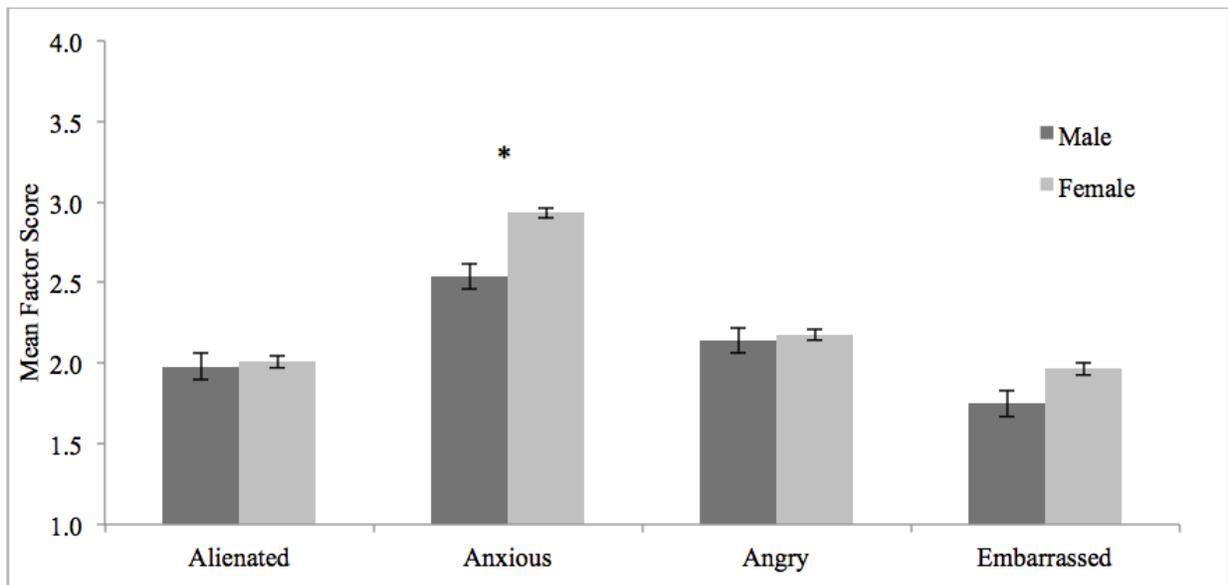


Figure 5. The mean (+/- SEM) scores on each factor as reported by male and females for each of the four factors. \* Significant at  $p < .001$

**Controlling for demographic variables.** A MANCOVA was performed to assess whether the above differences between individuals with and without LDs would remain while controlling for various demographic variables. Since our main research question was focused on this LD Vs. Non-LD comparison, this analysis was completed to ensure any differences were not caused by any of our demographic variables. Gender was placed in the model as a covariate since our sample is primarily female and the data suggest there are differences in how males and females report scores on some factors (Total sample is 83.3% female, see Table 1 in methods).

Thus, a 2 (Learning Disability; Yes vs. No) MANCOVA was performed to compare scores on the four survey factors between each group while controlling for gender, ethnicity, and socio-economic status assessed through both parents' highest level of education. The Box's M value of 11.93 was associated with a  $p = .32$ , which was interpreted as non-significant and thus the multivariate homogeneity of variance-covariance matrices assumption was met. Additionally,

Levene's test of equality of equal variances was not significant for all four factors and thus, the assumption of homogeneity of variance was achieved and the groups have equal variances.

There was a significant main effect for Learning Disability and Gender [ $F(4,426) = 3.75$ ,  $p = .005$ , partial  $\eta^2 = .034$ ; and  $F(4,426) = 11.48$ ,  $p = .000$ , partial  $\eta^2 = .097$ ; respectively].

Additionally, there was not a significant main effect for any of the other demographic variables.

The three factors, Alienated, Anxious, and Embarrassed were again found to be reported significantly higher in the LD group than the Non-LD group while controlling for gender, ethnicity, and SES [ $F(1,429) = 10.91$ ,  $p = .001$ , partial  $\eta^2 = .025$ ;  $F(1,429) = 12.40$ ,  $p = .000$ , partial  $\eta^2 = .028$ ;  $F(1,429) = 12.06$ ,  $p = .001$ , partial  $\eta^2 = .027$ , respectively]. On the Angry factor, individuals with an LD reported higher scores than those without an LD while controlling for gender, ethnicity, and SES. However, this difference was not significant at our more conservative  $p$ -value of .01 [ $F(1,429) = 4.23$ ,  $p = .04$ , partial  $\eta^2 = .010$ ]. Therefore, the same between-group effects for individuals with and without LDs were observed while controlling for Ethnicity, Gender, and SES.

**Proportion of participants with elevated average scores on each factor.** Frequency charts were created to determine the proportion of participants whose average score on each factor was one standard deviation above the mean. These frequencies were computed to determine the proportion of participants, with and without LDs with elevated scores, and to compare the two groups using Chi-Square analyses.

In general, a significantly greater proportion of participants with LDs had an average rating one standard deviation above the mean on each of the following factors compared to participants without LDs: the Alienated factor [ $\chi^2(1, N=489) = 4.22$ ,  $p < .05$ ]; Anxious factor [ $\chi^2(1, N=489) = 3.83$ ,  $p = .05$ ]; Angry factor [ $\chi^2(1, N=489) = 4.38$ ,  $p < .05$ ]; Embarrassed factor

$[\chi^2 (1, N=489) = 6.89, p < .01]$ ; and mean score across all factors  $[\chi^2 (1, N=489) = 6.75, p < .01]$ . See Table 13 for the proportions.

*Table 13.* The proportion of participants with and without learning disabilities whose average score on each factor was one standard deviation above the mean on each factor.

	<b>Alienated</b>	<b>Anxious</b>	<b>Angry</b>	<b>Embarrassed</b>	<b>Total</b>
<b>Learning Disability</b>					
Yes	26%	30%	27%	30%	29%
No	16%	20%	17%	17%	16%

An alternate way at looking at elevated scores was to determine the proportion of participants whose average score on each factor was greater than a rating of three, reflecting an average rating ranging from “Sometimes true about me” to “Often true about me.” Thus, we were interested in exploring the proportion of participants who feel these labels on average generally apply to them, as opposed to “rarely” or “never true” about them (a rating of two or lower).

In general, as previously shown in Figure 4, participants reported high ratings on the Anxious factor, suggesting feelings of anxiety are elevated in high school, regardless of the presence of an LD. In addition, a significantly greater proportion of participants with LDs (57%) had an average rating of above three on the Anxious factor compared to those without LDs [44%];  $\chi^2 (1, N=489) = 4.22, p < .05$ ] and on the overall mean score across all factors,  $\chi^2 (1, N=489) = 4.49, p < .05$ . However, none of the other three factors significantly differed (see Table 14).

Table 14. The proportion of participants with and without learning disabilities whose average score on each factor was greater than a rating of three.

	<b>Alienated</b>	<b>Anxious</b>	<b>Angry</b>	<b>Embarrassed</b>	<b>Total</b>
<b>Learning Disability</b>					
Yes	17%	57%	19%	12%	20%
No	10%	44%	12%	10%	11%

**Comparison of LD and Non-LD Groups on Survey Items Within Each Factor.**

See Appendix 4 for a complete list of each t-test comparison between all survey items, including the test statistic, degrees of freedom, p-value, and effect size.

*Alienated factor.* Using SPSS, each of the 13 items means were analysed to see whether there were any differences between participants with and without LDs. Bonferroni corrections with a significance level of .004 were used while completing 13 t-tests. In general, participants with LDs reported more negative feelings on each of the 13 survey items loading into the Alienated factor (see Figure 6). The following items were reported as significantly higher in participants with LDs: “People did not understand me” [ $t(480) = 5.13, p < .000, d = .67$ ], “I did not feel part of the class” [ $t(484) = 3.78, p < .000, d = .47$ ], “I was lonely” [ $t(483) = 3.07, p = .002, d = .39$ ], and “I felt helpless” [ $t(483) = 4.19, p < .000, d = .54$ ].

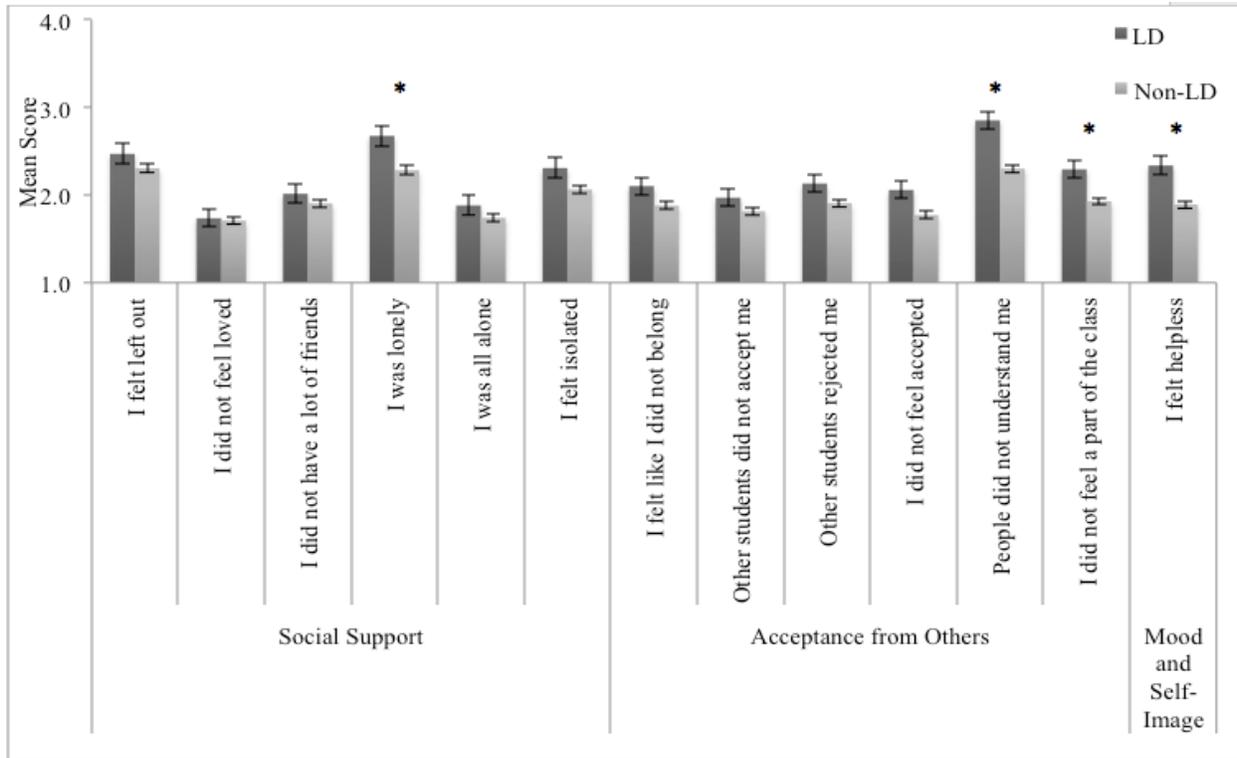


Figure 6. A comparison of participants with and without LDs on the 13 items that load onto the Alienated factor sorted by their hypothesized category. \* Significant at .004

**Anxious factor.** Using SPSS, each of the nine items means were analysed to see whether there were any differences between participants with and without LDs. Bonferroni corrections with a significance level of .005 was used while completing nine t-tests. Participants with LDs reported more negative feelings on most of the nine survey items loading into the Anxious factor (see Figure 7). The following items were reported as significantly higher in participants with LDs: “I was anxious” [ $t(485) = 3.33, p = .001, d = .45$ ], “I felt depressed” [ $t(484) = 3.28, p = .001, d = .43$ ], and “I felt sad” [ $t(484) = 2.87, p = .004, d = .37$ ]. In contrast, participants with and without LDs each reported elevated ratings on items “I feel stressed” and “I worry about my future,” suggesting that these are common anxious feelings to experience in high school.

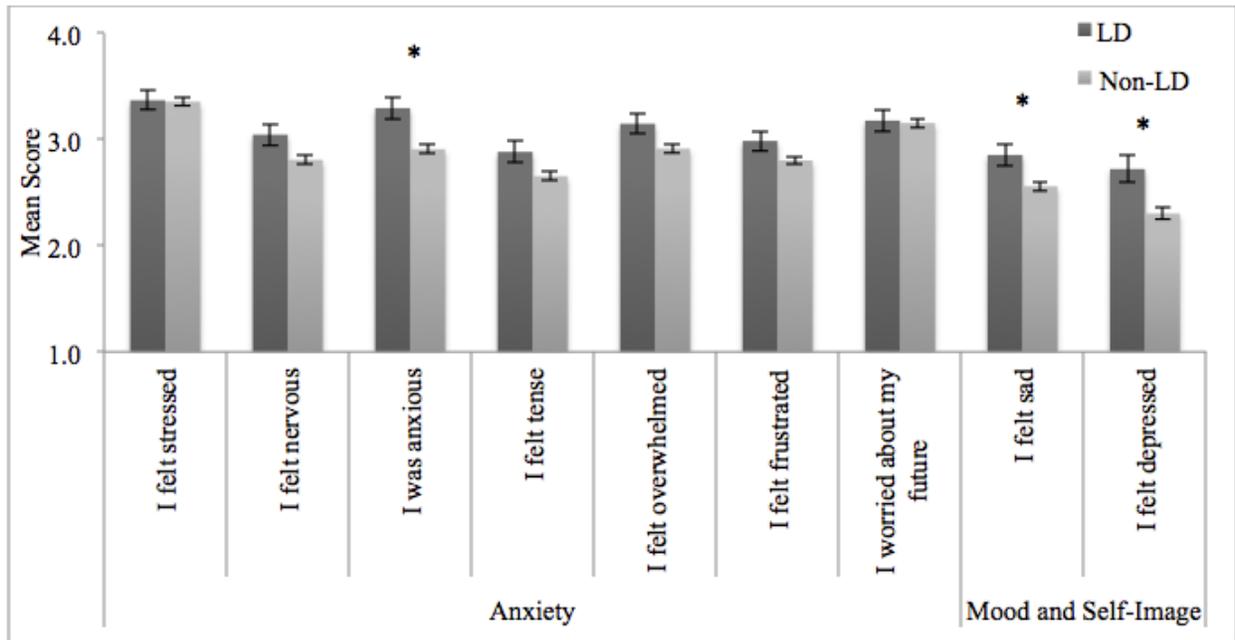


Figure 7. A comparison of participants with and without LDs on the nine items that load onto the Anxious factor sorted by their hypothesized category. \* Significant at .005

**Angry factor.** Using SPSS, each of the seven items means were analysed to see whether there were any differences between participants with and without LDs. Participants with LDs reported similar negative feelings of anger on all of the seven survey items loading onto the Angry factor (see Figure 8). Interestingly, participants appear to rate the two items that were originally hypothesized to reflect frustration as higher compared to the five reflecting anger.

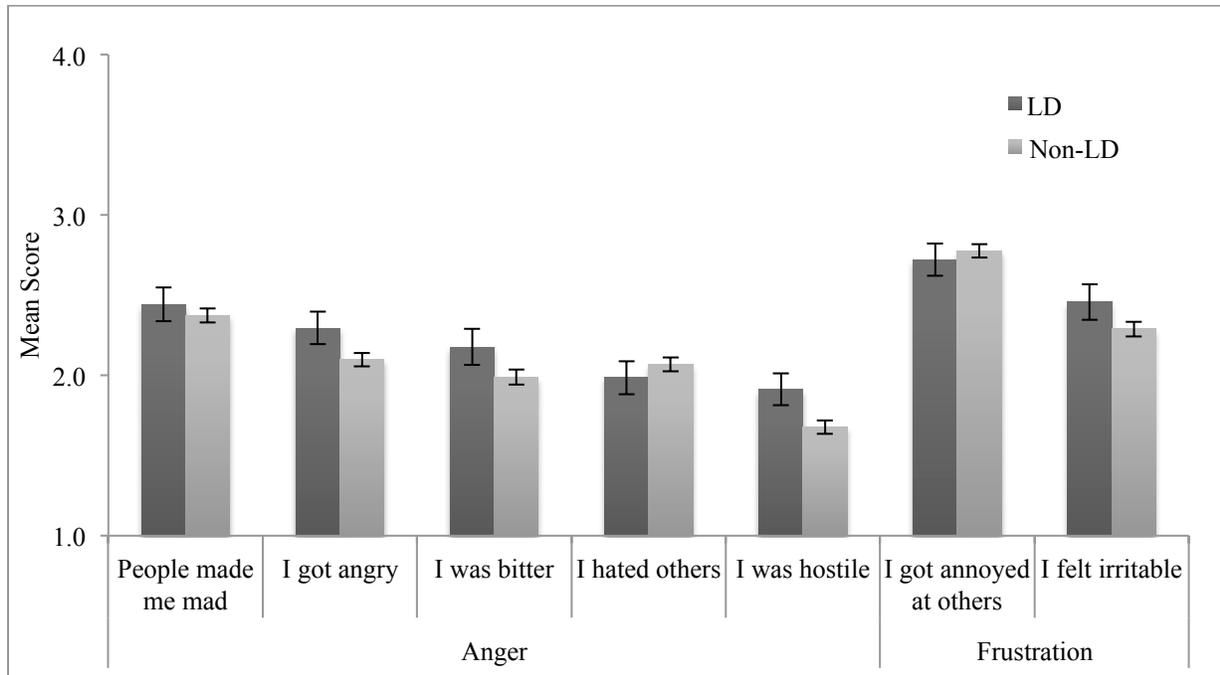


Figure 8. A comparison of participants with and without LDs on the seven items that load onto the Angry factor sorted by their hypothesized category.

**Embarrassed factor.** Using SPSS, each of the seven items means were analysed to see whether there were any differences between participants with and without LDs. A Bonferroni correction setting a significance level of .007 was used while completing seven t-tests. In general, participants with LDs reported increased negative feelings on all of the seven survey items loading into the Embarrassed factor (see Figure 9). However, only the “I felt confident (R)” item, contained a significant difference [ $t(482) = 2.80, p = .005, d = .36$ ]. Further, none of the items contained an average survey score above three, suggesting that these are not items strongly endorsed by participants.

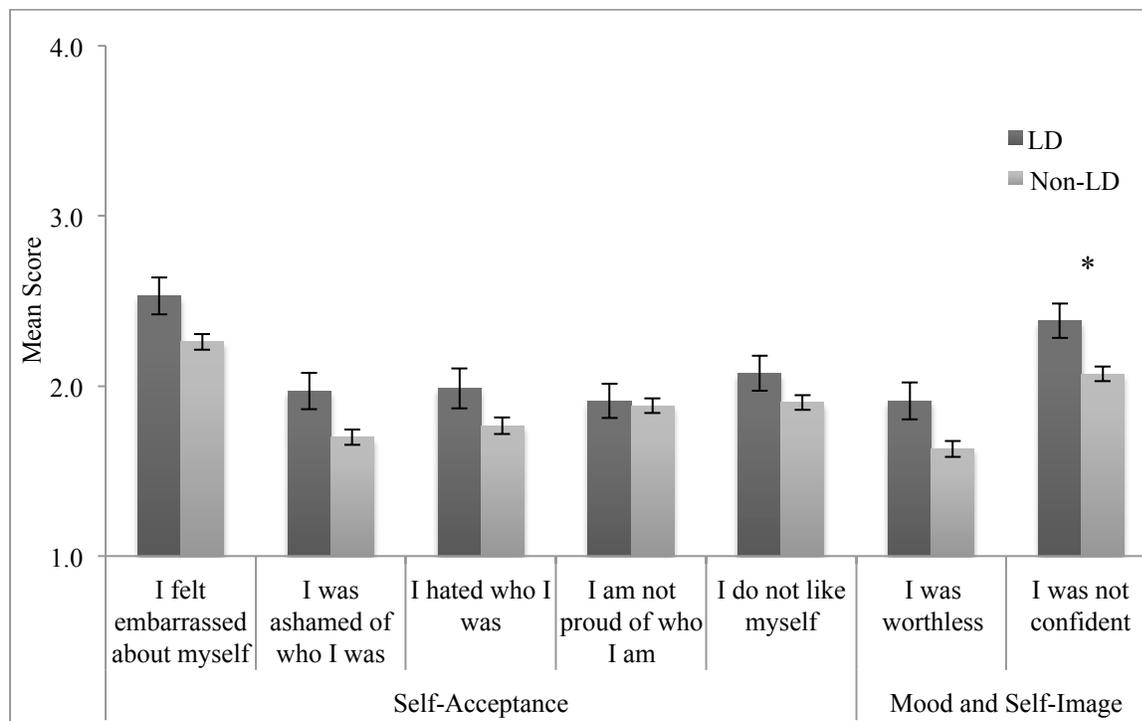


Figure 9. A comparison of participants with and without LDs on the seven items that load onto the Embarrassed factor sorted by their hypothesized category. \* Significant at .007

**Inadequacy factor.** The proposed sixth factor was assessed to compare differences for participants with and without LDs despite being removed from the model due to poor fit and a debateable existence of a sixth factor through the results of the parallel analysis (see earlier EFA section). This factor was assessed for differences because they represented items reflecting a feeling of inadequacy, which was a feeling we felt was unique to individuals with LDs. Firstly. The following items loaded onto the sixth factor: “I was not smart enough to go to university,” “I felt stupid,” “I felt like I was getting nowhere,” “I felt confused in class,” “I studied so much but the results did not reflect it,” and “I felt like something was constantly blocking me from being able to learn.” Students with LDs reported significantly higher feelings of inadequacy on the items that loaded onto the sixth factor [ $t(477) = 5.43, p < .000, d = .69$ ] and the proposed items

that were hypothesized to be in the inadequacy category displayed in Figure 10 [ $t(475) = 4.30, p < .000, d = .56$ ]. See Appendix 4 for complete list of each t-test comparison.

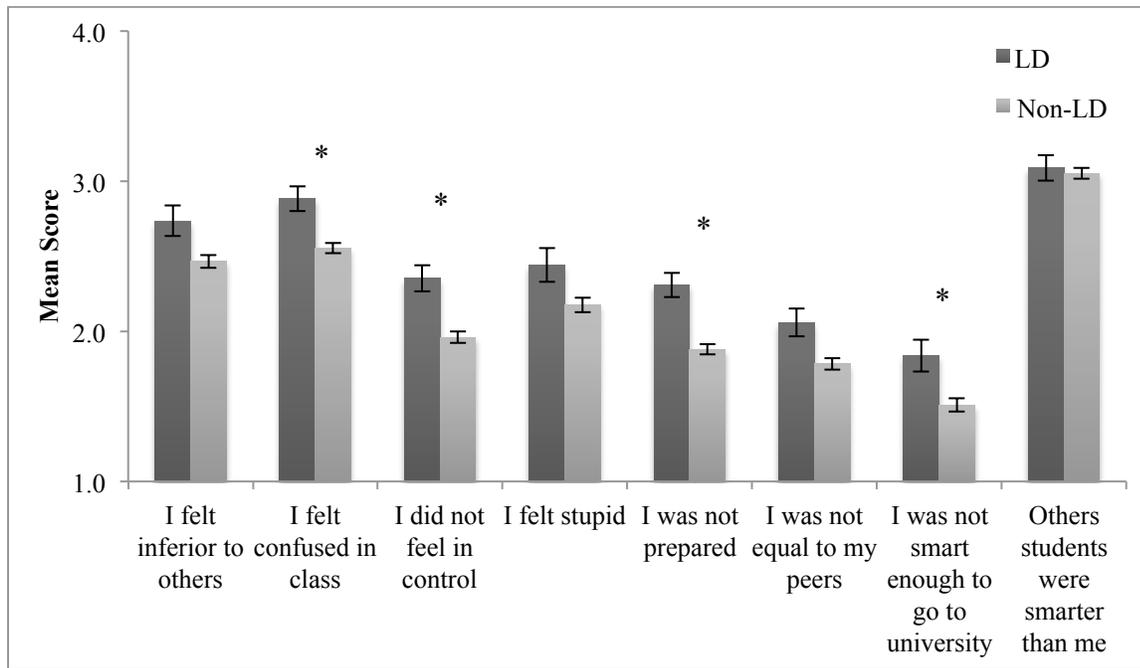


Figure 10. A comparison of participants with and without LDs on the items projected to originally be in the Inadequacy Category. Most of these items loaded onto the sixth factor, which was eliminated while assessing model fit. \* Significant at  $p < .001$

**Remaining items.** Some additional items that each contained significantly higher scores for individuals with LDs than those without, and failed to load onto any factors, are presented in Figure 11. Each of these items is significantly higher at  $p < .001$  for participants with LDs compared to those without LDs, including four of the eight proposed frustration items that had failed to load onto any of the four factors. In addition, although they did not load onto a specific factor, participants with LDs did report significantly higher scores on the hypothesized frustration category (i.e., mean of the original eight frustration items) compared to participants without LDs [ $t(473) = 4.58, p < .000, d = .58$ ].

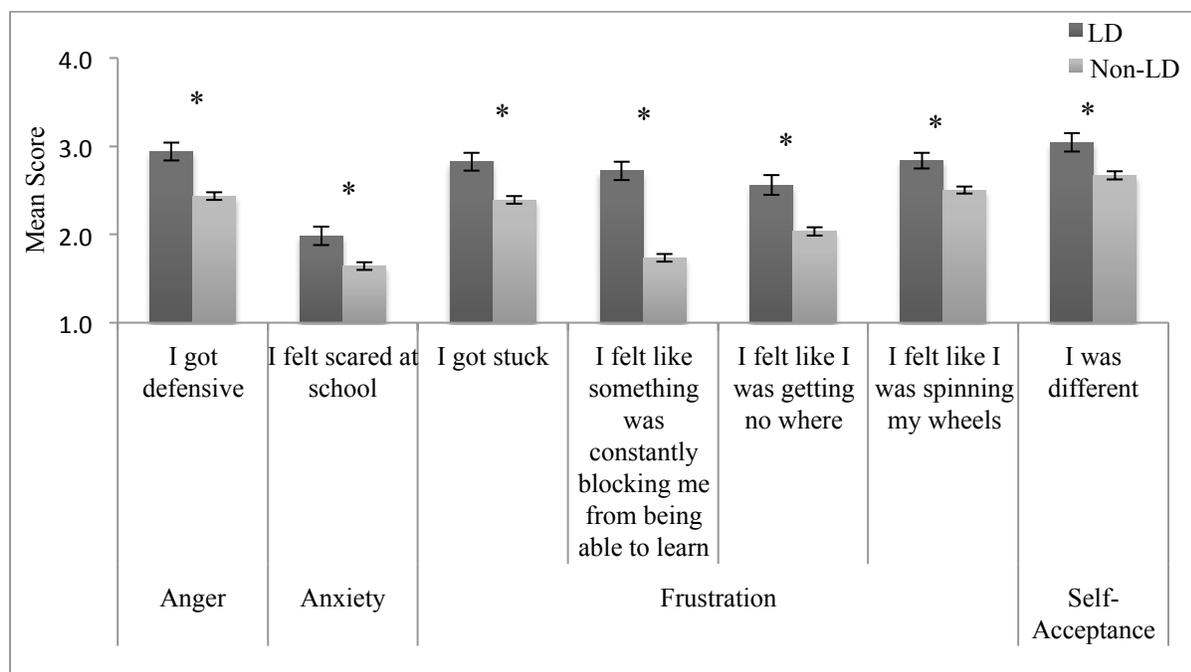


Figure 11. A comparison of participants with and without LDs on the seven items that failed to load onto any of the factors sorted by their hypothesized category. \* Significant at  $p < .001$ .

**Academic Abilities.** The data were first explored using an MANOVA on the entire data set. However, many of the assumptions were violated. Most notably, the data were not normal, has unequal sample variance, and unequal sample sizes. Thus, the data were tested using Welch Robust Tests of Equality of Means to ensure that it was not influenced by these violations (Kohr & Games, 1974). Additionally, non-parametric tests supported the following comparisons. Welch Robust Tests of Equality of Means was performed using SPSS to compare individuals with and without LDs on each of the eight academic skills, as well of for the average rating of academic ability. Bonferroni corrections were used to test significance and a critical value of .005 was used.

Individuals with LDs rated their overall academic abilities significantly lower compared to those without an LD [ $F(1,99.63) = 66.90, p = .000, d = 1.14$ ; see Figure 12]. Additionally, students with LDs rated their academic skills as significantly lower than participants without

LDs in Mathematics [ $F(1,88.28) = 10.19, p = .002, d = .47$ ]; Reading [ $F(1,85.33) = 20.28, p = .000, d = .71$ ]; Spelling [ $F(1,86.94) = 18.25, p = .000, d = .65$ ]; Memory [ $F(1,84.67) = 16.06, p = .000, d = .64$ ]; Concentration [ $F(1,98.89) = 94.70, p = .000, d = 1.21$ ]; and Science [ $F(1,96.66) = 12.36, p = .001, d = .45$ ; see Figure 13]. Although, participants with LDs rated their academic performance as lower than those without LDs in Writing and English, these values were not significant considering Bonferroni correction ( $p = .01, d = .39$  and  $p = .02, d = .36$ , respectively).

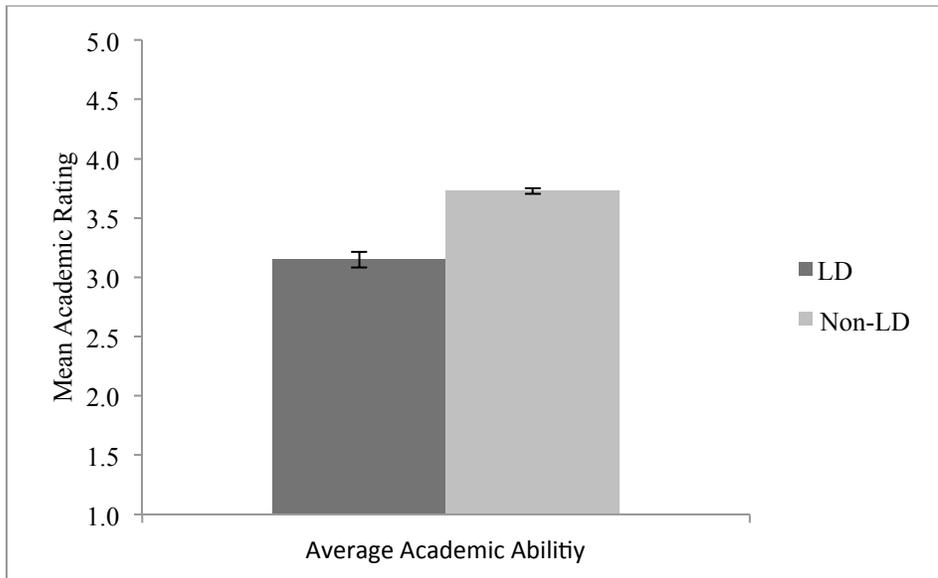
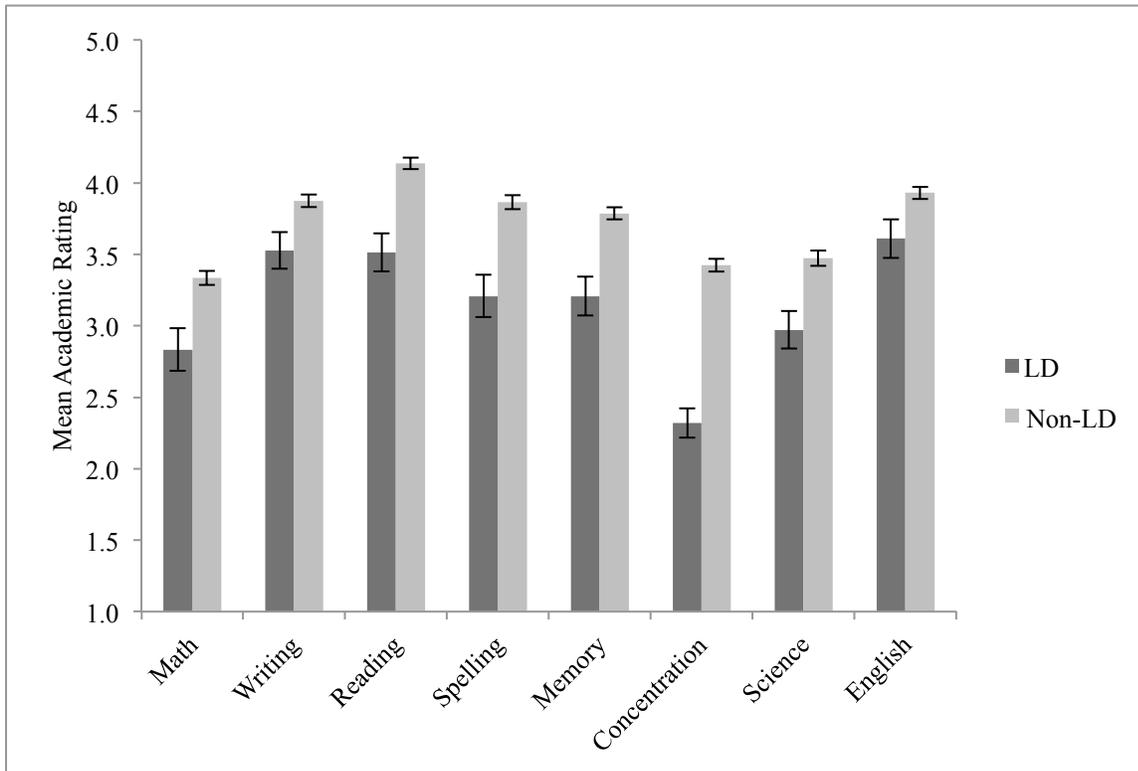


Figure 12. The mean (+/- SEM) Average Academic Ability reported by participants with and without learning disabilities.



*Figure 13.* The mean (+/- SEM) Academic Ability reported by participants with and without learning disabilities in eight different academic skills.

In addition, we found that memory skills positively correlated with each of the other seven academic skills, whereas concentration skills correlated with every academic skill except writing (see Table 15). In general, language based skills of writing, reading, English and spelling correlated with each other, whereas math and science tended not to correlate with the language based academic skills.

Table 15. The correlations between the eight academic skills.

	Writing	Reading	English	Spelling	Memory	Concentration	Math	Science
Writing	-	-	-	-	-	-	-	-
Reading	.59**	-	-	-	-	-	-	-
English	.77**	.52**	-	-	-	-	-	-
Spelling	.40**	.51**	.35**	-	-	-	-	-
Memory	.17**	.20**	.22**	.21**	-	-	-	-
Concentration	.09	.18**	.13**	.11*	.47**	-	-	-
Math	-.08	-.09	-.15**	-.00	.23**	.29**	-	-
Science	-.05	.03	-.07	-.05	.29**	.37**	.55**	-

\*Significant at  $p < .05$

\*\*Significant at  $p < .01$

### Academic Factor Analysis

Initially, the factor structure was assessed with all eight academic ratings. A Principal Axis Factor extraction method was performed using SPSS software on the entire data set. Unlike the previous factor analysis of the survey items, this factor structure was more exploratory and the communalities were not as high, therefore, we only performed an EFA on the entire data set to increase the sample size, rather than splitting the data set to also complete a CFA. Since this was an attempt at exploring the factor structure, first oblique rotations (Promax and Oblimin) were considered since we expected academic ratings to be correlated. After exploring each rotation, it was discovered that the two factors did not correlate in the first model ( $r = .05$ ). Thus, the process of exploring the factor structure will be described below using the orthogonal rotation Varimax.

**First model.** In the first model, three items with communalities below .4 were removed, as recommended while conducting an EFA (see Table 16; Costello & Osbourne, 2005).

Table 16. The communalities for the eight academic abilities factor model.

<b>Academic Ability</b>	<b>Communalities</b>
Writing	.73
English	.63
Reading	.53
Science	.52
Mathematics	.42
Concentration	.38
Memory	.32
Spelling	.28

**Final model.** After removing the three items with communalities lower than .4 (i.e., Spelling, Memory, and Concentration) an analysis of the Kaiser-Meyer Olkin, a measure of sampling adequacy, suggested that this sample was factorable since it was above .6 (KMO=.62). Additionally, and Bartlett's test of sphericity was significant ( $\chi^2 (10) = 841.40, p < .00$ ), suggesting the factor model is appropriate. This model produced a factor structure that converged in three iterations with two factors with an eigenvalue above one, which was reconfirmed by the results of a parallel analysis (see Figure 14). The factor loadings are displayed in Table 17.

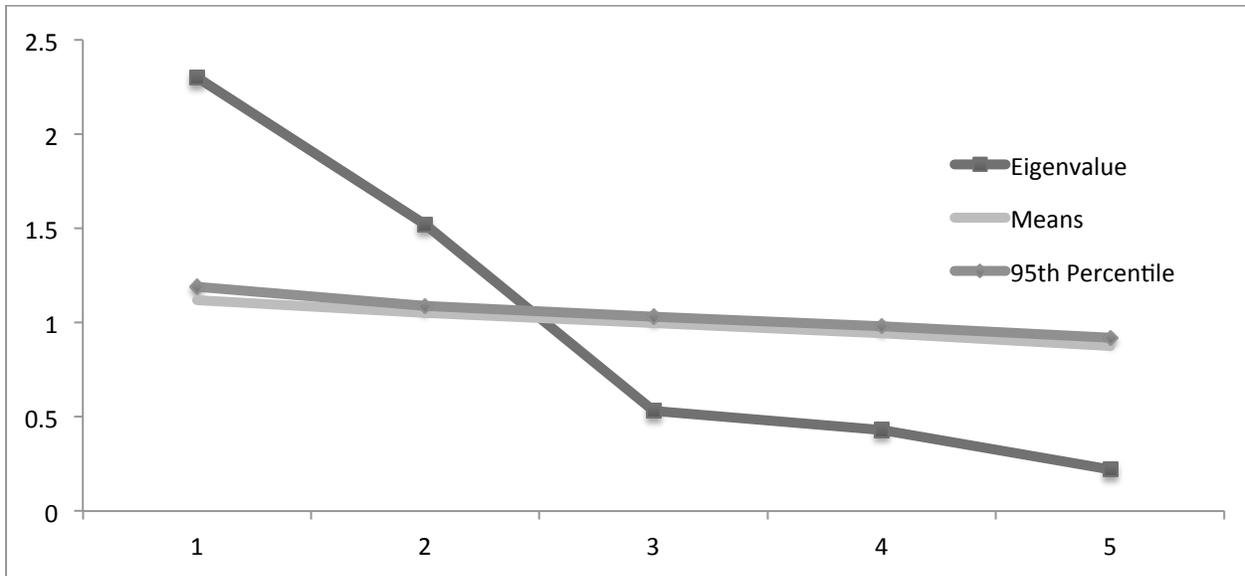


Figure 14. The scree plot for the Principal Axis Factor extraction with a Varimax rotation including the means and 95<sup>th</sup> percentile results from the parallel analysis of the five academic rating items.

Table 17. Principal Axis Factoring Varimax rotated loadings for each of the five academic ability items.\*

Survey Items	Factor Loadings	
	1	2
Writing	.91	
English	.83	
Reading	.62	
Science		.73
Mathematics		.71
Eigenvalue	2.30	1.52
Percentage of total variance	46.03	30.36
Number of test items	3	2

\*Loadings=>.32

**Two factors.** The results of the factor and parallel analyses suggested that there are two factors present for self-reported academic skill ratings. The first factor consists of participant's self-ratings of their skills in English, Reading, and Writing. This factor was named Language

Skills since all three items conceptually fall within this domain. The internal consistency of this factor is good ( $\alpha = .83$ ), it's mean is a 3.9 rating out of the five-point Likert scale, and all items are positively correlated ranging from moderate to strong linear relationships (see Table 18).

Table 18. The correlations between items within the Language Skills Factor.\*

	<b>Writing</b>	<b>Reading</b>	<b>English</b>
<b>Writing</b>	-	-	-
<b>Reading</b>	.59*	-	-
<b>English</b>	.77*	.52*	-

\*Significant at  $p < .000$

The second factor consisted of skills in the subjects of Mathematics and Science. Although these two subjects are conceptually related (e.g., both involve nonverbal abilities and contains elements of mathematics), it is difficult to suggest an overarching construct without knowing more detail about how participants operationally defined these subjects, or what other variables might load onto this factor. Thus, this factor will be called Science and Math Skills in order to not mislead the reader. The internal consistency of this factor is acceptable ( $\alpha = .71$ ), it's mean is a 3.3 rating out of the five-point Likert scale, and the items contain a moderate positive linear relationships ( $r = .55, p < .000$ ).

Lastly, as mentioned in the factor analysis section above, the two factors were not correlated in the first model, allowing the use of a Varimax rotation for extraction. Similarly, the two factors in the finalized model were not linearly correlated ( $r = -.10, p = .05$ ).

**Structural equation modeling.** The two-factor model with the above five academic skill ratings model fit was explored using the computer graphical software AMOS on the entire data set. The original model fit indices suggested the model was an acceptable fit for the data (see Table 19 and Figure 15).

Table 19. The fit indices for the two-factor structural equation model for the five academic skills.

Model	CFI	RMSEA	Chi-Square	Df	p-Value
2-Factor Model	.987	.075	15.20	4	.004

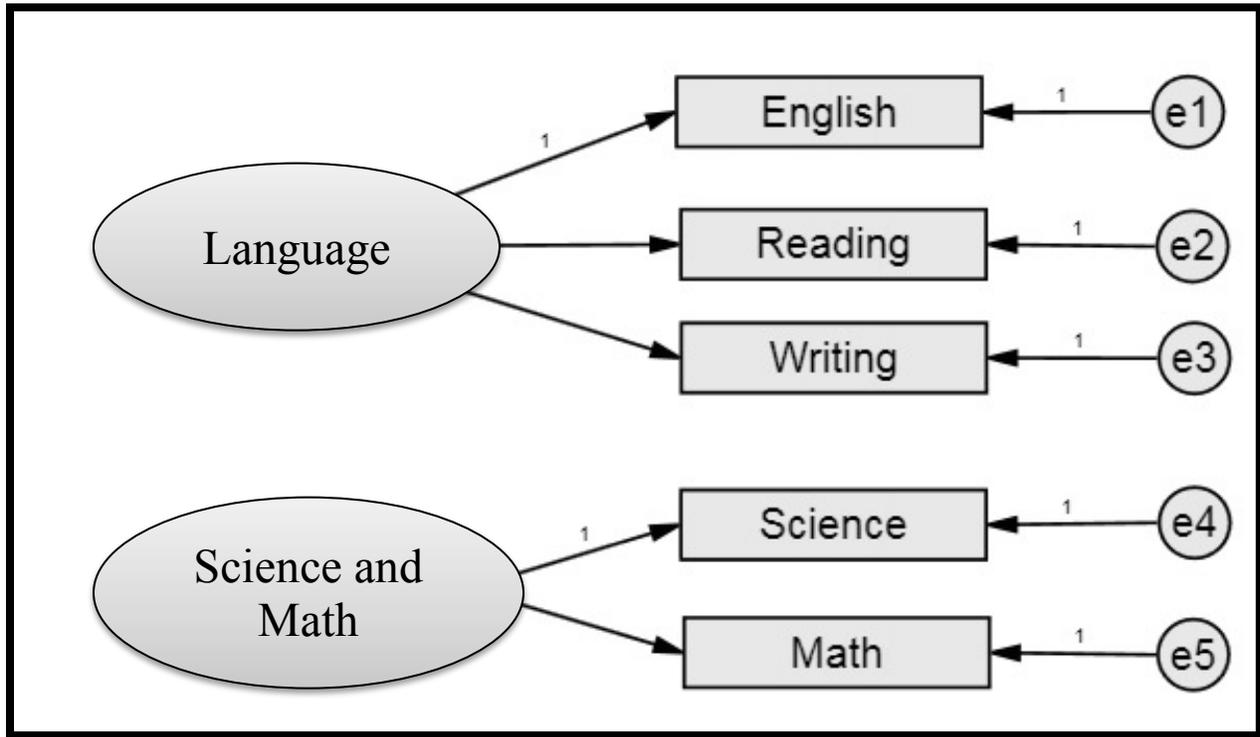


Figure 15. The structural equation model for each of the two academic factors.

### Comparing Academic Factors by Learning Disability

Similarly to previous academic abilities analyses, it was discovered the assumptions of normality and equal sample variance were violated. Thus, the data were tested using Welch Robust Tests of Equality of Means to ensure that it was not influenced by these violations (Kohr & Games, 1974). As with previous analyses, the results were supported by nonparametric tests. Thus, Welch Robust Tests of Equality of Means was performed using SPSS to compare individuals with and without LDs on each of the two academic factors. Bonferroni corrections were used to test significance with a critical value of .025. As would be expected, participants

with LDs rated their Language and Science and Math skills as significantly lower than participants without LDs [ $F(1,85.53) = 12.73, p = .001, d = .67$ ;  $F(1,88.94) = 13.10, p = .000, d = .95$ , respectively; see Figure 16].

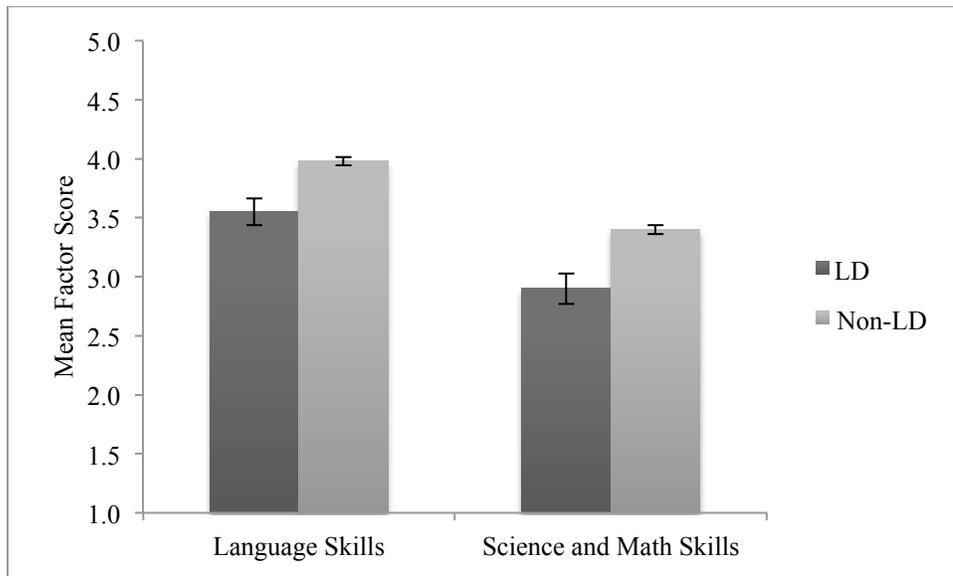


Figure 16. The mean (+/- SEM) score on each factor reported by participants with and without learning disabilities for each of the two academic factors.

**Proportion of participants with elevated average scores on each factor.** Similarly to the social emotional factors, we also created frequency charts to determine the proportion of participants whose average score across each factor was one standard deviation above the mean. These frequencies were used to compare the proportion of participants, with and without LDs, who gave average factor ratings endorsing higher academic abilities than the mean. A lower proportion of participants with LDs had average scores across each factor one standard deviation above the mean on the Math Science factor [ $\chi^2 (1, N=489) = 6.43, p < .01$ ]. However, similar proportions were found between individuals with and without LDs on the Language factor, see Table 20.

*Table 20.* The proportion of participants with and without learning disabilities whose average score on each factor is one standard deviation above the mean.

	<b>Language Factor</b>	<b>Math Science Factor</b>
<b>Learning Disability</b>		
Yes	15%	7%
No	20%	19%

In addition, we also used frequency charts to determine the proportion of participants whose average score on each factor was greater than a rating of four, reflecting an average rating ranging from “good” to “very good.” These frequencies were reported to compare the proportion of participants, with and without LDs, who gave average scores on each factor endorsing good academic abilities. A lower proportion of participants with LDs average score on each factor was greater than four on both the Language factor [ $\chi^2 (1, N=489) = 12.99, p < .01$ ] and Math Science factor [ $\chi^2 (1, N=489) = 10.48, p < .01$ ], see Table 21.

*Table 21.* The proportion of participants with and without learning disabilities whose average score on each factor is greater than a rating of four.

	<b>Language Factor</b>	<b>Math Science Factor</b>
<b>Learning Disability</b>		
Yes	33%	10%
No	56%	28%

**Proportion of participants with lower average scores on each factor.** We also created frequency charts to determine the proportion of participants whose average score on each factor was one standard deviation below the mean. These proportions were compared using Chi-Square analyses to see if there were any differences between the sample with and without LDs. A significantly greater proportion of participants with LDs rated their academic abilities as one

standard deviation below the mean compared to participants without LDs for both the Language factor [ $\chi^2 (1, N=489) = 22.96, p < .01$ ] and Math Science factor [ $\chi^2 (1, N=489) = 66.76, p < .01$ ], see Table 22.

*Table 22.* The proportion of participants with and without learning disabilities whose average score on each factor was one standard deviation below the mean.

	<b>Language Factor</b>	<b>Math Science Factor</b>
<b>Learning Disability</b>		
Yes	37%	45%
No	14%	9%

In addition, frequency charts were created to determine the proportion of participants whose average score on each factor was lower than a rating of two, reflecting an average rating ranging from “poor” to “very poor” and to compare the proportion of participants, with and without LDs, who give average ratings endorsing poor academic abilities on each factor. The converse of the results above concerning self-ratings of academic abilities higher than four was found: A significantly greater proportion of participants with LDs rated their academic abilities as poor compared to participants without LDs for both the Language factor [ $\chi^2 (1, N=489) = 41.62, p < .01$ ] and Math Science factor [ $\chi^2 (1, N=489) = 93.31, p < .01$ ], see Table 23.

*Table 23.* The proportion of participants with and without learning disabilities whose average score on each factor was less than a rating of two.

	<b>Language Factor</b>	<b>Math Science Factor</b>
<b>Learning Disability</b>		
Yes	10%	22%
No	.01%	.02%

**Concentration, memory, and spelling by social emotional factors.** We used Pearson correlations to explore the relation between concentration, memory, and spelling skills with each

social emotional factor as it failed to load onto either academic factor. Both memory and concentration were negatively correlated with each social emotional factor (see Table 24). Specifically, poorer self-rated concentration and memory was associated with greater alienation, anxiety and embarrassment. However, this correlation was weak.

*Table 24.* The correlations between items that failed to load onto the academic factors with the social emotional factors Language Skills factor.

	<b>Alienated</b>	<b>Anxious</b>	<b>Angry</b>	<b>Embarrassed</b>
<b>Memory</b>	-.20**	-.22**	-.12*	-.22**
<b>Concentration</b>	-.20**	-.25**	-.21**	-.26**
<b>Spelling</b>	-.04	-.05	.01	-.04

\*Significant at  $p < .05$

\*\*Significant at  $p < .00$

### **Learning Disability as a Moderator of the Relationship Between the Academic and Socio-Emotional Factors**

Prior to completing a multiple regression analysis, the two academic factors and four socio-emotional factor correlations were analysed to ensure the presence of a linear relationship between dependent and independent variables. The Language Skill factor was removed from the regression since it was not correlated with any of the Social-Emotional factors therefore violating an assumption of multiple regression (see Table 25).

*Table 25.* The correlation of the academic skills and socio-emotional factors along with means and standard deviations.

<b>Factor</b>	<b>(M, SD)</b>	<b>Language Skills<sup>1</sup></b>	<b>Science and Math Skills<sup>2</sup></b>
<b>Anxious</b>	(2.9, .62)	.052	-.174**
<b>Angry</b>	(2.2, .64)	.005	-.171**
<b>Embarrassed</b>	(1.9, .73)	-.006	-.241**
<b>Alienated</b>	(2.0, .69)	-.001	-.108*

\*\* Correlation is significant at the .01 level.

\* Correlation is significant at the .05 level.

<sup>1</sup>  $M$  and  $SD = 3.8, .76$ ; <sup>2</sup>  $M$  and  $SD = 3.4, .75$

**Regression model and assumptions.** Each multiple regression was performed using the statistic software SPSS with the predictor variable as Science and Math Skills, the outcome variable as each Social-Emotional factor tested individually, and the presence of an LD as a moderator. A modified linear multiple regression was performed whereby an interaction term was created by multiplying a dummy coded LD variable by the Science and Math Skills factor. The LD variable was coded to reflect the presence of an LD. The theory behind this methodology was adapted from Aguinis (2004).

In the first block, the dummy coded LD variable was entered into the regression model along with the Science and Math Skills factor. In a second block, the interaction term was entered into the model. This tested whether the addition of this interaction term (i.e., presence of a LDs effect on Math and Science Skills) improves the prediction of each Social-Emotional factor compared to a model with only the presence of an LD and Math and Science Skills entered independently. Thus, the *R* Square change would report whether there is an increase in variation explained by the addition of this interaction term. Additionally, the first model would test whether either the presence of an LD or Math and Science Skills explain any variance in each Social Emotional factor.

The assumption of homoscedasticity and normality of residuals was explored using plots of the standardized residuals against the standardized predicted values. Each regression displayed roughly normal distribution on the error residuals on the histograms and approximately even variances along the line of best fit on each scatterplot. The assumption of independence of observations was verified both by the study design and Durbin-Watson statistic (Each value ranged from lowest  $d = 1.65$  to highest  $d = 1.84$  and therefore above 1.5). Lastly,

multicollinearity was assessed through collinearity statistics with each VIF falling within the 1-10 range. Thus, all assumptions were met for each regression.

**Alienated factor.** The regression was performed with Science and Math Skills as the predictor variable, the Alienation factor as the outcome variable, and the presence of an LD as the moderator. The results of the regression found that the presence of a LD did not significantly moderate the relationship between Science and Math Skills and the Alienation factor since the *R* Square Change was not significant (see Table 26). However, there was a significant effect of the first model accounting for 3.7% of the variance in Alienation [ $F(2, 470) = 9.02, p < .00$ ]. See Table 26. This effect was explained by the Science and Math factor and the presence of an LD, which both independently contributed to the first model ( $t = -2.84, p < .00$ , Semi-Partial Correlation =  $-.13, sr^2 = .02$  and  $t = 2.6, p = .01$ , Semi-Partial Correlation =  $.12, sr^2 = .01$ , respectively; see Table 27).

Table 26. The regression model summary with Science and Math Skills as the predictor variable, the Alienation factor as the outcome variable, and the presence of an LD as the moderator.

Model	<i>R</i>	<i>R</i> -square	<i>R</i> -square change	<i>F</i> -Change	Significant <i>F</i> Change
1	.192	.037	.037	9.02	.000
2	.196	.038	.001	.661	.417

Table 27. A summary of the regression coefficients for the Alienation factor.

Model		Unstandardized B	Standardized β	<i>t</i> - value	<i>p</i> -value	<i>sr</i> <sup>2</sup>
1	Constant	2.28				
	Math and Science	-.09	-.13	-2.84	.00	.02
	Presence of LD	.23	.12	2.6	.01	.01
2	Constant	2.23				
	Math and Science	-.08	-.11	-2.17	.03	.01
	Presence of LD	.43	.22	1.65	.10	.01
	Math and Science x LD	-.07	-.11	-.81	.42	.00

Participants predicted alienation score was equal to  $2.28 - .09 (\text{math and science}) + .23$  (Presence of an LD), where LD is coded as 1 = LD and 0 = no LD. More specifically, reported feelings of alienation decreased by  $-.09$  units on our scale for each increase in 1 unit of math and science ratings, while having an LD led to an increase of  $.23$  units of alienation compared to individuals without LDs.

In general, as participant's ratings on their Science and Math skills increased (i.e., higher academic performance ratings), their reported feelings on the Alienated factor tended to decrease (i.e., lower feelings of alienation). Although the interaction was not significant (possibly due to small sample size of the LD group), there was a difference within the LD group. See Figure 17.

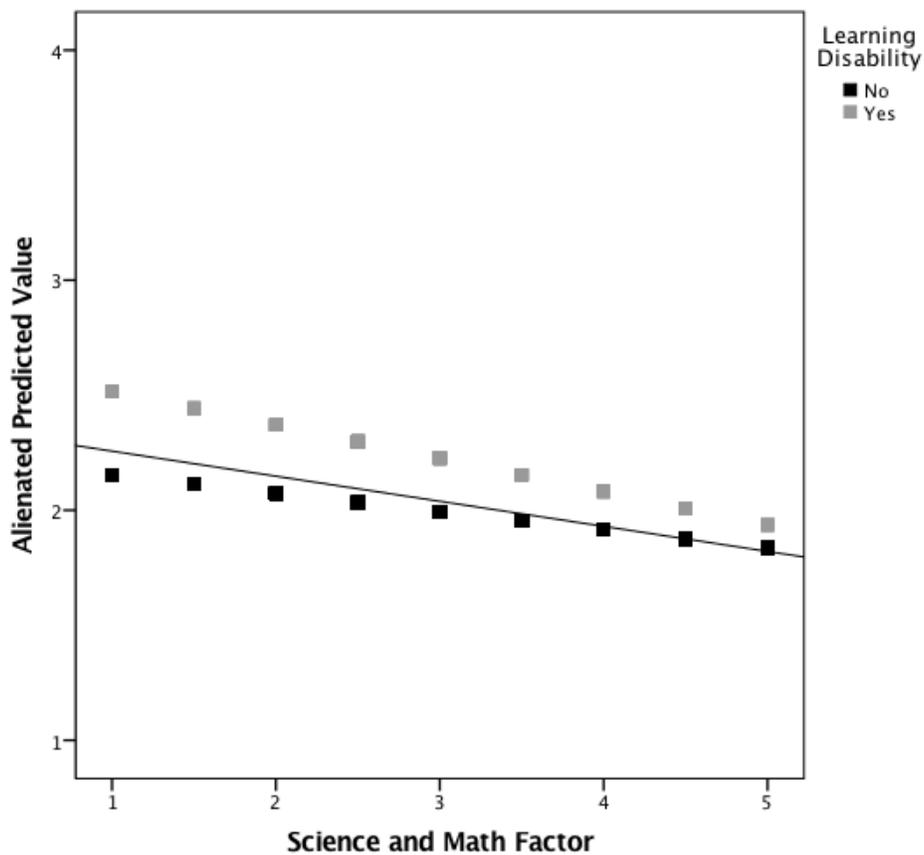


Figure 17. The predicted value of the Alienated factor by the Science and Math factor (represented by the solid line) and by LD.

**Anxious factor.** The regression was performed with Science and Math Skills as the predictor variable, the Anxious factor as the outcome variable, and the presence of an LD as the moderator. The results of the regression found that the presence of a LD did not significantly moderate the relationship between Science and Math Skills and the Anxious factor since the *R* Square Change was not significant. However, there was a significant effect of the first model accounting for 5.7% of the variance in the Anxious factor [ $F(2, 478) = 14.39, p < .00$ ]. See Table 28. More specifically, this effect was explained by the Science and Math factor ( $t = -4.44, p < .00$ , Semi-Partial Correlation =  $-.20, sr^2 = .04$ ), and to a lesser extent the LD factor ( $t = 2.17, p < .03$ , Semi-Partial Correlation =  $.10, sr^2 = .01$ ), both of which independently contributes to the model (see Table 29).

Table 28. The regression model summary with Science and Math Skills as the predictor variable, the Anxiety factor as the outcome variable, and the presence of an LD as the moderator.

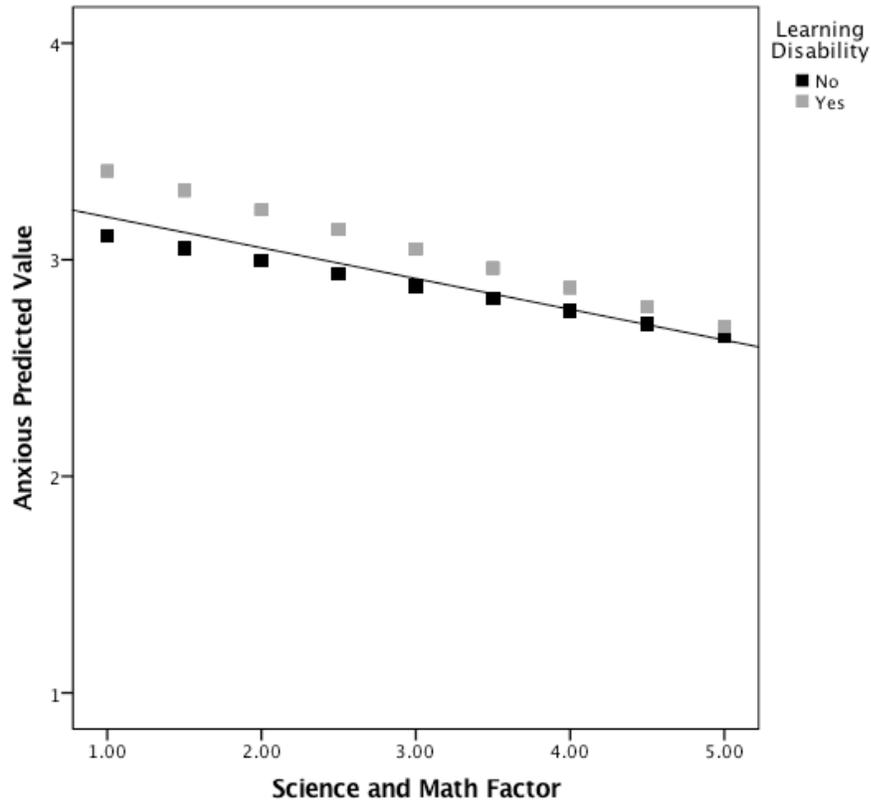
Model	<i>R</i>	<i>R</i> -square	<i>R</i> -square change	<i>F</i> -Change	Significant <i>F</i> Change
1	.238	.057	.057	14.39	.000
2	.241	.058	.001	.759	.384

Table 29. A summary of the regression coefficients Anxiety factor.

Model		Unstandardized B	Standardized β	<i>t</i> - value	<i>p</i> -value	<i>sr</i> <sup>2</sup>
1	Constant	3.27				
	Math and Science	-.13	-.20	-4.44	.00	.04
	Presence of LD	.17	.10	2.17	.03	.01
2	Constant	3.23				
	Math and Science	-.12	-.18	-3.6	.00	.03
	Presence of LD	.36	.21	1.56	.12	.00
	Math and Science x LD	-.06	-.11	-.87	.38	.00

Participants predicted anxiety score in the first model, was equal to 3.27 - .13 (math and science) + .17 (Presence of an LD), where LD is coded as 1 = LD and 0 = no LD. More

specifically, reported feelings of anxiety decreased by  $-.13$  units on our scale for each increase of 1 unit in math and science ratings, whereas having an LD lead to an increase of  $.17$  units of anxiety compared to individuals without LDs. Similarly to the Alienated factor, as participant's ratings of their Science and Math skills increased, their reported feelings on the Anxious factor tended to decrease (i.e., lower feelings of anxiety). See Figure 18.



*Figure 18.* The predicted value of the Anxious factor by the Science and Math factor (represented by the solid line) and by LD.

**Angry factor.** The regression was performed with Science and Math Skills as the predictor variable, the Angry factor as the outcome variable, and the presence of an LD as the moderator. The results of the regression found that the presence of a LD did not significantly moderate the relationship between Science and Math Skills and the Angry factor since the  $R$

Square Change was not significant. However, there was a significant effect of the first model accounting for 4.2% of the variance in the Angry factor [ $F(2, 473) = 10.47, p < .00$ ]. See Table 30. More specifically, this effect was explained by the Science and Math factor ( $t = -4.41, p < .00$ , Semi-Partial Correlation =  $-.20, sr^2 = .04$ ), which statistically contributes to the model (see Table 31). There were not any differences in the LD group, nor did the presence of an LD add any significant information to help explain the variance in the Angry factor. However, as Math and Science skills increased, participant's ratings on the Angry factor significantly decreased (see Figure 19).

Participants predicted angry score in the first model, was equal to  $2.62 - .14$  (math and science) +  $.03$  (Presence of an LD), where LD is coded as 1 = LD and 0 = no LD. More specifically, reported feelings of anger decreased by  $-.14$  units on our scale for each increase in math and science ratings, while having an LD did not significantly differ between individuals with and without LDs.

Table 30. The regression model summary with Science and Math Skills as the predictor variable, the Angry factor as the outcome variable, and the presence of an LD as the moderator.

Model	R	R-square	R-square change	F-Change	Significant F Change
1	.206	.042	.042	10.47	.000
2	.212	.045	.002	1.20	.27

Table 31. A summary of the regression coefficients Angry factor.

Model		Unstandardized B	Standardized β	t- value	p-value	sr <sup>2</sup>
1	Constant	2.62				
	Math and Science	-.14	-.20	-4.41	.00	.04
	Presence of LD	.03	.02	.39	.69	.00
2	Constant	2.56				
	Math and Science	-.12	-.18	-3.4	.00	.02
	Presence of LD	.28	.16	1.17	.25	.00
	Math and Science x LD	-.08	-.15	-1.10	.27	.00

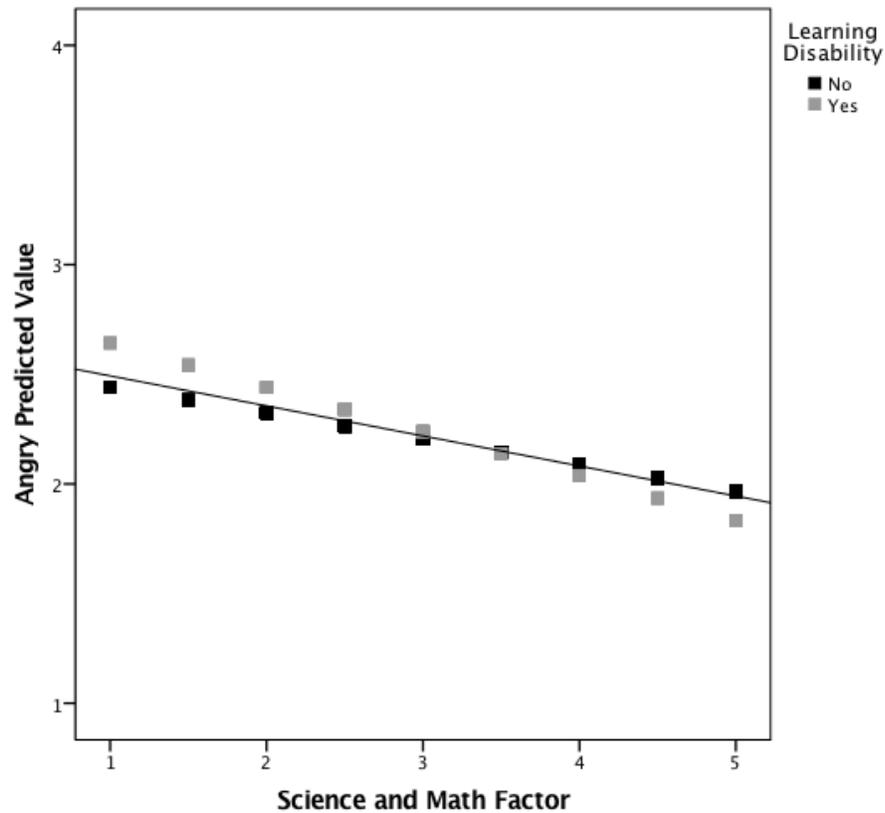


Figure 19. The predicted value of the Angry factor by the Science and Math factor (represented by the solid line) and by LD.

**Embarrassed factor.** The regression was performed with Science and Math Skills as the predictor variable, the Embarrassed factor as the outcome variable, and the presence of an LD as the moderator. The results of the regression found that the presence of a LD did not significantly moderate the relationship between Science and Math Skills and the Embarrassed factor since the *R Square Change* was not significant. However, there was a significant effect of the first model accounting for 7% of the variance in the Embarrassed factor [ $F(2, 477) = 17.54, p < .000$ ]. See Table 32. More specifically, this effect was explained by the Science and Math factor ( $t = -5.38, p < .000$ , Semi-Partial Correlation =  $-.24, sr^2 = .06$ ), which statistically contributes to the model, whereas having an LD does not (see Table 33).

Participants predicted embarrassed score in the first model, was equal to 2.52 - .18 (math and science) + .14 (Presence of an LD), where LD is coded as 1 = LD and 0 = no LD. More specifically, reported feelings of embarrassment decreased by -.18 units on our scale for each increase in math and science ratings, while having an LD did not significantly differ between individuals with and without LDs. In general, as participant's reported Math and Science skills increased, their scores on the Embarrassed factor decreased (see Figure 20).

*Table 32.* The regression model summary with Science and Math Skills as the predictor variable, the Embarrassed factor as the outcome variable, and the presence of an LD as the moderator.

<b>Model</b>	<b>R</b>	<b>R-square</b>	<b>R-square change</b>	<b>F-Change</b>	<b>Significant F Change</b>
<b>1</b>	.262	.069	.069	17.54	.000
<b>2</b>	.262	.069	.000	.06	.82

*Table 33.* A summary of the regression coefficients for the Embarrassed factor.

<b>Model</b>		<b>Unstandardized B</b>	<b>Standardized β</b>	<b>t- value</b>	<b>p-value</b>	<b>sr<sup>2</sup></b>
<b>1</b>	Constant	2.52				
	Math and Science	-.18	-.24	-5.38	.00	.06
	Presence of LD	.14	.07	1.47	.14	.00
<b>2</b>	Constant	2.53				
	Math and Science	-.19	-.25	-3.4	.00	.05
	Presence of LD	.08	.04	1.17	.78	.00
	Math and Science x LD	.02	-.03	-1.10	.82	.00

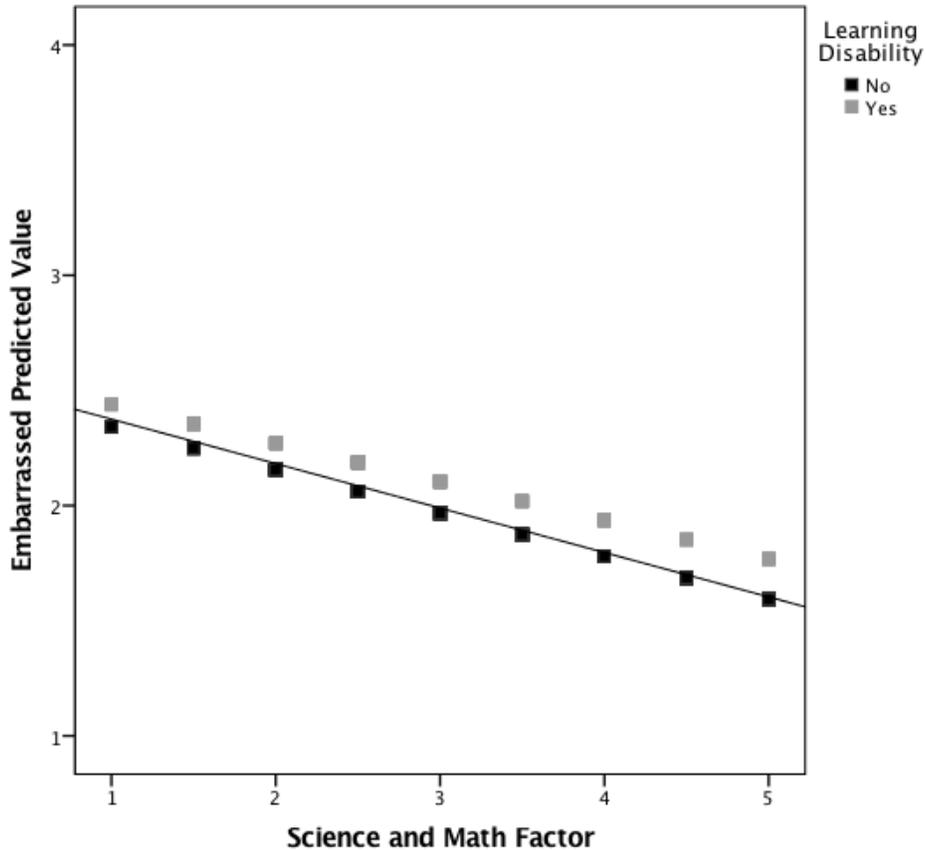


Figure 20. The predicted value of the Embarrassed factor by the Science and Math factor (represented by the solid line) and by LD.

**Across all factors combined.** The regression was performed with Science and Math Skills as the predictor variable, the mean skills across all four factors as the outcome variable, and the presence of an LD as the moderator. The results of the regression found that the presence of a LD did not significantly moderate the relationship between Science and Math Skills and the Anxious factor since the *R* Square Change was not significant. However, there was a significant effect of the first model accounting for 7.3% of the variance in the mean score across all factors [ $F(2, 459) = 18.09, p < .00$ ]. See Table 34. More specifically, this effect was explained by the Science and Math factor ( $t = -5.12, p < .00$ , Semi-Partial Correlation =  $-.23, sr^2 = .05$ ), and to a

lesser extent the LD factor ( $t = 2.17, p < .03$ , Semi-Partial Correlation = .10,  $sr^2 = .01$ ), both of which independently contributes to the model (Table 35).

*Table 34.* The regression model summary with Science and Math Skills as the predictor variable, the mean score across all factors as the outcome variable, and the presence of an LD as the moderator.

<b>Model</b>	<b>R</b>	<b>R-square</b>	<b>R-square change</b>	<b>F-Change</b>	<b>Significant F Change</b>
<b>1</b>	.270	.073	.073	18.09	.000
<b>2</b>	.273	.074	.001	.63	.43

*Table 35.* A summary of the regression coefficients for the mean score across all factors.

<b>Model</b>		<b>Unstandardized B</b>	<b>Standardized β</b>	<b>t- value</b>	<b>p-value</b>	<b>sr<sup>2</sup></b>
<b>1</b>	Constant	2.68				
	Math and Science	-.14	-.23	-5.12	.00	.05
	Presence of LD	.16	.10	2.17	.03	.01
<b>2</b>	Constant	2.63				
	Math and Science	-.13	-.22	-4.19	.00	.04
	Presence of LD	.31	.20	1.48	.14	.00
	Math and Science x LD	-.05	-.10	-.79	.43	.00

Participants' predicted mean score across all factors in the first model, was equal to 2.68 - .14 (math and science) + .16 (Presence of an LD), where LD is coded as 1 = LD and 0 = no LD. More specifically, reported total social emotional score decreased by -.14 units on our scale for each increase in math and science ratings, while having an LD lead to an increase of .16 units on our social emotional scale compared to individuals without LDs. More specifically, as participant's ratings of their Science and Math skills increased, their reported overall social emotional factor score tended to decrease (i.e., lower reported feelings of overall anxiety, embarrassment, anger, and alienation). See Figure 21.

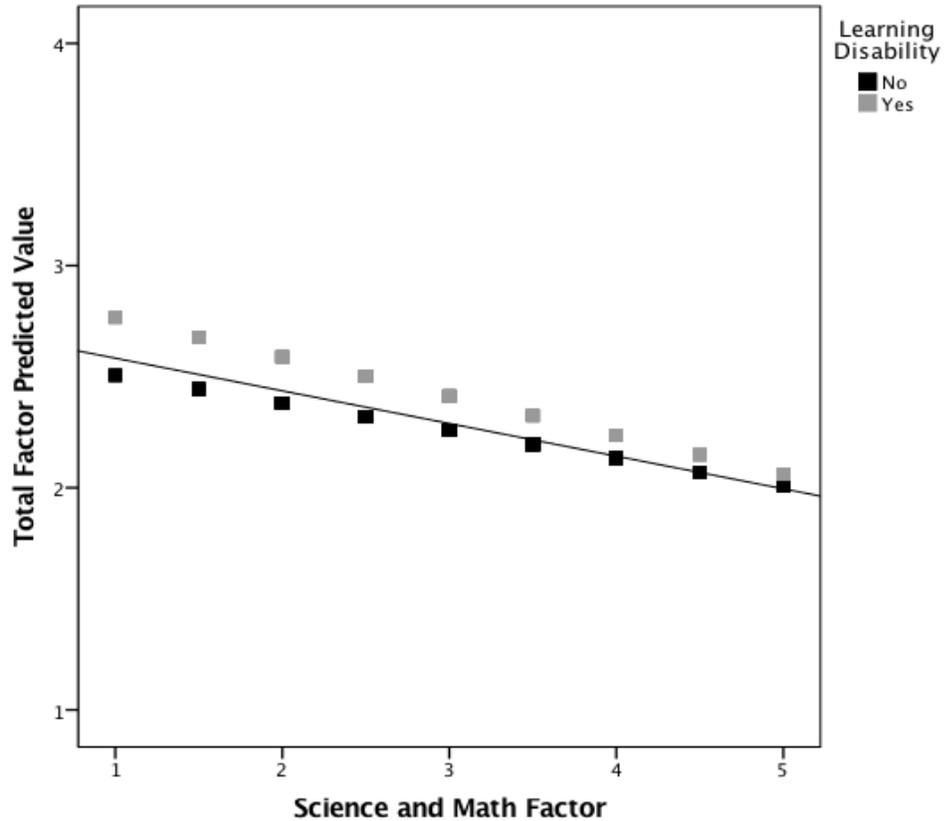


Figure 21. The predicted value of the mean score across all factors by the Science and Math factor (represented by the solid line) and by LD.

### Discussion

One goal of our research was to develop a scale that captured what it felt like to have an LD in high school. The scale was developed from the most common items individuals self-reported when describing their experience of having an LD in high school (obtained from Noble & Evans, 2013). We hoped this approach would help capture the depth of feelings associated with LDs, and help us gain a more complete understanding of the social-emotional life of students with LDs. By using this scale, we pursued our main goals of examining the intensity of these emotions reported by students with LDs, how they compared to students without LDs, and whether they were influenced by any differences in self-perceived academic abilities.

## Scale Construction

Our first goal was to develop a scale using the most common descriptors obtained from Noble and Evans (2013) research. Results of Noble and Evans' thematic analysis suggested that the most common descriptors reflected 16 different categories, many of which represented opposing positive and negative feelings (e.g., happiness vs. sadness). From these 16 categories, we created the following eight hypothesized factors by combining opposing feelings on the same factor: 1) Social Support; 2) Coping Strategies; 3) Mood and Self-Image; 4) Acceptance; 5) Adequacy; 6) Anger, 7) Frustration, and 8) Anxiety.

Q-sort methodology was used to objectively reduce the number of potential items from the 111 most frequent descriptors to a more manageable number. Individuals completing the Q-sort showed good agreement in placing the items within six of the categories and the eight items with the highest agreement in each category were retained for the survey. Very little placement agreement occurred in the Coping Strategies category and it was discarded. In addition, participants had difficulty distinguishing between whether the Acceptance category was about "acceptance of one's self" or about receiving "acceptance from others" leading to some items being sorted instead as reflecting the categories of Social Support or Mood and Self-image. We decided to split the Acceptance category into items reflecting Self-Acceptance and Acceptance from Others, and retained the eight descriptors with the greatest-sorted agreement reflecting each of these (see Appendix 1 for complete survey breakdown and list of excluded items).

Therefore, the final scale included eight items in each of the following conceptual categories: Acceptance from Others, Adequacy, Anger, Anxiety, Frustration, Mood and Self-Image, Self-Acceptance, and Social Support.

**Factor structure.** The results of the factor analysis suggested the presence of four factors that reflected feeling alienated (factor 1), anxious (factor 2), angry (factor 3), and embarrassed (factor 4). In addition we compared the responses of these two groups on a subset of items not among these four-factors that conceptually reflected inferiority, inadequacy, and frustration. Given that previous research has reported these feelings as higher in individuals with LDs than those without LDs (Estell et al., 2008).

**Factors.** Three of the confirmed factors in the survey—Anxious, Angry and Alienated—largely mirrored the conceptual categories resulting from the Q-sort. The Alienated factor consisted of items we had originally thought pertained to the separate categories of perceived Social Support and Acceptance from Others. Many of these items reflected feeling alone or isolated from others, as well as reversely coded items reflecting having lots of friends, feeling loved, and accepted by others. This category was named Alienated as high scores reflected a lack of social support and acceptance from others. The Anxious factor mostly consisted of items as originally sorted into the Anxiety category such as feeling nervous, anxious, tense, overwhelmed, and worried. However, a couple of items reflecting feelings of low mood such as feeling depressed and sad, as well as feeling frustrated, also fit in the Anxious factor. The Angry factor mostly consisted of a cluster of items sorted into an Anger category, and a couple that had originally been sorted as Frustration (irritable and annoyed). High scores on this factor tend to reflect feelings of anger, hate, annoyance, and irritability, items that all reflect feelings of anger. The last factor, Embarrassed, was more of a combination of items under the Self-Acceptance category and a couple of items that had been placed during the Q-sort under the Mood and Self-Image category. In general, high scores on this factor suggested feelings of shame, embarrassment, worthlessness, and hating towards oneself.

There are several reasons for why our original categories were not completely mirrored in the factor structure of the final scale. First, the factors that emerge are a function of the items that are entered. It is possible that had more descriptors been used, that additional factors reflecting more of the original categories would have emerged with strong eigenvalues. Second, although items may appear to be conceptually similar, whether and how much the experiences described by those items may vary considerably among individuals. Third, the experiences described by the items within a category likely correlate more with some of the items within a category than with others within it, and with experiences described by items from other categories. Regardless the resulting four categories provided a useful tool for examining the socio-emotional experience of high school in our participants with and without LD, and may be a useful tool for other samples and comparison.

### **Social Emotional Differences Between Individuals With and Without Learning Disabilities**

In general, participants with LDs had significantly higher scores for negative social emotions detailed in the survey compared to individuals without LDs, suggesting that overall, individuals with LDs report a more negative experience of high school compared to individuals without LDs. In addition, these findings remained while controlling for various demographic variables such as SES and ethnicity, suggesting that having an LD in high school, regardless of these variables, contributes to more negative social emotional well-being. In addition, although females tended to report higher scores overall than males, especially on the Anxious factor, participants' gender did not influence any observed social emotional differences between participants with and without LDs. Across the four factors, students with LDs reported elevated levels of negatively, especially for feelings of alienation, embarrassment, and anxiety. Although

students with LDs did report higher levels of anger compared to students without LDs, this difference was not significant.

**Feelings of alienation.** In our previous research, we found that many university students described their experience of having an LD in high school as lonely, isolating, and feeling different than their peers, with some participants reporting feeling unloved or a lack of social support (Noble and Evans 2013). These findings are supported by many other researchers (Estell et al., 2008; Kuhne & Wiener, 2000; Martinez, 2006; Sabornie, 1994). However, as our research was exploratory, we were unsure of the magnitude of these feelings of isolation, or whether most students endorse feelings of loneliness during high school.

Recall that on this factor, our original hypothesis and the results of our q-sort task suggested six items reflected Social Support, six items reflected Acceptance from Others, and one reflected Mood and Self-Image. Although participants with LDs reported higher scores on every item, only four were significantly higher for individuals with LDs compared to those without LDs, including one item originally thought to describe a lack of social support (“I was lonely”), two items reflecting a lack of acceptance from others (“People did not understand me” and “I did not feel part of the class”), and for the one item reflecting negative mood and self-image (“I felt helpless”). In addition, participants with LDs reported higher scores on the item “I was different,” compared to students without LDs. Although this item failed to load onto this factor, it was originally hypothesized to reflect feeling of alienation and sort onto our self-acceptance category.

A greater proportion (26%) of students with LDs obtained elevated average scores on the items within the Alienated factor (i.e., one standard deviation above the mean) compared to individuals without LDs (16%). Thus, the experience of isolation and loneliness does not

characterize the majority of LD students in high school. However, these feelings are experienced at higher levels in individuals with LDs, with 1 in 4 students with LDs reporting high feelings of alienation in high school, compared to our sample mean. In addition, participants with LDs reported more negative scores on each item of the Alienation factor, further suggesting that collectively, the experiences of having an LD contributes to the development of feelings of separation from others and loneliness.

**Feelings of anxiety and depression.** As with feelings of alienation, our previous research found that the second most commonly reported feelings used to describe participant's LD experience were those reflecting anxiety and sadness (Noble & Evans 2013). Previous research has also suggested that when anxious and depressive symptoms are measured dimensionally, individuals with LDs report higher ratings than those without (Gregoire & Desoete, 2009; Lackaye et al., 2006; Maag & Reid, 2006; Newcomer et al., 1995; Sideridis, 2007; Whitaker Sena et al., 2007).

Given these findings, we expected (and found) individuals with LDs to report higher levels of anxiety and depressive symptoms compared to those without LDs. With respect to the seven individual items in this factor, both groups reported similarly high scores on the items "I felt stressed" and "I worried about my future," suggesting that these are common feelings among many students in high school. Individuals with LDs reported significantly higher scores on the anxiety item "I was anxious," and on both mood and self-image items "I felt sad" and "I felt depressed". In addition, for the item "I feel scared at school," that was hypothesized to reflect anxiety but failed to load onto any factor, participants with LDs reported significantly higher scores compared to those without LDs.

A significantly greater proportion of participants with LDs reported elevated average scores (i.e., one standard deviation above the mean) on the Anxious factor compared to participants without LDs (30% and 20%, respectively). However, it is worth noting just how many participants, both with and without LDs, reported elevated feelings of anxiety on our scale, as the mean score for our sample was nearly three on the four-point scale. More specifically, 57% of participants with LDs reported average scores above three on items within the Anxious factor compared to 44% of those without LDs. In other words, nearly 3 out of every 5 participants with LDs on average endorsed feelings of anxiety, depression, and sadness as scores of three or above, reflecting the participant “sometimes” or “often” experiencing this feeling. These results suggest that the experience of anxiety is common in high school, but is more elevated in individuals with LDs.

Thus, our current study found that high school is a period in which it is common to experience feelings of sadness, stress, and anxiety, such as feelings of worry, nervousness, and fear. However, the experience of having an LD in high school appears to significantly increase feelings of anxiety and sadness.

**Feelings of anger.** In general, research has suggested a potential relationship between LDs and behavioural issues (Yu et al., 2006). Similarly, in our research (Noble & Evans, 2013), many participants reported their LD experience as feeling frustrated and angry. Thus, we expected to observe a higher report of these feelings in individuals with LDs. Contrary to our expectation, participants with LDs did not significantly differ from their non-LD peers on the Angry factor.

Overall, participants with and without LDs reported similar feelings of anger on all items loading onto this factor. Individuals with LDs did report higher scores on the item “I get

defensive,” an item initially hypothesized to load onto the Anger category. However, this item did not load onto any factor. One possible explanation for the lack of a significant difference in the mean of this factor and of its individual items lies in the gender distribution of the sample. Research tends to indicate that males report greater externalizing behaviour compared to females (Lahey et al., 2000). Our sample was primarily female (83%), which may have contributed to the lack of mean differences in reported anger. It is possible that our sample size of males with LDs was simply too small to observe any differences. A second possibility is that males with LDs who attend university experience lower levels of anger in high school than those who discontinue formal schooling or choose community college or apprenticeship programs.

However when elevated scores were examined, a significantly greater proportion of participants with LDs reported elevated average scores (i.e., one standard deviation above the mean) on the Angry factor compared to participants without LDs (27% and 17%, respectively), but similar proportions of participants with and without LDs reported average scores greater than three on the four-point scale on the items within the Angry factor (19% and 12%, respectively). Together this suggests that the experience of anger was approximately equally prevalent in both groups (approximately 1 in 7 participants), but that more individuals with LDs experience it at higher levels within our sample.

**Feelings of frustration.** Another possible explanation for the lack of mean differences in reported anger is that for university students with LDs, experience of anger may better be described as feelings of annoyance or frustration. Recall that for this factor, six items were drawn from the Anger category and two from the Frustration category. On average, participants tended to report scores fluctuating around two on the four-point scale for items from the former category in contrast to scores closer to three for the two items reflecting frustration (“I get annoyed at

others” and “I felt irritable”). In our previous research, feeling frustrated was by far the most frequently reported descriptor associated with having an LD in high school and university (Noble & Evans, 2013). Thus, although the results of our factor analysis did not result in a frustration category, we decided to explore items originally reflecting this category in attempt to see if their scores differed between individuals with and without LDs. This analysis showed that participants with LDs reported significantly higher scores compared to those without LDs on the following items: “I felt like something was constantly blocking me from being able to learn,” “I felt like getting nowhere,” I felt stuck,” and “I felt like I was spinning my wheels.”

Interestingly, “I felt like something was constantly blocking me from being able to learn” was the item with the largest observed differences between individuals with and without LDs in our results. This item nicely describes the potential frustration that individuals with LDs appear to feel when processing deficits and discrepant profiles prevent individuals from “showing what they know” in academic situations. In addition, the other above items somewhat imply feelings of academic frustration of getting stuck, getting nowhere, and spinning one’s wheels. Similarly, participants with LDs reported higher scores on the item “I studied so much, but the results did not reflect it,” a difference that approached significance, but was not significant at our stricter critical value given the number of comparisons. In contrast, individuals reported similar scores on items reflecting a combination of frustration and anger without this association with academics, such as the items that clustered into the anger category discussed above (i.e., “I felt irritable” and I felt annoyed”). It is possible that the anger associated with the LD experience in high school is better described by feelings of frustration, especially when it involves an emphasis on academic frustration. Future research should further explore this relationship.

**Feelings of embarrassment.** Describing feelings of embarrassment were the 7<sup>th</sup> most commonly reported descriptors of the LD experience in high school (Noble & Evans, 2013). Given this previous result, we expected higher reports of feeling embarrassed in individuals with LDs. Many students with LDs report feeling embarrassed about their academic struggles, about standing out, especially while using various accommodations and support, and about being labelled with a disability (Huntington & Bender, 1993; Raskind, Margalit, & Higgins 2006).

Overall, participants with LDs reported significantly higher scores on the Embarrassed factor than individuals without LDs. However, when assessing the individual items that clustered onto this factor, only one item significantly differed between the two groups. Feeling a lack of confidence particularly characterized individuals with LDs more than those without. Most other items on this factor approached significance, with individuals with LDs reporting greater levels of embarrassment, shame, and hatred of themselves, as well as greater feelings of worthlessness. Thus, collectively, these feelings were significantly greater in participants with LDs compared to those without.

Similarly to feelings of anger discussed above, a significantly greater proportion of participants with LDs reported elevated average scores (i.e., one standard deviation above the mean) on the embarrassed factor, but there was no significant difference in the proportions when looking at average scores above three. So again, while the prevalence of embarrassment may be about the same in both groups, more individuals with LDs may experience it to a greater degree than the norm.

Interestingly, in Noble and Evans (2013) study, feelings of embarrassment and shame were reported primarily in participants with a lower to medium overall severity of negative emotions in high school, rather than in those who reported extremely negative emotions.

Research has suggested that individuals often express their feelings of shame as feelings of chronic embarrassment, anger, inferiority, and by isolating and hiding from others (Tangney, Miller, Flicker, & Barlow, 1996). It is possible that feelings of embarrassment in students with LDs might be expressed in other ways, such as through feelings of isolation, rejection, anxiety, and low mood. In the present study we did not directly assess the relationship between feelings of shame and embarrassment with severity of social emotional issues. Future research could examine how shame is expressed in individuals with LDs given that participants with LDs did report higher feelings of embarrassment compared to those without.

**Feelings of inadequacy.** Recall that the proposed sixth factor of inadequacy was removed from the model due to poor fit and a debateable existence of a sixth factor through the results of the parallel analysis (see earlier EFA section). However, it was decided to explore this factor as it was one we predicted to be more prevalent in individuals with LDs. More specifically, individuals with LDs are more likely than those without to perceive their peers as smarter and as having higher social status (Dollinger et al., 1988; Estell et al., 2008; Goldberg et al., 2003; Kuhne & Wiener, 2000; Noble & Evans, 2013; Raskind et al., 2006; Sabornie, 1994). In addition, individuals with LDs report greater feelings of inadequacy, mediating a relationship between repeated academic failures and increased reports of depressive symptoms (Salokangas, Poutanen, & Stengard, 1995). Thus, given our previous research and the literature, we expected participants with LDs to report higher scores on items reflecting feeling inferior to others.

For both the hypothesized Adequacy category from the q-sort study, and our potential sixth factor reflecting inadequacy, participants with LDs reported significantly higher scores than those without on four of the eight items—"I was not smart enough to go to university," "I felt confused in class," "I was not prepared," and "I did not feel in control." Scores for the other

items only approached statistical significance. Unexpectedly, participants with and without LDs both reported similarly high ratings on the item “other students were smarter than me”. This suggests that within our sample, many students in high school in both groups felt less smart compared to their peers. This may reflect the competitive nature of high school in which the accomplishments and high averages of students are highlighted with awards and verbal praise with less recognition for progress in learning and development. Students with LDs did report higher ratings than those without LDs on other items reflecting inadequacy (“I felt inferior to others,” “I felt stupid,” and “I was not equal to my peers”), which individually did not significantly differentiate the groups, but approached significance and may, collectively suggest higher feelings of inadequacy among participants with LD.

**Proportion of participants with elevated mean scores across all factors.** As described previously, for each factor we explored the proportion of participants with and without LDs with elevated average scores on each factor both according to the distribution of scores in our sample (i.e., one standard deviation above the mean), as well according to scores reflecting experiencing the feelings on our scales (i.e., average scores across each factor above three). This was done to assess whether a greater proportion of participants with LDs endorse elevated feelings of alienation, anxiety, anger, and embarrassment compared to individuals without LDs.

In our sections above, we noted that this difference was significant for each factor while looking at our sample distribution, with a higher proportion of individuals with LDs endorsing elevated levels of alienation, anxiety, anger, and embarrassment compared to individuals without LDs. Thus, it is not surprising that, when all four factors were considered together, a significantly greater proportion (almost twice as many) of individuals with LDs (29%) reported elevated negative social emotional scores compared to individuals without LDs (16%). This was

also the case when comparing the proportion of participants whose average scores across the factors was above three on the four-point scale (20% and 11%, respectively).

We had hypothesized that the collective experience of living with an LD likely contributes to a more negative overall social emotional experience. We discussed in our introduction that many LD researchers investigate the relation between LDs and social emotional well-being, focusing on only one social emotional dimension, rather than the collective LD experience, an approach that potentially fails to capture the collective difficulties that are associated with having an LD and underestimates the social emotional difficulties individuals with LDs experience. Although a significantly greater proportion of individuals with LDs did not report experiencing elevated feelings on the individual factors of anger, alienation, and embarrassment, when the average across all four factors was considered, a significant difference emerged with one in five students with LDs versus one in ten without LDs obtaining a scores above three on our scale. This highlights the importance of considering multiple social emotional factors involved in the LD experience.

### **Differences in Ratings of Academic Skills between Individuals With and Without Learning Disabilities**

We had hypothesized that individuals with LDs would rate their academic abilities as significantly lower compared to individuals without LDs. This finding has been reported fairly consistently throughout the literature, with individuals with LDs reporting lower perceived academic performance than individuals without LDs, despite averaging similar grades (Boersma & Chapman, 1981; Boersma & Chapman, 1990; Chapman, 1988; Chapman & Boersma, 1979; Hen & Goroshit, 2014; Huntington & Bender, 1993; Lackaye et al., 2006).

Thus, it was not surprising that participants with LDs reported significantly lower perceived academic scores compared to those without LDs. This difference was found for every academic skill we measured, including the following: math, writing, reading, spelling, memory, concentration, science, and English. Most notably, participants with LDs reported much lower perceived concentration skills than those without. This also is not surprising given the high concordance rates between LDs and a diagnosis of Attention-Deficit-Hyperactivity Disorder (DuPaul, Gormley, & Laracy, 2013). Although the present study did not assess ADHD, future research should investigate how ADHD affects participant's social emotional experiences of high school.

In addition, we were curious whether any of the academic skills would cluster together. We expected certain academic skills to be highly correlated, potentially reflecting a cluster of similar language skills (i.e., writing, reading, spelling, and English). However, we were unsure how the remaining academic skills would be related. The results of our factor analysis revealed two factors, one reflecting the language skills of writing, English and reading, and another factor including science and math. In general, memory and concentration skills were moderately correlated with each academic skill, causing them to fail to load onto either academic factor.

As expected given our previous academic comparisons, participants with LDs reported significantly lower academic abilities on both factors. Additionally, a significantly greater proportion of participants with LDs reported their average academic skills ranging from “poor” to “very poor” for both the language and math and science factors (10% and 22%, respectively), compared to a very small proportion of participants without LDs (.01% and .02%, respectively). We did not have access to actual academic grades or skills. This is unfortunate as research suggests that individuals with LDs have a tendency to rate their academic skills lower than

individuals without LDs, despite controlling for academic abilities (Hen & Goroshit, 2014; Lackaye et al., 2006).

Our main interest, however, in these academic factors was to compare how they related to the social emotional factors. We hoped to identify whether having low ratings in one academic area was associated with specific social emotional difficulties.

### **The Relationship Between Social Emotional Factors and Academic Skills**

Recall that we hypothesized that individuals with greater self-reported academic difficulties would report a more negative experience of high school. Further, since language and reading are critical components of learning in most academic subjects, we hypothesized that students with difficulties in these areas would report more negative factors in high school than those with difficulties that are more specific to one subject (e.g., math). However, we did not observe any relationship between the language skills factor and the four social emotional factors.

One possible explanation for this is that very few individuals in our study reported poor language abilities. Only ten percent of our LD sample reported their language abilities as “poor” or “very poor,” while the remaining 90 percent rated their language skills as at least average. It is possible that participants with poor language abilities and LDs anticipate it to be too challenging to attend university and follow alternate post-secondary paths. Additionally, only .01% of participants without LDs rated their language abilities as poor. It is possible that our sample size was too small to observe an effect. It is also possible that individuals in university who report lower language abilities have chosen studies involving their strengths (i.e., niche-picking), such as math and science, a finding Goldberg and colleagues associated with predictors of success and better emotional well-being in adults with LDs (Goldberg et al., 2003). Success, or relative success in such niches may have coloured the retrospective memories of the high school

experience. More research is needed to investigate the relationship between language skills and feelings associated with having an LD in high school. Future research could partly address this by having a high school sample. This had been our original intention but a collective bargaining dispute among post-secondary teachers at the time made access to high school extremely difficult.

We did however find a negative correlation between the math science skills factor with each social emotional factor. This suggested that lower academic ratings in these areas were associated with greater ratings of anxiety, embarrassment, anger, and alienation. Since individuals with LDs report increased ratings on each of these social emotional and academic factors, we next investigated whether this relationship was influenced by the presence of an LD.

#### **LD as a moderator of the relation between academic and social emotional factors.**

The results of our regressions suggested that the presence of an LD did not significantly influence the relationship between the various social emotional factors and the science and math factor, as the presence of an LD did not add anything significant to the model. However, for the alienated, anxiety, and overall factors, there was a trend that might be worth investigating further in future research. Participants with LDs and very low science and math ratings had higher ratings of alienation and anxiety than those without LDs, a difference that slowly disappeared as science and math ratings increased. That is, of individuals who perceive themselves as having poor skills in science and math, those with LDs tend to report higher feelings of alienation and anxiety. This suggests that something specific to experiencing an LD and struggling in math and science might lead to increased feelings of anxiety and isolation from others, a finding that disappears once science and math skills are perceived as average or above average. Although this finding is not significant, as our sample size of individuals with low academic math science

ratings with LDs is small (approximately 22% of our LD sample), it is worth further investigating in a larger and wider study.

A possible explanation for why we observed a relationship between poor math and science skills and social emotional functioning is that many individuals with LDs who struggle in math often have weaknesses in working memory, processing speed, and or nonverbal reasoning, especially visual spatial abilities, among other things (Cowan, & Powell, 2014; Swanson, 1993; Wang & Liu, 2007). In addition, difficulties in each of these areas have all been associated with increased social emotional difficulties (Backenson et al., 2015; Beilock, 2008; Forrest, 2004; Rourke, 1995). Although these specific variables were not measured in the current study, future research should explore this relationship by looking at individuals with LDs learning profiles in relation to their social emotional functioning to assess why individuals with LDs and poor math and science skills report more negative social emotional experiences.

### **Limitations of the Current Study**

This study possesses several methodological limitations that may have affected the results and our conclusions. Firstly, our items on our social emotional questionnaire were developed using descriptor terms from previous research (Noble & Evans, 2013). Although this method allowed us to capture the feelings and sentiments of what it is like having an LD in high school most frequently expressed by individuals with LDs, it did not allow us to add any additional items that might also be important to investigate, such as items reflecting bullying or teasing. Further, in our previous research, the LD experience of 47 of the 64 items on the questionnaire were negatively worded. This may have negatively primed participant's assessments of high school. In addition, all of these items were obtained through first year university students reflecting upon high school rather than from students currently in high

school. Similarly, our current participants were also university students reflecting upon their experience of high school. It is possible that university students report their experience of high school less accurately compared students currently in high school.

Secondly, many of our LD participants were identified through self-disclosure of their LD (i.e., participants obtained through the participant pool and through advertisements), and therefore, we were unable to confirm their LD diagnoses. The subgroup of students obtained from the undergraduate course PSYC1300, had all been required to submit documentation of a diagnoses of an LD by a psychologist to enrol in the course. Although, we cannot confirm that all participants in the current study correctly self-disclosed as having an LD, it is somewhat reassuring that our results did not differ between these three collection groups. This suggests that the various methods used to obtain the participants did not influence our results, and that participants with confirmed LD diagnoses did not differ from those who self-disclosed their LD.

Thirdly, we assessed academic skills by asking participants to rate their ability in various academic areas (i.e., mathematics). This approach provided broad self-reports of perceived academic ability but did not provide any specific details on components within them (e.g., mathematics entails numerical operations, math problem solving, geometry, calculus, algebra, etc.). It is possible that more specific assessments could lead to further insight about whether the presence of an LD moderates the relationship between different academic skills and social emotional factors. In addition, we are unsure how accurately participants rated their abilities, as we are well aware that individuals with LDs tend to underestimate their academic abilities compared to individuals without LDs, even while controlling for grades, further suggesting the need for additional external sources of assessment (e.g., multiple informants, grades, direct assessments of academic abilities).

## **Generalizability of Results**

It is unknown to what extent our results will generalize to all individuals with LDs, as our sample assessed a subset of individuals with LDs who attended university. It is very possible that individuals with more severe learning difficulties are unable to achieve grades required for university and that these samples might report different academic and social emotional experiences compared to our sample of university students. In addition, as mentioned previously, Goldberg and colleagues (2003) research suggests that individuals with LDs who pick careers in areas they excel in tend to have more success in life and report better overall well-being. Therefore, it is unknown how the experience of having an LD differs in students who chose to continue academia in university, compared to others who chose to immediately enter the workforce or enter community college or apprenticeship programs, which may be in their areas of strength.

Lastly, the majority of our sample consisted of white females. Although we did not observe any gender or ethnic interactions with how individuals with and without LDs report their social emotional experience of high school, we did not have a large enough sample size of males and other ethnicities to speak to any potential differences in these groups. Future research could investigate whether these variables impact the social emotional experience of having an LD in high school.

## **Future Research**

Given these limitations, future research should be completed with a large sample of high school students at each grade level, and if possible, psychological assessment results of participants with LDs should be used to obtain objective measures of their academic skills, cognitive abilities, and processing deficits (i.e., phonological processing, processing speed,

memory, language processing, and executive functioning) to assess how they relate to the social emotional experience of having an LD in high school, as well as to confirm the LD diagnosis.

In addition, recall that participants with LDs rated their concentration skills as much lower than those without LDs. Future research on the social-emotional experiences of high school should assess in more detail the role of ADHD, executive functions, and attention.

### **Concluding Comments**

In conclusion, the results of our current study found that our questionnaire, designed to reflect the feelings and sentiments expressed by students with LDs as to what it is like to experience an LD in high school, contained four factors reflecting feelings of alienation and isolation, anxiety and depression, anger and hatred, and embarrassment and shame. Overall, participants with LDs reported significantly more negative social emotional experiences of high school than participants without LDs. Our questionnaire factors demonstrated that these differences pertained to greater feelings of alienation, anxiety, and embarrassment, but not anger. In addition, participants reported greater feelings of frustration on our questionnaire, especially when the items reflected frustration related to learning and academic performance. This highlights suggesting a need for more research on the social emotional impact of frustration in individuals with LDs. Although our scale did not generate a factor associated with feelings of inadequacy, on items we hypothesized to reflect these feelings, participants with LDs reported significantly higher scores than those without LDs, further supporting that individuals with LDs experience elevated feelings of inadequacy and inferiority.

As expected, participants with LDs reported significantly lower perceived academic abilities. We found that a factor containing math and science skills correlated with each social

emotional factor. That is, lower self-reported math and science skills were associated with increasingly negative social emotional experiences of high school.

In the current study, we found that nearly double the proportion of individuals with LDs (29%) obtained scores more negative than the average when collapsed across the domains of embarrassment, anxiety, anger, and alienation compared to those without LDs (16%). This highlights a serious need for increased efforts to help individuals with LDs feel more supported and accepted, and less ashamed, anxious, isolated, inadequate, and frustrated. It also highlights a need for better education for individuals who interact with adolescents with LDs, such as parents and school staff, to increase others' empathy and understanding about what it is like to experience an LD in high school. Thus, it would likely be helpful for those working with individuals with LDs (parents, educators, counsellors, therapists, etc.) to attend workshops designed to increase empathy and understanding of LDs. For example, institutions such as The Integra Program at the Child Development Institute in Toronto, offer a variety of experiential workshops designed to increase awareness of common social and emotional challenges children and adolescents experience as a result of their LD. It would also be helpful for educators and parents to seek more education through the literature and research on the socio-emotional aspects of LDs. For example, books such as "Bright Kids Who Can't Keep Up: Help Your Child Overcome Slow Processing Speed and Succeed in a Fast-Paced World" (Braaten & Willoughby, 2014) might help increase parents' and educators' empathy and understanding of children with processing speed deficits.

Additionally, our previous research suggested that university students with LDs benefited from education about LDs in university (i.e., definitions, social emotional and academic impacts, and learning strategies), as they reported more positive descriptors (e.g., acceptance, sense of

belonging, determination, and support) during the first semester of university compared to high school (Noble & Evans, 2013). Although this finding was likely the a result of a course fostering a sense of belonging and acceptance in combination with differences between high school and university experiences, it nonetheless suggests that gaining a better understanding into their LDs might lead to increased feelings of support during high school. Brigham, Morocco, Clay, and Zigmond (2006) discuss several school wide strategies used in three high schools to help increase support and inclusion for students with LDs.

In conclusion, such efforts discussed above could help enhance sensitivity, empathy and interventions for all high school students experiencing challenges, regardless of their disability status, especially with respect to feelings of anxiety and depression, as they are among the most common disorders reported during adolescence, with a lifetime prevalence of anxiety disorders as high as 32% during adolescence (Merikangas et al., 2010).

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## **Appendix 1**

### **Questionnaire**

#### **Adequacy**

I feel confused in class  
I feel prepared  
I feel in control  
Others students are smarter than me  
I am not smart enough to go to university  
I am inferior to others  
I am equal to my peers  
I am stupid

#### **Anger**

I hate others  
I have a bad temper  
I get angry  
People make me mad  
I get jealous  
I get defensive  
I am bitter  
I am hostile

#### **Anxiety**

I feel scared at school  
I worry about my future  
I am anxious  
I feel nervous  
I feel tense  
I worry about what other people think of me  
I feel stressed  
I feel overwhelmed

#### **Frustration**

I get stuck  
I feel frustrated  
I feel like something is constantly blocking me from being able to learn  
I feel like I'm getting no where  
I feel like I am spinning my wheels  
I get annoyed at others  
I study so much but the results do not reflect it  
I feel irritable

**Mood and Self-Image**

I am optimistic  
I feel depressed  
I feel sad  
I feel helpless  
I am worthless  
I am happy  
I am confident  
I am determined

**Acceptance from Others**

Other students reject me  
I do not feel a part of the class  
Other students do not accept me  
I feel accepted  
I feel like I belong  
I feel like others take me seriously  
People do not understand me  
I feel judged by others

**Self-Acceptance**

I like myself  
I am ashamed of who I am  
I try to hide in class  
I am proud of who I am  
I feel embarrassed about myself  
I hate who I am  
I am different  
I feel like I am not the only one like me

**Social Support**

I feel left out  
I'm all alone  
I am lonely  
I feel isolated  
I feel supported  
I have lots of friends  
I feel loved  
My friends are helpful

**Excluded Items (All excluded due to lower q-sort agreement)**

I feel exasperated  
I feel relaxed  
I have good self-esteem  
I am afraid other kids will judge me  
I persevere thorough hard task

I am smart  
People bully me  
Teachers are helpful  
I feel bored  
I have trouble coping with school  
I am disorganized  
It is hard to focus  
I am positive  
I am assertive  
I ask the teacher for help  
I work hard  
I feel upset  
I have suicidal thoughts  
I feel lost  
I am fun  
People like spending time with me  
I hope I do well  
I have fun at school  
I feel guilty  
I feel respected by others  
I feel welcomed  
I take longer to complete things than other students  
Learning is harder for me than others  
I am a failure  
I feel educated  
I find it (high school) easy to do well  
I am successful  
People think I am good at things  
Other people are ignorant  
Teachers are unfair  
I am impatient  
I feel behind  
I struggle in school  
I worry about my grades  
I feel uncertain  
I am self-conscious  
I am distracted  
I am insecure  
I feel distressed  
I am cautious  
I feel doubtful  
I feel uncomfortable at school

## Appendix 2



### **(Survey available through advertisements/pamphlet)**

The University of Guelph has given permission for us to complete research (REB # 15FE021) conducted at the University. It is described below and we hope you will help with it.

**Study Purpose:** The study looks at the social experiences and feelings that students with different learning profiles have in high school, and how they might differ between students with and without learning disabilities.

**If you volunteer to participate,** you will be asked to do an anonymous online survey. The survey takes 15 minutes. It will ask what it felt like to attend high school, your characteristics (age, grade, gender, etc.) and how you rate your abilities in different academic areas (math, reading etc.). You can take as long as you like on the survey but it must be completed in one sitting.

**You can choose to be in the study or not.** If you participate, you may leave blank any question you do not want to answer. You also may withdraw from participating up to the point of submission of the survey and still receive your course credit. Once submitted, your data cannot be identified, and therefore cannot be withdrawn from the study.

**Benefits:** There is little or no direct benefit to you but what we learn from you will inform mental health workers and teachers about how students experience high school, and may help to improve high school for individuals with and without learning disabilities.

**As a thank you,** everyone who takes part will receive a \$10 gift certificate to Tim Horton's. To receive the certificate, there are two boxes at the end of the survey: one to submit your survey and another to go to a separate site to submit your e-mail address. This ensures that your e-mail address it is not linked to the survey responses that you choose to submit.

**All information collected will be strictly anonymous.** The surveys will be provided on a secure server and a secure website. Your computer's IP address will not be collected. Only the researchers will see the data and will never share it with others. The survey does not ask for any information that could identify you.

If you complete the survey on a computer that others also use, you can help to keep information confidential by taking the following steps to clear private data from that computer:

1. Clear the browsing history
2. Clear the cache
3. Clear the cookies
4. Clear the authenticated session
5. LOG OFF

If you are using Internet Explorer, the first 4 steps can be done by going to Tools and selecting Delete Browsing History. Your application may have a similar system.

**Some people might find thinking about their high school experience upsetting.** If you experience distress, please talk to your parents a university counsellor (Counselling Services. Ext 53244), a mental health professional, or the researchers (contact information is below). You could also call Kids Help Line [www.kidshelpphone.ca](http://www.kidshelpphone.ca) 1-800-668-6868; or go to your local Emergency at your local hospital.

**If you have any questions about the research before or after participating, contact the researchers Dr. Evans by phone 519.824.4120 (x53080) or email [mevans00@uoguelph.ca](mailto:mevans00@uoguelph.ca), or Kevin Noble by email [noblek@uoguelph.ca](mailto:noblek@uoguelph.ca).** If you wish to know the results of the study, you can browse the University of Guelph Atrium website -- <http://dspace.lib.uoguelph.ca/> -- for Kevin Noble and his dissertation in two years, or e-mail Kevin.

**Rights of research participants:** You may withdraw your consent at any time and discontinue participation without penalty. You are not waiving any legal claims, rights or remedies because of your participation in this research study. This study has been reviewed and received ethics clearance through the University of Guelph Research Ethics Board. If you have questions regarding your rights as a research participant, contact: Director, Research Ethics; (519) 824-4120, ext. 56606; [reb@uoguelph.ca](mailto:reb@uoguelph.ca).

**Clicking the box below will start the survey. Clicking on it shows that you have read this information, that your questions have been answered to your satisfaction, and that agree to participate. Please print this information for your records.**

[CLICK TO PRINT THIS INFORMATION]

[CLICK I AGREE TO CONTINUE]

- 1) How old are you? \_\_\_\_\_
- 2) What is your gender?
  - a) Male
  - b) Female
  - c) Other
  - d) Decline
- 3) Which of the following BEST describes your ethnic background? Please TICK ALL THAT APPLY.
  - Aboriginal/First Nations/Métis
  - White/European
  - Black/Africa/Caribbean

- Southeast Asian (e.g., Chinese, Japanese, Korean, Vietnamese, Cambodian, Filipino etc.)
- Arab (Saudi Arabian, Palestinian, Iraqi, etc)
- South Asian (East Indian, Sri Lankan, etc.)
- Latin American (Costa Rican, Guatemalan, Brazilian, Columbian, etc.)
- West Asian (Iranian, Afghani, etc.)
- Other

If other, please write down your ethnicity: \_\_\_\_\_

4) What year are you in University?

- a) First
- b) Second
- c) Third
- d) Fourth
- e) Fifth
- f) Other

If other, please indicate which year: \_\_\_\_\_

5) Which of the following best describes your father's HIGHEST level of education?

- Some high school
- Completed high school
- Some college/university
- Apprenticeship training and trades
- Completed college/university
- Some graduate education
- Completed graduate education
- Professional degrees

6) Which of the following best describes your mother's HIGHEST level of education?

- Some high school
- Completed high school
- Some college/university
- Apprenticeship training and trades
- Completed college/university
- Some graduate education
- Completed graduate education
- Professional degrees

7) Have you ever been identified as an exceptional student with a learning disability?

- a) Yes

b) No

If yes, please write down at what age you were identified: \_\_\_\_\_

8) Have you ever been identified as a gifted student?

a) Yes

b) No

If yes, please write down at what age you were identified: \_\_\_\_\_

9) Have you been identified with any other exceptionality?

a) Yes

b) No

If yes, please write down what it is: \_\_\_\_\_

Please rate your ability in each area listed below:

10) Mathematics	1 – Very Poor	2- Poor	3- Average	4- Good	5-Very Good
11) Writing	1 – Very Poor	2- Poor	3- Average	4- Good	5-Very Good
12) Reading	1 – Very Poor	2- Poor	3- Average	4- Good	5-Very Good
13) Spelling	1 – Very Poor	2- Poor	3- Average	4- Good	5-Very Good
14) Memory	1 – Very Poor	2- Poor	3- Average	4- Good	5-Very Good
15) Concentration	1 – Very Poor	2- Poor	3- Average	4- Good	5-Very Good
16) Science	1 – Very Poor	2- Poor	3- Average	4- Good	5-Very Good
17) English	1 – Very Poor	2- Poor	3- Average	4- Good	5-Very Good

### High School Experience Questionnaire

This questionnaire has short phrases about what it felt like to be in high school. Please read each phrase and click the number that shows how true each phrase was for your experience of high school.

- 1- Never true about me
- 2- Rarely true about me
- 3- Sometimes true about me
- 4- Often true about me

	1- Never true about me	2- Rarely true about me	3- Sometimes true about me	4- Often true about me
My friends were helpful	1	2	3	4
I was inferior to others	1	2	3	4
I felt confused in class	1	2	3	4
I hated others	1	2	3	4
I felt scared at school	1	2	3	4
I worried about my future	1	2	3	4
I got stuck	1	2	3	4
I was optimistic	1	2	3	4
Other students rejected me	1	2	3	4
I felt left out	1	2	3	4
I liked myself	1	2	3	4
I had a bad temper	1	2	3	4
I was anxious	1	2	3	4
I felt prepared	1	2	3	4
I felt depressed	1	2	3	4
I felt frustrated	1	2	3	4
I did not feel a part of the class	1	2	3	4
I was ashamed of who I am	1	2	3	4
I was all alone	1	2	3	4
I felt like something was constantly blocking me from being able to learn	1	2	3	4
I felt in control	1	2	3	4
I felt helpless	1	2	3	4
I felt nervous	1	2	3	4
I got angry	1	2	3	4
I felt accepted	1	2	3	4
I felt loved	1	2	3	4
I felt stressed	1	2	3	4
I was happy	1	2	3	4

I felt like I was spinning my wheels	1	2	3	4
I felt like I belong	1	2	3	4
I felt tense	1	2	3	4
I felt sad	1	2	3	4
I was lonely	1	2	3	4
I got annoyed at others	1	2	3	4
I was different	1	2	3	4
I felt overwhelmed	1	2	3	4
I was confident	1	2	3	4
Others students were smarter than me	1	2	3	4
I felt embarrassed about myself	1	2	3	4
I was determined	1	2	3	4
I felt isolated	1	2	3	4
I worried about what other people think of me	1	2	3	4
I got jealous	1	2	3	4
I was worthless	1	2	3	4
I felt irritable	1	2	3	4
Other students did not accept me	1	2	3	4
I tried to hide in class	1	2	3	4
I was proud of who I was	1	2	3	4
I was not smart enough to go to university	1	2	3	4
I felt supported	1	2	3	4
I got defensive	1	2	3	4
I felt like I was not the only one like me	1	2	3	4
People made me mad	1	2	3	4
I was bitter	1	2	3	4
I studied so much but the results did not reflect it	1	2	3	4
I hated who I was	1	2	3	4
I had lots of friends	1	2	3	4
I was equal to my peers	1	2	3	4
I felt like others took me seriously	1	2	3	4
I was hostile	1	2	3	4
I was stupid	1	2	3	4
People did not understand me	1	2	3	4
I felt like I was getting nowhere	1	2	3	4
I felt judged by others	1	2	3	4

THANK YOU FOR ANSWERING THE QUESTIONS AND HELPING WITH THIS  
RESEARCH ☺

**Some people might find thinking about their high school experience upsetting.** If you experienced distress, please talk to your parents, a university counsellor (Counselling Services, Ext 53244), a mental health professional, or the researchers (Kevin's email: [noblek@uoguelph.ca](mailto:noblek@uoguelph.ca) or Dr. Evans's phone 519.824.4120 (x53080) email [mevans00@uoguelph.ca](mailto:mevans00@uoguelph.ca)). You could also call Kids Help Line [www.kidshelpphone.ca](http://www.kidshelpphone.ca) 1-800-668-6868; or go to your local Emergency at your local hospital.

[Click here to submit survey]

Qualitrics will switch to a separate panel so that data is not connected to email

[Click here to enter email]

By entering my email below I agree for the investigator, Kevin Noble, to contact me through this email in order to receive a \$10 certificate to Tim Horton's.

My email is: \_\_\_\_\_

Thank you for Participating in our study. Below is some information about what we have found about what it is like to have a learning disability in high school.

In our previous research (Noble & Evans, 2013), the experience of students with a learning disability in high school was retrospectively often reported as one of feeling alone and alienated, frustrated, depressed and hopeless, scared and anxious, embarrassed, and inferior to others (See also Raskind, Margalit, & Higgins, 2006). However, research on whether individuals with LDs experience a greater prevalence of clinical disorders, such as depression and anxiety disorders, is inconclusive (Gregoire & Desoete, 2009, Maag & Reid, 2006). To our knowledge, no research has directly compared the high school experience of adolescents with and without LDs.

Through this study we wish to understand through self-ratings the breadth of feelings, sentiments, and perspectives to capture the LD experience. Through the self-descriptions previously collected in Noble's MA thesis, we identified 17 different themes describing the students' own LD experiences. The most common descriptors within each of these 17 categories was used to create the new questionnaire reflecting 8 tentative subscales: 1) Social Support (alienation, socially integrated, and helpful environment descriptors); 2) Mood and Self-Image (positive and negative mood and self-image descriptors); 3) Self-Acceptance (embarrassed and acceptance of LD descriptors); 4) Acceptance from Others; 5) Adequacy (inadequate and capable descriptors), and items reflecting feelings of 6) Anger, 7) Frustration, and 8) Anxiety. The goal of this study is to compare the reported descriptors and their magnitude between high school students with and without LDs along with demographic information that might moderate responses to the questionnaire.

Again thank you very much for participating in our research. If you would like to find out more about our study, please **contact** the researchers Dr. Evans by phone 519.824.4120 (x53080) or

email [mevans00@uoguelph.ca](mailto:mevans00@uoguelph.ca), or Kevin Noble by email [noblek@uoguelph.ca](mailto:noblek@uoguelph.ca). If you wish to know the results of the study, you can browse the University of Guelph Atrium website -- <http://dspace.lib.uoguelph.ca/> -- for Kevin Noble and his dissertation in two years, or e-mail Kevin.

### Appendix 3 – Correlations Between Six Factors

	<b>Alienated</b>	<b>Anxious</b>	<b>Angry</b>	<b>Embarrassed</b>	<b>Pessimistic (5<sup>th</sup> factor)</b>	<b>Inadequate (6<sup>th</sup> factor)</b>
<b>Alienated</b>	1	-	-	-	-	-
<b>Anxious</b>	.634*	1	-	-	-	-
<b>Angry</b>	.523*	.542*	1	-	-	-
<b>Embarrassed</b>	.733*	.699*	.435*	1	-	-
<b>Positive</b>	.589*	.467*	.402*	.660*	1	-
<b>Inadequate</b>	.515*	.613*	.435*	.605*	.568*	1

\* Correlation is significant at the .01 level.

**Appendix 4 - Comparison of LD and Non-LD Groups on Survey Items Within Each Factor**

		<b>t-statistic</b>	<b>df</b>	<b>p-value</b>	<b>Cohen's D</b>	<b>Hedges G</b>
<b>Alienated Factor</b>						
	People did not understand me	5.13	480	.000	.67	.66
	I did not feel a part of the class	3.78	484	.000	.47	.48
	I was lonely	3.07	483	.002	.39	.40
	I felt helpless	4.19	483	.000	.54	.55
	I felt left out	0.99	485	.324	.12	.12
	I felt loved (Reverse)	0.44	483	.664	.05	.05
	I had lots of friends (Reverse)	0.88	481	.382	.12	.11
	I was all alone	1.22	484	.222	.16	.16
	I felt isolated	1.92	482	.055	.24	.24
	I felt like I belonged (Reverse)	2.32	483	.021	.28	.30
	Other students did not accept me	1.16	482	.246	.15	.15
	Other students rejected me	2.05	483	.041	.26	.26
	I felt accepted (Reverse)	2.62	483	.009	.31	.33
<b>Anxious Factor</b>						
	I was anxious	3.33	485	.001	.45	.42
	I felt depressed	3.28	484	.001	.43	.42
	I felt sad	2.87	484	.004	.37	.36
	I felt stressed	0.35	484	.724	.04	.04
	I felt nervous	2.21	484	.027	.30	.28
	I felt tense	2.20	484	.028	.36	.36
	I felt overwhelmed	2.49	480	.013	.31	.32
	I felt frustrated	1.66	484	.097	.21	.22
	I worried about my future	0.42	485	.677	.06	.06
<b>Angry Factor</b>						
	People made me mad	0.65	482	.515	.09	.09
	I got angry	1.71	483	.088	.22	.23
	I had a bad temper	1.08	483	.279	.14	.15
	I was bitter	1.42	480	.155	.03	.03
	I hated others	-0.82	484	.413	.10	.11
	I was hostile	2.10	482	.036	.26	.28
	I got annoyed at others	-0.40	483	.691	.05	.05
	I felt irritable	1.37	482	.170	.16	.17
<b>Embarrassed Factor</b>						

	I felt confident (Reverse)	2.80	482	.005	.36	.36
	I felt embarrassed about myself	2.26	483	.025	.30	.30
	I was ashamed of who I was	2.49	483	.013	.31	.33
	I hated who I was	1.75	482	.081	.25	.23
	I was proud of who I was (Reverse)	0.32	481	.747	.04	.04
	I liked myself (Reverse)	1.84	485	.067	.23	.24
	I was worthless	2.27	482	.024	.28	.30
<b>Inadequacy Factor</b>						
	I felt confused in class	3.66	484	.000	.47	.47
	I felt in control (Reverse)	4.27	483	.000	.54	.56
	I felt prepared (Reverse)	4.96	483	.000	.48	.48
	I was not smart enough to go to university	2.82	480	.005	.34	.37
	I felt inferior to others	2.33	485	.020	.30	.30
	I felt stupid	2.14	481	.033	.27	.28
	I felt equal to my peers (Reverse)	2.71	481	.007	.34	.35
	Others students were smarter than me	-0.15	483	.881	.01	.01
<b>Remaining Significant Items</b>						
	I got defensive	4.73	482	.000	.62	.61
	I felt scared at school	3.09	485	.002	.39	.39
	I got stuck	4.07	484	.000	.58	.62
	I felt like something was constantly blocking me from being able to learn	8.64	484	.000	1.00	1.12
	I felt like I was getting no where	4.26	481	.000	.55	.56
	I felt like I was spinning my wheels	3.26	478	.001	.44	.42
	I was different	3.47	483	.001	.44	.45
<b>Remaining insignificant Items</b>						
	I worried about what other people thought of me	-0.14	482	.886	.01	.01
	I got jealous	0.08	482	.934	.01	.01
	I tried to hide in class	2.77	481	.006	.64	.66
	I studied so much but the results did not reflect it	1.91	482	.056	.23	.25
	I felt judged by others	2.51	479	.012	.33	.33
	I felt optimistic (Reverse)	2.05	485	.041	.24	.25
	I was happy (Reverse)	1.68	483	.093	.21	.22

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I was determined (Reverse)	1.19	482	.237	.14	.16
Others took me seriously (Reverse)	2.40	481	.017	.30	.31
I was the only one like me (Reverse)	0.15	481	.885	.02	.02
I felt supported (Reverse)	1.97	481	.050	.24	.25
My friends were helpful (Reverse)	1.62	485	.106	.19	.20

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