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PSYCHOSOCIAL OUTCOMES AMONG COLLEGE STUDENTS WITH LEARNING DISORDERS

by

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DISSERTATION

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DEDICATION

This work is dedicated to my family - my husband William, daughter Charlotte, mother, grandparents, brothers, uncle and in-laws - who all uplift and inspire me to perservere, and to the unsung marvelously set-switching women who lead by bold example.

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CHAPTER 1

INTRODUCTION

Researchers have primarily focused on specific learning disorders during childhood and their influence on classroom performance. Increasingly, however, researchers are recognizing the lifelong impact of learning disabilities and the utility of taking a lifespan developmental approach for understanding their assessment and effects outside of educational settings (Gerber, 1994; Pennington, 2008; Polloway, Smith, & Patton, 2016). As emphasized by Polloway et al. (2016), too often, the difficulties experienced by adults with learning disorders are viewed as a continuation of childhood behavioral or academic difficulties, rather than an interaction between neurocognitive factors and changing social and biological contexts that accompany progression into adulthood. Over three decades ago, it was noted that the field lacked a “natural history” for adults with learning disorders (Bruck, 1987). Although some progress has been made in this area, generalizability of results has been limited, in part due to diagnostic discrepancies, lack of comparison groups, low ethnic and socioeconomic diversity in participants, and outcome studies that have often lacked detail regarding assessment-related and psychosocial factors. Gaining a better understanding of the factors related to outcomes for adults with learning disorders may help to inform recommendations made during the evaluation process to maximize outcomes as well as promote well-being by informing self-appraisal by adult individuals with learning disorders.

For these reasons, this study sought to examine psychosocial (i.e., employment, education, housing, life satisfaction and social activities) outcomes in a demographically diverse cohort of adult college students who were previously assessed for learning disorders at an urban outpatient psychology clinic between the years of 2011 and 2016. The role of diagnostic criteria used at the time of the assessment as well as assessment-related factors (i.e., adherence to recommendations, measures utilized) were also examined. As a comparison group, students who were referred due to concerns regarding learning difficulties but who did not meet criteria for a specific learning disorder at the time of assessment, were included in the analyses.

The introduction below reviews relevant literature regarding learning disorder diagnosis, prevalence, and assessment procedures. Additionally, literature related to outcomes in adults with learning disorders is reviewed and its limitations discussed.

Defining Specific Learning Disorders (LD)

The most recent edition of *The Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM–5*; American Psychiatric Association, 2013) defines a specific learning disorder, also known as a learning disability (LD), as a neurodevelopmental condition involving long-term "difficulties learning and using academic skills…despite the provision of interventions that target those difficulties" with "the affected academic skills (being) substantially and quantifiably below those expected for the individual's chronological age." Often, as is the case in this dissertation, the terms learning disorder and learning disability are used interchangeably to refer to the condition described above. In contrast to the approach taken herein, some scholars and practitioners (Pennington, 2008) view learning disorders as a broader category, including any condition that interferes with the acquisition of academic or social skills (i.e., attention deficit hyperactivity disorder, intellectual disability, autism spectrum disorder). Instead, when diagnoses other than LD were indicated among the participants, they were coded separately for the purposes of accounting for them in the analyses.

As indicated by the inclusion of specific learning disorders under the category of neurodevelopmental disorders within the organization of the *DSM-5*, evidence of these learning difficulties typically emerges early in development before formal education, although LD is typically not formally diagnosed until sometime during grade school. The current *DSM-5* diagnostic definition for specific learning disorder reflects a change from the previous version of the *Diagnostic and Statistical Manual of Mental Disorders (4th ed., text rev.; DSM–IV–TR; American Psychiatric Association, 2000)* in that specific learning disorder has been re-conceptualized as one "overarching" diagnosis, with specifiers for the academic area of difficulty (i.e., reading, math, written expression) available. Previously, the *DSM-IV-TR* required that a "significant discrepancy," defined statistically as greater than two standard deviations, be found between achievement in an academic domain and overall intellectual ability (i.e., intellectual quotient (IQ)) for a diagnosis of learning disorder to be made (*DSM-IV-TR*, 2000, p.49). Significantly, the intellectual ability-achievement discrepancy diagnostic requirement was removed for the *DSM-5*. Additionally, the reportedly "overused" category of learning disability "not otherwise specified" (NOS) was removed (Tannock, 2013; 2014).

The *DSM-5* revision to remove the intellectual ability-achievement discrepancy as a diagnostic requirement is particularly significant as it follows revisions to the most recent version of the Individuals with Disabilities Education Act (IDEA) eliminating the ability for states to require a "severe" ability-achievement discrepancy as part of their criteria for determining which individuals qualify for state-based learning disability services (*Individuals with Disabilities Education Act*, 2004). Given that IDEA regulations broadly specify how a child may or may not be diagnosed with a learning disability, what services must legally be provided by the state, and which stakeholders must be a part of the educational decision-making process, this regulation plays a significant role in shaping the criteria for learning disability diagnosis and intervention. However, IDEA regulation diagnostic requirements are quite broad and vague. For example, the regulations do not quantitatively define a "severe" discrepancy, have non-specific requirements for “observation” of the child in the learning environment, and vaguely indicate that a learning disability may be considered if a child “does not achieve adequately” or “make sufficient progress” when provided appropriate instruction or intervention (*Individuals with Disabilities Education Act*, 2004). The vagueness of the regulations surrounding diagnosis of learning disability may serve the purpose of allowing states to shape their own criteria based upon their needs and resources. However, this lack of specificity has also resulted in significant discrepancies between diagnostic techniques amongst states, educational environments, and individual clinicians (Frankenberger & Fronzaglio, 2016).

Diagnostic Framework

In their research, Proctor and Prevatt (2003) note that selecting LD diagnostic criteria to be used is “one of the most debated and dubious tasks in the fields of special education, general education, and even higher education" (p. 459). Four of the most commonly-used diagnostic criteria are (a) simple discrepancy between IQ and achievement, (b) intellectual ability-achievement discrepancy, (c) intraindividual and (d) the underachievement model.

Simple discrepancy models are reportedly the most commonly used (Proctor & Prevatt, 2003) and are somewhat similar to ability-achievement discrepancy. Simple discrepancy LD criteria involves comparing achievement standard scores utilizing *only* the overall actual full scale intellectual quotient (FSIQ) as the measure of ability for comparison. This model emphasizes the need for lower than expected achievement, based upon age or grade-level, to be specific to a certain educational domain (e.g., mathematics, reading), provided the individual has had adequate exposure to education. Thus, this method tends to reduce diagnosis among individuals with deficits in multiple areas. Notably, some opponents of this diagnostic method argue that there may also be a tendency to under-diagnose individuals with lower than average IQs and that the difference scores between IQ and achievement measures are statistically unreliable (Sternberg & Grigorenko, 2002). Intellectual ability-achievement discrepancy criteria, as defined by Proctor and Prevatt (2003), are very similar to simple discrepancy criteria but may use a measure outside of the FSIQ, such as a General Intellectual Ability (GIA) or regression-predicted achievement score based upon FSIQ. Use of intraindividual diagnostic criteria eliminates the need for comparison to a reference age- or grade-level group and focuses only on significant discrepancies from average difference scores, as calculated for that individual, between cognitive abilities and achievement. The underachievement diagnostic model simply puts forth that, if adequate educational opportunities have been provided, any domain achievement scores below a certain threshold indicate the presence of a learning disorder.

In their study, Proctor and Prevatt (2003) analyzed the psychoeducational assessment results of 170 college students clinically referred because of reported learning problems. They examined the four categories of diagnostic criteria noted above. They administered the Wechsler Adult Intelligence Scale – 3rd edition, Woodcock-Johnson III Tests of Cognitive Abilities (WJ-III Cog), and Woodcock-Johnson III Tests of Achievement (WJ-III Ach) (Wechsler, 2008; Woockock, McGrew, & Mather, 2001). Relevant test scores in their analysis included WAIS-III FSIQ, WJ-III Ach Broad Reading, Broad Math, Broad Written Language, Broad Oral Language, WJ-III Cog General Intellectual Ability (GIA), and WJ-III cluster difference scores. Significant discrepancies were defined as WJ-III Ach scores 15 points lower than FSIQ for the simple discrepancy model, difference scores equal to or greater than 1.3 standard deviations from the individual's average WJ-III Cog-Ach difference score for the intraindividual model, broad domain WJ-III Ach scores equal to or greater than 1.3 standard deviations from the calculated WJ-III Cog GIA for the intellectual ability-achievement model, and a broad WJ-III Ach score of less than 85 for the underachievement model. Overall, Proctor and Prevatt (2003) found that use of the simple discrepancy model resulted in a higher rate of learning disorder diagnosis among those assessed (46.5%) than any of the three other methods. Among the three other diagnostic methods, there was not a statistically significant difference in diagnostic rates, which ranged from 24.7 – 33.1% of the sample being diagnosed with a learning disorder. The authors also noted that although *rates* of diagnosis were similar amongst the three diagnostic criteria groups, there was significant variability in *which* students were diagnosed. Regarding agreement between which individuals were diagnosed by different methods, the highest consistency was found between the intraindividual and ability-achievement methods (70%) and the lowest consistency between the simple discrepancy and underachievement methods (48%). Proctor and Prevatt (2003) concluded that variability in diagnostic criteria likely results in identifying "very different populations" and that the qualitative differences between students with LD diagnoses require further exploration through research.

A diagnostic method not included in Proctor and Prevatt's research that has become particularly popular over the last decade is responsiveness to intervention (RTI). Generally, the goal of RTI is early identification and intervention for individuals with specific learning disorders through a multi-tiered intervention model (Fletcher & Vaughn, 2009; Fuchs & Fuchs, 2006). However, the actual methods for identifying students for and implementing RTI intervention are highly variable. Generally, Tier 1 instruction involves general classroom learning. Most typically, individuals scoring below a certain threshold on testing or who are identified as experiencing academic difficulty under Tier 1 instruction may move to Tier 2 intervention, which may involve specialized small group instruction, tutoring, or a general "problem-solving" intervention. At the end of this intervention, students who participated are again assessed. Based upon some predetermined cut-off, the students are identified as Tier 2 “responders” or “non-responders” (Morin & Niefield, n.d.). The majority of students are Tier 2 responders and do not continue to Tier 3 instruction, which involves more intensive interventions outside of the general education environment (Fuchs & Deshler, 2007a). An estimated 2-6% of students do not respond to Tier 3 intervention (Torgesen, 2010), with this group finally being defined as those with learning disorders. Some researchers argue that too little research on RTI interventions, particularly outside of reading interventions, has been conducted, that the definitions for “responders” are too inconsistent, and that this approach may not be well suited to more advanced, middle, or high-school students (Fuchs & Deshler, 2007b).

For the purposes of the present study, data regarding the diagnostic method utilized for each participant’s previous assessment was collected. Assessment reports were reviewed to determine which method was used by the clinician in their formulation, and diagnostic methods were categorized using Proctor and Prevatt’s (2003) four categories, along with RTI.

Incidence, Comorbidities, and Mechanisms

Based upon the 2003 National Survey of Children’s Health, the estimated lifetime prevalence of learning disabilities amongst children in the United States was estimated to be 9.7% (Altarac & Saroha, 2007). Because learning disorders may occur comorbidly with many other neurodevelopmental and neurological conditions, it is important to also consider the prevalence based upon risk status. Among typically developing children in the U.S., Altarac and Saroha (2007) estimated the prevalence to be at 5.4%. Among children with “special health care needs,” those requiring supplemental services for physical, emotional, behavioral, or developmental concerns, estimated prevalence was 27.8% (Altarac & Saroha, 2007).

Among children diagnosed with learning disorders in the United States, two-thirds are male, and Black as well as Hispanic children tend to be overrepresented (Cortiella & Horowitz, 2014). Notably, however, these racial diagnostic discrepancies in learning disorders are not found in U.S. Census survey data, which finds no significant differences in learning disorder rates among Black, White, and Hispanic individuals. This may indicate bias in the school-based diagnostic or identification process (Cortiella & Horowitz, 2014). Other demographic factors associated with higher prevalence of learning disorder diagnosis in U.S. children included lower socioeconomic factors such as living in poverty, living in a household where adults experienced long-term unemployment, and living in a household with adults with lower than average education levels (Altarac & Saroha, 2007). Higher than typical incidence of learning disorders has also been found in children with birth or perinatal complications, including significantly preterm birth, very low birth weight, and multiple early exposures to anesthesia (Aarnoudse-Moens, Weisglas-Kuperus, van Goudoever, & Oosterlaan, 2009; Wilder et al., 2009).

Regarding the diagnosis of learning disorders globally, it was long believed that LD rates for reading disorders would be correlated with orthographic and linguistic factors, particularly consistency between symbols and their pronunciations and whether symbols are alphabetic or nonalphabetic (Morrison & Manis, 1982; Stevenson, Stigler, Lucker, Lee, & Hsu, 1982). However, this assumption was refuted by a key study by Stevenson et al. (1982) in which a similar reading test was given to children in English, Japanese, and Chinese and evidence of reading disorders were observed in all language groups.

Although the study by Altrac and Saroha (2007) utilized data from a large, nationally-representative sample of over 100,000 U.S. children (ages 3 to 17) to make lifetime prevalence estimates, it is important to note that the authors emphasized that their conclusions were limited by a lack of details regarding how the diagnoses were made, the sort of clinician or provider assessing (i.e., teacher, health professional, psychologist), the specific learning disorder diagnosis given (i.e., math, written expression, etc.), and diagnosis severity. This prevalence data is also limited in that it focuses on incidence of diagnosis within children. Although learning disorders are typically diagnosed by mid-adolescence, it is not unheard of for individuals to fail to be diagnosed until adulthood (Altarac & Saroha, 2007). A 2012 online survey by the National Center for Learning Disabilities (NCLD) found that 12% of adults sampled reported having a learning disability diagnosis (Cortiella & Horowitz, 2014), and 8% of the entire sample also reported having a child with a learning disability.

Interestingly, data from the IDEA Part B Child Count suggest a recent trend toward a decline in the number of students receiving special education services related to learning disorders, with some states (e.g., Texas, Montana, and Idaho) having as high as a 25 to 46% reduction in the number of students being identified as having learning disorders since 2006 (Cortiella & Horowitz, 2014). The use of response to intervention, as both a diagnostic framework and intervention strategy, has been proposed as one of the leading causes for this shift in the data (Cortiella & Horowitz, 2014). The question remains whether this shift represents a more or less accurate picture of the prevalence of true specific learning disorders, or instead, a concerning trend to not identify learning disorders in an effort to reduce education spending. Ultimately, understanding learning disorders and how best to define them depends, in part, on understanding their long-term impact on adult outcomes, a key goal of the present study.

As previously noted, specific learning disorders have significant comorbidity with several other conditions. Among the most common comorbidities are having multiple types of specific learning disorders (i.e., both a reading and math disorder), attention deficit hyperactivity disorder

(ADHD), and speech or motor disorders. Regarding comorbidities between specific learning disorders, an estimated two-thirds of children with math disorders may also meet criteria for reading disorders (Ashkenazi, Black, & Abrams, 2013). An Italian study of 448 children, ages 7 to 16 years, clinically diagnosed with learning disorders found that 62.2% of the sample also met *DSM-IV-TR* criteria for one or more psychopathologies, in addition to a specific learning disorder (SLD) or Learning Disorder Not Otherwise Specified (NOS) (Margari et al., 2013). No statistically significant differences were found in total rate of comorbidities between the SLD and NOS groups; however, comorbidities were analyzed within each group due to the dearth of research comparing these two diagnostic categories. ADHD was present in 33.3% of the SLD sample and 25.4% of the NOS sample. Language disorders were present in 11% of the SLD sample and 28.6% of the NOS sample. Developmental Coordination Disorder was present in 17.8% of the SLD sample and 27.5% of the NOS sample. Anxiety disorders were present in 28.8% of the SLD sample and 16.4% of the NOS sample. Mood disorders criteria were met by 9.4% of the SLD sample and 2.1% of the NOS sample. Given these comorbidities, the present study also included information, derived from assessment records and follow-up interview, regarding all other psychological diagnoses. The potential impact of these diagnoses was explored.

Various explanations for the neuropsychopathological comorbidities with learning disorders have been hypothesized, although the results of few studies have been successfully replicated (Margari et al., 2013). Studies focusing on comorbidities associated with reading disorders have been a particular focus in the literature. One popular hypothesis for comorbidities involves theories of similar neurobiological underpinnings between specific learning disorders and their comorbidities, particularly learning disorders and ADHD (Ashkenazi et al., 2013; Willcutt, Pennington, & DeFries, 2000). A landmark twin study by Willicut et al. (2000) found, through behavior genetic analyses, support for common genetic influences between inattentive ADHD symptoms and reading disorder. However, a significant genetic relationship was not found for reading disorder and hyperactive symptoms.

Another popular hypothesis for comorbidities of learning disorders with psychiatric disorders focuses on the long-term emotional impact of learning difficulties. Learning disorders have been fairly consistently associated with higher levels of anxiety amongst students with LD, as compared to their non-LD peers (Nelson & Harwood, 2010). So-called *secondary reaction* theories postulate that emotional and behavioral difficulties, such as chronic anxiety and inattention, develop as a result of continued exposure to a stressful educational environment due to performance difficulties (Nelson & Harwood, 2010). However, the opposite directional relationship, in which higher baseline individual anxiety leads to or exacerbates learning difficulties is also possible (Nelson & Harwood, 2010). Nelson and Harwood (2010) emphasize the need for more research to be conducted exploring protective factors, those that reduce anxiety and promote well-being for students with LD to guide future interventions. They also note that, too often, the primary focus of interventions for individuals with LD tend to focus solely on educational needs and outcomes, rather than addressing emotional needs. For these reasons, the present study examined the presence, manifestation, and relative difficulties associated with learning problems and emotional concerns, particularly anxiety problems. Specifically, exploratory analyses examined whether the combination of anxiety and learning problems predicts adult outcomes.

Assessment of LD

As previously noted, the criteria used for arriving at an LD diagnosis are highly variable by state, agency, and individual clinician. Nonetheless, the general steps and assessment procedures following a referral for a comprehensive psychoeducational or neuropsychological evaluation are often quite similar. The comprehensive evaluation process generally consists of obtaining a medical, developmental, educational, and psychosocial history of the individual being evaluated, administration of standardized paper-and-pencil and/or computer-based cognitive measures and procedurally-based testing by trained personnel, classroom observation of the individual (for children), and integration of these data into a written report (which is often called an evaluation). This evaluation is then used by the individual, family, state, and educational environment to make decisions regarding eligibility for services and a possible individualized educational program (IEP). In an effort to standardize and empirically examine the various learning disability definitions, this study utilized trained undergraduate coders to reliably establish the Proctor and Prevatt-based (2003) definitions that each participants' data fit (e.g., intraindividual, underachievement model), regardless of the formal diagnosis provided by the individual clinician and supervisor of the assessment.

Prior to adulthood, learning disability assessments are often administered by school psychologists. However, neuropsychologists also have been involved in these assessments, especially in adulthood, to obtain a better understanding of the examinee's global cognitive functioning (Hiscock & Hiscock, 1991; Pennington, 2008; Silver et al., 2006). Silver et al. (2006) believe that a comprehensive neuropsychological evaluation offers the ability to extend beyond the question of "what" difficulties the child is experiencing to "why" these difficulties are occurring, as well as explore possible neurological concerns. Regardless, any assessment process, whether completed by neuropsychologists or other psychologists, must focus on convergent and discriminant validity testing for a hypothesis of a specific learning disability - exploring the ways in which the examinee’s performance on testing is consistent or inconsistent with a possible specific learning disorder diagnosis or diagnoses.

Most typically, those undergoing testing are still in the educational environment and particular tests may be required by a state, school district, agency, or university (Frankenberger & Fronzaglio, 2016; Weis, Sykes, & Unadkat, 2012). A survey of assessment service providers to college students found that the most common types of measures administered during assessments for specific learning disorders included intelligence and academic achievement measures (Ofiesh & McAfee, 2000). Less routinely administered tests included measures of social-emotional functioning (e.g., MMPI), foreign language learning measures (e.g., Modern Language Aptitude Test), and study skills measures (e.g., LASSI). Finally, a minority of respondents (19%) also assessed adaptive behavior and self-sufficiency as part of their assessment batteries, typically in the form of an unstructured interview. Overwhelmingly, the most commonly used measures of intelligence, at the time of the study, were the Wechsler Adult Intelligence Scale-Revised (Wechsler, 1981) and the Woodcock Johnson-Revised (Tests of Cognitive Ability (Woodcock & Johnson, 1989) In regard to testing academic achievement, the WJ-R Tests of Achievement were used by over half of the survey respondents. Ofiesh and McAfee (2000) also surveyed assessment providers regarding their perceptions of the utility of current assessment measures in making decisions about student eligibility for services and service delivery. The researchers emphasized that, although the assessment measures and diagnostic process used in post-secondary adults were very similar to those used for primary and secondary school students, those conducting assessments with adults often lack “intimate knowledge of the student’s functioning on a daily basis” (Ofiesh and McAfee, 2000, p. 19). Thus, to better address the unique needs of adults with learning disorder, they emphasized that interventions for this population need to move beyond those focused on basic academic skill acquisition and instead move to those emphasizing independence and self-advocacy. These remarks by Ofiesh and McAfee (2000) allude to a need for increased recognition of changing needs as individuals with learning disorders move into adulthood, particularly in regard to psychosocial and emotional supports. Thus, a focus of the present study was also to examine assessment recommendation type, compliance, satisfaction, and how these factors may be associated with outcomes at follow-up.

Further research is especially needed regarding the relationship between assessment recommendations, particularly those recommendations aimed at recruiting psychosocial and emotional supports, and outcomes for adults with learning disorders. Previous research conducted within the Wayne State Psychology Clinic has examined barriers to recommendation adherence by families within the context of child assessments (Mucka et al., 2016), but not in relation to subsequent outcomes. Additionally, given the lack of agreement amongst diagnostic methods and instruments utilized by clinicians, there is a notable lack of studies that take these factors into account.

Outcomes in Adults with LD

In the early 1990's, with the matriculation of the first generation of students under IDEA regulation into adulthood and post-secondary education, research began to emerge looking at the impact of learning disabilities in adulthood. Prior to this time, studies regarding outcomes for individuals with learning disabilities were largely cross-sectional and focused on interventions with children (Raskind, Goldberg, & Higgins, 1999a). As these children aged out of the K-12 environment, however, there began to be questions about what outcomes could be expected and how to improve outcomes for adults with learning disabilities. Although some researchers argued that students with learning disabilities who were less well-adjusted and "successful" might be "late bloomers" (Spekman, Goldberg, & Herman, 1992) or that learning disabilities were outgrown or did not continue to play a significant role in adult milestones (Rogan & Hartman, 1990), others emphasized that the difficulties in adjustment and relative success exhibited by many with learning disabilities continued into adulthood and were more stable over time than previously recognized (Raskind, Goldberg, & Higgins, 1999a). The results of key studies, in regards to educational/cognitive, occupational, and psychosocial outcomes for adults with LD, are reviewed below.

Educational and Cognitive

Many early follow-up studies of adults with learning disabilities were completed in the context of individuals who attended specialized schools or educational programs for children with LD (Goldberg, Higgins, Raskind, & Herman, 2003; Haring, Lovett, & Smith, 2016; Raskind, Goldberg, & Higgins, 1999b; Rogan & Hartman, 1976; Rogan & Hartman, 1990; Spekman et al., 1992). The earliest of these studies were conducted by Dr. Laura Lehtinen Rogan, who, in 1947, co-founded The Cove School in Illinois, which was the first school in the U.S. specifically for children with learning disabilities. Follow-up studies with smaller samples of adults who attended The Cove School as children were conducted to examine the potential impact of specialized childhood education on outcomes in adults with LD and to fill-in significant gaps in knowledge, at the time, regarding the lives of adults with LD. An initial follow-up was conducted with 91 former students (Rogan, 1976), and a secondary follow-up was published in 1990 (Rogan & Hartman, 1990). Comprehensive initial follow-up included interviews, cognitive and psychological testing, and questionnaires. The secondary follow-up study was conducted primarily through surveys and telephone interview. At the time of the secondary follow-up study, participants were 30 to 40 years old. Regarding educational outcomes, at initial follow-up Rogan and Hartman (1976) found that 69% of their sample completed high school, 36% completed college, 16% were currently enrolled in college, and 8% had completed or were currently enrolled in graduate programs. Cognitively, Wechsler Adult Intelligence Scale (WAIS) IQ scores were found to be in the average range across the sample, with discrepancies observed between Verbal and Performance IQ. The most typical cognitive domains of difficulty noted were reading, spelling, and math. Notably, individuals in the sample who dropped out of high school were excluded from much of the analysis and nearly all former students in the study were Caucasian and from families with middle and high socioeconomic status (SES). In the 1990 secondary follow-up study, although it was noted that reading, spelling, and math continued to be challenges for the former students, it was concluded that early detection and intense educational remediation of LD symptoms was effective in reducing the impact of LD on former students to the point that it was “no longer the dominant feature of their adult lives” (Rogan & Hartman, 1990).

Other follow-up studies with students who attended other specialized educational environments for learning disabilities typically have not found such positive outcomes as those found among adults who attended The Cove School as children. For example, post-secondary outcomes amongst a sample of 64 ethnically diverse students from specialized LD programs in New Mexico found that none of the students in the random sample went on to 2 or 4-year college programs, although 35% did attend non-degree vocational or educational training programs (Haring et al., 2016).

Raskind et al. (1999) published a 20-year follow-up study of adults who attended the Frostig Center, a non-profit school for children with learning disorders. Adult participants in the study were dichotomized as “successful” or “unsuccessful” at 10 and 20-year follow-ups based on ratings of their performance in six domains - employment, education, independence, family relationships, community relations/interests, and crime/substance abuse. Physical and psychological health outcomes were also explored. Participants in the study ranged from 18 to 25 years old at the time of the 10-year follow-up. Notably, researchers in the Frostig study uniquely had access to childhood cognitive testing data from the center as well as adult data from measures administered during the study. Overall, they noted that into adulthood, participants continued to exhibit academic achievement scores lower than would be expected based upon their educational exposure, although they generally continued to improve slowly in basic reading and math abilities through the 20-year follow-up (Goldberg et al., 2003; Raskind, Goldberg, & Higgins, 1999a).

Other research has focused on transitioning young adults with LD to post-secondary education. This focus is especially relevant as ‘transition planning’ was amended, in 2004, to IDEA, requiring secondary transition planning in older children’s IEPs (*Individuals with Disabilities Education Act*, 2004). Shifting focus onto long-term, adult outcomes in individuals with LD, the updated regulation language emphasizes that the goal of education is to “prepare (students) for further education, employment, and independent living" (Section 300.1).

To better understand the needs of educationally transitioning teens and young adults, the U.S. Department of Education commissioned the National Longitudinal Transition Study-2 (NLTS-2) in 2001. This large study followed more than 11,000 youth, ages 13 to 16 years old, with and without disabilities of various sorts, for approximately 10 years. The study found that two-thirds of students with LD received or participated in transition planning of some sort by age 14 (Cameto, 2004). Per the report, this transition planning tended to focus on post-secondary education and employment.

Since the increased emphasis on transition planning, there appears to have been increased participation of students with LD in post-secondary education. From 1990 to 2005, post-secondary education enrollment increased by 18% for students with LD (Cortiella & Horowitz, 2014). Based upon 2011 NLTS-2 data, approximately 67% of students with LD attend postsecondary education of some sort. Within this 67%, half of the young adults with LD attended two-year college, 36% attended vocational or technical programs, and 21% attended four-year college **(**Cortiella & Horowitz, 2014). Notably, the four-year college attendance rate for adults with LD was still found to be half that of young adults without LD. However, the enrollment rates for students with LD in two-year colleges and vocational/technical schools was actually higher than for those young adults without LDs.

Despite increased attendance in post-secondary education, college completion rates for young adults with LD continue to fall behind those of their non-LD peers (Cortiella & Horowitz, 2014). Additionally, only 17% of students with a previously diagnosed LD receive academic accommodations in post-secondary education. A *New York Times* article from 1995 discussed the difficulties experienced by college students with learning disabilities and some of the growing support options available on university campuses (Lewin, 1995). In a particularly poignant quote, one student states, “accepting that you’re learning-disabled and being able to tell people about it, is a little like coming out of the closet about being gay.” This student goes on to discuss how, despite being diagnosed in the first grade, he feels uncomfortable disclosing his learning disability diagnosis to others due to his concerns regarding the attributions and assumptions of others. The interviewed student’s reticence is understandable given the unfortunate hostility that can be exhibited within university environments regarding making accommodations for students with learning disorders, as evidenced by a particularly concerning example in which a Boston University professor’s refusal to accommodate students with learning disorders led to a class action lawsuit (Blanck, 1998; Lewin, 1997). Preliminary research suggests that those students who accept and come to terms with their LD diagnosis are more likely to obtain and benefit from help and to have better outcomes than students who reject their LD diagnosis (Higgins, Raskind, Goldberg, & Herman, 2016; Nalavany, Carawan, & Rennick, 2011; Stack-Cutler & Parrila, 2015). In many ways, parallels can be drawn between this understanding and acceptance of LD and the health psychology literature surrounding engagement in health protective behavior (e.g., routine exercise, taking medication as prescribed) (Weinstein, 1993). Given the potential relevance of acceptance of LD diagnosis, the present study examined evidence in follow-up interviews that the participant was accepting of their LD diagnosis and identified with its implications, to see whether these individuals had more positive outcomes than those who do not.

In a review of research regarding college students with LD, Sparks and Lovett (2009) noted several methodological issues that pose a barrier to better understanding the needs of college students with LD. They argued that many study findings were inconclusive, in part, because of significant variability in how students were initially diagnosed and how LD was defined by researchers, resulting in questions about diagnostic uniformity and lack of similarity in regards to cognitive features and profiles within the LD population (Sparks & Lovett, 2009). Other researchers have also emphasized the threat to validity that lack of agreement about diagnosis of LD poses in research with college-educated adults with LD (Weis et al., 2012; Weis, Erickson, & Till, 2016). This study addressed some of these concerns through direct follow-up with students regarding changes in their educational status, degree completion, and collecting information regarding the type(s) of educational program(s) attended, while also examining the relationships between these factors, as well as diagnostic and other outcome factors.

Occupational

Given the well-established relationship between educational attainment and employment outcomes (Ashenfelter & Ham, 1979; Day & Newburger, 2002), it is not surprising that many studies have found that adults with LD experience higher rates of unemployment and underemployment than their peers. In the seminal 1976 follow-up study by Rogan and Hartman, 60% of the sample of adults who were former students of The Cove School was found to be employed at the time of follow-up. By comparison, the overall, U.S. adult unemployment rate in 1976 was reported as 7.7% (Statistics, 1988). Although Rogan and Hartman generally concluded that the former students were successful in “maintaining their adult lives in the workplace,” (Rogan & Hartman, 1990) the rate of unemployment amongst their sample certainly appears to be significantly higher than that of the general population, particularly given that a large portion of their sample attended higher education and came from higher SES families of origin.

A later study involving a sample of adults with LD, also from higher SES families of origin, further explored occupational and SES trends (Raskind et al., 1999). They found that, despite most of their adult participants with LD originating from upper middle to upper class households, few of these adults were able to obtain a similar SES level to that of their parents at 20-year follow-up (Raskind et al., 1999). Across the sample, 47% were unemployed at the 10-year follow-up and 41% unemployed at the 20-year follow-up. Notably, the majority of individuals employed at the 10-year time point were engaged in part-time work, but, in many cases, appear to have successfully transitioned to full-time employment by the 20-year follow-up.

Unlike educational outcomes, which have shown improvements in recent years, unemployment for individuals with LD appears to be a worsening problem, with a 9% increase observed in the rate of unemployment in adults with LD since 2005 (Cortiella & Horowitz, 2014). In the 2014 report produced by the National Center for Learning Disabilities, it was noted that nearly half of individuals with LD no longer considered themselves as in the labor market despite being unemployed (Cortiella & Horowitz, 2014). A large portion of this figure may represent those adults with LD who have essentially become frustrated by seeking employment and no longer actively engage in doing so. Although individuals with LD often seek vocational assistance from agencies and training programs, evidence indicates that those who are employed are often underemployed, with 67% earning less than $25,000 per year (Cortiella & Horowitz, 2014).

Among those with LD who are successful in obtaining higher education and employment, employment issues often continue to arise, although rates of unemployment appear to be lower. A survey of over 2100 college graduates with LD found that 75% of these individuals were employed full-time, most with full benefits (Madaus, 2006). However, amongst this sample, nearly 73% acknowledged that their learning disability had an impact on their performance at work. The most typical areas of impact were writing (50.6%), rate of processing speed (42.5%), and reading comprehension (35.6%). Twenty-seven percent of employed college graduates with LD reported that their work was impacted by difficulties with mathematical computation. Regarding self-disclosure of learning disability status to an employer, 45.4% of the study sample indicated that they had never done so. Notably, 19.7% of those who did disclose their learning disability status to their employer reported experiencing negative effects after doing so. Despite not typically seeking formal workplace accommodations, the majority of those surveyed engaged in self-accommodations, such as arriving to work early or staying late and using time management strategies to improve their work performance.

In our technologically-advanced world, the importance of mathematical competency in employment has emerged as a theme in research examining the causes of unemployment for adults with LD. Difficulties in mathematical skills were found to be associated with relatively higher rates of unemployment and underemployment within individuals with LD (Geary, 2004; 2011; Parsons & Bynner, 1997). The relationship between unemployment and low mathematical skills appears to be particularly strong for adult women with LD (Geary, 2011; Parsons & Bynner, 1997). With these factors in mind, the present study examined SES and employment outcomes at follow-up, including salary, work hours, type of work (i.e., skilled, unskilled) and access to employment benefits (i.e., health insurance, vacation time). Type of work was classified using an adaptation to the British Registrar-General's Social Classification system, a graded hierarchy of occupations based upon level of skill and social status associated with different sorts of employment (Bland, 1979; Stewart & Burgard, 2003; Szreter, 1984). The original system was adapted in this study to include a category for full-time students. Additionally, qualitative information regarding labor force dropout and participation in vocational training was obtained during the follow-up interview. Additional analysis explored the possible differential impact of LD subtype, particularly math LD, on occupational attainment.

Psychosocial

The relationship between LD and increased emotional distress has been well-established by research. Amongst children, specific learning disorders, particularly reading disorders, have been correlated significantly with higher rates of externalizing behaviors and anxiety (Carroll, Maughan, Goodman, & Meltzer, 2005). Additionally, amongst adults, high rates of learning disorders have been noted, both in the United States and internationally, within prison populations

(T. Einat & Einat, 2007; Wolf, 2003). For example, a survey of U.S. state and federal prison inmates found that 66% of those surveyed had a learning disorder (Wolf, 2003).

In a meta-analysis of 58 studies, students with LD were found to have overall significantly higher (d=.61) levels of anxiety than their non-LD peers (Nelson & Harwood, 2010). Among adult students in higher education with various types of specific learning disabilities, students with dyslexia have been found to have relatively higher state anxiety, academic anxiety, and social anxiety (Carroll & Iles, 2006). A study examining the MMPI-2 profiles of adults with LD also found that LD status was associated with a response style consistent with increased anxious symptomatology, as well as evidence of higher short- and long-term stress (Gregg, Hoy, King, Moreland, & Jagota, 2016). Participants in the study responded to MMPI items in a manner often indicative of feelings of fear, low self-confidence, and high self-doubt and self-criticism. The authors emphasized that these personality and interpersonal styles may contribute to reduced long-term psychological well-being and social difficulties. Thus, as previously noted, examining whether different combinations of anxiety and learning problems predict adult outcomes was a key aim of this study. Generally, anxiety was hypothesized to be associated negatively with adult outcomes.

Nelson and Harwood (2011) outlined three hypothetical pathways for the relationship between LD and anxiety. The first is that anxiety develops secondary to childhood academic difficulties and the stress of long-term exposure to educational demands in the K-12 environment. The second is directionally opposite in that it proposes that learning disorders are the result of educational anxiety. The third theory proposes that anxiety and LD may co-occur due to a common neurocognitive etiology.

In regards to adult relationship functioning, many studies are less specific about outcomes in this highly relevant area. The early adult follow-up study by Rogan and Hartman (1976) provides limited details about psychosocial functioning, noting that 55% of the adult participants lived independently of their parents and that 15% of the sample was married. In regards to criminality, Rogan and Hartman (1976) report that 6% of the sample had been involved in adult offenses.

Upon secondary follow-up by Rogan and Dumas (1990), it was also noted that 75% of the college-educated subsample and 62% of the high school-educated sample had attended psychotherapy at some point (Rogan & Hartman, 1990). When analyzed by educational attainment, college graduates were found to have somewhat higher reported life satisfaction (68% satisfied) than those who did not graduate college (58% satisfied). The authors emphasized that psychotherapy attendance as well as continued family support in making more challenging life decisions (i.e., major purchases) likely play a significant role in adult outcomes for individuals with LD.

Another key, but often under-analyzed area of adult functioning is social engagement. A review of 32 studies regarding adults with learning disabilities found that less than 5% of studies examined community/civic engagement and social life (Sharfi & Rosenblum, 2014). The authors noted that the results of the available studies were highly inconsistent. For example, one study included in the review found no differences in involvement in crime and receipt of public aid between those with and without LD (Seo, Abbott, & Hawkins, 2008), while another found that LD status was predictive of length of homelessness, as well as physical health and substance use problems (Patterson, Moniruzzaman, Frankish, & Somers, 2012). Related to overall health, the role of learning disability status in physical health and health literacy is an emerging area of research (Rosoff, 2016). In the present study, qualitative data regarding health outcomes and barriers to engagement in health behaviors, such as assessment recommendation adherence and psychotherapy participation, were analyzed.

Summary and Purpose

With the exception of the few studies reviewed, previous literature has largely focused on psychosocial and family difficulties experienced by children with specific learning disorders, with limited follow-up studies available for adults. Even amongst the adult learning disorder outcome studies, students engaged in higher education are often excluded or underrepresented (Madaus, 2006; Sparks & Lovett, 2009; Weis et al., 2016). Furthermore, as noted by other researchers, follow-up studies with individuals with learning disorders have been plagued by methodological concerns that reduce the utility and generalizability of results produced. These methodological and research design concerns include inconsistency regarding the criteria for learning disability diagnosis, small sample sizes, lack of ethnic, educational, and socioeconomic diversity in study samples, and lack of a relevant comparison group for analysis. Additionally, studies have also often failed to examine psychological and social outcomes as perceived by the individuals with LD.

The present study sought to address these methodological concerns in several ways. All clinical assessment records from 2011 to 2016 were reviewed to identify eligible participants, with and without learning disorders diagnosed at assessment. Importantly, the diagnostic decision method for each participant (e.g., ability-achievement discrepancy) was coded for analysis, based upon assessment report review. Additionally, demographic and assessment-related variables were collected and compared between those participants diagnosed with LDs at assessment and those who were deemed not to meet diagnostic criteria at the time of assessment. Participants were contacted via telephone for a follow-up interview regarding their current occupational, emotional, health and educational functioning. This data was used to investigate the extent to which a diverse group of clinically-assessed *post-secondary educated* adults with learning disorders experienced differential socioeconomic, health, and psychosocial outcomes as compared to others with educational difficulties but without learning disorders. This study also sought to gain a better understanding of the specific clinician recommendations, community resources, and individual perceptions that may have promoted improved outcomes. Additionally, differential outcomes by type of specific learning disorder (i.e., reading, mathematics, written expression) were explored.

CHAPTER 2

METHOD

Participants

Participants were seventy-seven adults who received psychoeducational assessments between the years of 2011 and 2016, inclusive, within the Wayne State Psychology Clinic due to expressed concerns regarding a possible specific learning disorder. A sample size of 110 participants was initially proposed for the study, however, a significant number of these individuals who were found to have completed assessments to assess for learning difficulties did not meet study criteria in that their overall intellectual ability scores fell below the low average range. For those individuals meeting study inclusion criteria, both individuals who *were* diagnosed with a specific learning disorder (*n* = 47) as well as those who *were not* (*n* = 30) diagnosed, at the time of their assessment, were included. Participants not diagnosed with LDs at the time of assessment often did not meet criteria for any psychiatric condition. Those without LDs who were diagnosed with psychiatric conditions received diagnoses such as anxiety disorders, mood disorders, or attention deficit disorder (ADD). At the time of their assessments at the clinic, all participants were provided information regarding the nature of the Wayne State Psychology Clinic as a research and training setting, within their signed consent for services form. The assessment consent form also indicated that de-identified, aggregated client data may be used for research. Additionally, at the time of their assessment, participants also completed a form providing preferred contact information for follow-up, via telephone and/or mail, after receipt of clinical services. Eligible participants were contacted by telephone at the number they previously provided and offered an opportunity to participate by completing a telephone follow-up interview for the purpose of this study. Follow-up interviews were conducted from August 2018 to May 2019.

Inclusion criteria specified that all participants were English-speaking individuals and were between the ages of 18 and 70 years old at the time of their initial assessment. They must also have been able to provide informed consent individually at the time of the present study and have been initially referred for an assessment (by any source) due to concerns regarding a possible learning disorder or general academic difficulties. At the time of their clinic visit, participants must also have completed assessments that included intellectual ability and achievement measures, with a minimal estimated overall intellectual ability score in the low average range (FSIQ or GIA standard score (SS) of 80). Exclusion criteria included: (a) non-English speaking; (b) a known history of acquired brain injury (i.e., stroke or traumatic brain injury); and (c) cognitive or perceptual deficits sufficiently severe to undermine valid participation. All follow-up study participants were provided a $10 Amazon.com gift code as reimbursement for their time. Participants were alternatively offered a $10 cash reimbursement, although no participant selected this option.

Table 1 presents participant demographics for the total study sample (*n* = 77), along with group demographics for those participants who *were* diagnosed with a specific learning disorder (LD *n* = 47) and those who *were not* (No LD *n* = 30) diagnosed at the time of their clinic assessment. Table 2 presents participant demographics for participants who completed the telephone follow-up (*n* = 15; LD *n* = 10, No LD *n* = 5). Within the full study sample, the majority of participants were women (58%) and identified as White (57%). Average participant age was 30.5 years (*SD* = 10.0). Consistent with a primarily college-attending sample (76.6%), average years of formal education at initial assessment was 13.8 (*SD* = 1.9). At the time of assessment, the majority of the total sample reported an annual income of less than or equal to $10,000 (70%). Statistically significant between group differences (diagnosed LD vs No LD) were not observed in regards to ethnicity, gender, level of education, age or income at assessment (p>.05).

Measures

Demographic information regarding participants, previous diagnoses, and the results of their previous assessments were obtained through review of existing clinic files. Follow-up data was collected via a telephone interview. The telephone interview consisted of background questions regarding the participant's recollection of diagnoses and recommendations made by WSU Psychology Clinic clinicians following their assessment as well as the utility of these recommendations, along with questions regarding the participant's current psychosocial (i.e., employment, education, housing, and social activities) functioning and health. Psychosocial functioning was also assessed using a brief measure of well-being, the Satisfaction with Life Scale (Diener, Emmons, Larsen, & Griffin, 2010). Details regarding measures follow below.

Demographic characteristics

Demographic characteristics included in this study are (a) age, (b) gender, (c) ethnicity, (d) educational attainment at the time of assessment and at follow-up, (e) marital status, (f) parental status, (g) income at the time of assessment and at follow-up, (h) occupation at the time of assessment and at follow-up, and (i) history of previous psychological diagnoses. As previously noted, selected demographic characteristics for the full sample (Table 1) and follow-up sample (Table 2) of participants are provided in Appendix A.

Assessment-related characteristics

Assessments were conducted by student clinicians in training, with supervision provided by fully-licensed doctoral level psychologists. Nine different clinical supervisors were represented in the full sample. Psychoeducational assessment-related characteristics included in this study were: (a) reason for referral, (b) referral source, (c) date of initial intake, (d) date of first appointment, (e) date of feedback, (f) assessment fee, (g) distance traveled to assessment, (h), diagnostic method used (e.g., achievement-ability discrepancy), and (i) assessment supervising clinician.

Diagnostic method used, a variable of particular interest, was coded by one of three trained coders. A rubric, largely based upon the definitions of various diagnostic approaches provided by Proctor and Prevatt (2003), was created to guide coding and each coder completed and discussed initial training cases prior to beginning. Unusual or unclear cases were coded individually by all of the three coders and then discussed so that a consensus could be reached.

Predictors

Given that variability exists across participants and clinicians regarding the assessment measures used for evaluation, psychometric measures for analysis were selected primarily on the basis of similarity in measured construct. Predictors include standard scores (SS) derived for the following cognitive tests: Woodcock-Johnson III Tests of Achievement (WJ-Ach III) and Tests of Cognitive Abilities (WJ-Cog III), Woodcock-Johnson IV Tests of Achievement (WJ-Ach IV) and Tests of Cognitive Abilities (WJ-Cog IV), Wechsler Adult Intelligence Scale – Fourth Edition (WAIS-IV), Wechsler Individual Achievement Test – Third Edition (WIAT-III), Wechsler Abbreviated Scale of Intelligence (WASI), Wechsler Abbreviated Scale of Intelligence – Second Edition (WASI-II), and Kaufman Brief Intelligence Test – Second Edition (KBIT-2) (A. S. Kaufman & Kaufman, 2004; *Wechsler Individual Achievement Test - Third Edition (WIAT-III)*, 2009; Wechsler, 1999; 2008; 2011; Woodcock et al., 2001; *Woodcock-Johnson IV (WJ IV)*, 2014). Cognitive predictors were selected to measure constructs similarly across measures. The predictors selected measure overall intellectual abilities (i.e., FSIQ, GIA) and overall achievement (i.e., WIAT Overall Achievement, WJ-Ach Total Achievement), as well as overall verbal abilities (i.e., WAIS VCI, WJ-Cog Verbal ability cluster), nonverbal abilities (i.e., WAIS PRI, WJ-Cog Visuospatial thinking), processing speed (i.e., WAIS PSI, WJ-Cog Processing speed), reading achievement (i.e., WIAT Total reading, WJ-Ach Broad reading), math achievement (i.e., WIAT Composite Math, WJ-Ach Broad Math), and writing achievement (i.e., WIAT Written Language Composite, WJ-Ach Broad Written Language). Descriptive statistics for cognitive-related variables within the study sample are provided in Table 3.

At the time of the telephone interview, recommendation adherence and participant perceptions regarding their diagnoses and learning difficulties was discussed. Of particular focus was the participant’s perceptions regarding the severity of their learning difficulties and likelihood of future problems due to learning difficulties, given that these factors may play a role in engagement in health protective behaviors, such as compliance with assessment recommendations (Weinstein, 1993). Based on responses to the follow-up interview, participants diagnosed with a learning disorder at the time of assessment were categorized as “enlightened” regarding their LD diagnosis or “unenlightened.” Individuals were categorized as enlightened regarding their diagnosis if they perceived their diagnosis as having a long-term impact and/or reported attending psychotherapy or engaging in self-study (i.e., reading books, visiting websites) regarding their learning disorder. Other predictors included demographic and assessment-related characteristics as listed above.

Outcome measures

Follow-up outcomes were assessed via a semi-structured telephone interview, conducted with each participant who responded to a telephone call and consented to participation. The interview consisted of follow-up questions regarding the participant’s current psychosocial and health functioning (i.e., employment, education, housing, and social activities). Psychosocial functioning was also assessed using a brief measure of well-being, the Satisfaction with Life Scale (Diener et al., 2010). The Satisfaction with Life Scale is a 5-item measure of subjective well-being. Total scores range from 5 (extremely dissatisfied) to 35 (extremely satisfied). The brief measure shows good convergent validity with other scales of subjective well-being and has been utilized across many age, language, and intellectual ability populations (Pavot & Diener, 1993; Proctor, Linley, & Maltby, 2009; Vázquez, Duque, & Hervás, 2013).

Design and Procedures

The study received approval from the Wayne State University Institutional Review Board (IRB) and adhered to their guidelines regarding human investigation research (see Appendix B). The study was conducted through initial review of individual clinical assessment records and a subsequent follow-up semi-structured telephone interview. All available (300 +) clinic assessment records, from 2011 to 2016, were screened for eligible participants. Demographic and assessment related data was collected for participants meeting study inclusion criteria. These eligible participants, as determined by records review, were then contacted by study personnel via telephone using the follow-up number provided at the time of their original assessment. Information regarding the study procedures was provided and participants were asked to provide oral consent via telephone, as approved by the IRB. To protect the participant's identity, the call was not recorded, and telephone interview notes did not contain the participant's name or telephone number. If the participant consented to participate, only the consent date was recorded on the interview form.

The entire telephone follow-up interview, including reading the consent form aloud to the participant, took approximately 25 minutes and was completed during a single phone call once the participant was reached and available. Unless otherwise requested by the participant, three telephone attempts were made to reach the participant for follow-up. Fifteen follow-up telephone interviews were successfully completed (19.2%) for the eligible study sample (seventy-eight individual) identified. Ten of the follow-up participants were diagnosed with a learning disorder at the time of their assessment, and five follow-up participants did not meet LD criteria at that time. The majority of eligible participants contacted did not respond to phone calls (59%). Additionally, 15.4% of telephone numbers were not in service, 3.8% were found to be the wrong telephone number, and 1.3% of those eligible declined to participate in the follow-up call. Upon contacting one participant via telephone, the individual was found not to meet study eligibility requirements due low English language proficiency, as reported by the respondent and a relative.

CHAPTER 3

STATISTICAL ANALYSIS

Prior to analysis, data were screened for violation of statistical assumptions related to the planned analyses and the analysis plan was updated as necessary. As previously noted, of those participants meeting other follow-up study criteria, one case was excluded due to information provided regarding low English language proficiency during the follow-up telephone call. Fisher's test of independence demonstrated no statistically significant differences between participants who completed follow-up and those who were unable to be reached for follow-up on demographic variables and cognitive variables, including age at assessment (p =.50), years of education at assessment (p = .65), total achievement score (p = .10), overall intellectual ability (p = .74), or LD diagnostic status (p = .77).

Planned initial analyses focused on between-group (LD vs. no LD) cognitive, diagnostic, and psychosocial differences between individuals in the sample with and without learning disorder, both at the time of the initial assessment and at follow-up. Independent sample t-tests and intercorrelations were calculated for continuous variables, while chi-square and Fisher tests of independence were conducted to examine the relationship between LD diagnostic status (LD vs no LD) and categorical variables, such as diagnostic method, employment type, and annual income group. Participant responses on ordinal assessment process related (i.e., satisfaction with assessment) and psychological well-being scales were treated as categorical data. Due to low sample size and dichotomous response options on some variables, particularly on follow-up interview questions, Fisher's exact test was also used where appropriate. In the event of missing data for a particular variable, the case was excluded from that particular analysis but included in all other analyses.

Other planned primary analyses focused on within-group comparisons between individuals across various subtypes of learning disorders (i.e., math, reading, writing). Chi-square tests of independence and Fisher exact tests were again conducted to examine the within group differences on categorical outcome variables at follow-up outcome within the LD group.

Exploratory regression analyses were planned for examining the role of demographic factors (e.g., age, sex) in predicting to outcomes for anxiety and LD diagnostic subgroups, as well as regression equations predicting subjective and overall objective quality of life indices. Additional planned exploratory analyses included examining the potential mediational role of assessment recommendation adherence. Due to low sample size, limited regression analysis of follow-up data was possible. Within the diagnosed learning disorder group, relationships between demographic factors (i.e., gender, race), health outcomes, assessment-related characteristics (i.e., diagnostic criteria used) and learning disorder subtype were explored to a limited degree due to sample size.

Qualitative analysis included thematic coding of follow-up telephone interview responses. These results provide context and depth regarding the subjective assessment and adjustment experiences of adults with learning disorders and academic difficulties.

The five primary hypotheses examined in the study were as below:

1) Consistent with the literature (Proctor & Prevatt, 2003), the most common criteria used for diagnosing learning disorders would be the simple discrepancy method, based upon FSIQ and achievement discrepancy

2) Anxiety disorders diagnosed at the time of the initial assessment and/or pre-existing anxiety disorder diagnosis *would not* contribute significantly to predicting cognitive performance on achievement measures for those *without* LD but *would* contribute significantly *to* predicting

achievement for those with LD.

3) As compared to individuals with educational difficulties but without learning disorders, post-secondary adults with learning disorders would experience poorer socioeconomic and psychosocial outcomes, including higher rates of unemployment, lower income levels, lower educational attainment, less community involvement, and lower perceived quality of life.

4) Specific learning disorder with impairment in mathematics would be associated with relatively poorer socioeconomic and psychosocial outcomes as compared to individuals with other types of leaning disorders (Rivera-Batiz, 1992).

5) Among individuals with learning disorders, socioeconomic and psychosocial outcomes would be relatively better for individuals rated as “enlightened” -- who perceive their diagnosis as having a long-term impact, report attending psychotherapy, or engage in self-study (i.e., reading books, visiting websites) regarding their learning disorder—compared with those rated as “unenlightened” regarding their LD diagnosis.

CHAPTER 4

RESULTS

Assessment and Diagnosis of Learning Disorders

Table 4 presents descriptive statistics for variables related to the timing and referral process for clinical psychoeducational assessments completed by study participants. The mean time duration from clinical telephone intake to first assessment appointment was 58.4 days (*SD* = 39.0, Mdn = 50.5). The average time duration from first assessment appointment to results feedback appointment was 82.5 days (*SD* = 39.0, Mdn = 75.0). As previously noted, participants completed assessments from 2011 to 2016, thus follow-up calls for this study occurred an average of 6.03 years (*SD* = 1.9) after the start of the participant's assessment (first assessment appointment).

Regarding clinician's interpretation of the results of the assessments, the clinicians' rationale, as indicated within each participant’s assessment report, was coded using Proctor and Prevatt’s (2003) four categories for diagnostic decision making along with the addition of RTI. Table 5 presents the results of this analysis for the total sample, as well as by group for those with and without diagnosed LDs. Across all participants (42.8%) and within each group (LD = 42.5%; no LD = 43.3%), the most commonly used diagnostic approach endorsed by clinicians was intellectual ability-achievement discrepancy. Among the entire sample, as well as those diagnosed with an LD, simple discrepancy was the second most common diagnostic framework used (25.9% and 31.9%, respectively). For those participants not diagnosed with an LD, intraindividual comparison was the second most commonly utilized approach for arriving at a diagnostic decision. Notably, no clinicians appeared to utilize RTI or underachievement models for diagnostic decision making within the sample. Additionally, approximately 1/7th of reports in the sample were coded as providing no clear rationale for clinician diagnostic decision making.

Chi-square tests of independence were performed to examine the relationships between diagnostic method and LD diagnosis, as well as diagnostic method and specific LD diagnosis type (i.e., reading disorder, math disorder, etc.). The relationship between diagnostic method and the dichotomous LD diagnosis variable (LD, no LD) was not significant, X_2 (5, N = 77) = 3.79, p =.58, with participants appearing to be equally likely to receive or not receive an LD diagnosis across diagnostic approaches. However, the relationship between diagnostic method and specific type of learning disorder diagnosed was significant X_2 (15, N = 47) = 25.99, p =.038, with diagnostic decisions more likely to have been made using ability/achievement discrepancy for those participants receiving no diagnosis.

Chi-square test of independence was performed to examine the relationship between supervising clinician and LD diagnostic status (LD, no LD). As previously noted, nine different supervising clinicians were represented in the sample, four of whom supervised only one assessment. Four supervising clinicians saw 88.2% of assessment participants in the sample, ranging from 9 to 24 individuals seen per supervising clinician within this subset of supervisors. Amongst the four most frequent supervisors, the relationship between supervising clinician and the dichotomous LD diagnosis variable (LD, no LD) was not significant, X_2 (3, N = 67) = 0.87, p =.83, with participants appearing to be equally likely to receive or not receive an LD diagnosis regardless of supervisor.

LD vs. Non-LD Group Differences

Differences in cognitive and achievement performance at the time of assessment were examined for participants with and without LD diagnoses. Figure 1 visually presents the results of regression equations produced for each group, examining the relationship between overall intellectual ability and total achievement, with the shaded area around each line representing 95%

confidence intervals. Both lines demonstrate a clear linear relationship between overall intellectual ability and total achievement. Notably, the difference in this relationship between the LD and non-LD groups is only significant at an overall ability standard score of 80 (study minimum criteria) to approximately 106. For overall ability scores above 106, there is no longer a statistically significant difference in achievement scores between the LD and non-LD groups.

The role of learning disorder diagnosis as a potential moderator in the relationship between anxiety and cognitive achievement performance was also explored. Intercorrelations between anxiety status, LD status, and cognitive variables are provided in Table 6. Learning disorder diagnosis was examined as a moderator of the relationship between anxiety and cognitive achievement test performances, while controlling for overall intellectual ability, using a moderated multiple regression analysis. Overall achievement, as well as domain specific (math, reading, written expression) achievement were examined.

Results of the multiple linear regression indicated that the full model, consisting of anxiety disorder status, learning disorder status, overall intellectual ability and the interaction between anxiety and learning disorder status, was significant in predicting overall and domain specific achievement in all areas (Overall achievement F(4, 70) = 15.52, p < .001, R_2 = .47; math achievement F(4, 71) = 18.91, p < .001, R_2 = .52; reading achievement F(4, 72) = 6.26, p < .001, R_2 = .26; writing achievement F(4, 70) = 6.93, p < .001, R_2 = .28). Individual predictors were examined and indicated that LD status and overall intellectual ability were significant predictors across the models. Main effects for the regression are provided in Table 7. Overall, having a diagnosed learning disorder was associated with a negative effect, a 7.03 to 10.56-point reduction in overall or domain specific achievement standard scores. Conversely, each one-point increase in overall intellectual ability standard score was associated with a 0.37 to 0.83-point increase in overall or domain achievement scores. Anxiety status did not significantly contribute to models for overall or domain specific achievement performances. Additionally, the interaction term for LD status and anxiety disorder status did not contribute to a statistically significant amount of variance in any model. For a more detailed understanding of the interaction between anxiety disorder status and LD status, Figure 2 provides a regression plot of the interactive effect of anxiety disorder status and LD status on total achievement. This figure demonstrates that the highest mean total achievement scores are for individuals with neither LD nor an anxiety disorder (SS = 95). Additionally, there is a statistically significant difference between the performance of individuals with no anxiety disorder, with and without LD, but not between LD and non-LD group participants with anxiety disorders.

The third major hypothesis posited that individuals in the sample diagnosed with learning disorders would experience poorer socioeconomic and psychosocial outcomes than those in the sample without LDs, when compared at follow-up. The length of time from initial assessment to follow-up telephone interview varied from approximately 2.49 to 8.14 years, with a mean of 6.42 years. As previously noted, a total of 15 follow-up interviews were completed, 10 for individuals diagnosed with LD and 5 for those who did not meet LD criteria at the time of their initial psychoeducational assessment.

Regarding employment status at follow-up, there was not a large difference in the rates of employment for follow-up participants with and without learning disorders. For those with diagnosed learning disorders, 60% were employed at follow-up while 40% were not currently employed, including one participant who indicated that they were disabled. For follow-up participants without learning disorders, employment information was not provided for one participant. Of the remaining non-LD follow-up participants, 50% were currently employed and

50% unemployed at the time of follow-up, including one participant who identified themselves as primarily a student. Regarding employment type, Fisher's exact test of independence showed that there was no significant relationship between LD status and employment level *(p* = .48). Overall, however, the largest percentage of follow-up participants with diagnosed LDs were employed at the intermediate (40%) and skilled non-manual levels (30%), while those in the non-LD group tended to be employed at slightly lower levels (50% partly skilled, 25% skilled non-manual).

Of those participants providing employment information, 55.5% of individuals with LDs and 66.7% of those without LDs indicated that their current or most recent employment was full-time. Fisher's exact test of independence demonstrated no statistically significant relationship between LD status and full versus part-time employment *(p* = 1). A relatively larger percentage of individuals without LDs (66.7%) reported having job benefits such as paid leave, retirement savings, and employer-sponsored insurance through their current or most recent job when compared to those with LDs (33.3%). Fisher's test of independence showed no statistically significant relationship between LD status and benefits status *(p* = .52).

Participants from both groups reported equivalent rates of workforce dropout at some time over the last five years (40% for both LD and no LD). Fisher's test of independence demonstrated that there was no statistically significant relationship between LD status and workforce dropout *(p* = 1). Qualitatively, in the majority of cases, participants indicated that they left the workforce so that they could pursue higher education or training (66.7%).

Income was provided by participants at follow-up and calculated as an annual income range. Some participants declined to provide information regarding their current annual income (20%), and data were missing for one participant in the sample. Of the remaining participants, the majority of participants with LDs earned less than $40,000 per year (88.9%). Follow-up income data were only available for 2 participants without learning disorders, with one participant earning \$20,000-\$30,000 and the other earning \$40,000-\$60,000. Fisher's test of independence demonstrated no statistically significant relationship between LD status and income from employment *(p* = .41). When asked about their perceptions regarding the impact of their learning difficulties on their ability to earn a living, 50% of follow-up participants with LD self-reported no impact ("not a problem"), 30% reported a "mild" impact, 10% reported a "moderate" impact, and 10% reported a "severe" impact. For those participants not diagnosed with an LD, 40% of self-reported no impact ("not a problem"), 20% reported a "mild" impact, 20% reported a "moderate" impact, and 20% reported a "severe" impact.

Regarding income from sources outside of employment, the majority of all follow-up participants denied receiving financial assistance from non-employment sources (LD = 70%, no LD = 60%). For the remaining follow-up participants, one participant from each group reported receiving financial assistance from family and friends (LD = 10%, no LD = 20%) and one participant from each group reported receiving disability payments (LD = 10%, no LD = 20%). Additionally, one participant diagnosed with an LD also reported receiving federal food assistance (LD = 10%). Fisher's test of independence demonstrated no statistically significant relationship between LD status and financial support from non-employment income sources *(p* = 1.0).

Educational attainment at follow-up was also compared for follow-up participants with and without LDs. Given the study's focus on post-secondary educated adults, data regarding years of educational were skewed; thus, a nonparametric statistical test of comparison of means was selected. A Mann-Whitney-Wilcoxon test indicated that years of education completed was significantly greater for participants without LDs as compared to those with LDs, W = 225, p < .001. However, this effect was likely largely driven by an outlier in the data in the form of a participant who completed significantly less formal education than others in the sample. At follow-up, the majority of all follow-up participants were no longer enrolled in or attending classes (73.3%; LD = 80% LD and no LD = 60%). Fisher's test of independence found no statistically significant relationship between LD status and current school attendance *(p* = .56). Two participants from each group reported current school enrollment. The majority (75%) of these participants reported current enrollment in master's degree programs. Regarding technical and job-related training, one-third of participants indicated that they had received specific technical and/or job-related training/certification. Qualitatively, types of training completed included information technology/computer certifications, landscaping certifications, medical technician training, and commercial driving licensing. Fisher's test of independence was not statistically significant for the relationship between LD status and technical/job training *(p* = .60).

Mental and physical well-being were also discussed at follow-up and outcomes compared between the LD and no LD groups. Overall current self-perceived life satisfaction was statistically evaluated using a Welch t-test of Satisfaction with Life Scale (SWL) total scores. Results indicated that there was no significant effect for LD status on SWL total scores, *t*(5.95) = -.74, *p* = .49, despite participants with LDs (*M* = 23.5) attaining higher scores on average than those without LDs (M = 19.4). Fisher's exact test of independence found no statistically significant relationship between LD status and scores on any of the five individual Satisfaction with Life Scale items *(p* = .13, *p* = .80, *p* = .15, *p* = .47, *p* = .25, respectively).

When asked about social and community engagement, 60% of all participants reported participating in some form of unpaid community groups or activities (60% LD; 60% no LD). Fisher's test of independence found no significant relationship between LD status and community engagement ((*p* = .51). Across the follow-up sample, the majority of community engagement focused on faith-based activities and organizations (77.78%). Other activities reported included sports clubs, political party participation, and community performing arts. When follow-up participants were asked about their perceptions regarding the impact of their learning/cognitive difficulties on their ability to actively engage within their communities, 70% of follow-up participants with LD self-reported no impact ("not a problem"), 20% reported a "moderate" impact, and 10% reported a "severe" impact. For those participants not diagnosed with an LD, 40% self-reported no impact ("not a problem"), 20% reported a "mild" impact, 20% reported a "moderate" impact, and 20% reported a "severe" impact.

When asked about their perceptions regarding the impact of their learning difficulties on their own ability to maintain relationships with family and friends, 50% of follow-up participants with LD self-reported no impact ("not a problem"), 30% reported a "mild" impact, and 20% reported a "moderate" impact. For those participants not diagnosed with an LD, 40% self-reported a "mild" impact and 60% reported a "moderate" impact.

At follow-up, participants endorsed having a number of chronic physical and psychological conditions, including anxiety, depression, Asperger syndrome, cerebral palsy, IBS, asthma, hypercholesterolemia, diabetes, and deep vein thrombosis. The most commonly reported conditions were anxiety and depression, with one-third of the full follow-up sample endorsing a diagnosis of clinical anxiety (60% of no LD sample; 20% of LD sample). All cases of clinical depression reported were in the LD sample (20% of LD sample). When asked about the extent to which they perceive their learning difficulties as impacting their ability to care for themselves, the majority of participants with LDs (80%) indicated that their cognitive concerns were "not a problem" in regards to self-care. One participant (10%) indicated that their learning concerns were a "mild" barrier while another (10%) indicated that they were a "moderate" problem in regards to self-care. Within the non-LD sample, most participants in the group (80%) indicated that learning/cognitive concerns were "mild" barrier to self-care, while one participant reported their concerns as a "moderate" problem (20%).

Differential Outcomes within the LD Group

Differences at follow-up within the LD group, particularly based upon learning disorder subtype (math, reading, etc.) and self-perceptions regarding their diagnoses were explored. Due to low sample size, limited statistical analysis was possible.

Given that the literature previously discussed proposes that math LD may be associated with differential outcomes, follow-up outcomes for those with math versus other types of specific LDs were compared. Amongst the follow-up sample of participant with LD, 5 participants had been diagnosed with math LDs and 5 with other subtypes, primarily reading disorders but also disorders of written expression and learning disability NOS.

Regarding employment status at follow-up, Fisher's test of independence showed that there was no significant relationship between LD subtype and employment level ($p = 1$). Fisher's test of independence also demonstrated no statistically significant relationship between LD subtype and full versus part-time employment ($p = 1$). Additionally, Fisher's test of independence also showed no statistically significant relationship between LD subtype and employment benefits status ($p = 1$). Regarding workforce dropout, Fisher's test of independence was not statistically significant for the relationship between LD subtype and workforce dropout ($p = 1$).

Based upon participant-reported follow-up income, Fisher's test of independence demonstrated found no statistically significant relationship between LD subtype and income from employment ($p = 1$). Regarding income from sources outside of employment, Fisher's test of independence demonstrated no statistically significant relationship between LD subtype and financial support from non-employment income sources (*p* = .17).

Educational attainment at follow-up was also compared for participants diagnosed with math versus other LD types. A Mann-Whitney-Wilcoxon test indicated that years of education completed was significantly greater for participants without math LDs as compared to those with math LDs, W = 100, p < .001. However, this effect was likely largely driven by an outlier in the data in the form of a participant in the math LD group who completed significantly less formal education than others in the sample. Fisher's test of independence found no statistically significant relationship between LD subtype and current school attendance (*p* = 1). Regarding, technical and job-related training, Fisher's test of independence was not statistically significant for the relationship between LD subtype and technical/job training (*p* = .52).

In regards to mental well-being, results from an independent samples t-test indicated that there was no significant effect for LD subtype, *t*(6.23) = -.04, *p* = .97, with participants with math LDs (*M* = 23.4) attaining similar scores than those with other specific LDs (M = 23.6). Fisher's exact test of independence found no statistically significant relationship between LD subtype and scores on any of the five individual Satisfaction with Life Scale items (*p* = 1, *p* = .57, *p* = .71, *p* = .19, *p* = .19, respectively). Fisher's test of independence also found no significant relationship between LD status and community engagement (*p* = 1).

Another variable explored within the LD group was the impact of "enlightenment" regarding one's diagnosis on follow-up outcomes. Unfortunately, comparisons on this variable were unable to be made due to sample size limitations. Specifically, of the 10 follow-up participants with diagnosed LDs, only one was coded as unenlightened while the other nine met criteria for enlightened.

Recommendation adherence

After completing their initial assessments, study participants were previously provided, by their assessing clinicians, with recommendations for how to maximize and improve their school/work achievement and psychosocial functioning. Follow-up interview participants were asked to recall up to five recommendations and discuss their reasons for following or not following the first three recommendations recalled. Themes that emerged from these recalled recommendations and recommendation adherence information were coded.

In the total follow-up sample, 80% of participants (n = 12) indicated that they agreed with the diagnosis or results provided by their clinician at the time of feedback. To varying extents, all follow-up participants reported finding their assessment helpful, with 46.7% indicating that the assessment was "very helpful," 33.3% stating that the assessment was "helpful," and 20% indicating that their assessment was "somewhat helpful."

Regarding follow-up study participants' recollection of recommendations, participants recalled an average of 1.73 assessment recommendations, with three of the 15 participants recalling no recommendations. The specific types of recommendations recalled by participants and the total number of these type of recommendations made to the follow-up sample are provided in Table 8. The two most common types of recommendations made were exam accommodations (n = 5), classroom accommodations (n = 3), and psychotherapy/counseling (n =3).

The majority of recalled recommendations were followed, with participants reporting attempting to follow an average of 1.58 recommendations per participant. On the occasions where recommendations were not attempted, participants indicated that they felt they did not need to utilize that particular service (50%), did not understand the recommendation (25%), or that they experienced problems with access to services due to insurance (25%). Participants generally indicated that they found attempted recommendations helpful (85.7%). However, on those occasions where participants reported that the attempted recommendation was not helpful, participants cited recommendation ineffectiveness (33%), insurance difficulties (33%), or feeling that they did not need the service any longer (33%) as reasons why the recommendation was not helpful.

CHAPTER 5

DISCUSSION

If the five primary hypotheses are supported, it would strongly suggest that adults with learning disorders represent a population with unique outcome risks and that their support needs in the post-secondary environment may extend beyond providing educational accommodations. Establishing this academically and clinically-relevant distinction could help to inform cognitive, psychosocial, and/or behavioral interventions and best practice recommendations to improve outcomes in this group. Ultimately, however, most of the study's hypotheses were not statistically supported. Low sample size, particularly at follow-up due to low telephone survey response rate, likely played a significant role in limiting findings.

The first primary hypothesis predicted that the simple discrepancy method would be the most common criteria used for diagnosing learning disorders. This hypothesis was not supported and, contrary to the literature (Proctor & Prevatt, 2003), ability-achievement discrepancy was found to be the most common diagnostic method used to make diagnostic decisions in the overall, LD, and non-LD samples. As previously noted, the ability-achievement discrepancy method is very similar to simple discrepancy criteria in that it focuses on uncovering significant differences in overall intellectual ability and actual versus predicted achievement. However, with use of the ability-achievement discrepancy criteria, overall intellectual ability can be measured in multiple ways, by multiple measures, rather than just using FSIQ only, as is the case with the simple discrepancy method.

Thus, the finding in this sample that ability-achievement discrepancy was the most common diagnostic method used may largely reflect the use of measures beyond FSIQ, particularly GIA from the Woodcock-Johnson, to estimate overall intellectual ability.

Furthermore, there may also be a historical effect given that the Woodcock Johnson-IV (WJ IV) was released in 2014, during the timeframe in which these participants were seen for assessments. Thus, it may have been desirable for student clinicians in training to utilize and gain exposure to this new measure for training purposes, rather than utilizing Weschler measures to produce FSIQ. Additionally, even on occasions where clinicians used Weschler cognitive measures to estimate overall intellectual abilities, they may have been not specified in their case formulations that their conclusions were based on FSIQ, instead generally referencing a comparison between achievement and "overall intellectual abilities" more broadly, resulting in the decision being coded as made based upon ability-achievement discrepancy. Nonetheless, the simple discrepancy method was found to be the second most commonly used method for diagnostic decision-making method overall and in the LD group specifically, indicating that this method is still highly utilized.

Notably, the underachievement and RTI diagnostic decision methods were not utilized for diagnostic decision making in this sample at all. Because of RTI's requirements for applying and monitoring classroom and school-based interventions, as well as the approach's overall goal of early intervention, the RTI approach was likely less relevant to this study's sample of post-secondary educated adults and less easily applied by clinicians outside of the traditional primary or secondary school environments. It was somewhat surprising that no diagnostic decisions in the sample were made using the underachievement model. However, given the low consistency between this approach and other diagnostic approaches (Proctor & Prevatt, 2003), as well as disagreement in the field regarding appropriate cutoff thresholds for LD diagnosis, the low utilization of the underachievement method seems well-advised.

Notably, for the diagnostic methods used in this sample, patterns of diagnostic decisions (LD vs no LD) did not differ significantly by clinician or with method used when all participants diagnosed with LDs were grouped together. However, a significant relationship was found between diagnostic method and LD diagnosis subtype when the sample was separated by diagnosis subtype, including no diagnosis. Specifically, those participants who were found to not to meet diagnostic criteria (no LD) were more likely to have had a diagnostic decision made by ability-achievement discrepancy. In some ways, this may suggest a sort of gate-keeping function of the ability-achievement discrepancy method in clinical decision making such that LD may not be considered as a possible diagnosis, and no other secondary diagnostic method utilized, if this diagnostic criteria is not met. This finding regarding diagnostic decision making is interesting in that it seems to contradict the recent trend, exhibited both in the *DSM 5* and updated IDEA regulations, away from requiring an ability-achievement discrepancy for LD diagnosis.

Also notable from a diagnostic decision-making perspective, within the entire study sample, approximately 1/7th of reports provided an unclear or other rationale for diagnostic decision making. These cases were largely cases in which no clear case formulation or rationale was provided. Although relatively uncommon in the sample, these unclear or poorly formulated cases may indicate a need for additional cognitive testing for diagnostic clarification or a higher level of student clinician supervision, clinician support in case formulation, and supervisor training.

The second primary hypothesis proposed that for individuals who meet criteria for any type of anxiety disorder, diagnosed at the time of the initial assessment or pre-existing, anxiety *would not* contribute significantly to predicting achievement performance on achievement measures for those *without* LD but *would* contribute significantly to predicting achievement for those *with* LD. The interaction effect between LD and anxiety status was not significant, thus this hypothesis was not supported statistically. Notably, however, a significant correlation was found between anxiety disorder and LD, as well as anxiety disorder and overall intellectual ability, but not between LD and overall intellectual ability (Table 6). Although the present analysis may lack sufficient power to further elucidate these relationships, these correlations may point to some complex relationships between anxiety disorder, intellectual ability, and LD. Specifically, the correlation between anxiety disorder and LD was negative, while that between anxiety and IQ was positive. This begs the question of whether anxious attentional bias and increased vigilance for errors could potentially be a compensatory or deterrent cognitive strategy for LD, resulting in a reduced likelihood of meeting diagnostic criteria. These complex relationships were also demonstrated in this study's finding that statistically significant differences in total achievement were present between the LD/no LD groups in the absence, but not the presence, of an anxiety disorder. This result may be related to a reduction in achievement performance in the non-LD group due to performance-related anxiety or perhaps relates to a more complex relationship between all of these variables. As appears to be the case in the present study, previous research has also emphasized that the relationship between mood, cognition, and achievement is a complicated one, with unclear directionality (Nelson and Harwood, 2010).

The third major hypothesis of this study posed that individuals in the sample diagnosed with learning disorders would experience poorer socioeconomic and psychosocial outcomes, when compared to those who did not meet LD criteria at the time of assessment. Analysis was somewhat limited by small sample size, particularly for participants without a learning disorder diagnosis. Overall, regarding follow-up outcome differences between participants with and without diagnosed LDs, although there were generally not statistically significant differences (likely due to sample size limitations), interesting trends that may point to differences emerged.

No statistically significant differences were found between the LD and no LD groups in regards to educational/vocational training, employment rates, or type of employment. However, when compared to a unemployment rate of 3.5% for a relevant national sample (U.S. adults over 25 years old with some college), rates of unemployment were comparatively high in the follow-up sample overall (40% for the LD group and 50% for the no LD group), even after considering participants who indicated that they were disabled or currently enrolled as full-time students (U.S. Department of Labor, Bureau of Labor Statistics, 2018a). Although they tended to be employed at an equivalent or higher employment categories as those without LDs at follow-up, participants with LDs tended to earn relatively less than those without LDs at follow-up, with 80% of the LD group earning less $40,000 per year. Notably, this places the annual income for participants with LDs quite below the national average of $46,141 for employed U.S. adults with some college but no degree (U.S. Department of Labor, Bureau of Labor Statistics, 2018b). For the LD group, this lower than national average income, along with a relatively lower incidence of having job benefits (e.g., employer insurance, paid leave, etc.) when compared to participants without LD (33.3% vs. 66.7%) is likely indicative of underemployment in the LD sample. Although half of sample participants with LDs denied that their diagnosis has an impact on their ability to earn a living, it appears that there may be an impact in the form of underemployment. Interestingly, follow-up participants without LDs reported experiencing more difficulties relating to their learning/cognitive concerns, with 60% endorsing at least some level of problems (e.g., mild, moderate, severe).

In regards to mental and physical well-being, there was no statistically significant difference between follow-up participants with and without LDs on a number of measures including Satisfaction with Life total or item scores and community engagement. Consistent with this finding, 70% of participants with LDs denied perceiving their diagnosis as having an impact on their community engagement, with many reporting regular participation in faith-based activities. However, a significant proportion of both follow-up participants with and without LDs acknowledged experiencing difficulties in maintaining relationships with friends and family due to their learning and cognitive concerns (LD = 50%; no LD = 100%). Increased family conflict could conceivably be related to the somewhat high prevalence of residing with one's family of origin in the follow-up sample (full sample = 46.7%; LD = 30%; no LD = 80%). Although, notably, throughout the U.S., the prevalence (34.1%) of such multi-generational housing arrangements has increased significantly during recent years (U.S. Census Bureau, 2017).

Prevalence of anxiety and mood disorders was also examined and compared between the LD and non-LD groups. Although statistical analysis was limited, it is notable that one-third of the follow-up sample reported having an anxiety disorder (LD = 40%; no LD = 60%), which reflects a much higher prevalence (18.14%) than in the general U.S. adult population (Aada.org, 2018). Additionally, 20% of adults in the LD follow-up sample reported a diagnosis of clinical depression, higher than the U.S. adult prevalence of 7.1% (National Institute of Mental Health, 2019). These findings, although reflecting a sample who previously sought clinical services, are notable in that the rates of anxiety and depression do seem to exceed the national averages and highlight the importance of addressing anxiety and mood concerns, rather than only cognitive concerns, in individuals with learning and school performance difficulties.

Within the learning disorder follow-up group, based upon the literature, it was also hypothesized that specific learning disorder with impairment in mathematics would be associated with relatively poorer socioeconomic and psychosocial outcomes as compared to individuals with other types of leaning disorders (Rivera-Batiz, 1992). Although sample size concerns were again present, there were no statistically significant differences observed between those with math LD versus other LD subtypes in regards to employment, economic, educational, or psychological well-being.

The study's final major hypothesis posited that follow-up socioeconomic and psychosocial outcomes would be relatively better for participants with LDs who perceived their diagnosis as having a long-term impact, reported attending psychotherapy, or engaged in self-study regarding their learning disorder when compared with those participants with LDs who were less enlightened regarding their LD diagnosis. This analysis was unable to be completed because the vast majority of LD participants at follow-up (90%) were coded as enlightened due to their engagement in the activities noted above. Nonetheless, this finding positively indicates that individuals with LD in the sample engaged with and accepted their diagnosis. Further evidence of this active engagement is found in participants' recollections of and high adherence (91.3%) to clinical recommendations as recalled from their initial assessment. Encouragingly, follow-up participants overall (LD and no LD) reported generally finding assessment recommendations helpful (87.5%) and agreeing with the findings of their assessment as conveyed to them by their clinician. Ultimately, regardless of diagnosis made, satisfaction with the assessment process is key in that a more 'therapeutic' assessment, one in which they client feels heard and as though the clinician and process has been helpful in moving the client towards a better understanding of themselves, has been associated with reducing client's distress about symptoms and increasing self-confidence (Finn & Tonsager, 1992).

Limitations

The primary limitation of this study was study sample size, particularly at follow-up. As previously noted, a high percentage of follow-up phone calls went unanswered. In their consent for assessment forms, participants provided address and telephone information for follow-up and research purposes. Given that the study focused on college students, it was anticipated that physical addresses would likely have changed over the years since their assessment and possible graduation. Of the two follow-up contact methods available for the purpose of this study, telephone follow-up was chosen because it was believed to be more stable and to reduce reading burden to participants, particularly given that many eligible participants had been diagnosed with a reading disorder. However, more follow-up participants could have possibly been recruited had a secondary follow-up measure, particularly one allowing participants to complete the survey at any time convenient for them, been utilized. Future studies may benefit from providing eligible participants with an easily accessible online or text survey option in a reading disorder friendly format (e.g., larger, heavier typeface, colored background, short sentence length). Given possible difficulties on numerically-based ordinal scales for individuals with math disorders, Likert-style scales may also need to be adapted to improve information accessibility and clarity for this population.

Another key limitation of the study is in the generalizability of the results. Although the present study achieved the goal of capturing a relatively more racially and SES diverse sample than many previous LD adult follow-up studies, notably few participants of Hispanic or Asian descent are included in the sample. Additionally, the present study focuses on the experiences of post-secondary educated adults with LDs. Although rates of college attendance have continued to increase over time for individuals with LDs, unique cognitive or personality factors may play a role in successful college admission and attendance within this population. Additionally, study criteria specified that participants have overall low average or higher intellectual ability. While this approach reduced potential confounding variables such as the presence of intellectual disability, diagnosis and treatment for the many individuals with very low or high intellectual ability remains a source of disagreement amongst clinicians (Cornoldi et al., 2014; Faigel, 1983;

Fletcher, 1992). The use of assessment data from multiple clinicians also provides a source of variance in this study, although statistically significant differences in LD diagnostic rates were not found between clinicians.

Additionally, the entire sample for this study, including the comparison group, was composed of individuals who acknowledged having experienced academic difficulties, leading to their assessment. While individuals in the comparison group were not found to meet LD diagnostic criteria by their clinicians at the time of assessment, it remains possible that they may have met criteria had a different diagnostic method been used or that these individuals represent the milder or possibly differently expressed continuum of learning disorders. A recent review (Grigorenko et al., 2020) regarding the state of learning disorders, re-emphasizes a point made much earlier by Ellis (1985) that "cognitive components associated with (specific learning disorders), just like academic skills and instructional response, are dimensional and normally distributed in the general population" (p. 40). Thus, it remains unclear whether the comparison sample of individuals with academic difficulties in this study truly represents individuals fully without learning disorders. Participant diagnostic complexity may also limit the generalizability of, but perhaps increase the practical utility of, the study's results. Participants with multiple specific learning disorders or attentional disorders were not excluded, as high comorbidity of these disorders exists in practice.

The results may also not be generalizable to other samples due to several unique geographic and historical factors. Study data was derived from clients residing in or near a midwestern US urban city at a time of significant economic hardship and subsequent revitalization. Thus, it is very possible that historical effects play a role in results relating to systemic issues such as unemployment, housing, education and many other issues, as well as general psychological well-being.

An additional limitation in the current research is the use of primarily self-report measures at follow-up. For example, it is possible that participants engaged in impression management when providing information regarding their adherence to assessment recommendations. Although open-ended questions were generally used to encourage and facilitate an open dialogue with the participant regarding their experience with their assessment, it is possible that participants may have felt a desire to present themselves as more adherent to recommendations or more satisfied with their assessments. Additionally, given the time duration since completing their assessment, participants may have simply misremembered specific information regarding their assessment experience and recommendations made.

Future Directions

As previously mentioned, future follow-up studies of adults with learning disorders would likely benefit from a larger follow-up sample size and novel survey administration methods. Given some evidence of inconsistency between participants' perceptions of the impact of their LD diagnosis and more objective measures of impact (i.e., regarding employment), it may also be helpful to informative to include more objective, quantitative measures of psychological well-being and distress.

A general area that merits additional attention is continuing to explore factors that promote relatively better outcomes in individuals with LDs. This may include areas such as recommendation adherence in psychoeducational assessment. Particularly in the LD population, it would be interesting to explore whether clinician and patient understanding of recommendations differ and to what extent recommendation delivery method (e.g., report, orally, etc.) or style may have an impact on recommendation adherence, client-perceived recommendation acceptability, and understanding. Additionally, it also seems possible that latent personality constructs, particularly those around self-efficacy, locus of control, and possibly neuroticism, may also play a role in LD outcomes and help in untangling the web of effects surrounding LD status, anxiety disorder status, intellectual ability, and achievement performance. Also of particular interest in the LD population may be the trait of grit, defined as perseverance towards a long-term goal despite obstacles. While considered a non-cognitive trait, early research has indicated a possible neural basis for grit, with neural patterns of activation believed to be associated with the trait being found to be related to academic performance, even after controlling for intellectual ability (Wang et al., 2017).

Most importantly, future research should continue to longitudinally explore the experiences of adults with learning disorders, as well as those of individuals with other neurodevelopmental conditions. Given that the needs and expectations of a society and the individual are everchanging and evolving, this approach certainly seems merited.

Conclusions

Beyond the domain of research, given the sizable population of individuals with learning disorders and evidence of differential psychosocial outcomes based on LD status, particularly as it pertains to employment and economic status, policy recommendations are also warranted. Legislation to provide protections and assistance to adults with learning disorders appears particularly warranted. LD advocacy organizations, such as Learning Disabilities Association of America (LDA), have emphasized legislative goals around providing assessments to adults receiving federal assistance and making vocational rehabilitation and job training a priority service for adults with learning disorders. These are excellent initial steps, although they likely do not adequately address the admittedly complex problem of underemployment. Rather than receiving general job training, it would perhaps be more helpful for individuals with learning disorders to receive up-to-date and accurate information regarding demand, entry procedures, and ways to overcome potential entry barriers for growing and high-demand fields.

In clinical practice, given the high comorbidity of mood disorders in the LD population and generally amongst those with academic difficulties, clinicians should be certain to assess and provide recommendations to address mood. Additionally, recommendations regarding job training and connecting with LD advocacy organizations should also routinely be provided to older adolescents and adults with LD. Importantly, it is also suggested that clinicians move from using a single method for LD diagnostic decision-making to multiple methods. Particularly given that single methods have been shown to have low reliability. As an example of use of multiple diagnostic methods, Grigorenko et al. (2020) discussed the use of a "hybrid method" for diagnosis, involving two demonstrations of meeting "inclusionary" criteria, those that the individual must have (i.e., low achievement and poor response to intervention), as well as meeting "exclusionary" criteria, that which the individual must not demonstrate (e.g., poor educational opportunity). While incorporating multiple methods into diagnostic decision making may prove more time intensive or require more background, the field appears to be moving in this direction and this approach may improve the accuracy and reliability of our diagnoses.

Ultimately, this study has simultaneously attempted to provide depth and breadth regarding the experiences of adults with learning disorders. The study has taken a wide-angle view in the sense that many different facets of modern adult life, including higher education, employment, housing, interpersonal relationships, physical health, and emotional well-being, have been explored. Additionally, the entire assessment process as experienced by a client, from initial referral and clinical contact to recommendations and follow-up has been considered. Additional complexity and depth has been contributed to the field's understanding of learning disorder through qualitative interview details as well as focus on the unique population of post-secondary educated adults with LDs.

Overall, this study has highlighted a number of issues in regards to diagnosis, assessment, and psychosocial outcomes in post-secondary educated adults with learning disorders. Firstly, variability continues to exist in how learning disorders are diagnosed and more consistent guidelines for diagnosis are needed, as some diagnostic methods may be associated more strongly with reducing the likelihood of an LD diagnosis. Secondly, this study emphasizes that a complex relationship with unclear directionality may exist between anxiety, LD, and cognitive variables such as achievement and ability. Thirdly, outcomes for adults with learning disorders point to long-term issues with underemployment and higher prevalence of anxiety and depression. Interestingly, some related long-term concerns seem to also be experienced by adults with academic difficulties who do not meet learning disorder criteria.

APPENDIX A: TABLES AND FIGURES

Table 1

Descriptive statistics for the sample of participants at time of initial assessment

	Diagnosed LD (N = 47)			*No LD (N = 30)*			*All Participants (N = 77)*		
Variable	*Percent*	*M (SD)*	*Range*	*Percent*	*M (SD)*	*Range*	*Percent*	*M (SD)*	*Range*
Age (years)		31.2 (10.5)	18-58		29.4 (9.3)	18-51		30.5 (10.0)	18-58
Education (years)		13.5 (1.9)	8-17		14.3 (1.8)	11-18		13.8 (1.9)	8-18
Gender									
Women	63.8			46.7			57.1		
Men	34.0			53.3			41.6		
Transwoman	2.1						1.3		
Race/Ethnicity									
White	57.5			56.7			57.1		
Black	34.0			33.3			33.8		
Hispanic	4.3						2.6		
Multi-ethnic	2.1			10.0			5.2		
Not specified	2.1						1.3		
Vocational Status									
Professional	2.1			3.3			2.6		
Intermediate	2.1						1.3		
Skilled non-manual	4.3						2.6		
Skilled manual	2.1			10.0			5.2		
Partly skilled	2.1			3.3			2.6		
Student	76.6			76.7			76.6		
Unemployed	8.5			6.7			7.8		
Not specified	2.1						1.3		
Income									
≤$10,000	66.0			76.7			70.1		
$10,001-20k	10.6			13.3			11.7		
$20,001-30k	12.8						7.8		
$30,001-40k	6.4						3.9		
>$40,0001				3.3			1.3		
Not specified	4.3			6.7			5.2		

Table 2

Descriptive statistics for participants at telephone follow-up

	Diagnosed LD (N = 10)			*No LD (N = 5)*			*All Participants (N = 15)*		
Variable	*Percent*	*M* *(SD)*	*Range*	*Percent*	*M* *(SD)*	*Range*	*Percent*	*M* *(SD)*	*Range*
Age (years)		40.9 (13.1)	26-61		31.2 (5.0)	25-38		37.7 (11.8)	25-61
Education (years)		14.0 (2.5)	8-17		15.6 (1.7)	13-18		14.5 (2.4)	8-18
Gender									
Women	70.0			60.0			66.7		
Men	30.0			40.0			33.3		
Race/Ethnicity									
White	60.0			40.0			53.3		
Black	40.0			40.0			40.0		
Multi-ethnic				20.0			6.6		
Vocational Category									
Intermediate	40.0						28.6		
Skilled non-manual	30.0			25.0			28.6		
Partly skilled	20.0			50.0			28.6		
Student				25.0			7.1		
Disabled	10.0						7.1		
Vocational Status									
Employed	60.0			40.0			53.3		
Unemployed	40.0			40.0			40.0		
Not specified				20.0			6.7		
Income									
≤$10,000	10.0						6.7		
$10,001-20k	20.0						13.3		
$20,001-30k	20.0			20.0			20.0		
$30,001-40k	30.0						20.0		
$40,001-60k				20.0			6.7		
$60,001-80k							0.0		
$80k+	10.0						6.7		
Declined	10.0			40.0			20.0		
Not specified				20.0			6.7		

Note. Vocational category represented for current or most recent employment; Vocational status at follow-up

Table 3

Descriptive statistics for cognitive assessment variables

	Diagnosed LD (N = 47)		*No LD (N = 30)*		*All Participants (N = 77)*	
Variable	*M (SD)*	*Range*	*M (SD)*	*Range*	*M (SD)*	*Range*
Overall intellectual ability	91.6 (8.7)	80-118	95.1 (11.3)	81-123	92.9 (9.9)	80-123
Verbal ability					98.0 (15.5)	72-150
Non-verbal ability					100.9 (11.3)	73-125
Processing speed					93.7 (13.6)	65-126
Overall total achievement	86.4 (10.9)	58-111	97.5 (9.3)	72-114	90.6 (11.6)	58-114
Reading achievement					92.1 (12.6)	58-121
Math achievement					89.4 (13.3)	60-119
Writing achievement					93.3 (11.9)	69-130

Table 4

Descriptive statistics for assessment process-related variables

	Diagnosed LD (N = 47)			*No LD (N = 30)*			*All Participants (N = 77)*		
Variable	*Percent*	*M (SD)*	*Range*	*Percent*	*M (SD)*	*Range*	*Percent*	*M (SD)*	*Range*
Time intake to assessment (days)		63.6 (43.2)	3-124		50.3 (30.3)	2-167		58.4 (39.0)	2-167
Time assessment to feedback (days)		74.8 (33.5)	6-176		96.8 (45.0)	7-182		82.5 (39.0)	6-182
Assessment fee (US dollars)								159.3 (115.6)	100-750
Assessment year (initial appointment)									
2010	0			6.7			2.6		
2011	42.6			43.3			42.9		
2012	29.8			13.3			23.4		
2013	0			3.3			1.3		
2014	14.9			23.3			18.2		
2015	4.3			6.7			5.2		
2016	8.5			3.3			6.5		
Referral source									
University disability support	46.8			36.7			42.9		
Other academic	21.3			26.7			23.4		
Psychologist/Psychiatrist	6.4			10.0			7.8		
Other treating medical professional				3.3			1.3		
Self	19.2			23.3			20.8		
Family member/friend	2.1						1.3		
Other	2.1						1.3		
Not specified	2.1						1.3		
Referral reason									
Academic performance	66.0			66.7			66.2		
Standardized test accommodations	10.6			3.3			7.8		
Other				3.3			1.3		
Update pre-existing diagnosis	21.3			6.7			15.6		
Behavioral concerns	2.1			20.0			9.1		

Table 5

Diagnostic Decision-making Methods Used by Clinicians

Diagnostic Method	*Diagnosed LD (N = 47)*		*No LD (N = 30)*		*All Participants (N = 77)*	
	n	%	*n*	%	*n*	%
Simple discrepancy	15	31.9	5	16.6	20	25.9
Intraindividual	4	8.51	6	20	10	12.9
Abil/ach discrepancy	20	42.5	13	43.3	33	42.8
Underachievement	0	0	0	0	0	0.0
RTI	0	0	0	0	0	0.0
Multiple methods	2	4.2	1	3.3	3	3.9
Unclear/Other	6	12.7	5	16.6	11	14.28
Totals	47	100	30	100	77	100

Note. Simple discrepancy, intraindividual, ability/achievement discrepancy, and underachievement defined as by Proctor and Prevatt (2003).

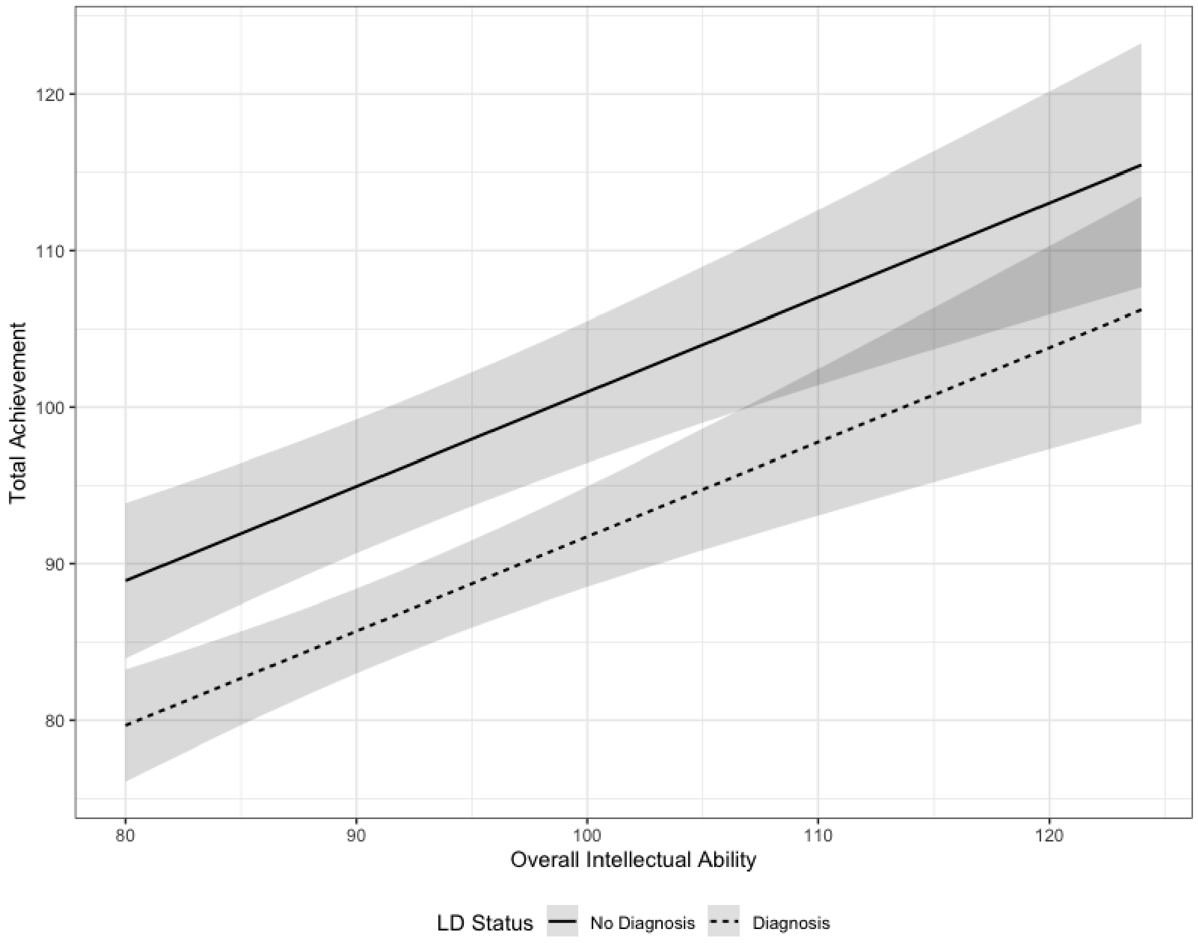


Figure 1. Regression equations predicting total achievement from overall intellectual ability by LD status group

Table 6

Variable Intercorrelations

Variable	7	6	5	4	3	2	1
1. Anxiety Diagnosis	0.118	0.216	0.126	0.181	0.233*	-0.284*	-
2. LD Diagnosis	-0.444**	-0.348*	-0.393**	-0.466**	-0.175	-	
3. FSIQ/GIA/BIA	0.363*	0.422**	0.654**	0.580**	-		
4. Total Ach	0.861**	0.846**	0.653**	-			
5. Math Ach	0.367*	0.257 *	-				
6. Reading Ach	0.792**	-					
7. Writing Ach	-						
M	25.56	70.91	64.10	8.61	15.58	24.28	47.44
SD	6.38	17.61	10.21	5.15	5.38	3.03	11.94

**p < .05, **p < .001.*

Note. N = 77. Entries are Pearson's correlation coefficients. FSIQ/GIA/BIA = Estimated overall intellectual ability score; Total Ach = Total achievement standard score; Math Ach = Math achievement standard score; Reading Ach= Reading achievement standard score; Writing Ach = Writing achievement standard score

Table 7

Regression Equation for LD Status and Anxiety Disorder Status

	Overall Achievement		*Math Achievement*		*Reading Achievement*		*Writing Achievement*	
Variable	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*	*B*	*SE B*
(Constant)	40.64***	9.994	17.84	10.96	52.96***	12.76	66.34***	11.98
Anxiety Disorder Status	-1.69	3.40	-2.77	3.70	1.36	4.28	-3.01	4.08
LD Status	-9.24***	2.57	-8.16**	2.76	-7.03*	3.17	-10.56**	3.08
Overall intellectual ability	0.60***	0.11	0.83***	0.12	0.46**	0.14	0.37**	0.13
Anxiety Disorder x LD Status	0.33	4.90	-1.27	5.37	0.52	6.24	1.78	5.88
N	75		76		77		75	
R^2	0.47		0.52		0.26		0.28	
F	15.52***		18.91***		6.26***		6.93***	

*$p<0.05$; **$p<0.01$; ***$p<0.001$

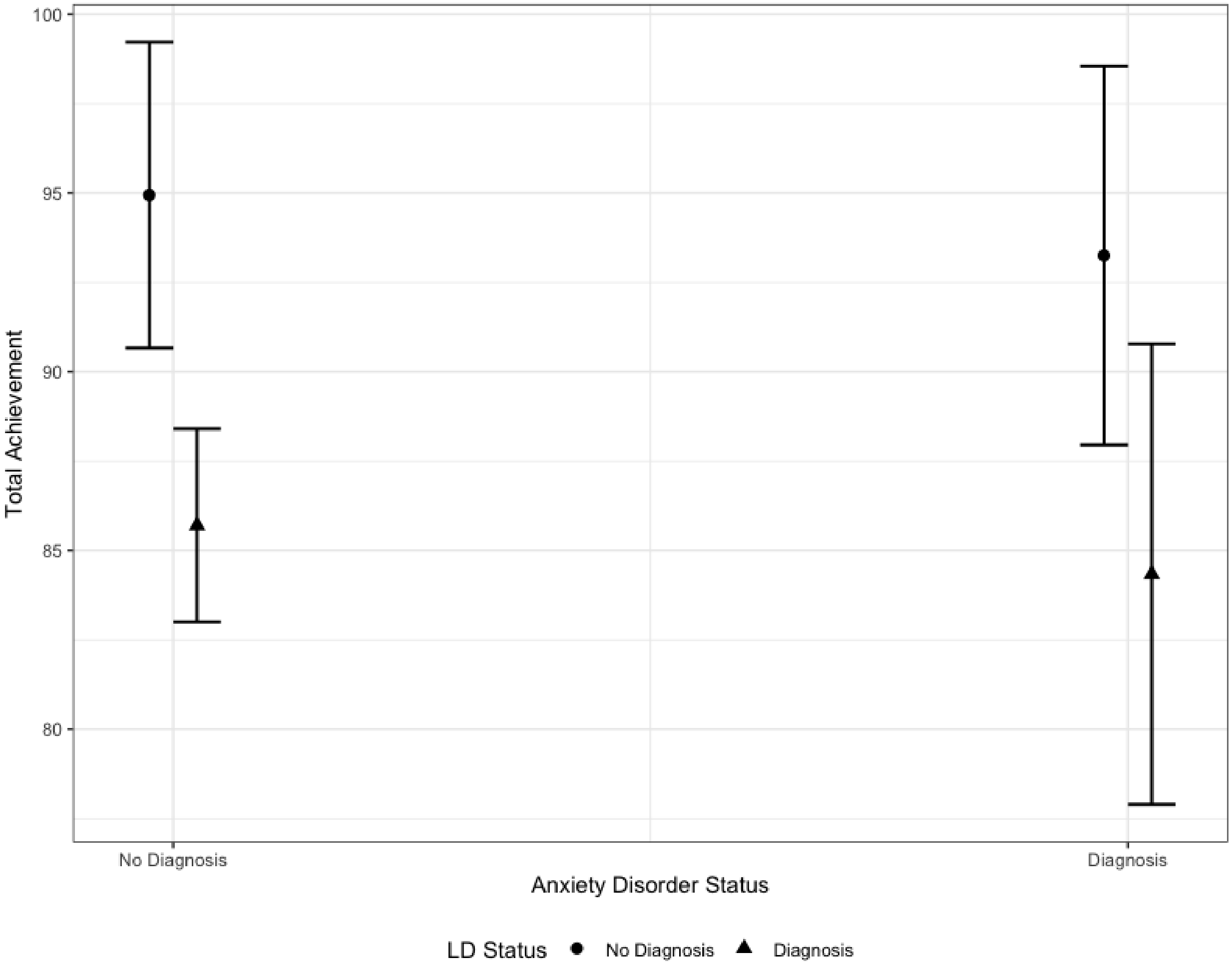


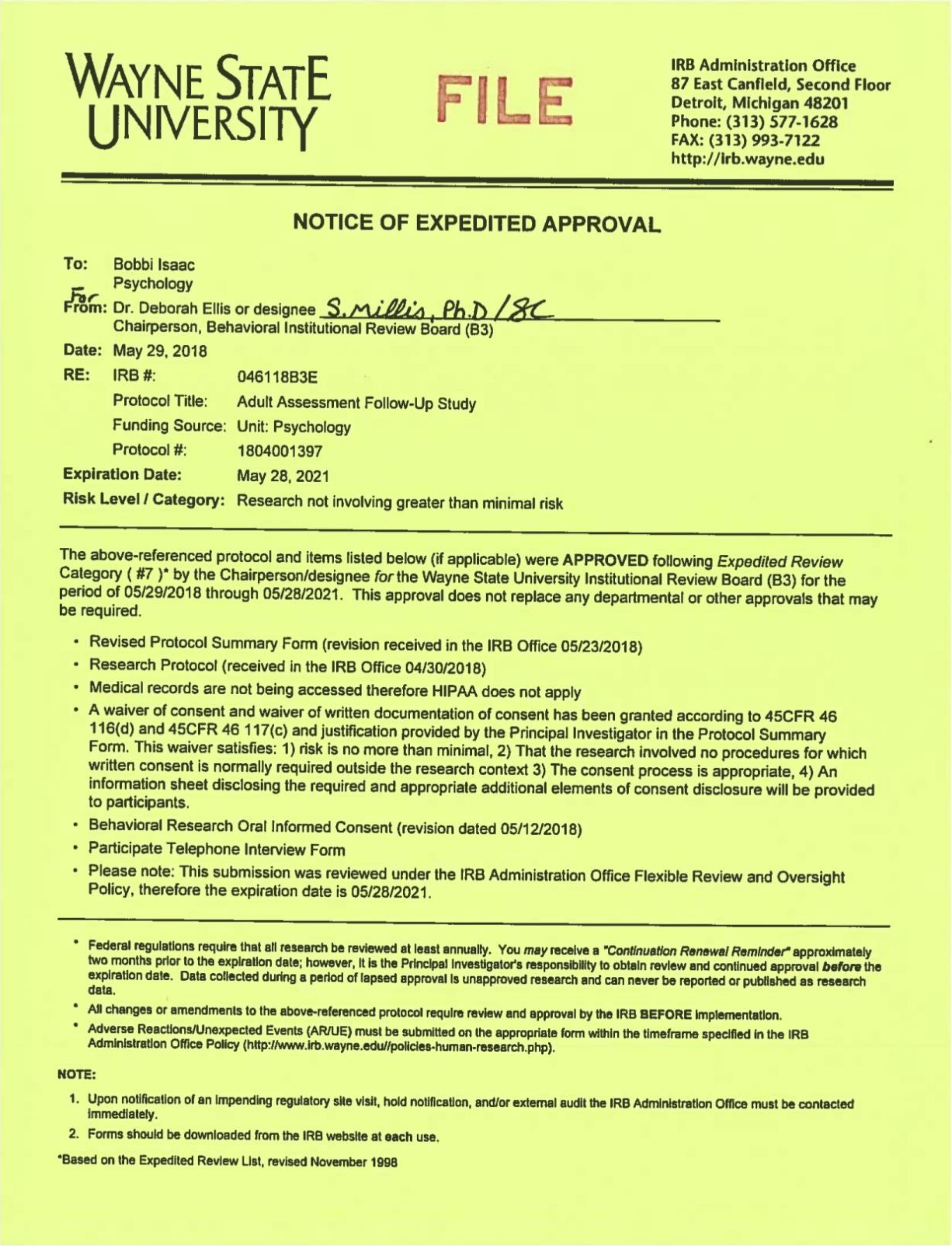
Figure 2. Interactive effect of anxiety disorder status and LD status on total achievement.

Table 8

Assessment Recommendations

Recommendation themes	*Example*	*Number of times recommended*
Exam accommodations	"additional time on exams"	5
Classroom accommodations	"notetaker in school"	3
Psychotherapy/counseling	"get a life coach"	3
Reading compensation strategies for self	"take time when reading"	2
Organization compensation strategies for self	"learn to make a schedule"	2
Seek support for LD/learning experts	"seek support from people familiar with dyslexia"	1
Tutoring	"tutoring through university"	1
Pharmacological intervention	"medicine"	1
Social support	"ask for help from family and friends"	1
Housing	"moving out"	1
Behavioral recommendations	"taking risks"	1

APPENDIX B: HIC APPROVAL



WAYNE STATE UNIVERSITY

FILE

IRB Administration Office
87 East Canfield, Second Floor
Detroit, Michigan 48201
Phone: (313) 577-1628
FAX: (313) 993-7122
http://irb.wayne.edu

NOTICE OF EXPEDITED APPROVAL

To: Bobbi Isaac
Psychology
For
From: Dr. Deborah Ellis or designee S. Millis, Ph.D /8C
Chairperson, Behavioral Institutional Review Board (B3)
Date: May 29, 2018
RE: IRB #: 046118B3E
Protocol Title: Adult Assessment Follow-Up Study
Funding Source: Unit: Psychology
Protocol #: 1804001397
Expiration Date: May 28, 2021
Risk Level / Category: Research not involving greater than minimal risk

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The above-referenced protocol and items listed below (if applicable) were **APPROVED** following *Expedited Review* Category (#7)* by the Chairperson/designee *for* the Wayne State University Institutional Review Board (B3) for the period of 05/29/2018 through 05/28/2021. This approval does not replace any departmental or other approvals that may be required.

- Revised Protocol Summary Form (revision received in the IRB Office 05/23/2018)
- Research Protocol (received in the IRB Office 04/30/2018)
- Medical records are not being accessed therefore HIPAA does not apply
- A waiver of consent and waiver of written documentation of consent has been granted according to 45CFR 46 116(d) and 45CFR 46 117(c) and justification provided by the Principal Investigator in the Protocol Summary Form. This waiver satisfies: 1) risk is no more than minimal, 2) That the research involved no procedures for which written consent is normally required outside the research context 3) The consent process is appropriate, 4) An information sheet disclosing the required and appropriate additional elements of consent disclosure will be provided to participants.
- Behavioral Research Oral Informed Consent (revision dated 05/12/2018)
- Participate Telephone Interview Form
- Please note: This submission was reviewed under the IRB Administration Office Flexible Review and Oversight Policy, therefore the expiration date is 05/28/2021.

- **Federal regulations require that all research be reviewed at least annually. You *may* receive a *"Continuation Renewal Reminder"* approximately two months prior to the expiration date; however, it is the Principal Investigator's responsibility to obtain review and continued approval *before* the expiration date. Data collected during a period of lapsed approval is unapproved research and can never be reported or published as research data.**
- **All changes or amendments to the above-referenced protocol require review and approval by the IRB BEFORE implementation.**
- **Adverse Reactions/Unexpected Events (AR/UE) must be submitted on the appropriate form within the timeframe specified in the IRB Administration Office Policy (http://www.irb.wayne.edu//policies-human-research.php).**

NOTE:

1. **Upon notification of an impending regulatory site visit, hold notification, and/or external audit the IRB Administration Office must be contacted immediately.**
2. **Forms should be downloaded from the IRB website at each use.**

***Based on the Expedited Review List, revised November 1998**

Notify the IRB of any changes to the funding status of the above-referenced protocol.

Assessment follow-up study

Behavioral Research Oral Informed Consent

Title of Study: *Adult assessment follow-up study*

Principal Investigator (PI):	Bobbi K. Isaac, MA Department of Psychology, Wayne State University (313) 577-8380
Funding Source:	Wayne State University

Purpose:

You are being asked to participate in a follow-up research study of life outcomes because you completed an assessment at the Wayne State University Psychology clinic, between 2011 and 2016, and had concerns about your school-related performance. This study is being conducted at Wayne State University. The estimated number of participants to be enrolled is 110.

Study Procedures

If you take part in the study, you will be asked to answer questions about your assessment results and your current life. Specifically, you will be asked about your education, living situation, health, current job and income. You will also be asked questions about your emotions, life stressors, and your general experience with your assessment. Additionally, records from your previous assessment, including test results and demographic information, will also be reviewed by study personnel.

You have the option of not answering some questions and remaining in the study. Participation in the study is voluntary and will require a single telephone call lasting approximately 25 minutes. The information obtained from your participation will remain confidential and accessible only to key research personnel. Data collected will use a coded identifier instead of your name.

Benefits

As a participant in this research study, there will be no direct benefit for you; however, information from this study may benefit other people now or in the future.

Risks

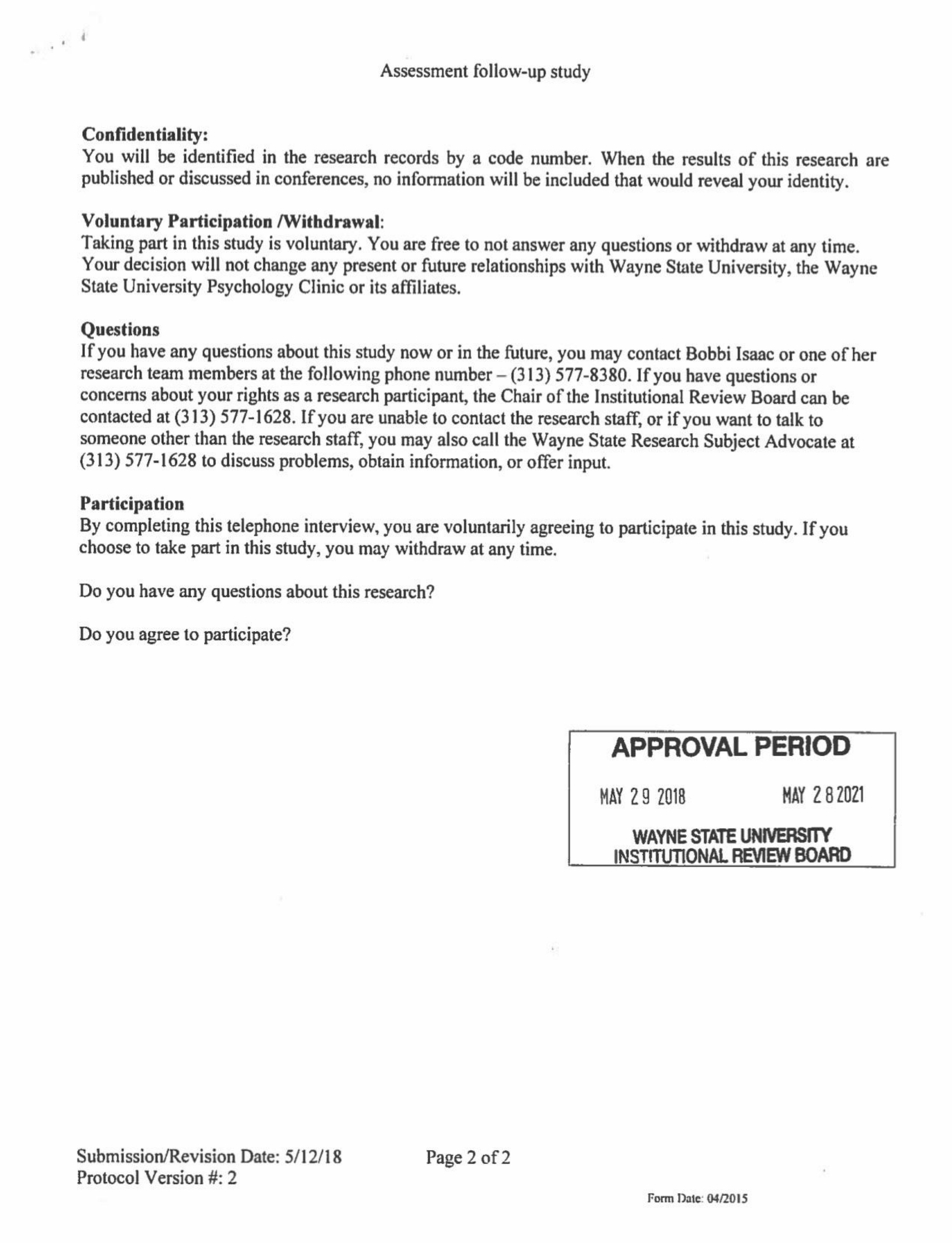
The anticipated level of risk is minimal. By taking part in this study, you may experience emotional discomfort when discussing your current life. Although you will only be identified by a code, breach of confidentiality may also present a minimal risk. There may also be risks involved from taking part in this study that are not known to researchers at this time.

Costs

There will be no costs to you for participation in this research study.

Compensation

For taking part in this research study, you will be compensated for your time and inconvenience with a $10 Amazon.com gift card code which will be provided to you at the end of this phone call. Instead of a Amazon.com gift card, you may also arrange to pick up $10 in cash from the Wayne State Psychology Clinic for your participation.



Assessment follow-up study

Confidentiality:
You will be identified in the research records by a code number. When the results of this research are published or discussed in conferences, no information will be included that would reveal your identity.

Voluntary Participation /Withdrawal:
Taking part in this study is voluntary. You are free to not answer any questions or withdraw at any time. Your decision will not change any present or future relationships with Wayne State University, the Wayne State University Psychology Clinic or its affiliates.

Questions
If you have any questions about this study now or in the future, you may contact Bobbi Isaac or one of her research team members at the following phone number – (313) 577-8380. If you have questions or concerns about your rights as a research participant, the Chair of the Institutional Review Board can be contacted at (313) 577-1628. If you are unable to contact the research staff, or if you want to talk to someone other than the research staff, you may also call the Wayne State Research Subject Advocate at (313) 577-1628 to discuss problems, obtain information, or offer input.

Participation
By completing this telephone interview, you are voluntarily agreeing to participate in this study. If you choose to take part in this study, you may withdraw at any time.

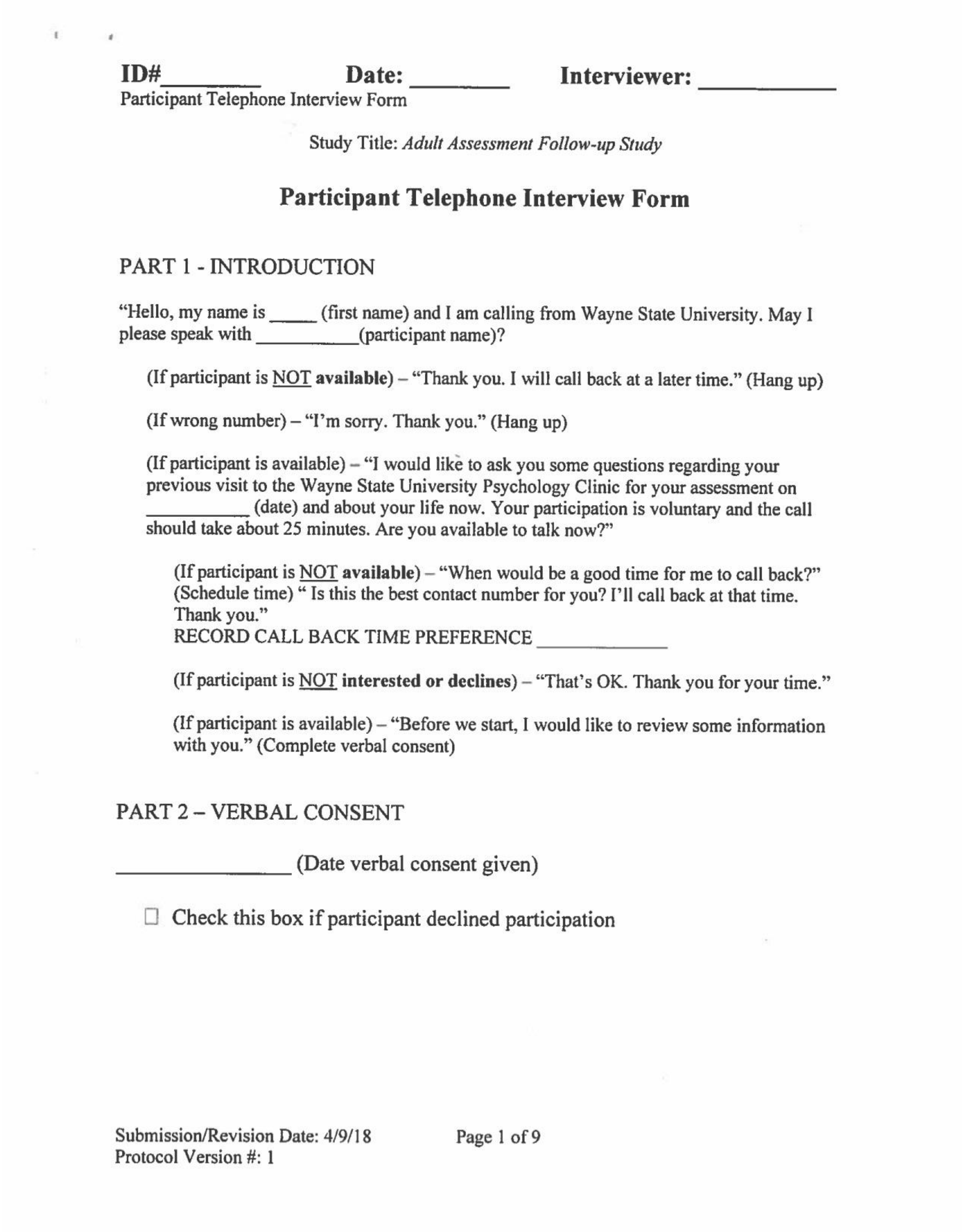
Do you have any questions about this research?

Do you agree to participate?

APPROVAL PERIOD
MAY 29 2018 MAY 28 2021
WAYNE STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD

Submission/Revision Date: 5/12/18 Page 2 of 2
Protocol Version #: 2

Form Date: 04/2015



ID#________ Date: ________ Interviewer: ____________
Participant Telephone Interview Form

Study Title: *Adult Assessment Follow-up Study*

Participant Telephone Interview Form

PART 1 - INTRODUCTION

"Hello, my name is _____ (first name) and I am calling from Wayne State University. May I please speak with ___________(participant name)?

(If participant is <u>NOT</u> **available**) – "Thank you. I will call back at a later time." (Hang up)

(If wrong number) – "I'm sorry. Thank you." (Hang up)

(If participant is available) – "I would like to ask you some questions regarding your previous visit to the Wayne State University Psychology Clinic for your assessment on ___________ (date) and about your life now. Your participation is voluntary and the call should take about 25 minutes. Are you available to talk now?"

(If participant is <u>NOT</u> **available**) – "When would be a good time for me to call back?" (Schedule time) " Is this the best contact number for you? I'll call back at that time. Thank you."
RECORD CALL BACK TIME PREFERENCE ______________

(If participant is <u>NOT</u> **interested or declines**) – "That's OK. Thank you for your time."

(If participant is available) – "Before we start, I would like to review some information with you." (Complete verbal consent)

PART 2 – VERBAL CONSENT

_________________ (Date verbal consent given)

☐ Check this box if participant declined participation

ID#________ **Date: ________** **Interviewer: ____________**

Participant Telephone Interview Form

PART 3 – General Information

1. Do you remember coming to the WSU Psychology Clinic for an assessment? **Yes No**
2. What problems were you having at the time of the assessment?

3. Overall, how would you rate your learning problems now? Not a problem, mild, moderate, or severe? *(circle one)*

   Not a problem **Mild** **Moderate** **Severe**

   a. How much does your problem interfere with your ability to earn a living? Not a problem, mild, moderate, or severe? *(circle one)*

      Not a problem **Mild** **Moderate** **Severe**

   b. How much does your problem interfere with your ability to maintain relationships with friends and family? Not a problem, mild, moderate, or severe? *(circle one)*

      Not a problem **Mild** **Moderate** **Severe**

   c. How much does your problem interfere with your ability to participate in your community (e.g., volunteering, church/social groups)? Not a problem, mild, moderate, or severe? *(circle one)*

      Not a problem **Mild** **Moderate** **Severe**

   d. How much does your problem interfere with your ability to take care of yourself? Not a problem, mild, moderate, or severe? *(circle one)*

      Not a problem **Mild** **Moderate** **Severe**

e. How much does your problem interfere with your ability to take care of others (e.g., family, pets? Not a problem, mild, moderate, or severe? (*circle one)*

Not a problem **Mild** **Moderate** **Severe**

4. Overall, how helpful do you feel the assessment was to you? Very helpful, helpful, somewhat helpful, or not helpful? (*circle one)*

   Very helpful **Helpful** **Somewhat helpful** **Not helpful**

5. When you completed your assessment at the Wayne State University Psychology Clinic did you receive a diagnosis? **Yes** **No**

   (IF NO, continue to question #6)

   (IF YES)
   1a) What was/were the diagnosis/diagnoses?

   1b) Did you agree with this conclusion? **Yes** **No**

6. Do you still have your assessment report? **Yes** **No**
   a. Have you looked back at it since your assessment? **Yes** **No**
7. What recommendations made by the clinician or in the report do you remember? (List up to five, in order recalled)

ID#________ Date: ________ Interviewer: ___________

Participant Telephone Interview Form

#1____

____

#3____

____

#3____

____

#4____

____

#5____

____

PART 4 - Specific Recommendations

"Now I am going to go over the specific recommendation(s) you mentioned and ask more details about it/them."

(**Ask details for <u>up to</u> 3 recommendations – in the order listed by participant***)

Recommendation #1**

1. Did you try this recommendation? **Yes** **No**

IF YES: A. For how long?	**IF NO:** A. Why did you choose not to follow this recommendation?

B. Did this recommendation help?

Yes **No** Please explain.

Recommendation #2**

1. Did you try this recommendation? **Yes** **No**

ID#________ Date: ________ Interviewer: __________

Page 5 of 9

IF YES:
A. For how long?

IF NO:
A. Why did you choose not to follow this recommendation?

B. Did this recommendation help?
Yes **No** Please explain.

Recommendation #3**

1. Did you try this recommendation? **Yes** **No**

IF YES:
A. For how long?

IF NO:
A. Why did you choose not to follow this recommendation?

B. Did this recommendation help?
Yes **No** Please explain.

PART 5 - Current Life

"Thank you for that information. Now I'd like to ask you a few questions about your life now. You can decline to answer a question if you would like."

1. What is the zip code where you are currently living?

   ____________________ (*Record zip code only*)

2. Is finding shelter a problem for you usually, sometimes, rarely, or never?

   Usually **Sometimes** **Rarely** **Never**

3. Who lives with you? How are they related or known to you? (e.g., mother, boyfriend, roommate)

4. In what ways do you contribute to the household finances? For example, do you pay the rent, utilities, purchase groceries, etc.?

ID#________ Date: ________ Interviewer: ___________

5. Are you receiving any kind of financial support, such as help from family members, disability, or SSI?

Family/friends **Disability payments (SSDI)** **Other** (*specify*)___________

6. Do you have a job at the present time? **Yes** **No**

(IF YES)
What sort of work do you do?

Is your job full-time?

Do you have benefits through work like paid vacation time, health insurance, and retirement savings?

(IF NO)
When was the last time you were employed?

What sort of work did you do?

Was your job full-time?

Did you have benefits through work like paid vacation time, health insurance, and retirement savings?

7. Has there been a time period within the last 5 years when you were unemployed but stopped looking for work? **Yes** **No**

(IF NO, continue to question #8)

(IF YES)
Please explain further.

8. How much do you earn from working at your current or last job? *(weekly, biweekly, hourly and number of hours worked, or annually)*

9. Do you have any major physical or mental health conditions (like diabetes, high blood pressure, or anxiety disorder)? **Yes** **No**

(IF NO, continue to question #10)

(IF YES)
Were any of these conditions diagnosed *after* your assessment? (*specify*)

10. What was the last grade/level you finished in school?

11. Are you currently attending school or other classes? **Yes** **No**

(IF NO, continue to question #12)

(IF YES)
What school or sort of classes?

Have you obtained a degree or certificate? **Yes** **No**

12. Have you participated or enrolled in any job training or technical programs? **Yes** **No**

(IF NO, continue to question #13)

ID#________ Date: ________ Interviewer: ___________

Page 8 of 9

(IF YES)
What sort?

13. Are you involved in any unpaid groups or activities in your community (like volunteering, church groups, support groups, or political parties)? **Yes** **No**

(IF NO, continue to question #14)

(IF YES)
What sort?

14. How likely do you think it is that your diagnosis will continue to impact your life? Very unlikely, unlikely, somewhat likely, or very likely? (*circle one*)

Very unlikely **Unlikely** **Somewhat likely** **Very likely**

PART 6 – Satisfaction with life

"Lastly, I would like to do a brief survey with you. I'll ask you five statements that you may agree or disagree with, using a 1 to 7 scale. A rating of 1 means that you strongly disagree, a 4 is neither agree nor disagree, and a 7 is strongly agree. You can pick any number between 1 and 7. I can repeat those numbers for you at any time. For each statement, tell me the number that best describes how you feel about the statement. Please be open and honest in your responding."

- 7 - Strongly agree
- 6 - Agree
- 5 - Slightly agree
- 4 - Neither agree nor disagree
- 3 - Slightly disagree
- 2 - Disagree
- 1 - Strongly disagree

____ In most ways, my life is close to my ideal.

____ The conditions of my life are excellent.

ID#________ **Date: ________** **Interviewer: ____________**

Page 9 of 9

PART 6 – Satisfaction with life (cont'd)

- 7 - Strongly agree
- 6 - Agree
- 5 - Slightly agree
- 4 - Neither agree nor disagree
- 3 - Slightly disagree
- 2 - Disagree
- 1 - Strongly disagree

____ I am satisfied with my life.

____ So far, I have gotten the important things I want in life.

____ If I could live my life over, I would change almost nothing.

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ABSTRACT

PSYCHOSOCIAL OUTCOMES AMONG COLLEGE STUDENTS WITH LEARNING DISORDERS

by

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May 2020

Advisor: Dr. Douglas Barnett

Major: Psychology (Clinical)

Degree: Doctor of Philosophy

Specific learning disorders, also known as learning disabilities, are defined as neurodevelopmental disorders in which long-term difficulties with learning and using academic skills occur within the context of one or multiple academic areas (i.e., reading, mathematics, writing). As our understanding of learning disorders (LD) has evolved beyond a focus on childhood diagnosis, a limited body of research has emerged examining adult outcomes for individuals with learning disorders in regards to higher education, employment, psychosocial, and health outcomes. Much of the results of this research seems to indicate that individuals with LDs may have poorer outcomes in adulthood across these domains. However, there are significant methodological concerns within the limited body of literature regarding adult outcomes for individuals with LDs, including a lack of relevant control comparison groups, variability in criteria used for learning disorder diagnosis, low representation from individuals who obtained higher education, and a tendency to follow-up with parents or caregivers rather than the diagnosed adult. Thus, one of the primary purposes of this study was to gather and analyze follow-up data regarding occupational, psychosocial, and health outcomes for a diverse clinically-assessed group of adults in higher education diagnosed with specific LDs. The roles of initial assessment cognitive factors,

LD subtype, specific assessment recommendations and adjustment to LD in outcomes were also examined.

Participants were 77 adults who had previously received clinic-based psychoeducational assessments due to expressed concerns regarding possible LD (47 LD; 30 No LD). The comparison group (no LD) consisted of higher education students who did not meet criteria for LD but were referred for psychoeducational assessment due to academic performance concerns. Fifteen participants completed telephone follow-up interviews (10 LD; 5 No LD) a mean of 6.03 years later (*SD* = 1.9 years).

Study findings regarding follow-up functioning overall indicated minimal group differences in outcomes between the comparison and LD groups in regards to education, employment, health and psychological well-being. However, evidence of possible underemployment and mental health difficulties emerged for participants in the study sample with and without LD. Specifically, unemployment rates (LD = 40%; no LD = 50%) for the total sample of participants exceeded the U.S. national average for adults of a similar education level. Annual income for the LD group (88.9% earning less than 40,000) was also found to be significantly below the national average. These findings occurred despite half of participants with LDs reporting that they did not perceive their diagnosis as impacting their employment. Additionally, within the entire study sample a relatively high reported prevalence of anxiety disorders (LD = 40%; no LD = 60%) was observed. 20% of follow-up participants diagnosed with LDs also reported being diagnosed with clinical depression. Interestingly, although the interaction effect between LD and anxiety status was not significant, a significant negative relationship was found between anxiety disorder and LD, and a positive correlation found between anxiety disorder and overall intellectual ability.

Regarding the assessment process and treatment recommendations for LD, findings of this study indicated that most participants generally viewed their assessments as helpful (87.5%) and attempted to follow recommendations provided by their clinicians, despite some barriers. Ability-achievement discrepancy was found to be the most common criteria used by assessing clinicians for determining the presence or absence of LD in this study sample, although a notable percentage (1/7th) of the assessment reports examined failed to provide a clear rationale for diagnostic decision-making.

This study highlighted a number of issues in regards to diagnosis, assessment, and psychosocial outcomes in post-secondary educated adults with learning disorders. Specifically, that ability-achievement discrepancy continues to be preferred for LD diagnostic decision-making, despite concerns in the field regarding the approach's reliability. More research also appears to be needed regarding the relationship between anxiety, LD, and cognitive variables such as achievement and ability. Additionally, outcomes for adults with learning disorders point to potential long-term issues with underemployment and relatively higher prevalence of anxiety and depression - issues which may need to be screened for and addressed more specifically at the time of assessment. Notably, individuals who did not meet criteria for LD diagnosis but did experienced education difficulties also appear to be at risk for occupational and psychological difficulties.

AUTOBIOGRAPHICAL STATEMENT

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EDUCATION

Wayne State University, Detroit, MI
Ph.D. in Clinical Psychology **2012 - 2020**
Concentration: Clinical Neuropsychology
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[Proposed dissertation: Psychosocial outcomes among college students with learning disorders]

Catholic University of America, Washington, DC
M.A. in General Psychology **2012**
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University of Alabama, Tuscaloosa, AL
B.S. in Biology; Minor: Spanish **2007**

SELECTED EXPERIENCE & TRAINING

Baylor College of Medicine Psychiatry Clinic, Houston, TX
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Neuropsychology/Rehabilitation Psychology Pre-Doctoral Resident **07/2018 – 07/2019**

Wayne State University, Detroit, MI
WSU Psychology Clinic Graduate Teaching Assistant
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Beaumont Hospital, Family Medicine Center, Troy, MI
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Practicum Student **07/2014 – 07/2015**

Veterans Affairs Medical Center – Multiple Sclerosis Clinic of Excellence, Washington, DC
Neurology Research Assistant – (Mitchell T. Wallin, MD) **06/2011 – 07/2012**

SELECTED AWARDS & HONORS

Initiative for Maximizing Student Development Program Fellowship, *Wayne State University*	2013 - 2015
Psychology Departmental Scholarship, *Catholic University of America*	2010 – 2012
Randall Award for Outstanding Undergraduate Research, *University of Alabama*	2006
Ronald E. McNair Post-baccalaureate Achievement Program, *University of Alabama*	2005 – 2007
National Achievement Scholarship, *National Merit Scholarship Corporation*	2003 – 2007

PUBLICATIONS AND PRESENTATIONS

Isaac, B. K., Fried-Gilboa, S., Salmeron Rios, S., & Strutt, A. M. (2019, June). *Utility of the Spanish Baylor Profound Mental Status Examination in Advanced Alzheimer's Disease*. Poster to be presented at the 17th Annual American Academy of Clinical Neuropsychology Conference, Chicago, IL.

Isaac, B., Vos, L., Whitman, R. D., Justice, J. & Letang, S. (2014, February). *Negative priming stroop task and inhibition.* Poster presented at the 42nd Annual Meeting of the International Neuropsychological Society, Seattle, WA.