Academic Performance in the 21st Century – Impact of Learning Disabilities

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A Thesis

in

the John Molson School of Business

Presented in Partial Fulfillment of the Requirements

for the Degree of Master of Science (Management)

at Concordia University Montréal, Québec, Canada

June 2022

CONCORDIA UNIVERSITY

School of Graduate Studies

This is to certify that the thesis prepared

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Entitled: Academic Performance in the 21st Century – Impact of Learning Disabilities

and submitted in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

Academic Performance in the 21st Century – Impact of Learning Disabilities

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Research on students with learning disabilities in higher education tends to emphasize their challenges and lower performance, which increases the stigma around this type of disability and its role for individuals and organizations. The goal of this study was to promote a more constructive view of what learning disabilities can provide to individuals and organizations by investigating not only the negatives, but also the potential benefits of learning disabilities and how certain contexts can enhance these benefits or buffer some of their negative consequences. Overall, this study sheds light on an under-researched topic by looking for new ways to help individuals with learning disabilities succeed in higher education and beyond.

ACKNOWLEDGEMENTS

I would like to thank professor Chadwick for her supervision on this research study. You were essential to the completion of my study and provided vital feedback to a very specific topic. I can't thank you enough for allowing me to pursue and research a topic that means so much to me and the countless others with learning differences. I would also like to thank my committee members for their valuable feedback throughout the process. I would also like to thank all my professors that have taught me and gave me valuable insight into how to affectively research. Lastly, I would like to acknowledge all the great teachers I have had throughout high school that helped to build my academic foundation.

I would also like to thank my family for supporting me to pursue a master's degree. As mentioned in my research having a support system is vital to the success of individuals with learning differences and I had a great one. Without my support system I would have not been able to accomplish my goals and for that I am forever grateful. My mom Laura has been that support figure for me and has at countless times advocated for my education and success. I can't thank you enough for never doubting my abilities.

Lastly, I would like to thank my partner Danica for you countless support and encouragement throughout this year. A master's thesis is filled with imposture syndrome and self-doubt and you made sure I remember to believe in myself.

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Introduction

In today's society, diversity has increasingly become part of many organizations' values and goals with as many as 75% of organizations now saying that diversity and inclusion are a priority (PricewaterhouseCoopers, 2021). Fueled by the 2020 social justice movements that demanded change for the treatment of minority groups and institutional racism throughout the world, organizations are becoming more committed to creating incentives to increase diversity and to developing more inclusive cultures overall. However, most of these organizational practices and research to date focus on exterior diversity, also known as surface level diversity or in other words differences between individuals based on "overt, biological attributes, reflected in observable physical features" (Tasheva & Hillman, pg. 748, 2019) such as race and gender. The dimension of deep-level diversity or invisible diversity, which is based on "unobservable attributes such as personality, values, beliefs, and attitudes", is in contrast often overlooked (Tasheva et al., 148, 2019).

One type of invisible diversity that is increasing in prevalence, and yet remains largely understood, is neurodiversity such as learning disabilities (Pais et al., 2020). Learning disabilities are defined as "an unexpected, specific, and persistent failure to acquire efficient academic skills despite conventional instruction, adequate intelligence, and sociocultural opportunity" (Lagae, 2008, p.1261). Research on learning disabilities overwhelmingly looks at the negatives that come with having a learning disability (e.g., increased amount of stress with the frustration and perceived lack of ability), which increases the stigma around this type of disability and its role for individuals and organizations (Thorwarth, 2014). Little research focuses on the positives of learning disabilities and how certain contexts can enhance these positives or buffer some of the negative consequences of such differences.

To address this lack of knowledge, the goal of this thesis was to offer a more nuanced investigation into performance outcomes of learning disabilities by looking at individuals with learning disabilities at the post-secondary level. In particular, I investigated the role of learning disabilities for student performance, recognizing that while learning disabilities may have negative effects on more typical performance outcomes like academic grades, they may actually promote other types of performance like creativity. The overarching theory for this research is the Conservation of Resources (COR) theory (Hobfoll, 2001), which is based on the core idea that individuals strive to gain and protect valuable resources as the potential or actual loss of such resources are stressful to them. Based on COR, I hypothesized that learning disabilities deplete resources necessary for academic performance, but increase those for creativity. In addition to looking at the direct effects of learning disabilities on performance, I also examined moderating factors to help us better understand under what circumstances learning disabilities may have more or less positive versus negative effects for students. More specifically, I took into account the role of both social (social support) and psychological (resilience) resources that may moderate this relationship. In line with COR theory, I proposed that psychological and social resources can help make up for other missing resources or enhance resources gained from having a learning disability. In other words, I expected that students who have an effective social support system or who are more resilient may be less negatively and more positively affected by their learning disabilities when it comes to their performance. Please see *Figure 1* for an overview of my conceptual model.

To empirically assess this model and to help increase our understanding of the performance implications of learning disabilities in an academic setting, I conducted a survey study of 292 university students from Concordia University that asked about their learning

disabilities, resources, and academic and creative performance. The results offered some preliminary support for this model, albeit in some counterintuitive ways. I corroborated these findings from this survey with insights from the University's Access Centre for Students with Disabilities (ACSD). This research helps to shed light on factors that may change or alleviate the negative effect of learning disabilities in an academic setting, which is critical for being able to understand how to address any needed accommodations for students with such learning differences. Importantly, this research provides insights that can help not only university students, but it also provides much-needed support for why and how organizations can increase neurodiversity among their employees and create accommodations for its success. This thesis promotes a different direction of research often neglected in terms of the positives that may be possible from having a learning disability, which has strong research and practical implications for the continued advocacy of neurodiverse individuals moving forward.

I would like to acknowledge the importance of having disability research conducted by individuals with a disability. I think that this can further decrease stigma and improve our understanding of both the pros and cons of a learning disability for individuals. Because of my connection and empathy to the topic, I personally want to see increased research in this area that can continue to promote support of learning differences in academia and organizations. For this reason and for the purposes of this research, the terminology of learning disabilities will be changed to learning differences. I strongly believe that using the word disability carries a negative connotation that does not accurately represent the full picture of a person who has a learning difference. The use of the word "disability" implies that there can be nothing done to increase success. As alluded to above, most research to date has looked at the negatives that learning differences carry for individuals, and how they are less likely to succeed because of

them. If both the positives and negatives are discussed, however, the advantages could be emphasized, leading to different accommodations for individuals with learning differences. Changing this negative perception could potentially change the view of individuals who have a learning difference, and provide further rationale for the importance of advocating and ensuring that the benefits are increased.

In conclusion, the aims of this thesis were to (a) promote a more constructive view of what learning differences can provide to individuals and organizations, (b) show how psychological and social factors can improve performance for individuals with learning differences, and (c) counteract the stigma many individuals with disabilities face. Lastly, I hope my research will also inspire more research into different aspects that can help individuals with learning differences succeed at school and work.

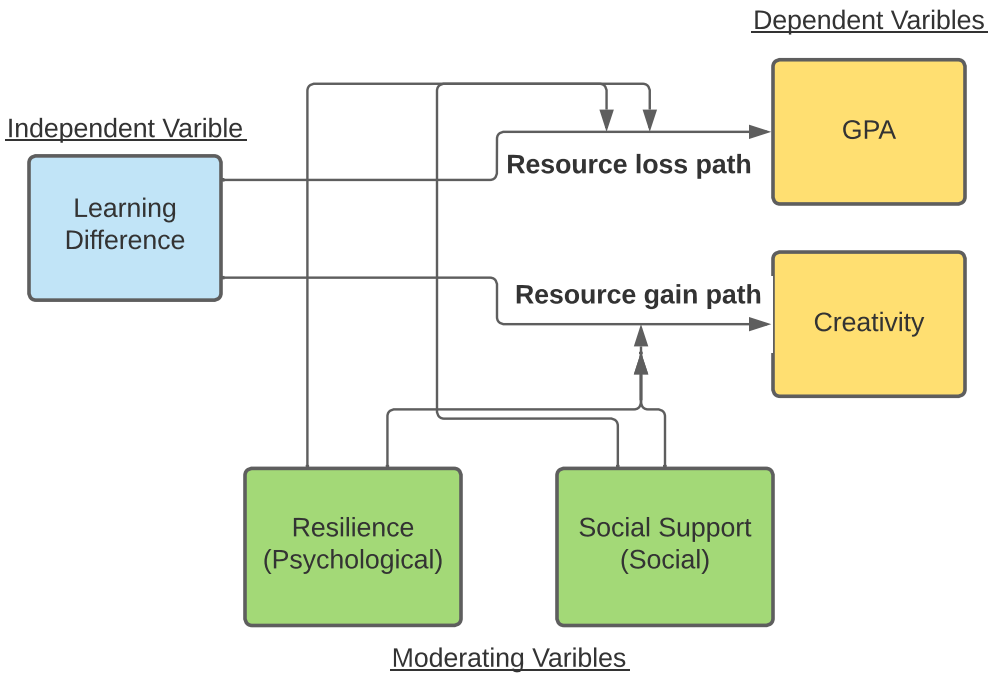

Figure 1: Conceptual Research Model

Literature Review

Conservation of Resources (COR) Theory

The baseline theory for this research is the Conservation of Resources (COR) theory by Hobfoll (1998). The main idea behind the COR theory is that people are motivated to maintain and obtain important resources that are valuable to their success (Hobfoll, 1998). Resources include anything that is valued by an individual, such as "objects (e.g. car, tools for work), conditions (e.g. employment, tenure, seniority), personal characteristics, (key skills and personal traits such as self-efficacy and optimism), and energies (e.g. credit, knowledge, money)" (Hobfoll et al, 2018, pg. 105). COR predicts that individuals suffer when they lose resources that they value, such as key external (e.g., family support) and internal (e.g., self-efficacy) coping resources, and as such, they are motivated to gain and protect these resources to avoid stress and to help them produce desirable psychological and performance outcomes (Hobfoll, 2001). Put differently, COR predicts that a resource loss creates stress in individuals, which leads them to perform poorer (Hobfoll, 2001). Additionally, this theory suggests that resource losses impact individuals to a higher degree than resource gains (McNall et al., 2010).

COR's corollaries state that individuals with more resources are better positioned to deal with resource losses because these resource reservoirs help them deal with the stress of losing other resources (Hobfoll, 2001). Building on this, initial resource gains versus losses lead to future resource gains versus losses, respectively (Halbesleben et al., 2014). As a result, individuals must invest resources in order to protect themselves from the loss of other resources (Halbesleben et al., 2014). This theory is critical for understanding performance in individuals with learning differences because it provides evidence for how having a learning difference impacts the resources at their disposal, ultimately affecting their performance.

In the next sections, I describe learning differences and how these can both negatively and positively impact students' performance outcomes in line with COR.

Learning Differences (Learning Disabilities)

Learning differences include a large heterogeneous group of disorders that is neurodevelopmental in nature and that poses challenges for affected individuals' academic capabilities (D'intino, 2017; Willoughby & Evans, 2019). In particular, there are three different types of specific learning disorders, including impairments in reading, written expression, and mathematics, which can present themselves in mild, moderate, or severe forms (D'intino, 2017). While research has mostly focused on the cognitive aspects learning differences, it is important to note that social–emotional factors also play a role and can be negatively affected (Willoughby & Evans, 2019).

Learning differences affect anywhere from 2-10% of the Canadian population (LDAO, 2018). With an increase in individuals with learning differences entering university, there is major concern that accommodation offices will not be able to handle the uptake in the learning difference population's needs (LDAO, 2018). Most of these disorders are invisible or intrinsic, giving a reason for why the definition of invisible disabilities exists (Hammill, Leigh, McNutt, & Larsen, 1987), meaning they are unobservable by looking at individuals (Tasheva et al., 2019, p.148). As a result, individuals with learning differences typically have to self-identify to receive the appropriate support, which does not always occur in light of the stigma associated with learning differences.

The majority of research on learning differences has focused on the experiences of younger students (childhood or adolescence), with fewer investigations into the experiences of these individuals as they grow up and enter higher levels of education (Longobardi, Fabris,

Mendola, & Prino, 2019). This is an important area to address as the challenges associated with learning differences have been shown to continue into adulthood (Willoughby & Evans, 2019, p. 175). Indeed, individuals with learning differences experience struggles in the transition to post-secondary education, which may be (a) due to the lack of understanding that individuals with learning differences have for their differences (and possibly due to over-involved parents) and (b) due to the lack of understanding universities have for how to appropriately accommodate them (Jacques & Abel, 2020). Specifically, this can be seen in students with learning differences' lack of abilities to manage their time and to self-advocate, as well as their increased procrastination (Jacques & Abel, 2020).

When it comes to accommodations that can help individuals with learning differences to better transition into post-secondary education – and to succeed once there – research suggests that universities are increasingly offering support programs that can assist these students with their academic challenges (Zeng, Ju, & Hord, 2018). While there are many types of interventions available, research has indicated that student-centered approaches to accommodation is a key characteristic for interventions to be effective for students with learning differences (Zeng, et al., 2018).

Performance Outcomes of Individuals with Learning Differences

Individuals who have a learning difference are less likely to attend and remain in post-secondary institutions, and if they do, they tend to receive a less than average grade point average (GPA) relative to their peers without learning differences (Thorwarth, 2014; Vogel & Adelman, 1990). Research suggests that students with learning differences have a number of challenges that negatively affect their grades (Hughes et al., 1990). For example, most of the teaching at school is not adjusted for the learning styles of students with learning differences

(Gregg, 2007), making them feel like the world is against them (Maag, 2006). As a result, the perception of having a learning difference is associated with strong negative feelings such as a lack of self-efficacy (Miller, 2002), which result in lower success at school (Thorwarth, 2014). Studies have shown that self-efficacy is an important resource in determining performance outcomes in general (Luthans, Avolio, Avey & Norman, 2007), and for individuals with learning differences in particular, whereby individuals with learning differences tend to lose their self-efficacy on account of feeling different and being in need of additional accommodation (Miller, 2002).

Additionally, the university environment often is limited to a degree of support that can be offered, which does not necessarily meet the demands of individuals with learning differences (Hughes et al., 1990). Hence, individuals with learning differences have to invest more time to perform academically compared to those without learning differences. That is, the amount of time available for academic pursuit is depleted when an individual has to devote more time to overcome their learning difference, negatively impacting their performance. Several studies have accordingly shown that students with learning differences tend to benefit from extra time in terms of performance, such that individuals with learning differences perform significantly better with extra time, while individuals without learning differences show no changes under such conditions (Lewandowski et al., 2013; Runyan, 1991). Having said that, it is important to remember that this is an average and is not always true for all individuals with learning differences.

Based on the above research, it is likely that individuals with learning differences will have a lower GPA than individuals who do not possess them. According to COR theory (Hobfoll, 2001), this is because students with learning differences tend to have fewer resources

to invest in their studies, which tend to generate stress, depression, and a further loss of resources (Gregg, 2007; Maag, 2006), which collectively harm their academic performance. As described above, individuals with learning differences tend to lack or lose resources such as time and self-efficacy as they pursue higher education; these resources are critical for a student's success and performance at university. The presence of a learning difference thus decreases their academic performance (Vogel & Adelman, 1990), which leads to my first hypothesis.

Hypothesis 1: Learning differences have a negative effect on GPA.

In contrast with the above, learning differences can also have positive effects on university students' performance. Drawing from the literature, it is likely that learning differences can increase individuals' creativity in particular, although this appears to be more of an opinion than an empirical conclusion (Wolff & Lundberg, 2002). That is, while some research has shown a positive link between learning differences and creativity, there seems to be inconsistent results with majority of positive results from a limited adult sample (Majeed, Hartanto, & Tan, 2021). The concept of creativity can be defined as "the ability to produce work that is both original and valuable" (Kapoula et al., 2016, p.1). Using dyslexia as an example, which can be defined as "difficulty in learning to decode (read aloud) and to spell" (Snowling et al., 2020, p. 501), given it is the most common learning difference (Kapoula et al., 2016), there has been some research suggesting that dyslexic individuals are more creative than others (Kapoula et al., 2016). Studies have found that dyslexic children are more creative in generating a larger quantity of ideas and more original responses than non-dyslexic children (Bigozzi et al., 2016; Cockcraft & Hartgill, 2004). Relatedly, an experiment conducted with college students

found that dyslexic students had higher levels of artistic talents than their counterparts (Pachalska et al., 2009), while another study found that dyslexic individuals were more likely to be in a creative major like art than non-dyslexic individuals (Wolff & Lundberg, 2002).

What the literature in this area has trouble pinpointing is why individuals with learning differences are more creative (Kapoula et al., 2016). Much of the debate about creativity has similar elements to the nature-nurture debate. On the nature side of this debate, some research has given physiological reasons for the increased creativity found in dyslexic individuals (Kapoula et al., 2016; Majeed et al., 2021), even hypothesizing that the high prevalence is a sign that dyslexia is an evolutionary advantage in some capacity (Kapoula et al., 2016). From a neurological standpoint, there may be additional reasons for why individuals with learning differences are more creative. Individuals with learning differences tend to process more information on the right side of their brain, even with processes that should activate the left side of the brain (McNamara, 2020). The over-activation of the right hemisphere of the brain strengthens the connectivity and finality of neurons (McNamara, 2020). In other words, if you use your right foot more it will naturally become better than your left foot. This over-activation and strength of connectivity in individuals with learning differences has been recognized as a possible underlining cause for their increased creativity (McNamara, 2020). Similarly, neuroimaging studies have provided evidence that the right hemisphere of the brain activates for tasks that require creativity (McNamara, 2020). Specifically, the "right hemisphere boosts creativity by releasing constraining effects of dopamine on remote associations" (Aberg et al., 2017, p. 4946).

Other researchers believe in the nurture approach for why individuals with learning differences are more creative (Bigozzi et al., 2016; McNamara, 2020). The main research in this

area suggests that creativity is caused by the environment that individuals with learning differences go through. For example, early failures from struggles in school cause individuals with dyslexia to cope and find alternative ways to be successful (Kapoula et al., 2016). This is another instance where the negatives a learning difference causes can create an adaptive advantage in terms of creativity. Put differently, by facing unique learning challenges, individuals with learning differences have to find different ways to approach their performance, leading to increased creativity.

According to COR theory (Hobfoll, 1998), individuals with learning differences are likely to gain creative resources due to the above mentioned nature versus nurture reasons. That is, their learning differences tend to enhance their brain structures and functions necessary for creativity (Wolff & Lundberg, 2002). These creative resources are in turn likely to produce further creativity in individuals with learning differences as per Hobfoll's (2001) resource gain argument such that individuals with resources are in a better position to gain additional resources. In summary, both of these areas of research as well as the COR theory (Hobfoll, 2001) suggest that individuals with learning differences are more creative. This leads to my second hypothesis:

Hypothesis 2: Learning differences have a positive effect on creativity.

Moderator Variables

In line with the goals of this research, it is important to also look at the role of psychological and social resources for individuals with learning differences, thereby shedding

light on the circumstances in which the relationship between individuals with learning differences and their creativity as well as GPA may be more or less positive versus negative.

Resilience

In terms of individual level or psychological resources, a person's resilience can affect the relationship between individuals' learning differences and their performance as per the first two hypotheses described above. Resilience can be defined as "positive adaptation, or the ability to maintain or regain mental health, despite experiencing adversity" (Herrman et al., 2011, p. 259), and it has been found to be a key resource for individuals' performance and satisfaction in positive organizational behavior research (e.g., Luthans, Avolio, Avey & Norman, 2007).

Evidence that provides rationale for the role of this psychological resource for individuals with learning differences in particular exists in the developmental psychology literature, which suggests that having higher levels of resilience can help individuals with learning differences to overcome their adversity (Miller, 2002). In line with COR theory, this resource of psychological resilience can serve as a buffer or substitute for the other resources missing or depleted on account of dealing with the challenges associated with learning differences in an academic setting. The use of other such resources can aid in restoring the resources that are lost during stressful events (Hobfoll, 2011). In other words, resource constraints from learning differences can be overcome when individuals are able to find other resources to act in their place, thereby reducing the negative effect of the learning differences on academic performance (GPA). Similarly, it is possible that psychological resources can also help individuals with learning differences enhance the positive effects of their other resources (i.e., a more positive effect on creativity). Having additional resources enables individuals to aggregate and capitalize on their resources further, creating a resource gain spiral (Hobfoll, 2011). That is, resilient individuals are

better able to draw from their current creative resources to gain further such resources, thereby having stronger positive performance effects in terms of creativity. Based on this literature, I expect that having more resilience can help individuals with learning differences become less negatively and more positively affected by their learning difference in terms of their GPA and creativity, respectively. This leads to my third hypothesis.

H3a: The relationship between learning differences and GPA is moderated by resilience, such that individuals with higher resilience have a less negative effect of their learning differences on their GPA.

H3b: The relationship between learning differences and creativity is moderated by resilience, such that individuals with higher resilience have a stronger positive effect of their learning differences on creativity.

Social Support

The other type of resource that may influence the relationship between learning differences and performance is social support. Social support can be defined as "support that is provided by other people and arises within the concept of interpersonal relationships, which can be tied to groups or larger communities" (Cooke et al., 1988, p. 211). Research has found that students' social support can be broken down into four categories including family support, interaction with other students, interacting with faculty, and university support services (Smith & Nelson , 1994). These types of social support correlate with the amount of success that individuals with learning differences have (Dole, 2000).

Following COR theory's resource substitution arguments described above (Hobfoll, 2001), adding a social resource can help to make up for the resource constraints that individuals with learning differences tend to encounter. That is, when an individual experiences resources losses due to their learning difference, having a support figure that gives them resources can help alleviate the negative effects of these resource losses on their performance. Indeed, most of the successful individuals with a learning difference in the literature had at least one support figure that "accepted them unconditionally" (Dole, 2000). In other words, a support figure can help take on the burden and constant psychological battle that individuals with learning differences tend to face (Ben-Naim, 2017). This resource substitution can help to improve overall performance for individuals with learning differences (Dole, 2000). In addition, providing additional resources through social support can also increase the ability for individuals with learning differences to be more creative in line with the process of resource gain spirals described above. That is, social support can enrich their creativity resource reservoir to lead to further creativity (Hobfoll, 2001). These arguments can be summarized in the fourth and final hypothesis.

H4a: The relationship between learning differences and GPA is moderated by social support, such that individuals with more social support have a less negative effect of their learning differences on GPA.

H4b: The relationship between learning differences and creativity is moderated by social support, such that individuals with more social support have a stronger positive effect of their learning differences on creativity.

From an anecdotal standpoint, I agree with the research findings in this area of social support. Many times having a support figure got me through the days in which I wanted to give up and not persevere. Having extra resources from my support figure allowed me to fill in the ones that were lost with the psychological stress of dealing with having a learning difference. This research provides a rationale for why individuals with learning differences are more likely to struggle at school or work without a proper support system. I also agree with the resilience arguments presented, such that I believe I have had to work really hard academically in order to achieve success. It is one of my core beliefs that this work ethic and resilience is why I have come as far in academics.

Methods

Procedure

An online survey was designed to measure all the variables in the proposed framework using relevant and validated measures as described below. Since the focus of this research was on individuals with learning disabilities enrolled in education at the post-secondary level, it was critical to gain access to this specialized population while maintaining confidentiality because of the potential stigmatization that comes with being identified as having a learning disability. A sample that met these requirements, and was therefore used for this study, was the "subject pool" at Concordia University. The subject pool is an online platform where students registered in a required undergraduate course can sign up to participate in research studies for course credit. These students were invited to participate in this survey through the subject pool website.

Sample

The final sample consisted of 292 university students from Concordia University, with 33 of them identifying as having a learning difference. The average age of this sample was 22.31

years old with 167 female, 111 male, 1 non-Binary, 1 transgender male, and 3 people who preferred not to say. The most common majors of the students in this sample was accounting (22%) and finance (28%). Lastly, the most common types of learning differences among these students were Attention-Deficient Disorder (ADD) (23%) and Attention-Deficit / Hyperactivity Disorder (ADHD) (58%) (see *tables 1-4*)

Table 1

Type of Learning Difference

Type of Learning Difference	**N**	**%**
ADD	7	22.6%
ADHD	18	58.1%
ADD, ADHD	1	3.22%
Dyslexia	1	3.22%
Processing issues	1	3.22%
Specific Learning Disorder	1	3.22%
ADHD, Anxiety	1	3.22%
ADHD, Dyslexia, Dysgraphia	1	3.22%

Table 2

Racial/Ethnic Background

Racial/Ethnic Background	N	%
Indigenous/Native American	1	.4%
Asian	82	29.1%
Black (African or Caribbean)	10	3.5%
Hispanic / Latino / Latina	9	3.2%
Other	52	18.4%
Caucasian / White	128	45.4%

Table 3

Major

Major	N	%
Accounting	62	21.99%
Administration	5	1.77%
Finance	79	28.01%
Technology management	22	7.80%
Management	23	8.16%
Marketing	41	14.54%
Economics	4	1.42
Human resource management	12	4.26
International business	20	7.09%
Supple chain	11	3.90%
Management and Accounting	1	0.35%
Management and Finance	1	0.35%
Marketing and Business technology	1	0.35%

Table 4

Gender

Gender	N	%
Female	167	59%
Male	111	39.2%
Non-Binary	1	0.4%
Transgender male	1	0.4%
Prefer not to say	3	1.1%

Measures

Learning Difference

Learning difference was measured in this study by asking the participants, using a "yes" or "no" multiple-choice question, whether they identified as having a learning disability. Additionally, individuals who disclosed that they did have a learning disability were also asked what type of learning disability they were diagnosed with and if they were registered with the accommodation office at Concordia University.

Academic Performance

Academic performance was measured using an open ended question where participants were asked to indicate their GPA for their major. This is similar to how academic performance has been measured in other research studies on students with learning differences (e.g., Miller, 2002).

Creativity

Creativity was be measured using the Short Scale of Creative Self by Maciej Karwowski and colleagues (2011; 2012). This scale contains 11 items to which participants responded on a 1-5 Likert scale (1 = "definitely not" to 5 = "definitely yes"). Sample questions from this scale include; "I think I am a creative person", and "I am good at proposing original solutions to problems". The reliability for this scale was confirmed using Cronbach's alpha (.899).

Resilience

The Academic Resilience Scale by Cassidy (2016) was used to measure resilience, specifically looking at academic resilience. Participants were asked to read a scenario about receiving an 'F' on a marketing course exam and to then answer questions about how they would respond to this scenario. This 30 item scale uses a 1-5 Likert scale (1="Unlikely" to 5="Likely"), where sample items include; "I would work harder", "I would be very disappointed", and "I would blame the instructor(s)". The Cronbach's alpha for this scale was .715.

Social Support

Social Support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS), by Zimet et al., (1988). This measure consists of 12 items in which participants responded to on a 1-7 Likert scale (1 = "I very strongly disagree" to 7 = "I very strongly agree"). Participants were asked questions such as "There is a special person in my life who cares about my feelings", "My friends really try to help me" and "I can count on my friends when things go wrong". The Cronbach's alpha for this scale was .899.

Social support was also measured using the question previously introduced "Yes, I have a learning disability and I am registered at the university accommodation office for a disability", as well as a similar question but with the difference of not being registered with the university accommodation office. This question measured an interesting potential phenomenon of

individuals either gaining social support through the Concordia university accommodation office or not.

Measures for Covariates and Supplemental Analyses

Demographic Covariates. Demographic questions were asked including gender and age. These variables were included as covariates because they may impact the results based on prior work. Studies have shown that there are differences in performance among individuals with learning differences due to gender and age (Smart et al., 1996; Tamboer et al., 2014).

Self-Efficacy. For supplemental mediation analyses described below, self-efficacy was measured using Schwarzer and Jerusalem's (1995) General Self-Efficacy Scale (GSE). This scale consists of 10 items, which participants responded to on a 1-4 Likert scale (1 = "Not true at all" to 4 = "Exactly true"). Participants were asked questions such as "I can always manage to solve difficult problems if I try hard enough", "It is easy for me to stick to my aims and accomplish my goals", and "Thanks to my resourcefulness, I know how to handle unforeseen situations". The Cronbach's alpha for this scale was .883.

Time Constraints. For supplemental mediation analyses described below, time constraints were measured using 3 items developed for the purpose of this research. Sample items include "I do not receive enough time to complete my school work by my instructors" and "I often run out of time to complete my school work", that participants responded to using a 1-5 Likert scale (1= "Strongly disagree", 5= "Strongly agree"). The Cronbach's alpha for this measure was .845.

Results

The descriptive statistics and correlations of the variables in my model are shown in Table 6. I tested my hypotheses with and without covariates and found no meaningful

differences in the results; hence, in line with current recommendations, I excluded the covariates from my analyses for model parsimony. Due to the directional hypotheses and the relatively small sample size of students with learning differences (33) in this study, I used one-tailed t-tests when evaluating the first two hypotheses.

Hypothesis 1 predicted that learning differences would have a negative effect on academic performance. The results showed a non-significant relationship between learning differences and academic performance (GPA) (t =.13, p = .45) with the mean GPA of individuals with learning differences (m=3.3) and the mean GPA of individuals without learning differences (m=3.4) not being statistically different. Thus, Hypothesis 1 was not supported (see *table 5*). Next, Hypothesis 2 predicted that learning differences would have a positive effect on creativity**.** The results showed that Hypothesis 2 was marginally significant. Learning differences had a positive effect on creativity (t =1.6, p = .06), with individuals with learning differences having a higher level of creativity (m = 3.9) than individuals without learning differences (m = 3.7) (see *table 5)*. Hypothesis 2 was thus supported at the level of marginal significance.

Hypothesis 3a and 3b predicted that the relationship between learning differences and performance would be moderated by resilience such that individuals with higher resilience would have a less negative effect of their learning difference on their GPA and a stronger positive effect on their creativity. First, I looked at the main effect of learning differences on resilience and found that individuals without learning differences were more resilient (m = 3.7) than individuals with learning differences (m = 3.5) (t = 2.2, p = .01), see *table 5)*. Next, I evaluated the hypothesized moderation model using Hayes' PROCESS Model 1 in SPSS (Hayes, 2022). I found no statistical support for Hypothesis 3a ($ß$=.24, p=.71) (see *table 7*). Similarly, in terms of

the moderating relationship of hypothesis 3b, no statistical support was found (β =.30, p=.13) (see *table 7)*.

Lastly, Hypothesis 4a and 4b predicted that the relationship between learning differences and performance would be moderated by social support, such that individuals with more social support would have less negative effects of their learning differences on GPA and stronger positive effects on creativity. Neither hypotheses 4a or 4b were supported in terms of the moderating effects of social support for GPA (4a: β =-.22, p=.44) and for creativity (4b: β =.0027, p=.98) (see *table 8)*. No statistically significant difference was found in terms of overall levels of perceived social supports for individuals with learning differences (m = 5.4) versus individuals without learning differences (m = 5.5) (t = .53, p = .30), (see *table 5)*.

Table 5

Baseline differences for individuals with and without learning differences for all variables in the proposed model

Variable	Mean	t-test statistics
GPA	LD: 3.3 No LD: 3.4	t = .13, p = .448
Creativity	LD: 3.9 No LD: 3.7	t =1.61 , p = .055
Resilience	LD: 3.5 No LD: 3.7	t = 2.23, p = .013
Social Support	LD: 5.4 No LD: 5.5	t = .53, p = .299

Notes. Individuals with learning differences = (LD), Individuals with no learning differences = (No LD).

Table 6

Descriptive statistics and correlations

	Variable	Mean	s.d.	1	2	3	4	5	6	7
1.	Learning Difference	N/A	N/A	--						
2.	GPA	3.35	1.83	.006	--					
3.	Creativity	3.71	.686	-.097	-.079	--				
4.	Resilience	3.71	.524	.134*	.056	.378**	--			
5.	Social Support	5.51	1.12	.032	-.060	.098	.290**	--		
6.	Gender	N/A	N/A	-.009	-.053	-.104	-.167**	-.157**	--	
7.	Age	22.31	4.75	.012	-.022	.040	.170**	-.031	.025	--

*Notes. * $p < .05$, ** $p < .01$, n=292, Learning difference (1 = yes, 2 = no), Gender (1 = female, 2 = male, 3 = non-binary, 4 = other)*

Table 7

Moderated model results for resilience (PROCESS model 1)

Variables	GPA as DV		Creativity as DV	
	β	SE	β	SE
Constant	4.20	4.48	4.34	.1.32
Model variables:				
Learning Differences (LD)	.867	2.38	1.40	.709
Resilience (Re)	.243	1.23	.031	.368
LD x Re	.241	.648	.301	.197
R^2	.0037		.172	
F-Statistic	.327		18.58	

Notes: ** $p < .01$, * $p < .05$, Learning differences = (LD), Resilience= (Re)

Table 8

Moderated model results for social support (PROCESS model 1)

Variables	GPA as DV		Creativity as DV	
	β	SE	*β*	SE
Constant	1.63	2.99	3.74	992
Model variables:				
Learning Differences (LD)	1.24	1.60	.201	.535
Social Support (SS)	.301	.526	.057	.177
LD x SS	.219	.281	.003	.096
R^2	.006		.017	
F-Statistic	.517		1.50	

Notes: ** $p < .01$, * $p < .05$, Learning differences = (LD), Social Support = (SS)

Supplemental Analyses

Supplemental analyses were conducted to test for possible in-direct effects in the theoretical model when it comes to students' academic performance (GPA) in particular. That is, while I did not find a direct effect of learning differences on GPA, it is possible that this effect may take place indirectly due to the lack of other resources that learning differences create, such as time and self-efficacy (as per my arguments for hypothesis 1). However, contrary to expectations, I found that individuals with learning differences had fewer time constraints (m = 3.7), than individuals without learning differences (m = 3.9) (t = 3.79, $p < .001$) (refer to *table 9*). This result may be due to the amount of accommodation offered at this university to students with learning differences. Specifically, the ACSD office has goals to "reduces barriers to academic participation in the University, raise awareness about students with disabilities, and engage in community-building to further promote an inclusive environment at Concordia" (ACSD, 2022). The ACSD office reduces barriers to academic participation by providing

specific accommodations that include; “Exam accommodations, Sign language interpretation, transcribing, accessible materials in alternate formats (e.g., braille, large print), hygiene and/or mobility attendants, textbook/course pack conversion services” (ACSD, 2022). These accommodations help students with learning differences to overcome a possible loss of resources that comes with having a learning, in particular time constraints. That is, one of the more commonly used exam and assignment accommodations at this University is the provision of extra time, which helps to explain the main effect result here.

In terms of time constraints mediating the relationship between learning difference and performance, I found that time constraints did not significantly influence GPA (β = .091, p = .398), nor did it serve as a mediator between learning differences and GPA (*indirect effect* = -.069, *LLCI* = -.285, *ULCI* = .040). (see *table 10*).

Next, I looked at the role of self-efficacy as a mediator between learning differences and performance. Contrary to expectations, I found that individuals with learning differences had similar levels of self-efficacy (m = 3.1) as individuals without learning differences (m = 3.1) (t = 0.6, p = .397)) (refer to *table 9*). Again, this result may be due to the extra support and accommodations offered at Concordia University, reducing the stigma and accompanying self-efficacy challenges for students with learning differences (ACSD, 2022). This is related to social support and resilience being at similar levels within both groups in this study; it then makes sense that self-efficacy would be at similar levels especially with no statistical difference in GPA. Individuals with learning differences in the current study do not have the common negative that is typically seen in individuals with learning differences in terms of performance at university. With this results I propose that what usually makes individuals with learning differences have low self-efficacy is not present in the context of this study.

In terms of self-efficacy mediating the relationship between learning difference and performance, I found that self-efficacy did not significantly predict GPA (β = -.130 , p = .590), and did not serve as a mediator between learning differences and GPA (*indirect effect* = .005, *LLCI* = -.058, *ULCI* = .097). (see *table 11*).

Table 9

Baseline differences for individuals with and without learning differences for all variables in post-hoc analysis

Variable	Mean	t-test statistics
Self-Efficacy	LD: 3.1 No LD: 3.1	t = 0.6 , p =.397
Time Constraints	LD: 3.7 No LD: 3.9	t = 3.8, p < .001

Notes. Individuals with learning differences = (LD), Individuals with no learning differences = (No LD).

Table 10

Mediation model results for time constraints (PROCESS model 4)

Variables	GPA as DV		Creativity as DV		GPA CI (LLCI, ULCI)	Creativity CI (LLCI, ULCI)
	β	SE	*β*	SE		
Model variables:						
Learning Differences	.100	.389	-.220	.138		
Time Constraints	.091	.107	-.052	.039		
Constant	2.89	.874	4.27	.312		
F-Statistic	.362		1.76			
R^2	.003		.013	.		
Mediation (Indirect) Effects						
LD → Time Constraints	-.069	.087	.041	.034	(-.285, .040)	(-.021, .114)

Notes. ** $p < .01$, * $p < .05$, Learning Differences = (LD)

Table 11

Mediation model results for self-efficacy (PROCESS model 4)

Variables	GPA as DV		Creativity as DV		GPA CI (LLCI, ULCI)	Creativity CI (LLCI, ULCI)
	β	SE	*β*	SE		
Model variables:						
Learning Differences	.027	.381	-.163	.120		
Self-Efficacy	-.130	.241	.656	.078		
Constant	3.71	1.06	1.97	.338		
F-Statistic	.149		36.2			
R^2	.001		.213			
Mediation (Indirect) Effects						
LD → Self-Efficacy	.005	.037	-.016	.072	(-.058, .097)	(-.151, .135)

Notes. ** $p < .01$, * $p < .05$, Learning Differences = (LD)

Discussion

Highlighting the importance of continued research into learning disabilities in school and work settings, this research drew from COR theory to investigate different performance outcomes of university students' learning differences and how factors like psychological and social resources may play a role. The overarching goal of this research was to promote a more constructive view of the impact of learning differences for individuals and organizations, and to help stop the stigma that many individuals with learning differences face. Accordingly, a quantitative study with 292 undergraduate students was conducted to test a theoretical model that proposed both positive and negative outcomes of having a learning difference. This study found that individuals with learning differences were more creative than individuals who did not have learning differences, while there was no meaningful difference in their academic (GPA) performance. I elaborate on these results in more detail below.

The first hypothesis was rejected as individuals with learning differences did not underperform in terms of their GPA relative to those without learning differences. This result does not follow theoretical and empirical research previously conducted, which predicted that having a learning difference leads to resource constraints and strain that in turn negatively impacts academic performance. Some possible reasons for this surprising result may be due to the limited research on individuals with learning differences in higher education (Longobardi et al., 2019). With the limited pool of individuals with learning differences who gain admissions into University and successfully complete a degree, it could be that individuals who have a learning difference and are currently in University may have a lower spectrum learning disability or have a statistically higher IQ that helps them overcome the resource constraints associated with learning differences. Alternatively, individuals with learning differences who make it to

University may be particularly motivated or possess the right type of social support necessary to make it in post-secondary education.

It is also important to recognize that universities have taken steps towards being more accommodating for students in general, in line with the concept of "universal design for learning" (Morin, 2018). This approach – based on scientific insights on how to optimize teaching and learning – ensures all students are given equal opportunity to succeed by allowing for flexibility for students' access to material, engagement, and ability to show knowledge (Morin, 2018). It is possible that this learning approach is especially helpful for students with learning differences who have a greater need for alternative ways to learn and succeed in academic settings (Morin, 2018). With introductions of the "universal design for learning" into the school system, therefore, these efforts are making a more even playing field for individuals with learning differences, which may be another possible reason why my results in particular did not support my first hypothesis.

As seen in the results of this study, the levels of social support and resilience were similar for those with and without learning differences, high enough that they can help combat the loss of resources following the baseline theory of COR (Hobfoll, 1998). Also, it is important to note that the majority of individuals with learning differences in this sample (20 of the 33) were registered with the ACSD office at Concordia, giving them extra support and time on assignments which may have benefited their performance, impacting the results. This gives further rationale for why the first hypothesis was not supported. However, while the majority of students with learning differences did register with the ASCD, it is interesting to note that not everyone did. This raises questions as to why individuals with learning differences do not seek out available accommodation. Based on the literature, some possible explanations include;

stigma, inadequate self-advocacy, and the lack of understanding that individuals with learning differences have for their differences and how to appropriately get accommodation for them (Jacques & Abel, 2020). To help me better understand possible differences between individuals who were registered with the ACSD office and those who were not in the current sample, I ran some additional tests of comparison. When conducting this analysis I did not find any meaningful differences on any of the main variables in this study, except that male students seemed more likely register with the ACSD office (89%; 8/9) in comparison to female students (45%; 10/22). It is not clear, however, whether this gender difference stems from concerns about stigma, a lack of self-advocacy, or perhaps even beliefs about not needing the support.

Next, hypothesis 2 was marginally supported in this study; this is on trend with previous research that provides nature and nurture rationale for the increased creativity in individuals with learning differences. That is, on the one hand, learning differences produce physiological differences in brain structure and connectivity, such as an overactivation of the right hemisphere, the side of the brain that is responsible for creativity (McNamara, 2020). On the other hand, individuals with learning differences need to come up with different ways to be successful in creating an equal performance to their typical counterparts, which encourages more creative solutions. This is in line with Hobfoll's (2001) resource gain argument; the creative resources gained from having learning differences are, in turn, likely to produce further creativity. This finding is corroborated by research on learning differences in entrepreneurship (Logan, 2008). Creativity is one of the key pillars of entrepreneurship, and there is a large population of entrepreneurs with learning differences (more than the general population; Renko Parker-Harris, & Caldwell, 2016), suggesting that individuals with learning differences are creative outside the confounds of the methods of this study. Overall, this result offers a more positive take on the

impact of learning differences for individuals' performance today, suggesting this is an important direction to investigate further.

The third and fourth hypotheses were not supported as resilience and social support did not moderate the relationship between learning differences and GPA or creativity. This may be due to individuals with learning differences having found other ways to overcome their resource constraints such that they have higher levels of other capacities, motivations, and support from the university/ACSD as alluded to above. Alternatively, it is plausible that all students, regardless of learning differences, benefit from social support and resilience in similar ways. Having said that, it is also possible that the small sample size in this study made it challenging to detect any meaningful differences due to its low statistical power.

Theoretical Contributions

This research addresses the need for more investigations into the impacts of individuals' learning differences in general and in higher education in particular. By drawing from a resource framework (COR theory; Hobfoll, 1998), this paper attempted to advocate and promote a more constructive view of what it means to have a learning difference today. This is in stark contrast with the majority of research on learning differences that focuses on the negatives of such differences. This study provides a theoretical model that hopefully will inspire future research that addresses and extends the model to further broaden the field of study of learning differences. For example, this study found preliminary support for increased creativity among students with learning differences. While the other hypotheses were not supported in this study, especially regarding the potential negative impact that learning differences can have on academic performance, the non-significant results are actually inspiring hope in that universities are findings ways to better support their students with learning differences. Specifically, this study

has contributed to the literature by showing that individuals with learning differences do not necessarily have lower performance (GPA) than individuals without learning differences, likely due to the additional resources they have gained on their path to higher education. Further investigations into the various resources lost, gained, and possibly substituted for individuals with learning differences' performance should be further prioritized as per the COR theory (Hobfoll, 1998). For example, resilience may have been a better mediator in my theoretical model, considering the many challenging situations individuals with learning differences have to overcome and thus build resilience from. Lastly, variables that include procrastination and self-advocacy may be very interesting avenues to investigate further in light of research suggesting that these are behaviors that may help or hinder individuals' access to resources and accommodation (Jacques & Abel, 2020).

Practical Contributions

Some practical contributions this study provides is that it shows individuals with learning differences that, based on the results of this study, they are not necessarily going to be lower academic performers than individuals without learning differences, and they may even have a creative advantage in post-secondary education. Previous literature showing that individuals with learning differences struggle at university could potentially negatively impact their perception and drive to go. This research tries to offer a different side to this story, recognizing that potential challenges can be overcome.

The results of this study support the notion of increased hiring of individuals with learning differences as doing so would increase diversity in different ways of thinking, which could lead to increased creativity rather than underperformance. "Bias against neurominorities in the workplace is staggering, with 50% of UK managers stating that they would not hire

neurodivergent talent", and as a result, it has become apparent that increased advocation and practical implications are vital to this research area (Herbst, 2021).

Having said that, it is important to remember that there are still hurdles individuals with learning differences face, and the hurdles should not be something that is not taken seriously. Resources can be very helpful in mitigating performance and universities that have an effective accommodation system in place can have a great impact. Universities that do not have appropriate support leave individuals advocating for themselves alone, which could potentially have negative impacts on their performance. That is why it is essential for individuals with learning differences to seek out the appropriate support in the form of accommodation and additional resources necessary for success.

Limitations and Future Research

The major limitation of this study was the small sample size of individuals with learning differences. With learning differences being only 18.3% of the "disability" population and even less of the population of universities (ACSD, 2022), it was challenging to get enough individuals to participate in this study. Additionally, with this study being only from a population at Concordia University, the results are limited in terms of their external validity. Future research should continue to focus on areas of learning differences that may influence interesting outcome variables like performance and creativity using other, larger samples. Learning what factors may influence important outcomes for individuals with learning differences could have significant and exciting implications for organizations. Future research should not only fill in gaps in the literature; it is essential that results have practical implications for the workplace. Research that promotes the continued push to hire and appropriately support neurodiverse individuals in the workplace will have substantial practical implications.

Lastly, in line with this push to increase neurodiverse hiring (HBR, 2021), future research should specifically look at the accommodations in work settings that allow individuals with learning differences to thrive at work. More research is also needed that highlights the positives of hiring individuals with the learning differences, such as autism spectrum disorder with incredible analytical abilities and the leadership potential of neurodiverse individuals such as Elon Musk (Herbst, 2021). Overall, future research needs to look at other areas of interest for individuals with learning differences that would significantly impact practical implications for organizations.

Conclusion

In conclusion, this paper had the goal to investigate an area of research from a different perspective to emphasize the potential positives that may be present for individuals with learning differences, either directly or through the provision of appropriate resources. While this research offers some preliminary support for a more constructive view of learning differences, more work is needed to help individuals, universities, and organizations better benefit from such differences.

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