EXAMINING PSYCHOMETRIC PROPERTIES OF THE ADOLESCENT SELF-DETERMINTION ASSESSMENT-SHORT FORM

By

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ABSTRACT

This dissertation consists of four chapters. Chapter 1 provides an overview of the development of theories of self-determination within special education and the emerging field of positive psychology and in the context of the how disability has been understood in our society. It also introduces The Adolescent Self-Determination Assessment-Short Form (ASDA-S) as the focus of research activities in this dissertation, and provides research questions that will be addressed in the subsequent chapter. In an initial effort to examine the psychometric properties of the ASDA-S, Chapter 2 reports reliability and construct validity data for the instrument by examining omega coefficient and three measurement invariance models using multiple groups Structural Equation Modeling (SEM). Three measurement invariance models were developed from the following samples: (a) two groups of gender, (b) seven groups of age between 11 to 22 years old, and (c) six groups of disabilities and a group of students without disabilities with adolescents and young adults. The data analyses suggested that the ASDA-S is measuring the same concept across these groups, and chi-square difference tests were conducted to examine latent mean differences across these groups. Chapter 3 examines criterion validity of the ASDA-S by examining interrelationships from the following: (a) the ASDA-S and the AIR Self-Determination Scale (AIR) and (b) the ASDA-S and the Adolescent Self-Determination Scale (ASDA; the original form of the ASDA-S). The development of higher order constructs of the ASDA-S and the AIR represented that domains statistically supported the theoretical perspectives in each measurement. In addition, the interrelationship between the ASDA-S and the ASDAS reported a strong relationship. Chapter 4 includes the conclusions of Chapters 2 and Chapter 3 and overviews implications for future research and practice of the development of collecting data from the ASDA-S.

To my father, Hyuntaek, and Lael

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CHAPTER 1: INTRODUCTION

In the past 50 years, there have been major paradigm shifts within the fields of psychology and disability. For example, in his presidential address to the American Psychological Association in 1998, Martin Seligman called for a new discipline of *positive psychology*, stating that "psychology has moved too far away from its original roots, which were to make the lives of all people more fulfilling and productive, and too much toward the important, but not all-important, area of curing mental illness" (Seligman, 1999, p. 559). Seligman described positive psychology as a "reoriented science that emphasizes the understanding and building of the most positive qualities of an individual" (Seligman, 1999, p. 559). In addition, Seligman and Cskszentmihalyi (2000) characterized positive psychology as having three *pillars*: "valued subjective experience, positive individual traits, and the civic virtues and the institutions that move individuals toward better citizenship" (p. 5). This conceptualization substantially impacted the development of positive psychology, and there emerged a focus on studying positive emotions, such as happiness, hope, love, courage, and compassion (Hart & Sasso, 2011; Lazarus, 2003). Expanding the framework of positive psychology, Diener (2009) stated that positive psychology not only includes working on positive aspects of human behavior, but also has a role in addressing problems that constituted the primary focus of traditional psychology with strengths-based approaches. Based on Diener's suggestion, consensus emerged on dealing with both the positive in life and challenging situations in the field of positive psychology with positive, strengths-based approaches.

Seligman's support for a *reorientation* on positive aspects of psychology provided a new paradigmatic perspective for researchers in the field of psychology, many of whom—particularly in areas pertaining to disability—had focused on a disease model of human functioning, with a

narrow focus on treating mental illness and disability as pathology (Linley, Joseph, Harrington, & Wood, 2006; Snyder & McCullough, 2000). But, developments in positive psychology began to influence research in disability. Specifically, Seligman (1998) defined the mission of positive psychology as "to measure, understand and then build the human strengths and the civic virtues" (p.2). Perhaps more importantly, Seligman's presidential address emphasized strengths-based models of human functioning that could supplant disease- and pathology-based models. Although research on positive attributes and values associated with human behavior has existed for a long time, the ideas pertaining to strengths-based models have emerged only in the last two decades in the fields of psychology and disability (Shogren, 2013b). From this perspective, scientific research and practice in psychology should move toward promoting optimal functioning and strengths-based approaches that enable people to pursue the best things in life, rather than focusing on remediating and curing problems, as was the focus when the field was dominated by deficit-based models.

The field of positive psychology has grown substantially in size, reach, impact, and breadth in the past 15 years (Donaldson, Dollwet, & Rao, 2015; Hart & Sasso, 2011; Rusk & Waters, 2013; Wong, 2011; Yen, 2010). These efforts to establish constructs and examine functioning in positive psychology has resulted in numerous published scholarly books, a journal (*Journal of Positive Psychology*), undergraduate courses, nearly 20 new graduate programs across the world, professional associations, conferences, grants, and research centers and foundations (Gilman, Huebner, & Furlong, 2009; Lopez & Snyder, 2009). Hart and Sasso (2011) found over 20,000 articles that delivered empirically-derived approximations of the scope and boundaries of the field, and Rusk and Waters (2013) reviewed over 18,000 PsycINFO® documents to provide a quantitative assessment of the progress of positive psychology.

Recently, Donaldson, Dollwet, and Rao (2015) conducted the first review to address critiques about the peer-reviewed empirical foundations of positive psychology, examining 1,336 peer-reviewed scientific articles published between 1999 and 2013. These authors concluded that sound scientific work has grown each year over the period and proliferated internationally across 46 countries. Furthermore, extensive research review articles on positive psychology have been conducted in a variety of individual fields, including counseling (Lopez et al., 2006), health psychology (Schmidt, Razue-Bogdan, Piont-kowski, & Schaefer, 2011), education (Froh, Huebner, Youssef, and Conte, 2011), organizational science (Donaldson & Ko, 2010), and behavioral medicine and health psychology (Schui & Krampen, 2010). The foundational knowledge in positive psychology is still developing, of course, and research is moving outside the parameters of the discipline of psychology into different fields, including special education and other disciplines that are more applied.

Positive Psychology and Disability

Historically, from the late 18th through the early 20th century, disability has been conceptualized within a deficit-based model, commonly called the *medical* or *functional limitations model*. Disability was characterized as constituting types of *differentness*; people with disabilities were seen as *unfit*, and scientists and researchers emphasized weaknesses and impairments in physical and/or mental functions (Braddock & Parish, 2002; Wehmeyer, 2013). For example, people with disabilities were labeled as *feebleminded* during the early 20th century as the pseudoscience of eugenics emerged, and they were blamed for social problems, including crime, poverty, and alcoholism (Smith & Wehmeyer, 2012). In addition, during the early part of the 20th century, disability was viewed as a trait and as inherent or internal to the individual, and something that needed to be fixed or dealt with by segregation, institutionalization, or

sterilization (Luckasson et al., 1992; Wehmeyer, 2013). From this perspective, consideration of the strengths or successes of people with disabilities was, in essence, irrelevant or inaccurate (Buntinx, 2013).

Since the latter part of the 20th century, there have been major shifts in our understanding of issues pertaining to disability that parallel the changes in the field of psychology described previously. In 1980, the World Health Organization (WHO) proposed the *International Classification of Impairments, Disability and Handicap* (ICIDH) (WHO, 1980), which moved away from pathology-based models and defined disability looking at the integration of issues pertaining to individual impairments, personal characteristics and traits, and contextual or environmental factors. In 2001, the WHO introduced the *International Classification of Functioning, Disability, and Health* (ICF) (WHO, 2001), which further emphasized the impact of contextual and environmental factors on health issues. Within the ICF, disability was used as an umbrella term for limitations in human functioning, shifting the understanding of disability from an interiorized state to an exteriorized state in which disability is understood by identifying "mismatches" and optimizing functioning between personal capabilities and environmental demands (Wehmeyer & Shogren, 2014). Such an understanding is referred to as a social-ecological model of disability.

In the field of intellectual disability, the American Association on Intellectual and Developmental Disabilities (AAIDD) proposed a conceptual framework of intellectual disability as a part of typical human functioning by adopting the social-ecological approach, beginning with the 1992 terminology and classification manual (Luckasson et al., 1992; Buntinx, 2013). From this perspective, disability was viewed as a part of the continuum of human experience. The AAIDD model emphasized the role of supports in reducing the mismatch between personal

capacity and the demands of the context. This social-ecological conceptual framework was expanded in the 10th (Luckasson et al., 2002) and 11th editions (Schalock et al., 2010) of the AAIDD manuals. In practices drawn from these social-ecological models, individual strengths and capabilities play an important role to enable people to achieve valued outcomes, moving the field toward strengths-based models of disability (Shogren, 2013a).

Changes in psychology and disability both focused on achieving optimal functioning and pursuing the good life (Shogren, 2013b; Shogren, Lopez, Wehmeyer, Little, & Pressgrove, 2006). As one of primary constructs that has emerged in efforts to apply positive psychological constructs to the field of disability, Shogren et al. (2006) explored associations between positive psychology constructs and self-determination, a general psychological construct that has been applied both in positive psychology and in special education, with students with and without disabilities. The study demonstrated comparability in the measurement and reported strong interrelationships in both groups. However, these strengths-based approaches are not yet fully adopted within disability or psychology (Wehmeyer & Shogren, 2014). Shogren (2013b) reviewed abstracts of articles published in *The Journal of Positive Psychology* since its inception in 2006 to 2011, and found that only 4% of articles (six abstracts of the 162 articles) explicitly mentioned people with disabilities or people with health-related issues that could be associated with disability. Although this review found a limited focus on disability issues within positive psychology, it is an important development that researchers in the field of positive psychology are interested in disability-related issues and, though only now emerging, disability issues are receiving attention within the broader field of positive psychology (Shogren, 2013b).

A Functional Model of Self-Determination

Within positive psychology and disability, an increased emphasis has been placed on self-determination as a general psychological construct to take into account the agentic nature of human actions and pursuing optimal human functioning and well-being (Ryan & Deci, 2000; Wehmeyer & Little, 2013). Working from this perspective, a functional model or theory of self-determination was developed and applied in disability research in the education of students with disabilities beginning in the early 1990s (Wehmeyer, 1992, 1996a, 2001, 2005; Wehmeyer, 2003).

Wehmeyer (1992) proposed a definition of self-determined behavior, revised in 1996, as "attitudes and abilities required to act as the primary causal agent in one's life and making choices and decisions regarding one's quality of life free from undue external influence or interference" (Wehmeyer, 1996, p. 24). The notion of causal agency is at the heart of this definition and theoretical perspective (Wehmeyer, 2003). Wehmeyer (2003) noted that "people who are causal agents make or cause something to happen in their lives; in other words, they act volitionally, intentionally, and purposefully to achieve a meaningful end" (p. 53). Research with the functional model linked self-determination to a more positive quality of life (Wehmeyer & Schwartz, 1998; Lachapelle et al., 2005; Nota, Ferrari, Soresi, & Wehmeyer, 2007; Shogren et al., 2006). Schalock (1996) proposed eight core dimensions of quality of life, including self-determination, and suggested that quality of life is best utilized as an organizing principle to guide policy and practice to enhance the life conditions of all people (independent of disability status). Wehmeyer (2005) refined the functional model's definition of self-determination, suggesting that "self-determined behavior refers to volitional actions that enable one to act as the primary causal agent in one's life and to maintain or improve one's quality of life" (p. 117).

Accordingly, self-determined behavior refers to actions that are identified by four essential characteristics: "(a) the person acts *autonomously*; (b) the behavior is *self-regulated*; (c) the person initiates and responds to the event(s) in a *psychologically empowered manner*; and (d) the person acts in *self-realizing manner*" (Wehmeyer, Kelchner, & Richards, 1996, p. 633). These four essential characteristics describe the function of the behavior that enables individuals to act as causal agents in their lives and to become self-determined or not (Wehmeyer, 2003; Wehmeyer & Field, 2007; Wehmeyer, 2013).

The functional model of self-determination was an integrative theory in that was based on a motivational construct and theories of human agency; therefore, it focused on how people learn, grow, and develop to improve the quality of their lives (Wehmeyer, 1999; Wehmeyer, 2013; Wehmeyer, 2003). Within the wide range of research to which it has been applied in psychology and education, this theory has explained how people become self-determined and exert control in their lives and, consequently, has provided a framework for the development of interventions to promote greater self-determination (Wehmeyer et al., 2003). Figure 1 depicts the functional model. Wehmeyer (1999) proposed three primary factors impact the emergence of self-determination (Figure 1): "(a) individual capacity, as influenced by learning and development; (b) opportunity, as influenced by environments and experiences, and (c) supports and accommodations" (Wehmeyer, 2003, p. 179). As shown in Figure 1, the functional model of self-determination proposed that "the environments in which people live and work influence the way supports are provided and have an impact on the opportunities many people with intellectual disability have to experience and enhance their self-determination and improve their quality of life, as well as prescribe, to a certain extent, the degree to which personalized, independent supports can be provided." (Wehmeyer, 2003, p. 179). Although studies that have examined the

functional model primarily focused on people with intellectual and developmental disabilities, Wehmeyer and colleagues purposefully approached the theoretical development in such a way as to make the model applicable for all persons, regardless of the presence or severity of disability (Wehmeyer, 1999).

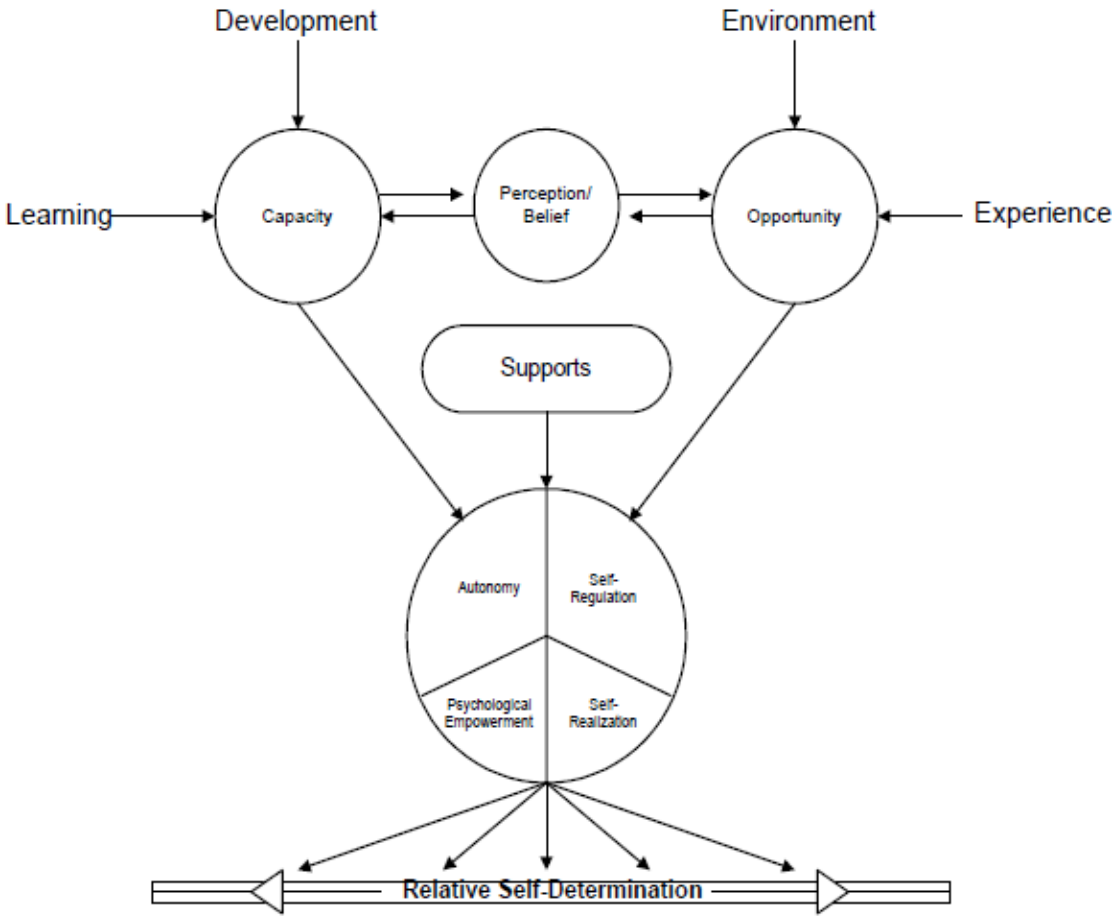

Figure 1. Wehmeyer's funcitonal model of self-determination. Adapted from "A Functional Model of Self-Determination: Describing Development and Implementing Instruction." By M. L. Wehmeyer, 1999, Focus on Autism and Other Developmental Disabilities, 14, p. 62.

Causal Agency Theory and Self-Determination

The functional model of self-determination and its application has extended a range of its meaning, practices, and environments over quarter century (Shogren, Wehmeyer, Palmer,

Forber-Pratt, et al., 2015). The emergence of the discipline of positive psychology supported the importance of this research by addressing self-determination is a construct to pursue optimal human functioning and well-being. In addition, "a strength-based approach and focus on improving the fit between the person's capacities and the demands of the environment or context (Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015, p.255)" has changed the views of how disability itself is understood and affected practice and theory in self-determination. As mentioned above, researchers in the field of self-determination in the context of special education conducted and provided a vast array of evidences that promoting self-determination as an evidenced-practice in secondary education and transition (Cobb, Lehmann, Newman-Gonchar, & Alwell, 2009; Test et al., 2009). More recent research provided causal evidence of the importance of self-determination for more positive school and post-school outcomes (Powers et al., 2012; Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015; Wehmeyer, Palmer, Shogren, Williams-Diehm, & Soukup, 2013). As a result of developments in positive psychology and the emergence of strengths-based approaches to disability, it became evident that a reconceptualization of the functional model to provide a common understanding of "the use of the self-determination construct in both special education and positive psychology" would be useful (Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015, p.255).

As such, Shogren and colleagues (2015) proposed Causal Agency Theory as an extension and reconceptualization of the functional theory of self-determination (Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015) (see Figure 2). Self-determination is defined within Causal Agency Theory as a "…dispositional characteristic manifested as acting as the causal agent in one's life. Self-determined people (i.e., causal agents) act in service to freely chosen goals. Self-determined actions function to enable a person to be the causal agent is his or her life"

(Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015, p.258). Causal Agency Theory retained the basic understanding and framework introduced by the functional model, but focused more on the role of causal action and incorporated research and theory that had emerged over the intervening years in motivational and positive psychology. Shogren and colleagues (2015) defined several key terms and assumptions from Causal Agency Theory:

- A dispositional characteristic is an enduring tendency used to characterize and describe differences between people;
- Causal agency refers to making or causing things to happen in one's life;
- Self-caused action refers to the degree to which behavior is volitional and agentic, driven by beliefs about the relationships between actions and ends (Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015, p.258).

In addition, Causal Agency Theory proposed three essential characteristics of self-determined action: "(a) volitional action that refers to making a conscious choice based upon one's preferences, (b) agentic action refers to actions that are self-regulated and self-directed, and (c) action-control beliefs refers to a sense of personal empowerment" (Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015, p.259). Comparing Causal Agency Theory with the functional model with regard to essential characteristics, volitional action includes autonomous functioning, agentic action includes self-regulation, and action-control beliefs include psychological empowerment and self-realization. Additional component constructs in Causal Agency Theory include self-initiation, self-direction, pathways thinking, control expectancy, agency beliefs, and causality beliefs.

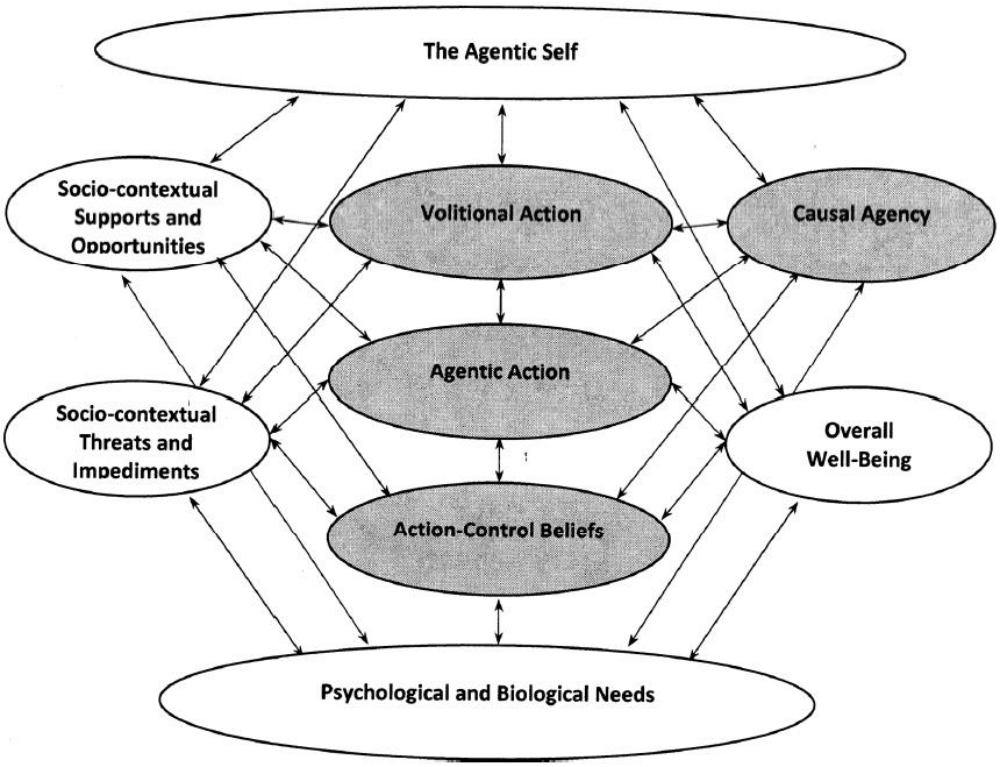

Figure 2. The multiple layers of human agency. Adapted from "Causal Agency Theory: Reconceptualizing a Functional Model of Self-Determination" By K.A. Shogren, M. L. Wehmeyer, S. B. Palmer, A. J. Forber-Pratt, T. J. Little, and S. Lopez, 2015, *Education and Training in Autism and Developmental Disabilities, 50*, p. 257.

Emergence of Issues and Application of Self-Determination

Researchers working within the functional model and Causal Agency Theory frameworks have expanded their work promoting the self-determination of people with disabilities in a wide array of social, political, and educational settings. To a degree, the emergence of a focus on self-determination in special education was an outcome of the Normalization Movement (Wolfensberger, 1972) of the 1980s, which emphasized supporting people with disabilities to experience independence, integration, and self-determination (Nirje, 1969). Nirje's call for attention to self-determination for people with intellectual disability was the earliest such mention of the topic in the disability literature, and until the early 1990s was the only such call. This changed, over the 25 years, an emphasis on improving the quality of life for people with

disabilities by embracing efforts to promote and value self-determination has emerged (Shogren et al., 2007). Such policy advances included mandates in the Individuals with Disabilities Education Act (IDEA) reauthorization of 2004 that "improving educational results for children with disabilities is an essential element of our national policy of ensuring equality of opportunity, full participation, independent living, and economic self-sufficiency for individuals with disabilities" (20 U.S.C. Sec. 1400 (c)(1)). In addition, the Rehabilitation Act Amendments of 1973, as amended in 1998 (P.L. 93-651, 29 U.S.C. Sec. 794), and Americans with Disabilities Act of 1990 (P.L. 101-336, 42 U.S.C. Secs. 12101 *et seq*.) emphasized the rights of individuals to make choices about their lives, state their preferences and goals, and live independently (Field, 1996). Between 1990 and 1996, the U.S. Department of Education, Office of Special Education and Rehabilitation Services (OSERS) supported projects to develop models to promote the self-determination of youth with disabilities (Field & Hoffman, 2002; Wehmeyer et al., 2013). Programs supported through this initiative led to improvements in federal legislation to address self-determination as well as an increase in the number of educational settings promoting the self-determination of students with disabilities.

As self-determination emerged as a valued concept in special education and transition, promoting self-determination became established as an evidence-based practice to enhance positive school and transition outcomes for students with disabilities (Algozzine, Browder, Karvonen, Test, & Wood, 2001; Cobb et al., 2009; Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015; Test et al., 2009). Studies have been conducted to examine the effects of interventions to promote students' self-determination (Lee et al, 2011, 2012; Powers et al., 2012; Wehmeyer et al., 2012, 2013), access to the general education curriculum and academic outcomes (Konrad, Fowler, Walker, Test, & Wood, 2007; Lee, Wehmeyer, Palmer, Soukup, &

Little, 2008; Shogren, Palmer, Wehmeyer, Williams-Diehm, & Little, 2012), and transition-related outcomes (Lee et al., 2011; Martin et al., 2006; Shogren, Wehmeyer, Palmer, Rifenbark et al., 2015; Wehmeyer & Palmer, 2003; Wehmeyer & Schwartz, 1997).

In addition, a growing body of literature, including meta-synthesis studies, has documented the importance of self-determination as a critical component of secondary education services and as linked to more positive academic, social, and adult outcomes (Cobb et al., 2009; Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015; Test et al., 2009). Research has examined and established a relationship between self-determination and more positive post-school outcomes, including employment, independent living, and quality of life, for youth and young adults with disabilities (Lee, Wehmeyer, & Shogren, 2015; Shogren et al., 2012; Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015). For example, Shogren and colleagues (2012) implemented the *Self-Determined Learning Model of Instruction*, a model of teaching based on the principles of self-determination, with 312 high school students with intellectual disability or learning disabilities. They found significantly higher attainment of academic goals and scores reflecting improved access to the general education curriculum for students who were in the treatment group compared to students in the control group. Recently, Shogren and colleagues (2015) investigated the degree to which promoting self-determination resulted in more positive post-school outcomes for 779 young adults with disabilities who received interventions to promote self-determination. These researchers found that youth who were provided instruction to promote self-determination became more self-determined and, subsequently, achieved more positive employment, and community access outcomes.

Measurements of Self-Determination

Given the general consensus about the importance of self-determination, various measures of self-determination have been developed for adolescents with disabilities (Wehmeyer, 2013). Several such assessments have been developed, including the American Institutes for Research (AIR) Self-Determination Scale (Wolman, Campeau, DuBois, Mithaug, & Stolarski, 1994); The Arc's Self-Determination Scale (Wehmeyer & Kelchner, 1995); the Minnesota Self-Determination Skills, Attitudes, and Knowledge Evaluation Scale (Abery, Stancliffe, Smith, McGrew, & Eggebeen, 1995); the ChoiceMaker Self-Determination Assessment (Martin & Marshall, 1995); and the Self-Determination Knowledge Scale (Hoffman, Field, & Sawilowsky, 2004). Although each assessment measures self-determination in a different way, most of these measures focus on student areas of strengths and instructional needs in order to plan, monitor, and evaluate effectiveness of instructional programming and curricula (Martin & Marshall, 1997; Shogren et al., 2008; Wehmeyer & Kelchner, 1995). Only two of these measures, however, are norm-referenced, standardized measures of self-determination: The Arc's Self-Determination Scale (Wehmeyer & Kelchner, 1995) and the AIR Self-Determination Scale (Wolman et al., 1994) (Shogren et al., 2008; Wehmeyer & Mithaug, 2006). The Arc's Self-Determination Scale (SDS) (Wehmeyer & Kelchner, 1995) was developed to operationalize the functional theory of self-determination discussed previously and provides data on four essential characteristics (autonomous functioning, self-regulation, psychological empowerment, and self-realization) of self-determined behaviors as domain scores (Wehmeyer, 1999). The AIR Self-Determination Scale (Wolman et al., 1994) was developed based on assumptions that adaptive capacity and environmental opportunity affect prospects for self-determination (Mithaug, Campeau, & Wolman, 2003). Self-determination was viewed as a

function of the interplay between available opportunities and an individual's ability to engage and control events to produce personal gain. The AIR assesses students' adjustment capability and opportunities for self-determined engagement at school and home (Mithaug et al., 2003). Each assessment has been utilized in published research examining the relationship between and among self-determination and individual and ecological predictors (Shogren et al., 2007; Wehmeyer & Garner, 2003); post-school outcomes (Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015; Wehmeyer, Palmer, Soukup, Garner, & Lawrence, 2007); differences between students with and without disabilities on levels of self-determination (Mithaug et al., 2003; Shogren et al., 2006; Shogren et al., in press); differences in self-determination across various disability categories (Chou, Wehmeyer, Palmer, & Lee, in press; Seo, Wehmeyer, Palmer, & Little, 2015; Seong, Wehmeyer, Palmer, & Little, 2015; Wehmeyer, 1996); and to evaluate the impact of interventions to promote self-determination (Shogren et al., 2012; Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015; Wehmeyer et al., 2013; Wehmeyer, Palmer, Lee, Williams-Diehm, & Shogren, 2011).

Among these measures of self-determination, the SDS has been the most widely used and reported in the field of special education, including having items from the measure included as a part of the data collection for a federally funded longitudinal study, the National Longitudinal Transition Study-2 (NLTS2) (Newman et al., 2011). The NLTS2 is a companion study to the original NLTS, through which data were collected from 2000 to 2010 with the intent to explore the secondary school and post-school experiences of youth with disabilities served under IDEA. To further identify the factors that impacted the post-school outcomes of students with disabilities, such as self-determination, NLTS2 included a subset of items from the SDS (Shogren, Kennedy, Dowsett, & Little, 2014).

The Adolescent Self-Determination Assessment (ASDA) (Wehmeyer, Lopez, & Shogren, 2007) is an adapted version of the SDS that was developed to assess the level of self-determination of youth and young adults with and without disabilities. The ASDA is based on items of the SDS, including all items included in the NLTS2 survey, but used revised language and altered components related to a disability-specific contexts to make it more useful with adolescents without disabilities. Subsequently, the Adolescent Self-Determination Assessment-Short form (ASDA-S) (Wehmeyer, Little, Lopez, & Shogren, 2011) was created to increase the utility and feasibility of application with the expanded populations of adolescents and young adults with and without disabilities. The ASDA-S has been included in data collection for the third wave of the NLTS study as well as is being utilized in a national study of the impact of post-secondary education on students with intellectual and developmental disabilities. Although the ASDA-S was developed by selecting items from the ASDA that were sensitive to students with and without disabilities (and that appeared in the NLTS2 survey), there is a need to examine measure's reliability and validity to advance its application to educational practice and to provide such information for the NLTS 2012 study and other current uses.

Validity

Validity is the extent to which a test measures what it is supposed to measure. According to Technical Recommendations (AERA, APA, NCME, 1999), types of validity can be divided into content validity, criterion validity, and construct validity. As the present study examined the validity of the ASDA-S, construct validity and criterion validity were examined.

Construct validity is the degree to which a test measures an intended hypothetical construct. From a series of studies establishing the theoretical construct of a scale, construct validity can be tested by the pattern of results obtained across all studies using the scale. This

pattern should satisfy several criteria: "(a) the scale should correlate highly with other, well established measures of the same construct; (b) the scale should correlate much lower with measures of quite different constructs; and (c) scale scores should vary as a function of relevant contexts or conditions" (Widaman, Little, Preacher, & Sawalani, 2011, p. 50). Criterion-related validity is established by "examining the predictive or concurrent correlations of a focal scale with key variables that are identified as criteria" (Widaman et al., 2011, p. 49). The stronger criterion validity of the scale can be accomplished by the stronger correlation of a scale with a criterion measure. Thus, this can be examined the relationship between the scale developed and conceptually related measures, the criterion, that are administered at the same time.

Research Questions

As previously documented, the ASDA-S has been recently developed and there is a need to validate the scale's psychometric properties to advance its application. So, the primary purpose of this study is to establish the scale's validity by examining the relationship among and between individual characteristics and self-determination.

Study 1: Examining the construct validity in individual characteristics, including gender, age, and disability category, of adolescents and young adults with and without disabilities. As a preliminary process before conducting validity studies of the ASDA-S, reliability was established following the recommendation of working with already-created short forms within the context of the secondary data analysis. Assuming that levels of reliability will be underestimated in a short form consisting of fewer items from the original form, coefficient omega was recommended over coefficient alpha to estimate the reliability from the existing data set (Widaman et al., 2011). Based upon a literature review, specific research questions were investigated and provided with null hypothesis (H_0^x) and alternative hypotheses (H_a^x) below.

1. Does the ASDA-S have acceptable internal consistency coefficients when administered to a selected sample of adolescents and young adults with and without disabilities?

   H_{0^1}: The ASDA-S does not have acceptable internal consistency coefficients when administered to a selected sample of adolescents and young adults with and without disabilities.

   H_{a^1}: The ASDA-S does have acceptable internal consistency coefficients when administered to a selected sample of adolescents and young adults with and without disabilities.

2. Can the ASDA-S be confidently given to adolescents and young adults with disabilities regardless of gender?

   H_{0^2}: Construct comparability, as demonstrated by strong factorial invariance testing of the manifest indicators, cannot be established for adolescents and young adults with disabilities in the ASDA-S by gender.

   H_{a^2}: Construct comparability, as demonstrated by strong factorial invariance testing of the manifest indicators, can be established for adolescents and young adults with disabilities in the ASDA-S by gender.

3. Are there mean level differences in the ASDA-S for adolescents and young adults with disabilities by gender?

   H_{0^3}: There are not mean level differences in the ASDA-S for adolescents and young adults with disabilities by gender.

   H_{a^3}: There are mean level differences in the ASDA-S for adolescents and young adults with disabilities by gender.

4. Can the ASDA-S be confidently given to adolescents and young adults with disabilities regardless of age?

   H_0^4: Construct comparability, as demonstrated by strong factorial invariance testing of the manifest indicators, cannot be established for adolescents and young adults with disabilities in the ASDA-S by age.

   H_a^4: Construct comparability, as demonstrated by strong factorial invariance testing of the manifest indicators, can be established for adolescents and young adults with disabilities in the ASDA-S by age.

5. Are there mean level differences in the ASDA-S for adolescents and young adults with disabilities by age?

   H_0^5: There are not mean level differences in the ASDA-S for adolescents and young adults with disabilities by age.

   H_a^5: There are mean level differences in the ASDA-S for adolescents and young adults with disabilities by age.

6. Can the ASDA-S be comparably used with adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities?

   H_0^6: Construct comparability, as demonstrated by strong factorial invariance testing of the manifest indicators, cannot be established in the ASDA-S for adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities.

H_{a^6}: Construct comparability, as demonstrated by strong factorial invariance testing of the manifest indicators, can be established in the ASDA-S for adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities.

7. Are there mean level differences in the ASDA-S for adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities?

   H_{0^7}: There are not mean level differences in the ASDA-S for adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities.

   H_{a^7}: There are mean level differences in the ASDA-S for adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities.

Study 2: Examining the criterion validity of the ASDA-S with other self-determination assessments, including the AIR-Student version and the original form of the ASDA, of adolescents and young adults with and without disabilities. Based upon a literature review, specific research questions will be investigated and provided with null hypothesis (H_{0^x}) and alternative hypotheses (H_{a^x}) below.

8. Are constructs measured by the ASDA-S and by the AIR-Student version for adolescents and young adults with disabilities highly correlated?

   H_0^8: Constructs measured by the ASDA-S and by the AIR-Student version for adolescents and young adults with disabilities are not highly correlated.

   H_a^8: Constructs measured by the ASDA-S and by the AIR-Student version for adolescents and young adults with disabilities are highly correlated.

9. Are higher-order constructs of the ASDA-S and the AIR-Student version for adolescents and young adults with disabilities highly correlated?

   H_0^9: Each higher-order construct created by the ASDA-S and the AIR-Student version for adolescents and young adults with disabilities are not highly correlated.

   H_a^9: Each higher-order construct created by the ASDA-S and the AIR-Student version for adolescents and young adults with disabilities are highly correlated.

10. Are counterpart constructs of the ASDA-S and the ASDA for adolescents with and without disabilities highly correlated?

    H_0^{10}: Counterpart constructs of the ASDA-S and the ASDA for adolescents with and without disabilities are not highly correlated.

    H_a^{10}: Counterpart constructs of the ASDA-S and the ASDA for adolescents with and without disabilities are highly correlated.

CHAPTER 2: EXAMINING THE CONSTRUCT VALIDITY OF THE ASDA-S IN INDIVIDUAL CHARACTERISTICS, INCLUDING GENDER, AGE, AND DISABILITY CATEGORY, OF ADOLESCENTS AND YOUNG ADULTS WITH AND WITHOUT DISABILITIES

Seligman's call for a positive psychology--a new science of human strengths--initiated a research focus emphasizing strengths and moving away from research that viewed the individual as a passive vessel responding to stimuli (Seligman, 1999). Seligman defined positive psychology as a "reoriented science that emphasizes the understanding and building of the most positive qualities of an individual" (Seligman, 1999, p. 559). Along with greater attention from researchers in positive psychology on positive attributes and emotions, theory and practice in disability fields has gradually moved from the examination of pathology to the promotion of human functioning and, thus, has created an impetus to consider issues of disability within the framework of positive psychology (Buntinx, 2013). Although these changes occurred independently in the fields of positive psychology and disability, they shared the concepts of promoting "the good life" for all with an emphasis on universality of disability across the spectrum of typical human functioning (Shogren, 2013b, p. 23). For most of the history of the psychology and disability fields, a deficit-based model of functioning dominated, with a focus on curing or remediating individuals' problems; these understandings have increasingly been replaced by positive and strengths-based models that view disability as part of, and not apart from, the continuum of typical human functioning (Shogren, 2013b).

Efforts to change scientific and societal views of disability have been supported by understanding and successfully applying positive psychological constructs in the disability context. To provide systematic support for people with disabilities, the social-ecological

approach emphasizes the importance of identifying mismatches between personal capacities and environmental demands and addressing the supports needed to reduce these mismatches (Buntix & Schalock, 2010; Shogren, 2013a). Specifically, the social-ecological model emphasizes systems of supports to build individually-valued environments to optimize human functioning for people with disabilities by shifting views from the outcome of promoting *normal* or *typical* human functioning to promoting the maximum desirable quality-of-life outcomes that each person experiences (Schalock, Gardner, & Bradley, 2007; Thompson et al., 2009). As such, within positive psychology and a social-ecological model of disability, strengths-based approaches have been emphasized to promote *the good life* for all people by achieving optimal functioning, building on a person's strengths, and promoting positive traits and experiences (Shogren et al., 2006).

Along with positive psychology and strengths-based approaches, the field of disability has increasingly focused attention on self-determination and understanding ways to enable people to act as a causal agent to pursue optimal human functioning and well-being (Ryan & Deci, 2000; Wehmeyer & Little, 2013). Within the disability literature, one of the empirically validated theories of self-determination was the functional theory of self-determination (Wehmeyer, 1996; 1999). Wehmeyer defined self-determination as referring to "volitional actions that enable one to act as the primary causal agent in one's life and to maintain or improve one's quality of life" (Wehmeyer, 2005, p. 117). This theoretical framework provided a foundation for the growing literature base pertaining to self-determination and has driven research demonstrating the importance of and benefits related to the promotion of self-determination.

Recently, Causal Agency Theory has emerged as an extension and reconceptualization of the functional model. Causal Agency Theory retains some of the basic understandings from the functional model of self-determination and serves to provide a linkage between current research in positive and motivational psychology. Causal Agency Theory defines self-determination as a "…dispositional characteristic manifested as acting as the causal agent in one's life. Self-determined *people* (i.e., causal agents)" act in service to freely chosen goals. Self-determined actions function to enable a person to be the causal agent is his or her life (Shogren, Wehmeyer, Palmer, Forber-Pratt et, al., 2015, p.258)". Self-determined *action* is emphasized in this theory, and it is characterized by three essential elements: (a) volitional action (self-initiated and function to enable a person to act autonomously), (b) agentic action (self-regulated and self-directed), and (c) action-control beliefs (a sense of personal empowerment, including control expectancy, capacity beliefs, and causality beliefs) (Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015, p. 259). Promoting self-determination has been emphasized both in the field of special education and general education and has been related to positive life outcomes for people with disabilities for almost two decades, especially in secondary education. Specifically, a growing body of literature has documented the importance of self-determination as a critical component of secondary education services and as linked to more positive academic, social, and adult outcomes (Cobb et al., 2009; Fowler, Konrad, Walker, Test, & Wood, 2007; Wehmeyer & Palmer, 2003; Wehmeyer & Schwarz, 1997; Wehmeyer, Palmer, et al., 2007).Along with research to determine the effectiveness of promoting self-determination, there was a need for measuring self-determination as a function of personal characteristics, contexts, or as a function of interventions designed to enhance self-determination. The functional model of self-determination identified four essential characteristics of self-determined behavior: autonomous

functioning, self-regulation, psychological empowerment, and self-realization (Wehmeyer et al., 1996). The Arc's Self-Determination Scale (SDS) (Wehmeyer & Kelchner, 1995) was developed to enable students (with support from educators as needed) to self-assess strengths and limitations and as a tool to empower students to become self-determined by providing information related to self-determination (Wehmeyer & Field, 2007). For example, from the SDS, students gain knowledge about which environments, instructional strategies, and curricular materials enhance or impede their self-determination and determine goals and instructional programming to promote self-determination. As the SDS was designed based upon the functional model of self-determination to measure overall self-determination, students also are provided four domain scores aligned with the four essential characteristics in the model. The SDS is one of only a few standardized measure of self-determination and its utility has been validated across extensive studies covering a variety of participants, settings, and cultures (Seo et al., 2012; Shogren et al., 2014; Ginevra, Nota, Soresi, Shogren, Wehmeyer, & Little, 2015). Specifically, there has been a significant amount of research using the SDS that has emerged since its publication, including research examining individual and environmental factors (Carter, Lane, Pierson, & Glaeser, 2006; Chou et al., in press; Nota et al., 2007; Seo et al., 2012; Shogren et al., 2007; Wehmeyer & Garner, 2003), reporting effectiveness of interventions (Lee et al., 2011, 2012; Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015; Wehmeyer et al., 2013), examining relationships between promoting self-determination and accessing to the general education curriculum (Lee et al., 2008), validating the scale's reliability (Shogren et al., 2008), and establishing the causal relationship between self-determination and positive postschool outcomes (Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2105; Wehmeyer et al., 2013).

As strengths-based approaches to disability have emerged, the need to consider issues of self-determination and disability in the context of typical environments and contexts has increased and there has emerged a need for a tool that was useful with people with and without disabilities (Spooner, Dymond, Smith & Kennedy, 2006; Wehmeyer, Lance & Bashinski, 2002; Wehmeyer, Yaeger, Bolding, Agran & Hughes, 2003). There is a need to conduct research that moves beyond a disability-specific context or disability-only populations. To meet the need for a reliable and valid measure to achieve this and to be able to examine levels of self-determination across youth with and without disabilities, a modified version of SDS, titled the Adolescent Self-Determination Assessment (ASDA) (Wehmeyer, Lopez, & Shogren, 2007), was developed. The ASDA removed items and elements related to disability-specific contexts. As an initial evaluation of the measure's utility, Shogren and colleagues (2006) used the ASDA to examine associations between positive psychological constructs, self-determination, and life satisfaction for adolescents with and without cognitive disabilities.

Due to the increased demands for a measure that would take less time to administer, within inclusive settings and with a wider population, the Adolescent Self-Determination Assessment-Short form (ASDA-S) (Wehmeyer, Little, et al., 2011) was developed. As it is a new assessment (or, more accurately, a new version of an existing assessment), there has been no in-depth examinations of what is being measured. The purpose of this study was to test measurement invariance models to examine whether the ASDA-S is assessing the same concept across groups. Thus, the primary purpose of this study was to examine psychometrics, such as reliability and validity, of the ASDA-S with examinations of these models across individual characteristics, including gender, age, and disability category, of adolescents and young adults with and without disabilities. Reliability, an indicator of the overall consistency of a measure

across replications, was examined for the ASDA-S based on Widaman and colleagues' (2011) recommendations. That is, assuming that levels of reliability will be underestimated in a short form consisting of fewer items from the original form, coefficient omega was recommended over coefficient alpha to estimate the reliability from the existing data set (Widaman et al., 2011). The analyses in this study addressed four main research questions and provided below as follows:

1. Does the ASDA-S have acceptable internal consistency coefficients when administered to a selected sample of adolescents and young adults with and without disabilities?
2. Are self-determination constructs differently measured for adolescents and young adults with disabilities regardless of gender?
    2-1. Can the ASDA-S be confidently given to adolescents and young adults with disabilities regardless of gender?
    2-2. Are there mean level differences in the ASDA-S for adolescents and young adults with disabilities by gender?
3. Are self-determination constructs differently measured for adolescents and young adults with disabilities regardless of age?
    3-1. Can the ASDA-S be confidently given to adolescents and young adults with disabilities regardless of age?
    3-2. Are there mean level differences in the ASDA-S for adolescents and young adults with disabilities by age?
4. Are self-determination constructs differently used with adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism,

emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities?

4-1. Can the ASDA-S be comparably used with adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities?

4-2. Are there mean level differences in the ASDA-S for adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities?

Method

Participants

In this study, four analyses were conducted: reliability, analysis by gender, analysis by age, and analysis by disability characteristics. For reliability, the first analysis involving adolescents and young adults with and without disabilities was conducted with 1,851 participants. As shown in Table 1, the sample included 31.9% female participants (n = 590) and 48.7% male participants (n = 901) with 19.4% missing data for gender (n = 360). Age distribution is provided in Table 1 (M = 17.85; SD = 48.62). Most participants were Caucasian (n = 807; 43.6%) and other races/ethnicities are shown in Table 1: African American (n = 270; 14.6%); Hispanic (n = 261; 14.1%); Asian or Pacific Islander (n = 20; 1.1%); Native American/Alaskan Native (n = 14; 0.8%); other (n = 16; 0.8%); and missing data (n = 463; 25.0%).

Table 1

Demographic Characteristics of the Participants with and without Disabilities

Characteristics	*n*	%
Gender		
Female	590	31.9
Male	901	48.7
Missing	360	19.4
Age		
11	7	0.5
12	34	1.9
13	77	4.4
14	114	6.3
15	229	12.4
16	330	17.8
17	177	9.4
18	157	8.5
19	84	4.6
20	27	1.6

21	9	0.6
22	3	0.2
Missing	603	32.6
Disability Group		
No Disabilities	430	23.2
ADD or ADHD	59	3.2
EBD	128	6.9
Hearing Impairment	9	0.5
ID	368	19.9
Speech	37	2.0
OHI	91	4.9
Autism	66	3.6
LD	611	33
Physical Disability	5	0.3
TBI	11	0.6
Vision Impaired	3	0.2
Missing	33	1.8
Race/Ethnicity		
Caucasian	807	43.6
African American	270	14.6
Hispanic	261	14.1
Asian or Pacific Islander	20	1.1
Native American/Alaskan Native	14	0.8
Other	16	0.8
Missing	463	25.0
Total	1,851	100

Note. ADD or ADHD = Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; OHI = Other Health Impairment; LD = Learning Disabilities; and TBI = Traumatic Brain Injury.

For reliability, the second analysis included only adolescents and young adults with disabilities, and included 1,421 participants. The sample included 39% female (n = 554) and 61% male (n = 867) with no missing data, as shown in Table 2. Age distribution is provided in Table 2 (M = 16.48; SD = 1.83). Most participants were Caucasian (n = 807; 56.8%) and other races/ethnicities are shown in Table 2: African American (n = 270; 19.0%); Hispanic (n = 261; 18.4%); Asian or Pacific Islander (n = 20; 1.4%); Native American/Alaskan Native (n = 14;

1.0%); Other (*n* = 16; 1.1%); and missing data (*n* = 33; 2.3%). Distribution of disability characteristics are represented in Table 2.

Table 2

Demographic Characteristics of the Participants with Disabilities

Characteristics	*n*	%
Gender		
Female	554	39
Male	867	61
Missing	0	0
Age		
11	7	0.5
12	34	2.4
13	77	5.4
14	114	8.0
15	229	16.1
16	330	23.2
17	177	12.5
18	157	11.0
19	84	5.9
20	27	1.9
21	9	0.6
22	3	0.2
Missing	173	12.2
Disability Group		
ADD or ADHD	59	4.2
EBD	128	9.0
Hearing Impairment	9	0.6
ID	368	25.9
Speech	37	2.6
OHI	91	6.4
Autism	66	4.6
LD	611	43.0
Physical Disability	5	0.4
TBI	11	0.8
Visual Impairment	3	2.0
Missing	33	2.3
Race/Ethnicity		
Caucasian	807	56.8
African American	270	19.0

Hispanic	261	18.4
Asian or Pacific Islander	20	1.4
Native American/Alaskan Native	14	1.0
Other	16	1.1
Missing	33	2.3
Total	1,421	100

Note. ADD or ADHD = Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; OHI = Other Health Impairment; LD = Learning Disabilities; and TBI = Traumatic Brain Injury.

For the analysis by gender**,** due to lack of demographic information with participants without disabilities**,** 1,356 adolescents and young adults with disabilities were included. The sample includes 38.4% female (*n* = 521) and 61.6% male (*n* = 835) with no missing data, as shown in Table 3. The analysis of age across individuals with disabilities ranged from 11 to 22 years and age distribution is provided in Table 3 (*M* = 16.50; *SD* = 1.83). Most participants were Caucasian (*n* = 769; 56.7%) and other races/ethnicities are shown in Table 3: African American (*n* = 258; 19.0%); Hispanic (*n* = 250; 18.5%); Asian or Pacific Islander (*n* = 17; 1.3%); Native American/Alaskan Native (*n* = 13; 1.0%); Other (*n* = 16; 1.1%); and missing data (*n* = 33; 2.4%). Distribution of disability characteristics are represented in Table 3.

Table 3

Demographic Characteristics of the Participants with Disabilities for Gender Analysis

Characteristics	*n*	%
Gender		
Female	521	38.4
Male	835	61.6
Missing	0	0
Age		
11	7	0.5
12	29	2.1
13	70	5.2
14	109 (111)	8.0
15	218 (259)	16.1
16	311 (405)	22.9
17	169 (201)	12.5

18	150 (153)	11.1
19	84	6.2
20	25	1.8
21	9	0.7
22	3	0.2
Missing	172 (0)	12.7
Disability Group		
ADD or ADHD	59	4.4
Autism	66	4.9
EBD	128	9.4
ID	373	27.5
LD	611	45.1
OHI	91	6.7
Missing	33	2.3
Race/Ethnicity		
Caucasian	769	56.7
African American	258	19.0
Hispanic	250	18.5
Asian or Pacific Islander	17	1.3
Native American/Alaskan Native	13	1.0
Other	16	1.1
Missing	33	2.4
Total	1,356	100

Note. ADD or ADHD = Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; and OHI = Other Health Impairment.

For analysis by age, as demographic information was not enough to include students without disabilities in the analysis, 1,356 adolescents and young adults with disabilities were included. The sample included 38.4% female (n = 521) and 61.6% male (n = 835) with no missing data, as shown in Table 4. The analysis of age across individuals with disabilities ranged from 11 to 22 years and age distribution is provided in Table 3 (M = 16.50; SD = 1.83). There were 12 individual age groups. However, seven groups were created for this analysis due to limited sample sizes from ages of 11 to 13 and ages of 19 to 22 as described in Table 2: one pre-adolescent group (11 to 13 years), five individual adolescent groups (14, 15, 16, 17, and 18), and one young adult group (19 to 22 years). Age distribution by groups are represented in Table

4. Most participants were Caucasian (*n* = 769; 56.7%) and other races/ethnicities are shown in Table 2: African American (*n* = 258; 19.0%); Hispanic (*n* = 250; 18.5%); Asian or Pacific Islander (*n* = 17; 1.3%); Native American/Alaskan Native (*n* = 13; 1.0%); other (*n* = 16; 1.1%); and missing data (*n* = 33; 2.4%). Distribution of disability categories are represented in Table 4.

Table 4.

Demographic Characteristics of the Participants with Disabilities for Age Group Analysis

Characteristics	*n*	%
Gender		
Female	521	38.4
Male	835	61.6
Missing	0	0
Age (Imputed)		
11 to 13 years old	106	7.8
14	111	8.2
15	259	19.1
16	405	29.9
17	201	14.8
18	153	11.3
19 to 22 years old	121	8.9
Disability Group		
ADD or ADHD	59	4.4
Autism	66	4.9
EBD	128	9.4
ID	373	27.5
LD	611	45.1
OHI	91	6.7
Missing	33	2.3
Race/Ethnicity		
Caucasian	769	56.7
African American	258	19.0
Hispanic	250	18.5
Asian or Pacific Islander	17	1.3
Native American/Alaskan Native	13	1.0
Other	16	1.1
Missing	33	2.4
Total	1,356	100

Note. ADD or ADHD = Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; and OHI = Other Health Impairment.

The analysis by disability status was conducted with 1,786 adolescents and young adults with and without disabilities. As shown in Table 5, the sample included 31.2% female (*n* = 557), 48.7% male (*n* = 869), and missing data (*n* = 360; 20.2%). Age information of adolescents and young adults without disabilities was not collected; However, age distribution of individuals with disabilities whose ages were between 11 and 22 years is provided in Table 5 (*M* = 16.50; *SD* = 1.83). Most participants were Caucasian (*n* = 807; 43.6%) and other races/ethnicities are shown in Table 5: African American (*n* = 270; 14.6%); Hispanic (*n* = 261; 14.1%); Asian or Pacific Islander (*n* = 20; 1.1%); Native American/Alaskan Native (*n* = 14; 0.8%); other (*n* = 16; 0.8%); and missing data (*n* = 463; 25.0%). Lastly, to analyze the difference across disability characteristics, the sample included youth without disabilities and young people within each of the seven disability statuses as shown in Table 5.

Table 5

Demographic Characteristics of the Participants with and without Disabilities

Characteristics	*n*	%
Gender		
Female	557	31.2
Male	869	48.7
Missing	360	20.2
Age		
11	7	0.4
12	29	1.6
13	70	3.9
14	109	6.1
15	218	12.2
16	311	17.4
17	169	9.5

18	150	8.4
19	84	4.7
20	25	1.4
21	9	0.5
22	3	0.2
Missing	602	33.7
Disability Group		
Without Disabilities	430	24.1
ADD or ADHD	59	3.3
Autism	66	4.9
EBD	128	7.2
ID	373	20.9
LD	611	34.2
OHI	91	5.1
Missing	28	1.6
Race/Ethnicity		
Caucasian	769	43.1
African American	258	14.4
Hispanic	250	14.0
Asian or Pacific Islander	17	1.0
Native American/Alaskan Native	13	0.7
Other	16	0.8
Missing	463	25.9
Total	1,786	100

Note. ADD or ADHD = Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; and OHI = Other Health Impairment.

Procedures

This study involved a secondary data analysis of data from previously collected data. Baseline (pre-intervention) data from multiple studies of the effects of interventions to promote self-determination were used to compile this dataset, including studies involving both adolescents with and without disabilities. All participants provided informed consent to participate in the research and district research consent was obtained in each case.

After all levels of informed consent and assents were completed, baseline data were collected prior to intervention implementation. Baseline data included demographic information

and items on the ASDA-S. Although the data used in these analyses were collected through the auspices of several intervention studies examining the self-determination of students with and without disabilities, participants for each project were recruited in the same manner to provide a consistent overall sample and for the purpose of this study, only baseline data used in the analysis.

Measurement

The Adolescent Self-Determination Assessment-Short Form. The Adolescent Self-Determination Assessment (ASDA) (Wehmeyer, Lopez, & Shogren, 2007) was developed to provide a measure of self-determination for youth with and without disabilities. The ASDA was a revision of The Arc's Self-Determination Scale (SDS) (Wehmeyer & Kelchner, 1995), which is widely used in special education research to identify student strengths and areas of support and instructional need in self-determination. The SDS provides data on overall self-determination and on four essential characteristics of self-determined behavior (Wehmeyer, 2003). Subscale scores can be calculated for each essential characteristic, including autonomous functioning, self-regulation, psychological empowerment, and self-realization, as well as total self-determination scores. With a total of 72 items, the overall total score available is 148 points and subscale scores can be calculated by users as well. Higher scores indicate higher levels of self-determination. The SDS was validated with 500 students with intellectual and developmental disabilities and learning disabilities across five states in the U.S. and provided acceptable reliability and validity (Wehmeyer, 1996b).

The ASDA includes revised items from the SDS that removed language pertaining to disability-specific content. To achieve this, a panel of adolescents without disabilities reviewed each item on the SDS to rate its appropriateness for them and made recommendations for

wording changes. For example, item 33 in the SDS used "vocational class," but it was changed to "a class" as shown in Appendix A. Other than changing wording to be more appropriate for youth without disabilities, constructs and item numbers in the SDS were not changed. So, like the SDS, the ASDA includes 72 items with four subscales which describe essential characteristics of self-determined behavior.

To address the need for an assessment that could be completed in a shorter time (half an hour or less), the Adolescent Self-Determination Assessment-Short Form (ASDA-S) (Wehmeyer, Little, et al., 2011) was developed. Developers used item analysis to identify a subset of items within each of the four ASDA domains that had the highest technical adequacy and predictive quality. This resulted in a reduction of items from 72 to 28, with each domain (autonomous functioning, self-regulation, psychological empowerment, and self-realization) having seven items, as seen in Appendix B. Section I, Autonomous functioning, includes 7 items (questions 1-7) rated on a 0 to 3 scale with a higher score indicating greater levels of autonomous functioning (0 = *I do not do even if I have the chance*; 1 = *I do sometimes when I have the chance*; 2 = *I do most of the time I have the chance*; and 3 = *I do every time I have the chance*). There are 21 points possible in this section. Section II, Self-Regulation, consists of two subdomains, including interpersonal cognitive problem solving and goal setting and task performance. The first subdomain includes six items (questions 8-13) and is scored on a scale of 0 to 2 points having 12 possible points as a total. Scoring depends on the effectiveness of the solution to resolve the problem. The other subdomain question has one item (question 14) asking students to identify a transportation goal and steps they need to take to achieve this goal. Scores are rated on a 0 to 3 scale with higher score indicating higher levels of self-regulation (0 = *have no plan*; 1 = *have a goal, but no steps for reaching that goal*; 2 = *have a goal with 1 or 2*

steps for reaching that goal; and 3 = *have a goal with 3 or 4 steps for reaching that goal*). Section II has 15 points possible. Section III, Psychological Empowerment, comprises seven items (questions 15-21) and students choose the best answers that describe themselves. Scores are rated on a 0 to 1 scale (0 = *do not reflect a psychologically empowered belief or attitude*; and 1 = *reflect psychological empowerment*) and total points can be as high as seven, with higher scores representing higher levels in psychological empowerment. Section IV, Self-Realization, has seven items (questions 22-28) and scores are rated with either 0 or 1 point based on the direction of the answer to measure individual self-knowledge and self-awareness. Higher scores indicate higher levels of self-realization. The ASDA-S overall total score available is 50 points.

Analytic Procedure

Four analyses and four different configurations of the sample/dataset were used in this study. The main research questions are listed below:

- Main research question 1: Reliability (data only with disabilities & data including participants without disabilities)
- Main research question 2: Analysis across gender (Female vs. Male)
- Main research question 3: Analysis across age (11-13, 14, 15, 16, 17, 18, and 19-22)
- Main research question 4: Analysis across disability groups (attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities)

For the first main research question, regarding reliability, two sets of data were used as shown in Table 1 and Table 2. Research questions two and three shared the same data. However,

for research question three, data were modified by grouping the age variable in seven groups instead of twelve groups, as shown in Table 4. For the last research question, Table 5 provides demographic information that includes students without disabilities compared to Table 3 and Table 4. Although different analyses were conducted, this study shared the same process for data preparation. Explanation of each analysis follows after an explanation of the data preparation process.

Pre-modeling steps. Prior to each analysis, data screening and data preparation were completed, including (a) rescaling variables, (b) parceling, and (c) missing data analysis. First, rescaling variables was performed by using the proportion of maximum scoring (POMS) process, which is an efficient way to transform variables to be on a similar metric without changing the shape of the distribution or the magnitude of an association between any of the variables (Little, 2013). Autonomous functioning item response options varied from 0 to 3, Self-Regulation item response options varied from a 0 to 2 and 0 to 3 scale, and Psychological Empowerment and Self-Realization response options varied from 0 to 1. POMS was computed separately in each domain by (the observed score for each question – the minimum possible score on each domain of the ASDA-S)/(the maximum possible score on each domain of the ASDA-S – the minimum possible score on each domain of the ASDA-S) (Cohen, Cohen, Aiken, & West, 1999).

Second, parcels were created for each subscale through a process of parceling that involves "an aggregate-level indicator comprised of the sum (or average) of two or more items, responses, or behaviors" (Little, Cunningham, Shahar, & Widaman, 2002, p. 152). Models based on parceled data are more efficient compared with item-level data by increasing reliability, communality, and ratio of common-to-unique factor variance (Little, 2013; Little et al., 2002).

Four latent constructs were provided in the measurement model by the ASDA-S that indicated the four essential characteristics of self-determined behavior: Autonomous functioning (AUTO), Self-Regulation (SREG), Psychological Empowerment (PSYE), and Self-Realization (SREA). For each latent construct, three parcels were created to maintain a just-identified model using a balancing approach that "assigns the item with the highest item-scale correlation to be paired with the item that has the lowest-item scale correlation" (Little, 2013). After parcels were created, each parcel was used as manifest indicator of the latent construct. Means, standard deviations, and correlations among created parcels within each group are provided in Appendix C (main research question 2), Appendix D (main research question 3), and Appendix E (main research question 4).

Third, after parcels were created, there was a small amount of missing data on a number of variables. The overall average percentages of missing data values were approximately 2.5% (ranging from 0 to 3.2) and 2.025% (ranging from 0 to 2.5). Full-information maximum likelihood (FIML) estimation was used for the study with missing data, which is a state-of-the-art approach that uses all information to inform the parameters' values and standard errors to prevent the potential deleterious effects of not including all data. Missing data were utilized by Mplus version 7.0 (Muthén & Muthén, 2012). Especially for research question three, analysis by age group, age was a grouping variable and missing data was 12.7%. The imputation model was estimated based on the average of the 100 imputed age variables. Using the totality of information within our data set to impute the missing data, we could maintain important characteristics of our data set and improve our ability to calculate unbiased and efficient parameter estimates (Graham et al., 2003). Table 4 represents estimates for age groups after imputing missing data. To improve recapturing lost information in age, additional analysis has

been included in the process of treating missing data. Auxiliary variables were created using principal components analysis (PCA)(Howard, Rhemtulla, & Little, 2015). An auxiliary variable is a variable that is not part of the model of substantive interest, but includes variables that are either correlates of missingness or correlates of incomplete variables into the analysis model or imputation process (Graham, 2003). Inclusion of auxiliary variables increase power and reduces bias. Once the auxiliary variables have been included in the imputation model, subsequent analyses involving the imputed data benefit from the auxiliary variables, whether or not those variables appear in the analysis of substantive interest. As Graham (2003) found reasonable approaches for inclusion of auxiliary variables into SEM/FIML models, these methods worked well with incorporating auxiliary variables in this analysis. In addition, PCA reduces the number of possible auxiliary variables in effective and practical ways, including the benefits of inclusive strategy. Therefore, this analysis used PCA technique creating auxiliary variables (Howard et al. 2015) and ten auxiliary variables were created and used in Mplus version 7.0 (Muthén & Muthén, 2012). This process was conducted for research questions two and three. Research questions one and four used FIML to treat missing data, as mentioned previously.

Main Research Question One.

Internal Consistency Reliability. To examine the reliability of the Adolescent Self-Determination Assessment-Short form (ASDA-S; Wehmeyer, Little, et al., 2011), internal consistency reliability was reported by computing coefficient omega (McDonald, 1970, 1999). Coefficient alpha (Cronbach, 1951) has been widely used as an estimator of reliability; however, coefficient omega is more suitable for most research applications because coefficient alpha is grounded in the *tau-equivalent model*, which assumes equal factor loadings within a certain construct. This assumption is violated when multiple factors underlie items on a scale.

Coefficient omega is usually greater than or equal to coefficient alpha (Widaman et al., 2011). Coefficient omega was recommended over coefficient alpha to estimate the reliability because (a) factor loadings for all scale items are unequal and (b) levels of the reliability are underestimated in a short form that consists of fewer items from the original form (Widaman et al., 2011). To examine coefficient omega, we used maximum likelihood estimation in Mplus version 7.4 (Muthén & Muthén, 1998-2015) and fixed factor variances to 1.0. Based on a factor analysis of the variance-covariance matrix, coefficient omega was estimated from the following equation (Widaman et al., 2011):

$$\omega = \frac{\left(\sum \lambda_j\right)^2}{\left(\sum \lambda_j\right)^2 + \sum \theta_j^2} = 1 - \frac{\sum \theta_j^2}{s_x^2}$$

Main Research Question Two, Three, and Four.

Measurement Invariance Testing. Structural equation modeling (SEM) was used to test main research questions two, three, and four. Researchers are able to identify the relationships between observed and latent variables in flexible and powerful ways using SEM (Little, 2013). The procedure includes measurement models with structural models. The measurement models specify the relationships among latent and observed variables (i.e., indicators) and the structural models indicate the relationships among latent factors. In so doing, SEM is beneficial to examine cross-group similarities and differences among latent variables (Kline, 2011). Once measurement equivalence is established, statistical comparisons across groups of the means, variances, correlations, and regression relationships among the latent constructs is done (Little, 2013).

For research questions two to four, factorial invariance tests examined the measurement equivalence in constructs across gender, age, and disability characteristics. To establish the

relationship of constructs among these groups, gender analysis contained two groups and age and disability analyses included seven groups for each analysis based on the theoretical literature review and the result from the preliminary analysis. The ASDA-S has seven manifest indicators for each construct and four constructs were examined: Autonomous functioning (AUTO), Self-Regulation (SREG), Psychological Empowerment (PSYE), and Self-Realization (SREA). To evaluate hypothesized measurement and structural models in multiple-groups, analyses consisted of three sequential steps across all sub-studies in this study. The following steps are recommended for the multiple-groups SEM invariance evaluation to establish measurement invariance (Brown, 2015; Little, 2013): (a) null model, (b) configural invariance, (c) weak invariance, and (d) strong factorial invariance. First, configural invariance testing examines a model fit based on manifest variables to determine if the model has the same pattern of fixed and freed parameters across several groups. Second, the weak invariance testing investigates the equality of corresponding factor loadings for each construct across the groups at the same time. Third, strong invariance testing examines the equality of indicator means by constraining the corresponding intercepts for each construct across groups. Measurement invariance constraints are considered tenable when the nested model of the Root Mean Square Error of Approximation (RMSEA) value falls into the RMSEA confidence interval for the less constrained model. In addition, the changes in Comparative Fit Index (CFI) were examined. If the change is less than .01, this indicates the nested model is tenable (Cheung & Rensvold, 2002; Little, 1997). For the invariance testing, the change in CFI guideline was considered as robust to model complexity and sample size (Cheung & Rensvold, 2002; Little, 2013). For main research questions two and three, effects coding method of scaling (Little, Bovaird, & Slegers, 2006) was used to set the scale because it is both non-arbitrary and provides a real scale. As the loadings average is 1.0

using effects coding method, all estimated loadings provide an unbiased and optimal balance of the information with meaningful interpretation (Little, 2013). This method was also conducted to set the average of intercepts to be 0 to provide a real scale (Little, 2013). For main research question four, fixed factor method was used because of the characteristics of the analysis. The aforementioned three steps were conducted three times for each main research question, including gender, age, and disability characteristics. As all three analyses include the same indicator and constructs, Figure 3 displays the measurement model for the analysis across groups of gender, age, and disabilities. Once strong invariance was established, tests of population heterogeneity were performed to examine the latent construct parameters (Little, 2013). Comparing latent parameters included testing equality of factor variance/covariance matrices and equality of latent means in each group. Chi-square difference tests were performed to examine the equality of factor variances and covariances and the equality of latent means using the strong invariance model as a baseline model.

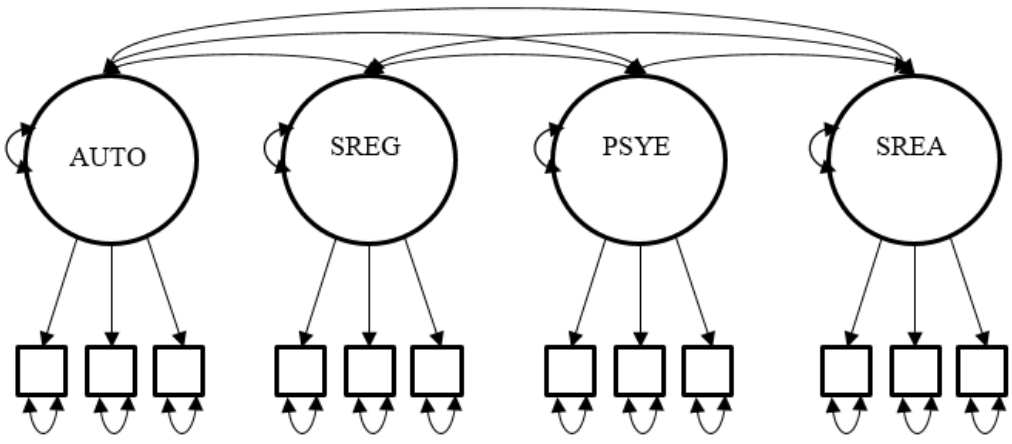

Figure 3. Hypothesized measurement model of the ASDA-S in the analyses of gender, age, and disability category. AUTO = Autonomous functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; and SREA=Self-Realization.

Results

Main Research Question One

The ASDA-S was normed with 1,851 youth and young adults with and without disabilities and reported excellent reliability (Coefficient Omega = .97). Coefficient omega for the autonomous functioning domain was .96, for the self-regulation domain was .97, for the psychological empowerment domain was .97, and for the self-realization domain was .98. In addition, the ASDA-S was normed with 1,421 youth and young adults with disabilities and reported strong reliability (Coefficient Omega = .97). Specifically, coefficient omega for the autonomous functioning domain was .97, for the self-regulation domain was .97, for the psychological empowerment domain was .93, and for the self-realization domain was .98. These results are shown in Table 6.

Table 6

Coefficient Omega of the Adolescent Self-Determination Assessment-Short Form

	Adolescents with & without Disabilities (*N* = 1,851)	Adolescents with Disabilities (*N* = 1,421)
Overall	.97	.97
Autonomous functioning	.96	.97
Self-Regulation	.97	.97
Psychological Empowerment	.97	.93
Self-Realization	.98	.98

Main Research Question Two

Measurement model for each group. The CFA model for each gender group demonstrated good fit, χ^2 (48) = 83.872, CFI = 0.987, TLI = 0.982, RMSEA = 0.030 (0.019-0.041),

and SRMR= 0.029 for the male group and χ^2 (48) = 96.529, CFI = 0.973, TLI = 0.963, RMSEA = 0.044 $_{(0.031\text{-}0.057)}$, and SRMR= 0.042 for the female group.

Testing measurement parameters. Measurement parameter comparisons follow three steps subsequently: configural invariance, weak invariance, and strong invariance. First, the configural invariance model was acceptable: χ^2 (96) = 186.401, CFI = .982, TLI = .975, and RMSEA = .036 $_{(.028 - .044)}$. This indicates that male and female groups have the same pattern of fixed and freed parameters in each self-determination construct. Second, weak factorial invariance was established by equating corresponding factor loadings across each group. These results were considered based on one of these criteria, whether the RMSEA value of the less constrained model fell within the 90% RMSEA confidence interval or if the CFI changed less than 0.01 (Cheung & Rensvold, 2002). Accepted weak factorial model indicates that corresponding factor loadings are equivalent across the two groups. Third, the strong invariance model was accepted by the same criteria used for the weak invariance model, representing that corresponding intercepts are equivalent across the two groups. Table 7 indicates fit indices to examine measurement invariances. In addition, Table 8 reports parameter estimates, including loadings, intercept values, residuals, R^2, and latent variances for the strong factorial invariance model in each parcel. For chi-square difference tests, the .001 criterion was used to determine the tenable model, due to the chi-square test's sensitivity to sample size (Brannick, 1995; Kelloway, 1995).

Table 7

Fit Indices for the Nested Sequence in the Two-Group CFA (Gender)

Model	$\chi 2$	*df*	*p*	$\Delta\chi 2$	Δ *df*	*p*	RMSEA	RMSEA 90% CI	CFI	TLI	Constraint Tenable?
Measurement model estimates											
Independence (null)	4865.602	156	0.000	---	---	---	---	---	---	---	---
Configural invariance[1]	180.401	96	0.000	---	---	---	0.036	0.028 –0.044	0.982	0.975	---
Weak invariance[1]	198.666	104	0.000	---	---	---	0.037	0.029 - 0.045	0.979	0.974	Yes
Strong invariance[1]	211.847	112	0.000	---	---	---	0.037	0.029 - 0.044	0.978	0.974	Yes
with age and disability status (covariates)	358.295	208	0.000	---	---	---	0.035	0.029 - 0.042	0.954	0.939	---
with sig. paths (covariates)[3]	433.624	249	0.000	75.33	41	0.001	0.036	0.030 - 0.041	0.943	0.937	Yes
Latent model estimates											
Homogeneity of Var/Cov[2]	240.965	122	0.000	29.118	10	0.001	---	---	---	---	Yes
Tests of the latent means[2]	244.918	116	0.000	33.071	4	0.000	---	---	---	---	No
with sig. paths (covariates)[4]	469.955	253	0.000	36.331	4	0.000	---	---	---	---	No

1 Evaluated with RMSEA and CFI Model Test, a change in CFI of .01 or less is used.

2 Evaluated with $\chi 2$ Difference Test. Each nested model contains its constraints, plus the constraints of all previous tenable models.

3 Evaluated with $\chi 2$ Difference Test. This model is nested in the model of "strong invariance with age and disability status (covariates)".

4 Evaluated with $\chi 2$ Difference Test. This model is nested in the model of "strong invariance with significant paths with age and disability status (covariates)".

Table 8

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
AUTO (MALE): Estimated Latent Variance = 0.039					
AT 1	0.983 (0.026)	0.008 (0.018)	0.795	0.368	0.632
AT 2	1.015 (0.027)	0.008 (0.019)	0.717	0.486	0.514
AT 3	1.002 (0.026)	-0.016 (0.018)	0.717	0.486	0.514
AUTO (FEMALE) : Estimated Latent Variance = 0.036					
AT 1	0.983 (0.026)	0.008 (0.018)	0.799	0.361	0.639
AT 2	1.015 (0.027)	0.008 (0.019)	0.713	0.491	0.509
AT 3	1.002 (0.026)	-0.016 (0.018)	0.729	0.469	0.531
SREG (MALE) : Estimated Latent Variance = 0.038					
SG 1	0.940 (0.030)	0.051 (0.015)	0.726	0.473	0.527
SG 2	1.037 (0.030)	-0.066 (0.015)	0.713	0.492	0.508
SG 3	1.023 (0.030)	0.015 (0.015)	0.702	0.508	0.492
SREG (FEMALE) : Estimated Latent Variance = 0.039					
SG 1	0.940 (0.030)	0.051 (0.015)	0.726	0.473	0.527
SG 2	1.037 (0.030)	-0.066 (0.015)	0.742	0.449	0.551
SG 3	1.023 (0.030)	0.015 (0.015)	0.729	0.469	0.531
PSYE (MALE) : Estimated Latent Variance = 0.022					
PY 1	1.038 (0.053)	-0.056 (0.046)	0.626	0.608	0.392
PY 2	0.952 (0.056)	0.031 (0.048)	0.481	0.769	0.231
PY 3	1.009 (0.053)	0.024 (0.046)	0.536	0.713	0.287
PSYE (FEMALE) : Estimated Latent Variance = 0.015					
PY 1	1.038 (0.053)	-0.056 (0.046)	0.585	0.658	0.342
PY 2	0.952 (0.056)	0.031 (0.048)	0.421	0.823	0.177
PY 3	1.009 (0.053)	0.024 (0.046)	0.611	0.627	0.373
SREA (MALE): Estimated Latent Variance = 0.071					
SA 1	0.996 (0.019)	-0.009 (0.016)	0.835	0.302	0.698
SA 2	0.998 (0.019)	0.016 (0.016)	0.818	0.332	0.668
SA 3	1.006 (0.020)	-0.007 (0.016)	0.787	0.381	0.619

Indicator	Equated Estimates		Standardized		
	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
SREA (FEMALE) : Estimated Latent Variance = 0.076					
SA 1	0.996 (0.019)	-0.009 (0.016)	0.840	0.294	0.706
SA 2	0.998 (0.019)	0.016 (0.016)	0.803	0.354	0.646
SA 3	1.006 (0.020)	-0.007 (0.016)	0.826	0.318	0.682

Note. AUTO = Autonomous functioning; AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SREG = Self-Regulation; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PSYE = Psychological Empowerment; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SREA = Self-Realization; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

Testing latent parameters. As the strong invariance model was accepted, structural invariance models were conducted that enable the comparison of latent parameters: (a) equality of factor variances/covariances and (b) the equality of latent means. First, as shown in Table 7, the equality of variances and covariances across the two groups was tenable. The strong invariance model was set as a baseline and chi-square difference test was conducted to establish the homogeneity of variances/covariances ($\Delta \chi^2$ (122) = 240.965, p = .001). The tenable result from the variances and covariances test suggested that the residual variances are equivalent in male and female groups (Brown, 2015).

Second, equality of latent means was examined using chi-square difference tests based on the model with significant age and disability paths as covariates to control for their impacts on the latent constructs. To test the latent mean invariance model, controlling age and disability status on each self-determination construct, age and disability variables were included as covariates. Chi-square difference tests were conducted to establish the adequate model. As disability status was a nominal variable, dummy variables were created. In this analysis, there were six disability statuses, so five dummy codes were included. The model including age and disability status as a covariate was created, and then included significant paths using the

criteria .05. As the model was not tenable using the .05 criteria, having too many constraints to the model, we adjusted to the .01 criteria and began to add one path at a time, including the largest p-value, until the model was tenable. As seen in Table 7, a strong invariance model with significant paths, including age and disability status as a covariate, was established and used to compare latent means (χ^2 (249) = 433.624, CFI = .943, TLI = .937, and RMSEA = .036 $_{(.030 - .041).}$ As seen in Table 7, the equality of latent means across two groups was not established, $\Delta\chi^2$ (4) = 36.331, $p < .0001$. The result shows that two groups differ in their levels of the self-determination constructs. Follow-up mean difference tests were conducted to determine where the differences originated. Table 9 indicates that autonomous functioning ($\Delta\chi^2$ (1) = 18.586, p <.0001), self-regulation ($\Delta\chi^2$ (1) = 14.917, p <.0001), and psychological empowerment ($\Delta\chi^2$ (1) = 16.613, p <.0001) constructs have different mean levels between the two groups, however, the effect sizes are small in these constructs as shown in Table 9 (Cohen, 1988). Specifically, the female group tends to have greater autonomous functioning, self-regulation, and psychological empowerment as compared to the male group as shown in Table 10.

Table 9

Tests for Latent Mean Differences Across Gender

Model	$\chi 2$	*df*	*p*	$\Delta\chi 2$	Δ *df*	*p*	Constraint Tenable?	Effect size[2]
Strong invariance with sig. paths of covariates (Baseline Model)	433.624	249	0.00	---	---	---	---	---
Latent Mean Invariance with Sig. Paths of Covariates[1]	469.955	253	0.00	36.331	4	0.000	No	---
AUTO[1]	452.210	250	0.00	18.586	1	0.000	No	0.364
SREG[1]	448.541	250	0.00	14.917	1	0.000	No	0.326
PSYE[1]	450.237	250	0.00	16.613	1	0.000	No	0.380
SREA[1]	438.508	250	0.00	4.884	1	0.027	Yes	---

Note. AUTO = Autonomy; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

[1] Evaluated with $\chi 2$ Difference Test. This model is nested in the model of "Strong invariance with sig. paths of age and disability status (covariates)".

[2] Effect size is latent *d*, where $d = (\alpha_2-\alpha_1)/\sqrt{\frac{(n_1 * \psi_1 + n_2 * \psi_2)}{n_1 + n_2}}$; α_2 and α_1 are the estimated means in latent variable metric; n_2 and n_1 are the sample size for each group; ψ_2 and ψ_1 are the estimated latent variances of the distributions around the latent means of α_2 and α_1, respectively. χ^2 = chi-square value; *df* = degrees of freedom; *p* = *p* value; $\Delta\chi^2$ = changes in chi-square values.

Table 10

Latent Means Across Gender

	Male		Female	
Group	*M*	*S.E.*	*M*	*S.E.*
AUTO	0.688	0.010	0.756	0.012
SREG	0.520	0.009	0.580	0.012
PSYE	0.853	0.007	0.902	0.009
SREA	0.875	0.007	0.902	0.010

Note. Unstandardized values are presented. AUTO = autonomous functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

Main Research Question Three

Measurement model for each seven group. The CFA model for each of seven age groups demonstrated good fit, χ^2 (48) = 65.192, CFI = 0.947, TLI = 0.927, RMSEA = 0.058 (0.002-0.091), and SRMR= 0.060 for the age group of 11 to 13 year olds, χ^2 (48) = 87.439, CFI = 0.898, TLI = 0.859, RMSEA = 0.086 (0.057-0.114), and SRMR= 0.057 for the age group of 14 year olds, χ^2 (48) = 68.287, CFI = 0.979, TLI = 0.971, RMSEA = 0.040 (0.014-0.061), and SRMR= 0.042 for the age group of 15 year olds, χ^2 (48) = 105.569, CFI = 0.962, TLI = 0.948, RMSEA = 0.055 (0.041-0.069), and SRMR= 0.051 for the age group of 16 year olds, χ^2 (48) = 70.197, CFI = 0.967, TLI = 0.954, RMSEA = 0.048 (0.020-0.072), and SRMR= 0.059 for the age group of 17 year olds, χ^2 (48) = 47.323, CFI = 1.000, TLI = 1.002, RMSEA = 0.000 (0.000-0.052), and SRMR= 0.049 for the age group of 18 year olds, and χ^2 (48) 83.123 =, CFI = 0.899, TLI = 0.861, RMSEA = 0.079 (0.050-0.108), and SRMR= 0.076 for the age group of 19 to 22 years olds.

Testing measurement parameters. The series of tests of measurement invariance models were conducted in the same manner illustrated in the previous main research question for

two comparing gender groups, including configural invariance model, weak invariance model, and strong invariance model. The configural invariance model demonstrated good model fit: χ^2 (336) = 527.130, CFI = .959, TLI = .943, and RMSEA = .036 $_{(.028 - .044)}$, displaying that self-determination constructs are maintaining their general measurement integrity across the seven age groups. The weak and strong invariance models were also accepted with the CFI criterion (i.e., ΔCFI < .01), describing that corresponding factor loadings and intercepts are equivalent across the seven age groups as shown in Table 11. Fit indices for the nested sequences of measurement invariance models are shown in Table 11. Tables 12, 13, 14. and 15 report parameter estimates for each construct, including loadings and intercept values, residuals, R^2, and latent variances from the strong factorial invariance model in each parcel.

Table 11

Fit Indices for the Nested Sequence in the Seven-Group CFA (Ages of 11-13, 14, 15, 16, 17, 18, and 19-22)

Model	$\chi 2$	*df*	*p*	$\Delta\chi 2$	Δ *df*	*p*	RMSEA	RMSEA 90% CI	CFI	TLI	Constraint Tenable?
Measurement model estimates											
Independence (null)	5808.790	606	0.000	---	---	---	---	---	---	---	---
Configural invariance[1]	527.130	336	0.000	---	---	---	0.036	0.028 –0.044	0.959	0.943	---
Weak invariance[1]	604.488	384	0.000	---	---	---	0.037	0.029 - 0.045	0.953	0.943	Yes
Strong invariance[1]	678.373	432	0.000	---	---	---	0.037	0.029 - 0.044	0.947	0.943	Yes
with gender and disability status (covariates)	1174.758	772	0.000	---	---	---	0.037	0.032 - 0.043	0.918	0.898	---
with sig. paths (covariates)[3]	1378.517	915	0.000	203.76	143	0.001	0.025	0.046 - 0.058	0.906	0.901	Yes
Latent model estimates											
Homogeneity of Var/Cov[2]	1004.381	492	0.000	326.008	60	0.000	---	---	---	---	No
Tests of the latent means[2]	815.698	456	0.000	137.330	24	0.000	---	---	---	---	No
with sig. paths (covariates)[4]	1512.545	939	0.000	134.028	24	0.000	---	---	---	---	No

1 Evaluated with RMSEA and CFI Model Test, a change in CFI of .01 or less is used.
2 Evaluated with $\chi 2$ Difference Test. Each nested model contains its constraints, plus the constraints of all previous tenable models.
3 Evaluated with $\chi 2$ Difference Test. This model is nested in the model of "strong invariance with gender and disability status (covariates)".
4 Evaluated with $\chi 2$ Difference Test. This model is nested in the model of "strong invariance with significant paths with gender and disability status (covariates)".

Table 12

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances of Autonomous Functioning Construct

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
11 to 13 years old: Estimated Latent Variance = 0.043					
AT 1	0.978 (0.025)	0.012 (0.018)	0.784	0.385	0.615
AT 2	1.024 (0.027)	0.001 (0.019)	0.760	0.422	0.578
AT 3	0.998 (0.026)	-0.013 (0.018)	0.724	0.476	0.524
14 years old : Estimated Latent Variance = 0.033					
AT 1	0.978 (0.025)	0.012 (0.018)	0.786	0.382	0.618
AT 2	1.024 (0.027)	0.001 (0.019)	0.651	0.576	0.424
AT 3	0.998 (0.026)	-0.013 (0.018)	0.703	0.506	0.494
15 years old : Estimated Latent Variance = 0.039					
AT 1	0.978 (0.025)	0.012 (0.018)	0.816	0.334	0.666
AT 2	1.024 (0.027)	0.001 (0.019)	0.747	0.442	0.558
AT 3	0.998 (0.026)	-0.013 (0.018)	0.705	0.503	0.497
16 years old : Estimated Latent Variance = 0.032					
AT 1	0.978 (0.025)	0.012 (0.018)	0.763	0.418	0.582
AT 2	1.024 (0.027)	0.001 (0.019)	0.703	0.506	0.494
AT 3	0.998 (0.026)	-0.013 (0.018)	0.696	0.516	0.484
17 years old : Estimated Latent Variance = 0.040					
AT 1	0.978 (0.025)	0.012 (0.018)	0.817	0.333	0.667
AT 2	1.024 (0.027)	0.001 (0.019)	0.715	0.489	0.511
AT 3	0.998 (0.026)	-0.013 (0.018)	0.746	0.443	0.557
18 years old : Estimated Latent Variance = 0.051					
AT 1	0.978 (0.025)	0.012 (0.018)	0.827	0.317	0.683
AT 2	1.024 (0.027)	0.001 (0.019)	0.784	0.385	0.615
AT 3	0.998 (0.026)	-0.013 (0.018)	0.786	0.383	0.617
19 to 22 years old: Estimated Latent Variance = 0.038					
AT 1	0.978 (0.025)	0.012 (0.018)	0.769	0.409	0.591
AT 2	1.024 (0.027)	0.001 (0.019)	0.700	0.510	0.490
AT 3	0.998 (0.026)	-0.013 (0.018)	0.704	0.504	0.496

Note. AT 1 = Parcel 1; AT 2 = Parcel 2; AT 3 = Parcel 3.

Table 13

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances of Self-Regulation Construct

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
11 to 13 years old : Estimated Latent Variance = 0.039					
SG 1	0.919 (0.028)	0.061 (0.015)	0.759	0.425	0.575
SG 2	1.030 (0.029)	-0.064 (0.015)	0.767	0.411	0.589
SG 3	1.050 (0.030)	0.002 (0.015)	0.731	0.466	0.534
14 years old : Estimated Latent Variance = 0.030					
SG 1	0.919 (0.028)	0.061 (0.015)	0.725	0.475	0.525
SG 2	1.030 (0.029)	-0.064 (0.015)	0.662	0.562	0.438
SG 3	1.050 (0.030)	0.002 (0.015)	0.708	0.498	0.502
15 years old : Estimated Latent Variance = 0.033					
SG 1	0.919 (0.028)	0.061 (0.015)	0.668	0.553	0.447
SG 2	1.030 (0.029)	-0.064 (0.015)	0.703	0.505	0.495
SG 3	1.050 (0.030)	0.002 (0.015)	0.706	0.502	0.498
16 years old : Estimated Latent Variance = 0.033					
SG 1	0.919 (0.028)	0.061 (0.015)	0.681	0.536	0.464
SG 2	1.030 (0.029)	-0.064 (0.015)	0.665	0.558	0.442
SG 3	1.050 (0.030)	0.002 (0.015)	0.687	0.529	0.471
17 years old : Estimated Latent Variance = 0.037					
SG 1	0.919 (0.028)	0.061 (0.015)	0.701	0.509	0.491
SG 2	1.030 (0.029)	-0.064 (0.015)	0.740	0.452	0.548
SG 3	1.050 (0.030)	0.002 (0.015)	0.754	0.431	0.569
18 years old : Estimated Latent Variance = 0.048					
SG 1	0.919 (0.028)	0.061 (0.015)	0.733	0.463	0.537
SG 2	1.030 (0.029)	-0.064 (0.015)	0.792	0.372	0.628
SG 3	1.050 (0.030)	0.002 (0.015)	0.778	0.395	0.605
19 to 22 years old : Estimated Latent Variance = 0.049					
SG 1	0.919 (0.028)	0.061 (0.015)	0.765	0.415	0.585
SG 2	1.030 (0.029)	-0.064 (0.015)	0.755	0.430	0.570
SG 3	1.050 (0.030)	0.002 (0.015)	0.768	0.411	0.589

Note. SG 1 = Parcel 1; SG 2 = Parcel 2; SG 3 = Parcel 3.

Table 14

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances of Psychological Empowerment Construct

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
11 to 13 years old : Estimated Latent Variance = 0.021					
PY 1	1.040 (0.052)	-0.056 (0.046)	0.537	0.712	0.288
PY 2	0.941 (0.055)	0.041 (0.048)	0.444	0.803	0.197
PY 3	1.019 (0.055)	0.016 (0.048)	0.490	0.760	0.240
14 years old : Estimated Latent Variance = 0.035					
PY 1	1.040 (0.052)	-0.056 (0.046)	0.760	0.423	0.577
PY 2	0.941 (0.055)	0.041 (0.048)	0.581	0.662	0.338
PY 3	1.019 (0.055)	0.016 (0.048)	0.616	0.620	0.380
15 years old : Estimated Latent Variance = 0.025					
PY 1	1.040 (0.052)	-0.056 (0.046)	0.669	0.552	0.448
PY 2	0.941 (0.055)	0.041 (0.048)	0.508	0.742	0.258
PY 3	1.019 (0.055)	0.016 (0.048)	0.537	0.711	0.289
16 years old : Estimated Latent Variance = 0.013					
PY 1	1.040 (0.052)	-0.056 (0.046)	0.551	0.697	0.303
PY 2	0.941 (0.055)	0.041 (0.048)	0.406	0.835	0.165
PY 3	1.019 (0.055)	0.016 (0.048)	0.520	0.729	0.271
17 years old : Estimated Latent Variance = 0.012					
PY 1	1.040 (0.052)	-0.056 (0.046)	0.548	0.700	0.300
PY 2	0.941 (0.055)	0.041 (0.048)	0.343	0.882	0.118
PY 3	1.019 (0.055)	0.016 (0.048)	0.538	0.711	0.289
18 years old : Estimated Latent Variance = 0.013					
PY 1	1.040 (0.052)	-0.056 (0.046)	0.454	0.794	0.206
PY 2	0.941 (0.055)	0.041 (0.048)	0.346	0.881	0.119
PY 3	1.019 (0.055)	0.016 (0.048)	0.540	0.709	0.291
19 to 22 years old : Estimated Latent Variance = 0.028					
PY 1	1.040 (0.052)	-0.056 (0.046)	0.723	0.477	0.523
PY 2	0.941 (0.055)	0.041 (0.048)	0.531	0.718	0.282
PY 3	1.019 (0.055)	0.016 (0.048)	0.705	0.503	0.497

Note. PY 1 = Parcel 1; PY 2 = Parcel 2; PY 3 = Parcel 3.

Table 15

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances of Self-Realization Construct

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
11 to 13 years old : Estimated Latent Variance = 0.026					
SA 1	0.989 (0.018)	-0.003 (0.015)	0.630	0.604	0.396
SA 2	0.994 (0.019)	0.019 (0.016)	0.614	0.624	0.376
SA 3	1.016 (0.019)	-0.017 (0.016)	0.572	0.672	0.328
14 years old : Estimated Latent Variance = 0.037					
SA 1	0.989 (0.018)	-0.003 (0.015)	0.699	0.511	0.489
SA 2	0.994 (0.019)	0.019 (0.016)	0.725	0.475	0.525
SA 3	1.016 (0.019)	-0.017 (0.016)	0.727	0.472	0.528
15 years old : Estimated Latent Variance = 0.095					
SA 1	0.989 (0.018)	-0.003 (0.015)	0.875	0.234	0.766
SA 2	0.994 (0.019)	0.019 (0.016)	0.821	0.326	0.674
SA 3	1.016 (0.019)	-0.017 (0.016)	0.826	0.318	0.682
16 years old : Estimated Latent Variance = 0.111					
SA 1	0.989 (0.018)	-0.003 (0.015)	0.902	0.186	0.814
SA 2	0.994 (0.019)	0.019 (0.016)	0.867	0.248	0.752
SA 3	1.016 (0.019)	-0.017 (0.016)	0.863	0.255	0.745
17 years old : Estimated Latent Variance = 0.060					
SA 1	0.989 (0.018)	-0.003 (0.015)	0.819	0.329	0.671
SA 2	0.994 (0.019)	0.019 (0.016)	0.794	0.370	0.630
SA 3	1.016 (0.019)	-0.017 (0.016)	0.829	0.312	0.688
18 years old : Estimated Latent Variance = 0.021					
SA 1	0.989 (0.018)	-0.003 (0.015)	0.588	0.655	0.345
SA 2	0.994 (0.019)	0.019 (0.016)	0.673	0.546	0.454
SA 3	1.016 (0.019)	-0.017 (0.016)	0.573	0.671	0.329
19 to 22 years old : Estimated Latent Variance = 0.023					
SA 1	0.989 (0.018)	-0.003 (0.015)	0.569	0.677	0.323
SA 2	0.994 (0.019)	0.019 (0.016)	0.578	0.666	0.334
SA 3	1.016 (0.019)	-0.017 (0.016)	0.639	0.592	0.408

Note. SA 1 = Parcel 1; SA 2 = Parcel 2; SA 3 = Parcel 3.

Testing latent parameters. As configural, weak, and strong invariance models were established, latent parameters comparisons were conducted: (a) omnibus test of variances/covariances and (b) omnibus test of equal latent means across the groups. First, as shown in Table 11, the omnibus test of variances and covariances across the seven age groups was not tenable with the CFI criterion using the strong invariance model as a baseline model ($\Delta \chi^2$ (60) = 326.008, $p < .0001$). This indicates that the amount of within-group variability of the construct differs across the seven age groups.

Second, the omnibus test of equal latent means was performed including significant paths of gender and disability status as a covariate in the model to control for its impact on self-determination constructs. As gender is a binary variable, it was coded with 0 and 1. The disability status variable was included as a covariate using dummy codes and analyzed identically as previously described in the gender group analysis. Omnibus test of equal latent means with significant paths as a covariate was not tenable ($\Delta \chi^2$ (24) = 134.028, $p <.0001$), indicating that the latent means across the seven groups are not identical as shown in Table 11. The follow-up mean difference tests were conducted to examine which constructs have different mean levels across the seven groups. As seen in Table 16, chi-square difference tests, setting the latent mean invariance with significant paths as a baseline model, indicated that latent means of only the self-realization construct are invariant across the seven groups ($\Delta \chi^2$ (6) = 62.15, $p <.0001$). Then, the follow-up mean comparisons were performed using two group contrasts to determine which age group pairs were significantly different in the self-realization construct. As seen in Table 17, the results showed that latent means in the pair of groups with 15 and 16 years old participants are invariant in this construct. Among 21 comparisons, 9 comparisons (43%) were significantly different in the self-realization construct and all 9 comparisons included 15

and 16 years old participants. The effect sizes were calculated to describe the strengths of the latent mean differences across the compared groups. Effect sizes are reported as small, medium, and large from the criterion of .20, .50, and .80, respectively (Cohen, 1988). Effect sizes of the nine comparisons, as shown in Table 17, ranged from small to medium. The results indicated that participants who are 15- and 16-year-old tend to have lower self-realization levels compared to other age groups, including 11- to 22-year-old groups. All latent means for the seven age groups are reported in Table 18.

Table 16

Results of Nested Chi-Square Difference Tests for Latent Mean Differences across the Seven-Group of Students with Ages of 11-13, 14, 15, 16, 17, 18, and 19-22

Model	$\chi 2$	*df*	*p*	$\Delta\chi 2$	Δ *df*	*p*	Constraint Tenable?
Strong Invariance with Sig. Paths of Gender and Disability Status (covariates)	1378.517	915	0.00	--	--	--	--
Latent Mean Invariance with Sig. Paths of Gender and Disability Status (covariates) [1]	1512.545	939	0.00	134.028	24	0.000	No
AUTO [1]	1401.001	921	0.00	22.48	6	0.001	Yes
SREG [1]	1400.447	921	0.00	21.93	6	0.001	Yes
PSYE [1]	1401.725	921	0.00	23.21	6	0.001	Yes
SREA [1]	1440.663	921	0.00	62.15	6	0.000	No

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.
[1] Evaluated with $\chi 2$ Difference Test. This model is nested in the model of "Strong invariance with sig. paths of gender and disability status (covariates)".

Table 17

Significant Mean Level Differences across the Seven-Group of Students with Ages of 11-13, 14, 15, 16, 17, 18, and 19-22 for Self-Realization Construct

Construct	Age Group 1	Age Group 2	Mean Group 1	Mean Group 2	Cohen's D[1]
Self-Realization	15	11-13	0.71	0.84	0.46
	15	14	0.71	0.87	0.56
	15	17	0.71	0.84	-0.47
	15	18	0.71	0.88	-0.67
	15	19-22	0.71	0.87	-0.62
	16	14	0.75	0.87	0.39
	16	17	0.75	0.84	-0.32
	16	18	0.75	0.88	-0.47
	16	19-22	0.75	0.87	-0.43

Note. [1] Effect size is latent *d*, where $d = (\alpha_2-\alpha_1)/\sqrt{\frac{(n_1\psi_1 + n_2\psi_2)}{n_1 + n_2}}$; α_2 and α_1 are the estimated means in latent variable metric; n_2 and n_1 are the sample size for each group; ψ_2 and ψ_1 are the estimated latent variances of the distributions around the latent means of α_2 and α_1, respectively. χ^2 = chi-square value; *df* = degrees of freedom; *p*= *p* value; $\Delta\chi^2$ = changes in chi-square values.

Table 18

Latent Means across the Seven-Group of Students with Ages of 11-13, 14, 15, 16, 17, 18, and 19-22

Group	11-13 years old		14 years old		15 years old		16 years old		17 years old		18 years old		19-22 years old	
	M	*S.E.*	*M*	*S.E.*	*M*	*S.E.*	*M*	*S.E.*	*M*	*S.E.*	*M*	*S.E.*	*M*	*S.E.*
AUTO	0.630	0.024	0.682	0.020	0.727	0.015	0.708	0.010	0.723	0.020	0.754	0.029	0.652	0.021
SREG	0.493	0.021	0.519	0.020	0.549	0.014	0.552	0.012	0.548	0.019	0.520	0.026	0.445	0.023
PSYE	0.812	0.020	0.843	0.022	0.845	0.013	0.862	0.010	0.915	0.014	0.875	0.013	0.857	0.019
SREA	0.836	0.020	0.865	0.021	0.712	0.025	0.746	0.018	0.843	0.020	0.881	0.015	0.873	0.018

Note. AUTO = Autonomy; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

Main Research Question Four

Measurement model for each group. The CFA model for each of the seven disability groups demonstrated good fit, χ^2 (48) = 64.138, CFI = 0.938, TLI = 0.915, RMSEA = 0.076 (0.000-0.122), and SRMR= 0.074 for the group with attention deficit disorder or attention deficit hyperactivity disorder, χ^2 (48) = 73.074, CFI = 0.884, TLI = 0.841, RMSEA = 0.089 (0.043-0.128), and SRMR= 0.085 for the group with autism, χ^2 (48) = 71.859, CFI = 0.934, TLI = 0.909, RMSEA = 0.063 (0.029-0.091), and SRMR= 0.066 for the group with emotional and behavior disorder, χ^2 (48) = 54.696, CFI = 0.994, TLI = 0.991, RMSEA = 0.020 (0.000-0.041), and SRMR= 0.032 for the group with intellectual disability, χ^2 (48) = 70.732, CFI = 0.989, TLI = 0.984, RMSEA = 0.028 (0.012-0.041), and SRMR= 0.028 for the group with learning disabilities, χ^2 (48) = 49.395, CFI = 0.996, TLI = 0.994, RMSEA = 0.018 (0.000-0.072), and SRMR= 0.074 for the group with other health impairment, and χ^2 (48) = 66.275, CFI = 0.988, TLI = 0.984, RMSEA = 0.030 (0.006-0.046), and SRMR= 0.034 for the group without disabilities.

Testing measurement parameters. The procedures to investigate measurement invariance models were performed in the same manner as described previously. First, the configural invariance model established good model fit: χ^2 (606) = 7388.142, CFI = .980, TLI = .973, and RMSEA = .037 (.027 – .046), indicating that adolescents and young adults with attention deficit disorder or attention deficit hyperactivity disorder, autism, emotional and behavior disorder, intellectual disability, learning disabilities, other health impairment, and adolescents and young adults without disabilities have the same pattern of fixed and freed parameters for each self-determination construct as shown in Table 19. Second, the weak invariance model was also supported with the CFI criterion (i.e., ΔCFI < .01), showing that corresponding factor loadings are identical across the seven disability groups. Third, strong invariance was only

partially accepted using the CFI criterion as well. It is meaningful that partial strong invariance was established including all six disability groups and participants without disabilities. The partial strong invariance allows the invariance evaluation to proceed, including analysis of latent and level differences across disability groups, even researchers encountered to free a very small number of parameters that are noninvariant across groups (Brown, 2015; Lee, Little, & Preacher, 2011). Fit diagnostics assisted us to identify the parameters with two distinct but compatible approaches: structural equation modeling (SEM) and item response theory (IRT). With the procedures of differential item functioning (DIF), intercepts in two items (7 and 16) with participants with intellectual disability were identified as noninvariant parameters across groups. After freeing these two intercepts among all the parameters, partial strong invariance was established to proceed with further analyses. The loading and intercept values, residuals, R^2 values for each parcel, and the estimated latent variances from the partial strong invariance model are presented in Table 20, 21, 22, and 23.

Testing latent parameters. Population heterogeneity tests were followed after the measurement invariance model was established: (a) the equality of factor variance/covariances and (b) the equality of latent means. First, the equality of variances/covariances was not established ($\Delta \chi^2$ (78) = 362.35, $p < .0001$) as seen in Table 19, indicating that the relationships of latent constructs across the seven disability groups are different. Second, the equality of latent mean was not established as well ($\Delta \chi^2$ (24) = 225.01, $p < .0001$). Individual latent mean comparisons were performed to identify which latent means were different across the seven disability groups. As shown in Table 24, autonomous functioning ($\Delta \chi^2$ (6) = 733.728, $p < .0001$), self-regulation ($\Delta \chi^2$ (6) = 765.765, $p < .0001$), and self-realization ($\Delta \chi^2$ (6) = 683.882, $p < .0001$) constructs were making the difference in this study. Follow-up comparisons across

the seven disability groups with these three latent constructs using two-group contrasts were conducted to further examine which latent means in disability groups were making the difference. The results are shown in Table. 25. With a total of 63 comparisons, 10 comparisons reported latent mean differences in autonomous functioning, self-regulation, and self-realization constructs. Among these 10 significantly different comparisons, 9 comparisons included participants with autism and intellectual disability, and the effect sizes ranged from medium to large, but mostly large as seen in Table 25. In addition, one comparison with participants with learning disabilities and adolescents and young adults without disabilities in the self-realization construct reported medium effect size of the latent mean difference. Latent means across all the seven disability groups for each construct are reported in Table 26.

Table 19

Fit Indices for the Nested Sequence in the Seven-Group CFA (ADHD, Autism, ED, ID, LD, OHI, and Without Disabilities Group)

Model	$\chi 2$	*df*	*p*	$\Delta\chi 2$	Δ *df*	*p*	RMSEA	RMSEA 90% CI	CFI	TLI	Constraint Tenable?
Measurement model estimates											
Independence (null)	7388.142	606	0.00	---	---	---	---	---	---	---	---
Configural invariance[1]	450.170	336	0.00	---	---	---	0.037	0.027 - 0.046	0.980	0.973	---
Weak invariance[1]	545.096	384	0.00	---	---	---	0.041	0.033 - 0.049	0.972	0.967	Yes
Strong invariance[1]	692.425	432	0.00	---	---	---	0.049	0.042 - 0.056	0.952	0.955	No
Partial Strong invariance[1]	647.327	430	0.00	---	---	---	0.045	0.038 - 0.052	0.962	0.960	Yes
Latent model estimates											
Homogeneity of Var/Cov[2]	907.45	462	0.00	362.35	78	0.00	---	---	---	---	No
Tests of the latent means[2]	872.339	454	0.00	225.01	24	0.00	---	---	---	---	No

Note. Each nested model contains its constraints, plus the constraints of all previous tenable models. ADHD = Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; OHI = Other Health Impairment; Without = Students without disabilities.

1 Evaluated with RMSEA and CFI Model Test, a change in CFI of .01 or less is used.

2 Evaluated with $\chi 2$ Difference Test. This model is nested in the Partial Strong Invariance model.

Table 20

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances of Autonomous Functioning Construct

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
Without Disabilities : Estimated Latent Variance = 1.000					
AT 1	0.158 (0.008)	0.725 (0.009)	0.720	0.481	0.519
AT 2	0.176 (0.008)	0.763 (0.009)	0.900	0.190	0.810
AT 3	0.157 (0.009)	0.819 (0.011)	0.578	0.666	0.334
Attention Deficit Hyperactivity Disorder : Estimated Latent Variance = 1.619					
AT 1	0.158 (0.008)	0.725 (0.009)	0.826	0.317	0.683
AT 2	0.176 (0.008)	0.763 (0.009)	0.815	0.336	0.664
AT 3	0.157 (0.009)	0.819 (0.011)	0.560	0.687	0.313
Autism : Estimated Latent Variance = 1.226					
AT 1	0.158 (0.008)	0.725 (0.009)	0.753	0.433	0.567
AT 2	0.176 (0.008)	0.763 (0.009)	0.803	0.356	0.644
AT 3	0.157 (0.009)	0.819 (0.011)	0.439	0.807	0.193
Emotional and Behavioral Disorder : Estimated Latent Variance = 1.004					
AT 1	0.158 (0.008)	0.725 (0.009)	0.680	0.538	0.462
AT 2	0.176 (0.008)	0.763 (0.009)	0.775	0.400	0.600
AT 3	0.157 (0.009)	0.819 (0.011)	0.430	0.815	0.185
Intellectual Disability : Estimated Latent Variance = 1.704					
AT 1	0.158 (0.008)	0.725 (0.009)	0.774	0.401	0.599
AT 2	0.176 (0.008)	0.763 (0.009)	0.879	0.228	0.772
AT 3	0.157 (0.009)	0.744 (0.020)	0.541	0.708	0.292
Learning Disabilities : Estimated Latent Variance = 1.134					
AT 1	0.158 (0.008)	0.725 (0.009)	0.721	0.480	0.520
AT 2	0.176 (0.008)	0.763 (0.009)	0.836	0.301	0.699
AT 3	0.157 (0.009)	0.819 (0.011)	0.521	0.729	0.271
Other Health Impairment : Estimated Latent Variance = 0.904					
AT 1	0.158 (0.008)	0.725 (0.009)	0.703	0.506	0.494
AT 2	0.176 (0.008)	0.763 (0.009)	0.811	0.343	0.657
AT 3	0.157 (0.009)	0.819 (0.011)	0.430	0.815	0.185

Note. AT 1 = Parcel 1; AT 2 = Parcel 2; AT 3 = Parcel 3.

Table 21

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances of Self-Regulation Construct

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
Without Disabilities : Estimated Latent Variance = 1.000					
SG 1	0.194 (0.010)	0.538 (0.011)	0.727	0.471	0.529
SG 2	0.211 (0.010)	0.557 (0.012)	0.820	0.328	0.672
SG 3	0.209 (0.010)	0.570 (0.012)	0.722	0.479	0.521
Attention Deficit Hyperactivity Disorder : Estimated Latent Variance = 1.001					
SG 1	0.194 (0.010)	0.538 (0.011)	0.842	0.292	0.708
SG 2	0.211 (0.010)	0.557 (0.012)	0.767	0.411	0.589
SG 3	0.209 (0.010)	0.570 (0.012)	0.763	0.418	0.582
Autism : Estimated Latent Variance = 1.165					
SG 1	0.194 (0.010)	0.538 (0.011)	0.775	0.399	0.601
SG 2	0.211 (0.010)	0.557 (0.012)	0.806	0.350	0.650
SG 3	0.209 (0.010)	0.570 (0.012)	0.698	0.513	0.487
Emotional and Behavioral Disorder : Estimated Latent Variance = 0.603					
SG 1	0.194 (0.010)	0.538 (0.011)	0.648	0.580	0.420
SG 2	0.211 (0.010)	0.557 (0.012)	0.739	0.454	0.546
SG 3	0.209 (0.010)	0.570 (0.012)	0.602	0.637	0.363
Intellectual Disability : Estimated Latent Variance = 1.093					
SG 1	0.194 (0.010)	0.538 (0.011)	0.754	0.432	0.568
SG 2	0.211 (0.010)	0.557 (0.012)	0.786	0.383	0.617
SG 3	0.209 (0.010)	0.570 (0.012)	0.770	0.407	0.593
Learning Disabilities : Estimated Latent Variance = 0.664					
SG 1	0.194 (0.010)	0.538 (0.011)	0.671	0.550	0.450
SG 2	0.211 (0.010)	0.557 (0.012)	0.727	0.471	0.529
SG 3	0.209 (0.010)	0.570 (0.012)	0.657	0.569	0.431
Other Health Impairment : Estimated Latent Variance = 0.607					
SG 1	0.194 (0.010)	0.538 (0.011)	0.633	0.600	0.400
SG 2	0.211 (0.010)	0.557 (0.012)	0.678	0.540	0.460
SG 3	0.209 (0.010)	0.570 (0.012)	0.596	0.645	0.355

Note. SG 1 = Parcel 1; SG 2 = Parcel 2; SG 3 = Parcel 3.

Table 22

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances of Psychological Empowerment Construct

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
Without Disabilities : Estimated Latent Variance = 1.000					
PY 1	0.200 (0.011)	0.872 (0.011)	0.778	0.395	0.605
PY 2	0.190 (0.010)	0.852 (0.011)	0.771	0.405	0.595
PY 3	0.200 (0.014)	0.851 (0.014)	0.528	0.721	0.279
Attention Deficit Hyperactivity Disorder : Estimated Latent Variance = 0.746					
PY 1	0.200 (0.011)	0.872 (0.011)	0.736	0.458	0.542
PY 2	0.190 (0.010)	0.852 (0.011)	0.791	0.374	0.626
PY 3	0.200 (0.014)	0.851 (0.014)	0.476	0.774	0.226
Autism : Estimated Latent Variance = 0.659					
PY 1	0.200 (0.011)	0.872 (0.011)	0.636	0.596	0.404
PY 2	0.190 (0.010)	0.852 (0.011)	0.510	0.740	0.260
PY 3	0.200 (0.014)	0.851 (0.014)	0.437	0.809	0.191
Emotional and Behavioral Disorder : Estimated Latent Variance = 0.616					
PY 1	0.200 (0.011)	0.872 (0.011)	0.678	0.540	0.460
PY 2	0.190 (0.010)	0.852 (0.011)	0.588	0.654	0.346
PY 3	0.200 (0.014)	0.851 (0.014)	0.453	0.795	0.205
Intellectual Disability : Estimated Latent Variance = 0.393					
PY 1	0.200 (0.011)	0.872 (0.011)	0.528	0.721	0.279
PY 2	0.190 (0.010)	0.852 (0.011)	0.515	0.734	0.266
PY 3	0.200 (0.014)	0.949 (0.019)	0.453	0.794	0.206
Learning Disabilities : Estimated Latent Variance = 0.518					
PY 1	0.200 (0.011)	0.872 (0.011)	0.675	0.545	0.455
PY 2	0.190 (0.010)	0.852 (0.011)	0.599	0.642	0.358
PY 3	0.200 (0.014)	0.851 (0.014)	0.430	0.815	0.185
Other Health Impairment : Estimated Latent Variance = 0.877					
PY 1	0.200 (0.011)	0.872 (0.011)	0.694	0.518	0.482
PY 2	0.190 (0.010)	0.852 (0.011)	0.780	0.392	0.608
PY 3	0.200 (0.014)	0.851 (0.014)	0.550	0.697	0.303

Note. PY 1 = Parcel 1; PY 2 = Parcel 2; PY 3 = Parcel 3.

Table 23

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel, and the Estimated Latent Variances of Self-Realization Construct

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
Without Disabilities : Estimated Latent Variance = 1.000					
SA 1	0.176 (0.009)	0.883 (0.010)	0.794	0.369	0.631
SA 2	0.174 (0.009)	0.859 (0.011)	0.627	0.607	0.393
SA 3	0.174 (0.009)	0.865 (0.011)	0.617	0.620	0.380
Attention Deficit Hyperactivity Disorder : Estimated Latent Variance = 1.372					
SA 1	0.176 (0.009)	0.883 (0.010)	0.868	0.246	0.754
SA 2	0.174 (0.009)	0.859 (0.011)	0.790	0.376	0.624
SA 3	0.174 (0.009)	0.865 (0.011)	0.711	0.495	0.505
Autism : Estimated Latent Variance = 1.925					
SA 1	0.176 (0.009)	0.883 (0.010)	0.845	0.286	0.714
SA 2	0.174 (0.009)	0.859 (0.011)	0.690	0.524	0.476
SA 3	0.174 (0.009)	0.865 (0.011)	0.712	0.493	0.507
Emotional and Behavioral Disorder : Estimated Latent Variance = 2.166					
SA 1	0.176 (0.009)	0.883 (0.010)	0.832	0.307	0.693
SA 2	0.174 (0.009)	0.859 (0.011)	0.774	0.401	0.599
SA 3	0.174 (0.009)	0.865 (0.011)	0.760	0.422	0.578
Intellectual Disability : Estimated Latent Variance = 1.626					
SA 1	0.176 (0.009)	0.883 (0.010)	0.790	0.376	0.624
SA 2	0.174 (0.009)	0.859 (0.011)	0.637	0.595	0.405
SA 3	0.174 (0.009)	0.865 (0.011)	0.735	0.460	0.540
Learning Disabilities : Estimated Latent Variance = 2.822					
SA 1	0.176 (0.009)	0.883 (0.010)	0.877	0.232	0.768
SA 2	0.174 (0.009)	0.859 (0.011)	0.811	0.342	0.658
SA 3	0.174 (0.009)	0.865 (0.011)	0.833	0.306	0.694
Other Health Impairment : Estimated Latent Variance = 3.933					
SA 1	0.176 (0.009)	0.883 (0.010)	0.915	0.162	0.838
SA 2	0.174 (0.009)	0.859 (0.011)	0.840	0.295	0.705
SA 3	0.174 (0.009)	0.865 (0.011)	0.905	0.181	0.819

Note. SA 1 = Parcel 1; SA 2 = Parcel 2; SA 3 = Parcel 3.

Table 24

Results of Nested Chi-Square Difference Tests for Latent Mean Differences across Students with ADHD, Autism, ED, ID, LD, OHI, and Without Disabilities Group

Model	$\chi 2$	*df*	*p*	$\Delta\chi 2$	Δ *df*	*p*	Constraint Tenable?
Partial Strong Invariance (Baseline Model)	647.327	430	0.00	--	--	--	--
Latent Mean Invariance[1]	872.339	454	0.00	225.010	24	0.000	No
AUTO[1]	733.728	436	0.00	86.401	6	0.000	No
SREG[1]	765.765	436	0.00	118.440	6	0.000	No
PSYE[1]	668.700	436	0.00	21.373	6	0.002	Yes
SREA[1]	683.882	436	0.00	36.555	6	0.000	No

Note. ADHD = Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; OHI = Other Health Impairment; Without = Students Without Disabilities; AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA=Self-Realization.

[1] Evaluated with $\chi 2$ Difference Test. This model is nested in the Partial Strong Invariance model.

Table 25

Significant Mean Level Differences across Students with ADHD, Autism, ED, ID, LD, OHI, and Without Disabilities Group for Constructs

Construct	Disability Group 1	Disability Group 2	Mean Group 1	Mean Group 2	Cohen's D[1]
Autonomous Functioning	Autism	LD	-1.16	-0.17	-0.93
	Autism	WO	-1.16	0.00	1.14
	ID	LD	-0.67	-0.17	-0.44
	ID	WO	-0.67	0.00	0.59
Self-Regulation	ID	ADHD	-0.76	0.04	0.77
	ID	EBD	-0.76	0.02	0.80
	ID	OHI	-0.76	-0.07	-0.70
	ID	LD	-0.76	-0.05	-0.78
	ID	WO	-0.76	0.00	0.75
Self-Realization	LD	WO	-0.45	0.00	0.32

Note. ADHD = Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; OHI = Other Health Impairment; Without = Students Without Disabilities. [1] Effect size is latent *d*, where $d = (\alpha_2-\alpha_1)/\sqrt{\frac{(n_1\psi_1 + n_2\psi_2)}{n_1 + n_2}}$; α_2 and α_1 are the estimated means in latent variable metric; n_2 and n_1 are the sample size for each group; ψ_2 and ψ_1 are the estimated latent variances of the distributions around the latent means of α_2 and α_1, respectively. χ^2 = chi-square value; *df* = degrees of freedom; *p*= *p* value; $\Delta\chi^2$ = changes in chi-square values.

Table 26

Latent Means across Students with ADHD, Autism, EBD, ID, LD, OHI, and Without Disabilities Group

Group	Without[1]		ADHD		Autism		EBD		ID		LD		OHI	
	M	*S.E.*	*M*	*S.E.*	*M*	*S.E.*	*M*	*S.E.*	*M*	*S.E.*	*M*	*S.E.*	*M*	*S.E.*
AUTO	0.000	0.000	-0.165	0.193	-1.161	0.177	-0.483	0.120	-0.674	0.096	-0.169	0.072	-0.326	0.129
SREG	0.000	0.000	0.038	0.155	-0.591	0.160	0.024	0.099	-0.764	0.088	-0.052	0.066	-0.068	0.115
PSYE	0.000	0.000	0.040	0.144	-0.367	0.147	-0.073	0.105	-0.159	0.075	0.079	0.067	-0.031	0.129
SREA	0.000	0.000	0.007	0.178	-0.399	0.199	-0.416	0.155	-0.330	0.096	-0.453	0.095	-0.717	0.231

Note. ADHD = Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; OHI = Other Health Impairment; Without = Students Without Disabilities; AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA=Self-Realization.

[1]This model was identified using the fixed-factor method. So the means in the reference group (Students without disabilities) are fixed to 0. Therefore, the means of all other groups should be interpreted as mean differences from the reference group.

Discussion

The purpose of this study was to examine the psychometric properties of the ASDA-S (Wehmeyer, Little, et al., 2011). Reliability was established using the coefficient omega and validity was investigated using the SEM framework with a series of measurement invariance tests across various groups. This study is the first to provide evidence of established measurement invariance for a measurement of self-determination, including (a) age groups between 11- to 22-year-old and (b) six individual disability group and adolescents and young adults without disabilities. The results of this study validated the reliability and validity of the ASDA-S and provided meaningful implications in research and practice. The discussion section includes three sections: limitations of the study, the summary of the findings, and implications for future research.

Limitations of the Study

There are several limitations that must be acknowledged prior to our discussion to inform future research for the utilization of this assessment. First, one issue of this study was the limited demographic information of participants without disabilities, which did not allow the author to undertake any additional analyses, such as including that information as covariates. Future studies should include basic or overall demographic information for students without disabilities to explore the relationship with students with disabilities and the impacts on the ASDA-S. Second, although this study included six disability groups and a without disabilities group and participants from 11- to 22-year-old, sample sizes of participants with sensory and physical disabilities were too small to perform measurement invariance testing. Prior to establishing disability groups for the final model, there was an effort to include students with sensory disabilities and students with physical disabilities into one group to increase the sample

size, however, the models were not tenable, showing unacceptable fit due to the still-small sample size. Future studies need to include more participants with sensory and physical disabilities to ensure that the measure is statistically reliable and valid for all adolescents and young adults.

Summary of the Findings

Three measurement invariance models were established to provide evidence of *validity assurances* (Brown, 2015; Little, 2013). The SEM enables us to account for measurement error and latent means reflect true score differences with uncontaminated measurement process. For *validity assurances* (Brown, 2015; Little, 2013), established strong measurement invariances provided a basis to compare outcomes across groups and ensured the same latent constructs were being measured in each group.

First, analysis of gender groups established the strong invariance model, indicating that corresponding self-determination construct factor loadings and intercepts were equivalent across gender groups. Once factorial invariance was accepted, we could achieve true score differences, which is regarded as latent mean differences, between female and male groups. The latent mean differences showed that autonomous functioning, self-regulation, and psychological empowerment constructs are significantly different across gender groups, even though the effect sizes were small. Among these three significantly different latent constructs, the results reported that the female group has a significantly higher levels than the male group in the three constructs mentioned above. The finding is consistent with previous studies that have compared levels of self-determination across gender groups (Nota et al., 2007; Shogren et al., 2007). Nota et al. (2007) and Shogren et al. (2007) found that adolescent or young women showed a greater degree

of self-determination than adolescent or young men, which is consistent with earlier research by Wehmeyer and colleagues.

Second, the analysis of seven age groups established the strong invariance model showing that factor loadings and intercepts are invariant across the seven groups. The result of this invariance in the intercepts in the mean structure allows us to evaluate mean differences in latent variables across the seven groups. With including significant paths of gender and disability statuses as covariates, only the latent mean of the self-realization construct varied across groups. Then, follow-up tests using two-group contrasts were performed to examine which group comparisons were not invariant in self-realization. Twenty-one contrasts for the self-realization construct were created and 43% of those comparisons reported significant differences across two groups. Among those significantly different contrasts, 56% included participants who were 15 years old and 44% was with students who were 16 years old, as shown in Table 17. Thus, students who were 15 and 16 years old exhibited latent mean differences only in the self-realization construct and reported lower latent means compared to other age groups. Students ages 15 and 16 years are generally freshmen and sophomores in high school who are 9th and 10th graders. As transition from middle school to high school brings significant changes in curriculum and environments, this finding suggests that students with disabilities at this stage of age range experience significant differences among other ages in self-realization. Self-realization items included emotions, abilities and limitations, and influences by others or his or her own. As this section measures students' self-awareness and self-knowledge, it is logical that students in transition age reported significant differences than other age groups. For example, Wehmeyer, Palmer, Soukup, Garner, and Lawrence (2007) examined the contribution of self-determination to transition planning knowledge and skills and found that self-regulation and self-

realization were the most important contributors to student transition planning knowledge and skills.

Third, analysis of disability groups established strong measurement invariance (partial at the intercept level) and we tested for latent differences using two group contrasts as described in the Method section. In general, students without disabilities reported the highest level of self-determination and participants with intellectual disability and autism showed the lowest scores on the scale. This finding was expected, based on previous studies comparing level of self-determination across students with disabilities. For example, Seo and colleagues (2012) found that students with learning disabilities showed the highest level of self-determination on the SDS whereas students with autism demonstrated the lowest score on the SDS, among adolescents with intellectual disability, learning disabilities, emotional behavior disorders, autism, and a group of students with other health impairment/attention deficit disorder/ attention deficit hyperactivity disorder. In addition, Wehmeyer and colleagues reported that students with learning disabilities scored significantly higher on the SDS than students with intellectual disability or students with autism or students with emotional or behavioral disorders. Specifically, significant mean level differences were demonstrated on comparisons including students with autism or intellectual disability as shown in Table 25. Students with autism showed significantly lower levels on autonomous functioning than students with learning disabilities and students without disabilities. This finding is also supported by previous research using the SDS (Chou et al., in press). For example, Chou and colleagues (in press) found that students with autism showed relatively low self-determination levels in the autonomous functioning construct compared to students with intellectual disability or learning disabilities. As shown in Table 26, participants with autism reported the lowest autonomous functioning score across six disability groups and adolescents

without disabilities. In addition, students with intellectual disability reported lower scores on autonomous functioning and self-regulation than students with attention deficit disorder or attention deficit hyperactivity disorder, emotional and behavior disorder, learning disabilities, other health impairment, and adolescents and young adults without disabilities. Shogren and colleagues (2014) also found that students with intellectual disability show significant differences from high-incidence disability group (i.e. learning disabilities, other health impairment, emotional disturbance, and speech or language impairment), as well as from students with low-incidence disabilities. Lastly, there was a significant difference between students with learning disabilities and students without disabilities on self-realization, however, the effect size was small to medium.

Implications for Practice and Future Research

Overall, given the emphasis on promoting self-determination in the field of special education and the corresponding use of scales to measure self-determination in both research and practice, it is important to examine whether widely used self-determination assessments measure the same constructs among and between students from different disability categories. It is important that this study provides evidence of a newly developed scale's utility and efficacy, including adolescents and young adults without disabilities. Given the general consensus that skills leading to enhanced self-determination are an important component of transition instruction, it is important that teachers have reliable and valid ways to assess these skills.

The 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA, 2004) mandates that transition planning commence by age 16 and the IDEA in 1997 required transition planning commence by age of 14 (Shogren & Plotner, 2012). Shogren and colleagues (2012) reported that the average age at which transition planning began was 14.4 and 14.5. Students

and families who are actively involved in transition planning report greater satisfaction with postschool and adult outcomes. In addition, higher levels of self-determination impact adult outcomes (Palmer et al., 2012). With the relationship between transition planning, self-determination, and positive adult outcomes and the results from this study, it is recommended to involve adolescents with ages of 15 and 16 in activities related to self-realization to promote level on self-determination and to further improve their transition outcomes.

Since promoting self-determination for adolescents and young adults with disabilities is recognized as best practice as well as evidence-based practice and valued as an essential predictor of successful adult outcomes (Wehman, 2012; Palmer et al., 2012), it is important to have reliable and valid assessments, such as ASDA-S, SDS, and ASDA, to measure students' levels of self-determination globally, efficiently, and precisely to provide information for instruction and research purposes. For example, Petcu and colleauges (in press) reported that three domains in self-determination, including autonomous functioning, psychological empowerment, and self-realization, predicted enrollment and completion of postsecondary education. A small number of researchers have begun to investigate factors that affect self-determination in social-ecological approach. However, there remains a gap between research and practice in the field of self-determination (Shogren, 2013a). One possible reason for this might be a lack of systematic considerations of context. To deliver meaningful supports for self-determination in schools and communities based on research, including results from this study that reported variability within and across gender, age, and disability, it is necessary to understand and explore factors that interact with disability and affect support need and self-determination. Along with a social-ecological perspective, an integrative framework for assessing levels of self-determination needs to be adapted for the future research and practice. In

addition, results for the disability category analysis can support that this scale can be used in a wide array of disability group, including students without disabilities. As such, interventions that might benefit students with and without disabilities, such as the Self-Determined Learning Model of Instruction (SDLMI) within the context of multi-tiered systems of support (MTSS) (Shogren, Wehmeyer, & Lane, 2016), can be included and the ASDA-S could be used to measure the effects of the intervention.

CHAPTER 3: EXAMINING UNDERLYING RELATIONSHIPS BETWEEN THE ASDA-S AND THE AIR-STUDENT VERSION AND THE ASDA OF ADOLESCENTS AND YOUNG ADULTS WITH AND WITHOUT DISABILITIES

A considerable amount of research has been conducted over the past three decades in the U.S. and internationally—including in Belgium, China, Italy, Japan, South Korea, and Spain—on the importance of self-determination in secondary education and transition services for students with disabilities (Lee, 2009; Lee et al., 2015; Ohtake & Wehmeyer, 2004; Martorell, Gutierrez-Recacha, Pereda, & Ayuso-Mateos, 2008; Nota et al., 2007; Shogren, 2011; Test et al., 2009; Wehman, 2012; Shogren, Wehmeyer, Palmer, & Paek, 2013). Promoting self-determination has been linked to more positive academic goal attainment and outcomes (Konrad et al., 2007; Lee, Wehmeyer, Soukup, & Palmer, 2010); to more positive transition outcomes, including benefits in employment and community living (Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015; Wehmeyer & Palmer, 2003; Wehmeyer & Schwartz, 1997); and to a more positive quality of life and enhanced life satisfaction (Lachapelle et al., 2005; Shogren et al., 2006; Wehmeyer & Schwartz, 1998). In addition, a number of meta-analytic studies have recommended the promotion of self-determination as effective practices to achieve more positive postschool and transition-related outcomes (Algozzine et al., 2001; Cobb et al., 2009; Test et al., 2009). For example, Lee and colleagues (2015) conducted a meta-analysis of the efficacy of the *Self-Determined Learning Model of Instruction* (SDLMI), an evidence-based intervention that enables teachers to teach students to self-regulate goal setting and attainment and to improve student self-determination, with nine studies from the U.S. studies and six studies from Korea. These researchers reported the efficacy of the SDLMI in academic and functional outcomes

related to access to the general education curriculum and transition outcomes, and found that these positive effects were equally robust across the two countries.

Promoting self-determination emerged as a focus in special education in part as a result of the normalization, independent living, and disability right movements in the 1960s and 1970s (Nirje, 1969; Wolfensberger, 1972) and the self-advocacy movement in the early 1980s (Driedger, 1989; Ward, 1996; Wehmeyer & Field, 2007). In 1989, the U.S Department of Education's Office of Special Education Programs (OSEP) provided funding to 26 projects over four years totaling around $10 million dollars to develop and promulgate models to promote the self-determination of youth with disabilities (Wehmeyer & Shogren, 2017). In addition, the Individuals with Disabilities Education Act (IDEA) (P.L. 101-476) as reauthorized in 1990, mandated that transition services take into account students' needs, interests, and preferences as IEP teams planned for the student's transition from school to adult life (Bremer, Kachgal, & Schoeller, 2003). As self-determination became a valued outcome of secondary education, the Council for Exceptional Children's Division on Career Development and Transition (DCDT) emphasized the importance of self-determination to transition for all students for a more satisfying and fulfilling adult life (Field, Martin, Miller, Ward, & Wehmeyer, 1998). These various initiatives resulted in the establishment of a focus on self-determination as an important aspect of the transition of youth with disabilities to the adult world (Wehmeyer & Schalock, 2001; Wehmeyer & Schwartz, 1998).

In 1992, as a result of one of the original self-determination model demonstration projects, Wehmeyer defined self-determination as "the attitudes and abilities required to act as the primary causal agent in one's life and to make choices regarding one's actions free from undue external influence or interference" (p.305). At the center of this definition and the

resulting theoretical framework was the notion of causal agency, which means to cause or make things to happen in one's life. In 2005, Wehmeyer refined this definition as "volitional actions that enable one to act as the primary causal agent in one's life and to maintain or improve one's quality of life" (Wehmeyer, 2005, p. 117). That is, self-determined people who act volitionally and intentionally to cause or make things to happen in their lives are causal agents. In addition, causal agency implies that "the individual acts with an eye toward causing an effect to accomplish a specific end or to cause or create change" (Wehmeyer & Little, 2013, p.119). Working from these definitions, Wehmeyer proposed and refined the functional model of self-determination, which conceptualized self-determination as a dispositional characteristic based on the function of a person's behavior in acting as a causal agent in their lives (see Figure 1 and Figure 2). The functional model of self-determination proposed four essential characteristics of self-determined behavior, including (a) autonomous functioning, (b) self-regulation, (c) psychological empowerment, and (d) self-realization (Wehmeyer & Field, 2007).

The Arc's Self-Determination Scale (SDS) (Wehmeyer & Kelchner, 1995) was developed to operationalize the constructs imbedded in the functional model to measure the self-determination of youth and young adults with disabilities (Shogren & Wehmeyer, 2017). The SDS is composed of 72 items and provides measures of the four essential characteristics proposed by the functional theory (autonomous functioning, self-regulation, psychological empowerment, and self-realization) as well as an indicator of overall self-determination (Wehmeyer, 1996b). The SDS has been standardized and empirically validated in the field of special education (Shogren et al., 2008).

The Adolescent Self-Determination Assessment (ASDA)(Wehmeyer, Lopez, & Shogren, 2007) is a modified version of the SDS, developed to create a tool that could be used to measure

the self-determination of youth with and without disabilities. The ASDA was created by revising items on the SDS to remove disability-specific content. The format, number of items, and administration procedures of the ASDA remained identical to that of the SDS. As a means to provide a shorter, less time-consuming version of the ASDA for use in the National Longitudinal Transition Study in 2012 (NLTS 2012), the Adolescent Self-Determination Assessment-Short form (ASDA-S) (Wehmeyer, Little, et al., 2011) was developed. The ASDA-S consisted of 28 items that can be administered briefly compared to the ASDA. The ASDA-S is also a self-report measurement and is administered in the same manner as the SDS and the ASDA (e.g., with whatever supports students need to be able to respond)(Wehmeyer & Field, 2007).

There have been no studies examining the psychometric properties of the ASDA-S or to examine its compatibility and relationship to other self-determination measurements. A logical first step in doing so would be to compare the ASDA-S with the AIR Self-Determination Scale (AIR) (Wolman et al., 1994). The AIR is a norm-referenced measure of self-determination based on theoretical work by Mithaug and colleagues and empirically validated in the field of special education. Specifically, the AIR provides information on students' capacity and opportunities to act in a self-determined manner. Based on in part on Mithaug's (1993) theory of self-determination as self-regulation, the scale examines capacities and opportunities that explain their prospects of getting what they need and want in life. Within the context of this theory, capacity refers to students' knowledge, abilities, and perceptions that enable them to be self-determined and feel good about it, and opportunity refers to students' chances to use their knowledge and abilities. Although students are the critical players in the development of self-determination, Mithaug and colleagues believed that teachers and parents could support that

development, so the AIR is comprised of three versions: an educator version, a student version, and a parent version.

This study examined the relationship between the ASDA-S and the AIR student version, as well as between the ASDA-S and the ASDA. Based upon a literature review, there were two main research questions and total three research questions (three analyses) were investigated from the following:

1. Examine the relationship between the ASDA-S and the AIR-Student version
    1-1. Are constructs measured by the ASDA-S and by the AIR-Student version for adolescents and young adults with disabilities highly correlated?
    1-2. Are higher-orders constructs of the ASDA-S and the AIR-Student version for adolescents and young adults with disabilities highly correlated?
2. Examine the relationship between the ASDA-S and the ASDA

Method

Participants

In this study, two analyses were conducted examining correlations between the ASDA-S with the AIR-Student version and the ASDA-S with the ASDA. The purpose of this study is to establish the criterion validity of the ASDA. The first two analyses, two research questions in main research question one, in this study was conducted with the same data and demographic information as mentioned in Study 1 (Chapter 2); specifically, with participants with disabilities described in the analyses of age and gender. However, the analysis examining the relationship between the ASDA-S and the ASDA included adolescents and young adults with and without disabilities.

For the first two analyses examining correlations between the ASDA-S and the AIR-Student version, there were 1,356 adolescents and young adults with disabilities in the sample. As shown in Table 27, 521 females (38.4%) and 835 males (61.6%) participated in this study with no missing data. The age across participants ranged from 11- to 22-year-old and age distribution is provided in Table 27 (M = 16.50; SD = 1.83). For the race/ethnicity distribution, 769 Caucasians (56.7%), 258 African Americans (19.0%), 250 Hispanics (18.5%), 17 Asian or Pacific Islanders (1.3%), 13 Native American/Alaskan Natives (1.0%), and 16 reporting other (1.1%) were included in this study. Distribution of disability characteristics is represented in Table 27.

Table 27

Demographic Characteristics of the Participants with Disabilities

Characteristics	*n (imputed)*	%
Gender		
Female	521	38.4
Male	835	61.6
Missing	0	0
Age		
11	7	0.5
12	29	2.1
13	70	5.2
14	109 (111)	8.0
15	218 (259)	16.1
16	311 (405)	22.9
17	169 (201)	12.5
18	150 (153)	11.1
19	84	6.2
20	25	1.8
21	9	0.7
22	3	0.2
Missing	172 (0)	12.7
Disability Group		
ADD or ADHD	59	4.4

Autism	66	4.9
EBD	128	9.4
ID	373	27.5
LD	611	45.1
OHI	91	6.7
Missing	33	2.3
Race/Ethnicity		
Caucasian	769	56.7
African American	258	19.0
Hispanic	250	18.5
Asian or Pacific Islander	17	1.3
Native American/Alaskan Native	13	1.0
Other	16	1.1
Missing	33	2.4
Total	1,356	100

Note. ADD or ADHD = Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; and OHI = Other Health Impairment.

The third analysis, main research question two, examining correlations between the ASDA-S and the ASDA was conducted with 1,786 adolescents and young adults with and without disabilities. As shown in Table 28, the sample included 557 females (31.2%), 869 males (48.7%), and missing data (n = 360; 20.2%). Age information of adolescents and young adults without disabilities was not available. However, age distribution of individuals with disabilities whose ages were between 11 and 22 years is provided in Table 28 (M = 16.50; SD = 1.83). Most participants were Caucasian (n = 807; 43.6%) and other races/ethnicities are shown in Table 28s: African American (n = 270; 14.6%); Hispanic (n = 261; 14.1%); Asian or Pacific Islander (n = 20; 1.1%); Native American/Alaskan Native (n = 14; 0.8%); other (n = 16; 0.8%); and missing data (n = 463; 25.0%). Distribution of disability characteristics is represented in Table 28.

Table 28

Demographic Characteristics of the Participants with and without Disabilities

Characteristics	*n*	%
Gender		
Female	557	31.2
Male	869	48.7
Missing	360	20.2
Age		
11	7	0.4
12	29	1.6
13	70	3.9
14	109	6.1
15	218	12.2
16	311	17.4
17	169	9.5
18	150	8.4
19	84	4.7
20	25	1.4
21	9	0.5
22	3	0.2
Missing	602	33.7
Disability Group		
Without Disabilities	430	24.1
ADD or ADHD	59	3.3
Autism	66	4.9
EBD	128	7.2
ID	373	20.9
LD	611	34.2
OHI	91	5.1
Missing	28	1.6
Race/Ethnicity		
Caucasian	769	43.1
African American	258	14.4
Hispanic	250	14.0
Asian or Pacific Islander	17	1.0
Native American/Alaskan Native	13	0.7
Other	16	0.8
Missing	463	25.9

Total	1,786	100

Note. ADD or ADHD = Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder; EBD = Emotional and Behavioral Disorder; ID = Intellectual Disability; LD = Learning Disabilities; and OHI = Other Health Impairment.

Procedures

This study involved a secondary data analysis of data from previously collected data. This data included adolescents and young adults with and without disabilities recruited to participate in studies to examine the impact of interventions to promote self-determination on post-school outcomes, including employment, independent living, and quality of life.

In all studies from which data were compiled, IRB approval was obtained and informed consent (and assent if appropriate) was obtained from participants. District-level permissions were also obtained. In all studies, baseline data were collected before implementing interventions, including demographic information. Only baseline data were used in the analyses for this study and participants were recruited in the same manner to provide a consistent overall sample.

Measurement

The Adolescent Self-Determination Assessment. The Arc's Self-Determination Scale (SDS) (Wehmeyer & Kelchner, 1995) is a student self-report assessment that measures the self-determination of adolescents with disabilities, providing an overall score and scores on and four essential characteristics of self-determined behavior (Wehmeyer, 2003). These four essential characteristics are calculated as four subscale scores: Autonomous functioning, Self-Regulation, Psychological Empowerment, and Self-Realization. The SDS includes 72 items totaling 148 possible points and was normed with 500 students with cognitive disabilities and reported adequate reliability (Cronbach alpha = .90) and adequate construct validity based on multiple means (Wehmeyer, 1996b). From the norming sample, the overall mean score was 97.52 (*SD* =

19.43). The mean score for each subdomain is: autonomous functioning —63.35 (*SD* = 15.50), self-regulation—9.78 (*SD* = 4.95), psychological empowerment—13.28 (*SD* = 2.64), and self-realization—11.11 (*SD* = 2.25) (Wehmeyer, 1995).

The Adolescent Self-Determination Assessment (ASDA) (Wehmeyer, Lopez, & Shogren, 2007) is a revised version of the SDS intended to broaden its use to measure the self-determination of youth both with and without disabilities. The ASDA was created using the same format and items from the SDS, but items were revised to be more appropriate for use with all adolescents. To revise the SDS items to create the ASDA, a focus group of adolescents without disabilities examined each item to rate that item's appropriateness for them and to make recommendations for wording that would make the item more appropriate. For example, item 21 in the SDS asks whether the participant is involved in groups, such as 4-H, scouting, and church groups. The ASDA changed the examples of the clubs to church groups and school clubs. Underlying constructs and item numbers remained the same between the SDS and the ASDA. That is, the ASDA includes 72 items with four subscales that operationalize essential characteristics of the functional model of self-determination, as mentioned above and presented in Appendix A. First, the Autonomous Functioning domain (Section I), includes 32 items with 96 total possible points rated on a 0 to 3 scale with a higher score representing greater levels of autonomous functioning. Second, for the Self-Regulation domain (Section II) includes two sections, interpersonal cognitive problem-solving (Section IIA) and goal setting and task performance (Section IIB). Section IIA includes six items rated on a 0 to 2 scale and Section IIB included three items rated on a 0 to 3 scale. This section had 21 total possible points and higher scores demonstrated higher levels of self-regulation. Third, the Psychological Empowerment domain (Section III) includes 16 questions rated on a 0 to 1 scale having 16 points possible.

Fourth, the Self-Realization domain (Section IV) includes 15 questions rated on a 0 to 1 scale having 15 points possible. For overall self-determination scores, total scores can be calculated adding these four subscale scores. There are 148 points available and higher scores indicate higher level of self-determination.

The Adolescent Self-Determination Assessment-Short Form. The Adolescent Self-Determination Assessment-Short Form (ASDA-S) (Wehmeyer, Little, Lopez, & Shogren, 2012) was developed to be completed in a shorter time, one-half of an hour or less. Item analysis was utilized to investigate a subset of items within each of the four ASDA domains that had the highest technical adequacy and predictive quality. As a result, 28 items were selected from among the original 72 items of the ASDA. Each domain included seven items, as shown in Appendix B. Section I, Autonomous Functioning, included seven items rated on a 0 to 3 scale having total 21 possible points with a higher score indicating greater levels of autonomous functioning. Section II, Self-Regulation, included two subdomains, such as interpersonal cognitive problem-solving and goal setting and task performance. The interpersonal cognitive problem-solving subdomain included six items and is scored on a scale of 0 to 2 points having 12 possible points as a total. The goal setting and task performance subdomain has one item and is scored on a scale of 0 to 3 scale having 3 points possible. Higher scores indicate higher levels of self-regulation. Section III and Section IV, Psychological Empowerment and Self-Realization, included seven items each and scores are rated on a 0 to 1 scale having each 7 points possible. Higher scores indicate higher levels of psychological empowerment and self-realization. The ASDA-S overall total score available is 50 points.

The AIR Self-Determination Scale. The AIR Self-Determination Scale (AIR) (Wolman et al., 1994) measures individual capacity and opportunity for self-determined gain, and includes

three versions; an educator version, a student version, and a parent version. This study only examined 18 items from the AIR-Student version (AIR-S) data, which used a five-point Likert-type scale (1 = *never* to 5 = *always*), consisting of Capacity and Opportunity subscale scores. Although the AIR-Student version has 24 items as shown in Appendix F, six of those items are from the 'Home Opportunities' subscale, which is often not completed because it requires information from the student's home environment that is usually not available to the teacher. In the Capacity subscale, there were two sections: "Things I Do" items asked students questions related to actions of self-determination and "How I Feel" items asked how students felt doing self-determined behaviors. The Opportunity subscale asked questions about students' perceptions of opportunities to perform self-determined behavior at home and at school; this study, however, only included the school subsection as mentioned previously. The AIR was normed with 450 students with and without disabilities in approximately 70 schools and programs in California and New York and reported adequate reliability and validity in measuring self-determination (Wolman et al., 1994). Specifically, split-half test for the internal consistency of the instrument reported a correlation of .95 and a test-retest measure of stability over 3 months reported a correlation of .74 (Wolman et al., 1994).

Analytic Procedures

The primary purpose of this study was to identify the underlying relationship between latent constructs of measures of self-determination. In addition, analyses included the examination of correlations between a higher-order construct of the ASDA-S and the AIR-S. To achieve these, structural equation modeling (SEM) techniques tested the proposed measurement model investigating the ASDA-S as distinct or similar constructs measured in the AIR-S and the ASDA. As SEM includes measurement models with structural models, SEM provides flexible

and powerful ways to examine relationships between observed and latent variables (Kline, 2011). For example, the measurement models included the relationship among latent and observed variables and structural models investigate the relationships among the latent factors.

Three analyses and two different sets of data were used in this study. First two research questions were analyzed using the data with information represented in Table 27 and the third research question conducted with using the data having information from Table 28. Three research questions were:

(1) Are constructs measured by the ASDA-S and by the AIR-Student version for adolescents and young adults with disabilities highly correlated?

(2) Are higher-order constructs of the ASDA-S and the AIR-Student version for adolescents and young adults with disabilities highly correlated?

(3) Are counterpart constructs of the ASDA-S and the ASDA for adolescents with and without disabilities highly correlated?

Explanation of each analysis follows after an explanation of data preparation. Although different data sets and analyses were conducted, this study shared the same process for data preparation.

Pre-modeling steps. Data preparation included (a) rescaling variables, (b) parceling, and (c) missing data analysis. First, proportion of maximum scoring (POMS) was conducted to rescale variables. POMS allows for the transformation of variables without changes in the shape of the distribution or the magnitude of an association between any of the variables (Little, 2013). For the ASDA and the ASDA-S, the response range of the autonomous functioning domain was from 0 to 3, the response range of the self-regulation domain was from 0 to 2 and 0 to 3 scale, and the psychological empowerment and self-realization domains varied from 0 to 1. For the AIR-S, all items varied from 1 to 5. POMS was computed separately in each domain except for

psychological empowerment and self-realization domains by [the observed score for each question – the minimum possible score on each domain of the ASDA, ASDA-S, and AIR-S)/(the maximum possible score on each domain of the ASDA, ASDA-S, and AIR-S – the minimum possible score on each domain of the ASDA, ASDA-S, and AIR-S] (Cohen et al., 1999).

Second, a process of a parceling was used to create parcels for each subscale. A definition of a parcel is "an aggregate-level indicator comprised of the sum (or average) of two or more items, responses, or behaviors" (Little et al., 2002, p. 152). Parcels are then used as the manifest indicator of the latent construct. Parcels possess a number of advantages over item-level analyses, including higher reliability and greater communality. For the ASDA-S in research question one examining the relationship between the ASDA-S and the AIR-S, four latent constructs were provided in the measurement model that represented the four essential characteristics of self-determined behaviors: Autonomous functioning (SAUTO), Self-Regulation (SSREG), Psychological Empowerment (SPSYE), and Self-Realization (SSREA). For the AIR-S, two latent constructs were created as represented as subdomains, including AIR-S Capacity (AIRSC) and AIR-S Opportunity (AIRO). For all the latent constructs, three parcels were created to maintain a just-identified model for each construct. A balancing approach was used to create parcels that "assigns the item with the highest item-scale correlation to be paired with the item that has the lowest-item scale correlation" (Little, 2013, p. 24).

For the examination of the ASDA-S and the ASDA, four parcels were created for each of the four latent constructs, including Autonomous functioning (AUTO), Self-Regulation (SREG), Psychological Empowerment (PSYE), and Self-Realization (SREA). For the ASDA, one parcel in each construct was created by gathering all the items not included in the ASDA-S and three parcels were created by averaging the rest of the items using balancing approach mentioned

above. For the ASDA-S, three parcels for each construct were created by conducting the same method used in the ASDA, however, one parcel in each construct consisted of orthogonalized variables that are described in the following section.

Third, after parcels were created, there was a small amount of missing data of the analysis of the ASDA-S and the AIR-S (M = 2.5%, range = 1.7%-3.1%) and the analysis for the ASDA-S and the ASDA (M = 1.7%, range = 0.6%-2.4%). Full-information maximum likelihood (FIML) estimation, an approach that uses all information to inform the parameters' values and standard errors, was used for missing data analysis and utilized by Mplus version 7.4 (Muthén & Muthén, 1998-2015).

Main Research Question One.

Relationship between the ASDA-S and the AIR-S. As mentioned above, SEM was used to examine the underlying relationship between the ASDA-S and the AIR-Student version. First, measurement models were tested to investigate relationships between manifest and latent variables. Second, structural models were examined to examine the causal relationship among latent constructs by analyzing the degree to which each of the latent constructs predicted a higher-order in the ASDA-S and the AIR-Student version. The measurement model for this study is shown in Figure 4 and the hypothesized structural model that represented relationships among latent constructs is shown in Figure 5.

As shown in Figure 4, the measurement model included the six latent constructs: Autonomous functioning (SAUTO), Self-Regulation (SSREG), Psychological Empowerment (SPSYE), Self-Realization (SSREA), AIR-S Capacity (AIRSC), and AIR-S Opportunity (AIRSO). As prescribed in the data preparation section, each latent construct included three parcels as observed variables. To set the scale, the effects-coding method of scaling were used to

achieve estimates of construct's latent variance in a nonarbitrary metric that provided an unbiased and optimal balance of the information (Little, 2013; Little, Slegers, & Card, 2006).

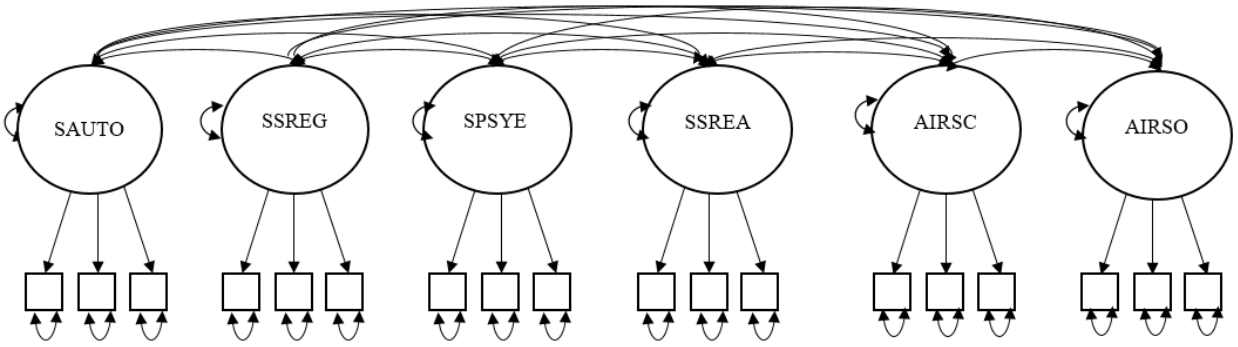

Figure 4. Hypothesized measurement model of the ASDA-S and the AIR-S. SAUTO = Autonomous functioning; SSREG = Self-Regulation; SPSYE = Psychological Empowerment; SSREA=Self-Realization; AIRSC = AIR-S Capacity; and AIRSO = AIR-S Opportunity.

For the examination of structural models as seen in Figure 5, two higher order constructs were created. The first higher order construct, ASDA-S, comprised the first-order constructs of SAUTO, SSREG, SPSYE, and SSREA. The second higher order construct, AIR-S, consisted the first-order constructs of AIRSC and AIRSO.

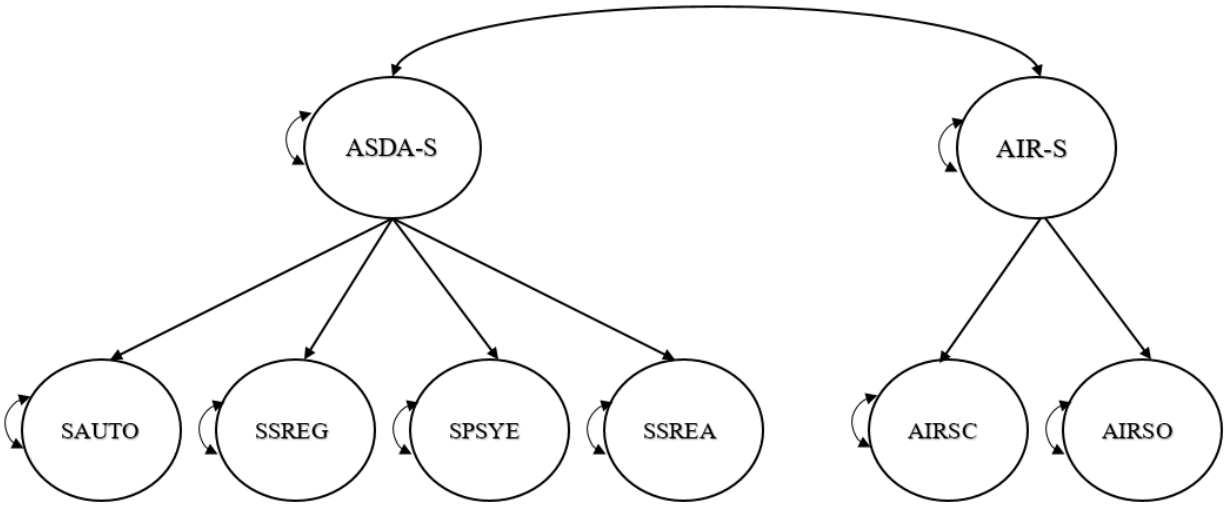

Figure 5. Hypothesized structural model of the ASDA-S and the AIR-S. SAUTO = Autonomous functioning; SSREG = Self-Regulation; SPSYE = Psychological Empowerment; SSREA=Self-Realization; AIRSC = AIR-S Capacity; and AIRSO = AIR-S Opportunity.

Main Research Question Two.

Relationship between the ASDA-S and the ASDA. SEM is also beneficial for examining cross-group similarities and differences among latent variables (Kline, 2011). Within this context, latent factorial invariance, such as a two group CFA, was conducted to compare the ASDA-S and the ASDA by creating the parcels parallel for each scale and leaving the 4th parcel in the ASDA, including items left out from the ASDA-S. Specifically, as mentioned briefly in a pre-modeling step, there were four latent constructs and four manifest variables created for each construct as shown in Figure 6. In the ASDA, items not included in the ASDA-S were gathered and created one parcel as the fourth parcel in each construct. For the ASDA-S, three parcels for each construct were created by using a balancing approach and the fourth parcels for each construct were created with orthogonal noise variable to examine underlying similarities or differences between each latent construct of the ASDA-S and the ASDA. The orthogonal approach (referred as *residual centering*) was performed to create orthogonal noise variables to represent latent variable interactions by eliminating nonessential multicollinearity (Little, Bovaird, & Widaman, 2006). When predictors are correlated, the collinearity can lead to problems when estimating parameters in SEM. Collinearity refers to when two or more predictor variables in a model are highly correlated. With the collinear variables, the model can be poorly estimated as well. For these reasons, the orthogonal approach was used to develop a variable by providing stable and interpretable results. After the measurement model was accepted, tests of population heterogeneity were performed to compare latent parameters by conducting tests of equality of factor variance/covariance matrices and equality of latent means in each group (Little, 2013). Chi-square difference tests were performed to examine the equality of factor variances and covariances and the equality of latent means using the baseline model

(Little, 2013). In addition, factor scores were created individually in each construct to achieve correlation from counterpart constructs between the ASDA-S and the ASDA.

Results

Main Research Question One

The CFA model for each self-determination measurement demonstrated good fit, χ^2 (48) = 182.863, CFI = 0.970, TLI = 0.959, RMSEA = 0.046 (0.039-0.053), and SRMR= 0.035 for the ASDA-S and χ^2 (8) = 54.085, CFI = 0.991, TLI = 0.982, RMSEA = 0.069 (0.052-0.087), and SRMR= 0.020 for the AIR-S.

First, the initial measurement model, as shown in Figure 4, was acceptable: χ^2 (120) = 318.432, $p < .001$, RMSEA = .035 (.030 – .040), CFI = .979, and TLI = .974. Table 29 reports parameter estimates, including loadings, intercept values, residuals, R^2, and latent variances for the initial model in each parcel. Latent correlations among constructs are represented in Table 30. For the ASDA-S, autonomous functioning and psychological empowerment were moderately correlated while others provided weak relationships. Compared to other weak relationships among latent constructs in the ASDA-S, a correlation between psychological empowerment and self-realization showed comparatively higher relationship as reported in previous studies that compared the SDS and the AIR-S (Shogren et al., 2006, 2008). In the AIR-S, latent constructs of AIRSC and AIRSO suggested moderate relationships. These correlations suggested moderate to weak relationships with all the subscales in the ASDA-S and the AIR-S. Between the ASDA-S and the AIR-S, latent constructs of autonomous functioning and psychological empowerment were moderately correlated with both AIRSC and AIRSO, while self-regulation and self-realization constructs reported weak relationships to AIRSC and AIRSO.

Table 29

Loading and Intercept Values, Residuals, and R^2 Values for Each Indicator, and the Estimated Latent Variances

	Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	θ	R^2
SAUTO : Estimated Latent Variance = 0.025					
SAT 1	0.999 (0.030)	0.665 (0.007)	0.776	0.398	0.602
SAT 2	0.996 (0.031)	0.667 (0.008)	0.669	0.553	0.447
SAT 3	1.005 (0.032)	0.735 (0.008)	0.658	0.568	0.432
SSREG : Estimated Latent Variance = 0.034					
SSG 1	0.934 (0.029)	0.517 (0.007)	0.723	0.477	0.523
SSG 2	1.034 (0.030)	0.447 (0.008)	0.724	0.476	0.524
SSG 3	1.031 (0.030)	0.522 (0.008)	0.719	0.483	0.517
SPSYE : Estimated Latent Variance = 0.013					
SPY 1	0.819 (0.042)	0.839 (0.007)	0.522	0.727	0.273
SPY 2	1.080 (0.044)	0.887 (0.007)	0.676	0.544	0.456
SPY 3	1.101 (0.045)	0.854 (0.007)	0.623	0.612	0.388
SSREA : Estimated Latent Variance = 0.062					
SSA 1	0.996 (0.019)	0.790 (0.009)	0.836	0.301	0.699
SSA 2	0.994 (0.019)	0.816 (0.009)	0.808	0.347	0.653
SSA 3	1.010 (0.020)	0.799 (0.009)	0.805	0.351	0.649
AIRSC : Estimated Latent Variance = 0.009					
AIRC 1	0.973 (0.014)	0.704 (0.005)	0.877	0.230	0.770
AIRC 2	0.983 (0.014)	0.710 (0.005)	0.870	0.242	0.758
AIRC 3	1.044 (0.014)	0.706 (0.006)	0.894	0.201	0.799
AIRSO : Estimated Latent Variance = 0.008					
AIRO 1	0.995 (0.019)	0.662 (0.006)	0.829	0.313	0.687
AIRO 2	0.996 (0.019)	0.702 (0.006)	0.822	0.324	0.676
AIRO 3	1.009 (0.019)	0.694 (0.007)	0.810	0.343	0.657

Note. SAUTO = Autonomous functioning; SAT 1 - SAT 3 = Parcel 1 - Parcel 3 for SAUTO; SSREG = Self-Regulation; SSG 1 - SSG 3 = Parcel 1 – Parcel 3 for SSREG; SPSYE = Psychological Empowerment; SPY 1 - SPY 3 = Parcel 1 – Parcel 3 for SPSYE; SSREA = Self-Realization; SSA 1 - SSA 3 = Parcel 1 - Parcel 3 for SSREA; AIRSC = AIR-Student Capacity; AIRC 1 – AIRC 3 = Parcel 1 - Parcel 3 for AIRSC; AIRSO = AIR-Student Opportunity; AIRSO 1 – AIRSO 3 = Parcel 1 – Parcel 3 for AIRSO.

Table 30

Correlations Between Latent Constructs

	SAUTO	SSREG	SPYSE	SSREA	AIRSC	AIRSO
SAUTO	1					
SSREG	0.180	1				
SPSYE	0.367	0.215	1			
SSREA	0.207	0.121	0.247	1		
AIRSC	0.295	0.173	0.352	0.198	1	
AIRSO	0.311	0.183	0.371	0.209	0.532	1

Note. SAUTO = Autonomous functioning; SAT 1 - SAT 3 = Parcel 1 - Parcel 3 for SAUTO; SSREG = Self-Regulation; SSG 1 - SSG 3 = Parcel 1 – Parcel 3 for SSREG; SPSYE = Psychological Empowerment; SPY 1 - SPY 3 = Parcel 1 – Parcel 3 for SPSYE; SSREA = Self-Realization; SSA 1 - SSA 3 = Parcel 1 - Parcel 3 for SSREA; AIRSC = AIR-Student Capacity; AIRC 1 – AIRC 3 = Parcel 1 - Parcel 3 for AIRSC; AIRSO = AIR-Student Opportunity; AIRSO 1 – AIRSO 3 = Parcel 1 – Parcel 3 for AIRSO.

Second, the proposed structural model, as provided in Figure 5, demonstrated acceptable fit with two higher order constructs: χ^2 (128) = 397.395, $p < .001$, RMSEA = .039 $_{(.035 - .044)}$, CFI = .972, and TLI = .967. Table 31 provides the estimates of lower order loadings to the higher-order factors, such as the ASDA-S and the AIR-S. As a moderate correlation level is between .5 to .7 and strong relationship is higher than .7, correlations between the higher order of the ASDA-S and the AIR-S demonstrated a moderate but to close to strong relationship (r = .644) as reported in Figure 7. This result showed similar relationships to those that Shogren and colleagues (2008) found and who reported a moderate relationship (r = .5) between the SDS, (from which the ASDA-S was modified), and the AIR-S.

Table 31

Loading of the Lower-Order Constructs on the Higher-Order Self-Determination Constructs

Indicator	*Beta (SE)*	*z-score*	*p*-value	Standardized Beta
the Adolescent Self-Determination Assessment-Short form (ASDA-S)				
Autonomous functioning	0.665 (0.071)	9.429	<.001	0.554
Self-Regulation	0.334 (0.049)	6.985	<.001	0.326
Psychological Empowerment	0.883 (0.107)	8.219	<.001	0.662
Self- Realization	0.402 (0.048)	8.394	<.001	0.373
The AIR Self-Determination Assessment-Student Version (AIR-S)				
Capacity	1.461 (0.159)	9.178	<.001	0.825
Opportunity	1.772 (0.249)	7.107	<.001	0.871

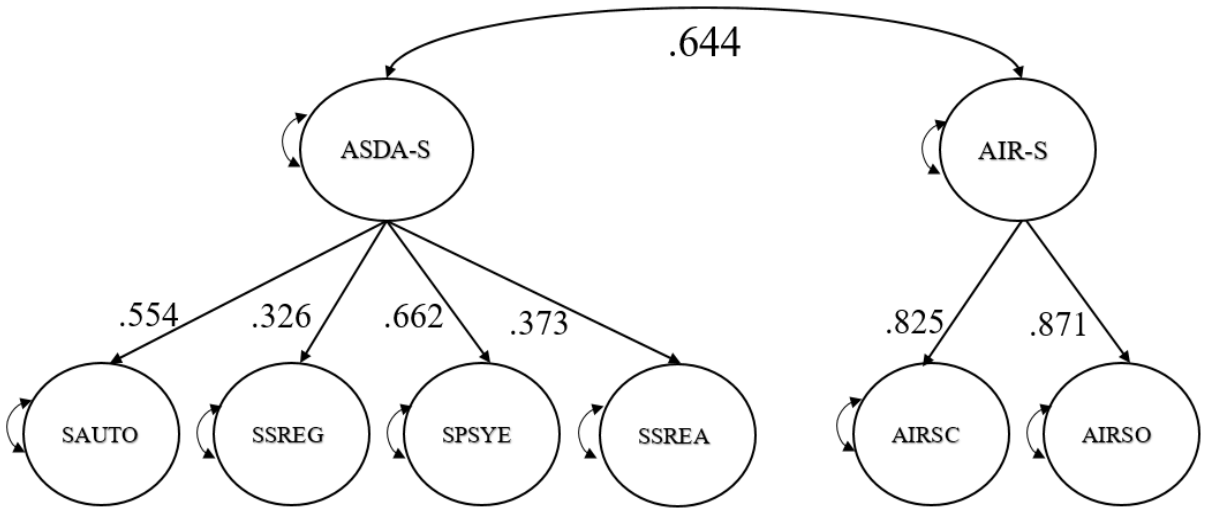

Figure 6. Final structural model with correlations between the ASDA-S and the AIR-S and standardized beta values for the loadings of the lower order constructs on the higher order constructs. SAUTO = Autonomous functioning; SSREG = Self-Regulation; SPSYE = Psychological Empowerment; SSREA=Self-Realization; AIRSC = AIR-S Capacity; and AIRSO = AIR-S Opportunity.

Main Research Question Two

The established measurement model, as shown in Figure 7, was acceptable: $\chi 2$ (216) = 1032.439, $p < .001$, RMSEA = .046 (.043 – .049), CFI = .946, and TLI = .940. Table 31 reported parameter estimates, including loadings, intercept values, residuals, and R^2 for the initial model in each parcel. As shown in Table 32, the model established in this analysis freed fourth parcels that included orthogonal noise variables in each construct in the ASDA-S and equated the rest of the three parcels in each construct across the measurements. Along with these processes, a fixed factor method of scaling (Little, Bovaird, & Slegers, 2006) was used to set the scale. As the measurement model was accepted, structural invariance models were conducted that enabled comparison of latent parameters: (a) the equality of latent means and (b) equality of factor variances/covariances. First, as shown in Table 33, the equality of latent means across the ASDA-S and the ASDA was tenable. From the baseline model, chi-square difference tests were

conducted to establish the homogeneity of latent means ($\Delta \chi^2$ (4) = 0.017, p = 1). The tenable result suggests that the latent means were equivalent across these measurements (Brown, 2015).

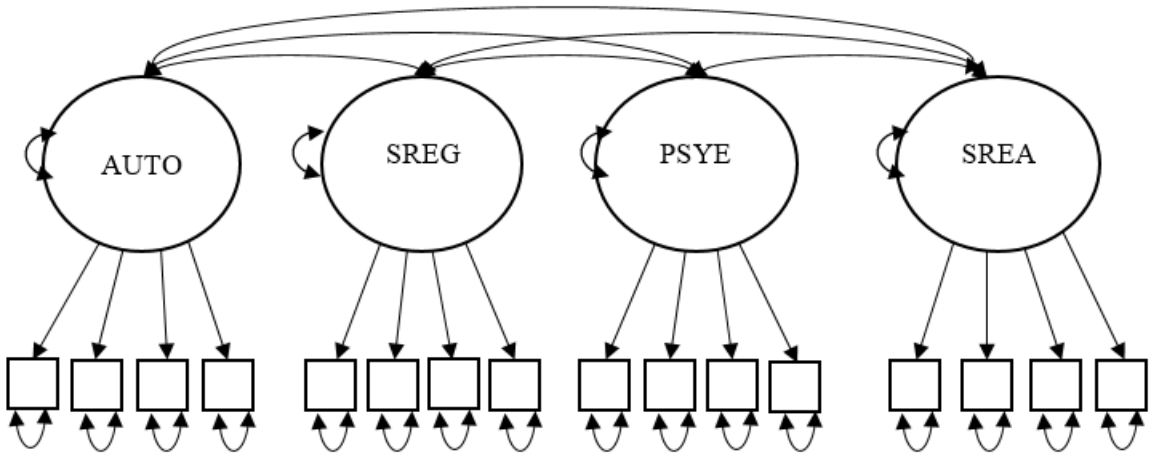

Figure 7. Measurement model in the analyses of the ASDA-S and the ASDA. AUTO = Autonomous functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; and SREA=Self-Realization.

Table 32

Loading and Intercept Values, Residuals, and R^2 Values for Each Parcel

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
AUTO (ASDA):					
AT 1	0.183 (0.005)	0.683 (0.005)	0.762	0.419	0.581
AT 2	0.186 (0.005)	0.682 (0.006)	0.680	0.537	0.463
AT 3	0.183 (0.006)	0.753 (0.006)	0.661	0.563	0.437
AT 4	0.132 (0.003)	0.630 (0.004)	0.848	0.281	0.719
AUTO (ASDA-S):					
AT 1	0.183 (0.005)	0.683 (0.005)	0.771	0.405	0.595
AT 2	0.186 (0.005)	0.682 (0.006)	0.682	0.535	0.465
AT 3	0.183 (0.006)	0.753 (0.006)	0.657	0.568	0.432
AT 4	0.005 (0.027)	0.000 (0.000)	0.005	1.000	0.000
SREG (ASDA):					
SG 1	0.192 (0.005)	0.499 (0.006)	0.749	0.439	0.561
SG 2	0.208 (0.005)	0.513 (0.006)	0.785	0.383	0.617
SG 3	0.201 (0.006)	0.528 (0.006)	0.707	0.501	0.499
SG 4	0.112 (0.009)	0.455 (0.008)	0.334	0.888	0.112
SREG (ASDA-S):					
SG 1	0.192 (0.005)	0.499 (0.006)	0.741	0.451	0.549
SG 2	0.208 (0.005)	0.513 (0.006)	0.792	0.373	0.627
SG 3	0.201 (0.006)	0.528 (0.006)	0.710	0.495	0.505
SG 4	-0.006 (0.026)	0.000 (0.000)	-0.006	1.000	0.000
PSYE (ASDA):					
PY 1	0.094 (0.005)	0.830 (0.005)	0.389	0.849	0.151
PY 2	0.107 (0.006)	0.876 (0.005)	0.410	0.832	0.168
PY 3	0.094 (0.005)	0.878 (0.005)	0.362	0.869	0.131
PY4	0.193 (0.006)	0.772 (0.006)	0.795	0.368	0.632
PSYE (ASDA-S):					
PY 1	0.094 (0.005)	0.830 (0.005)	0.635	0.597	0.403
PY 2	0.107 (0.006)	0.876 (0.005)	0.678	0.541	0.459

	Equated Estimates		Standardized		
Indicator	Loading (SE)	Intercept (SE)	Loading	Residual Variance	R^2
PY 3	0.094 (0.005)	0.878 (0.005)	0.597	0.643	0.357
PY 4	0.005 (0.018)	0.000 (0.000)	0.008	1.000	0.000
SREA (ASDA):					
SA 1	0.252 (0.006)	0.828 (0.007)	0.844	0.287	0.713
SA 2	0.250 (0.006)	0.802 (0.007)	0.746	0.443	0.557
SA 3	0.246 (0.006)	0.810 (0.007)	0.759	0.423	0.577
SA4	0.105 (0.005)	0.630 (0.005)	0.521	0.728	0.272
SREA (ASDA-S):					
SA 1	0.252 (0.006)	0.828 (0.007)	0.850	0.277	0.723
SA 2	0.250 (0.006)	0.802 (0.007)	0.745	0.445	0.555
SA 3	0.246 (0.006)	0.810 (0.007)	0.765	0.414	0.586
SA 4	0.005 (0.018)	0.000 (0.000)	0.005	1.000	0.000

Note. AUTO = Autonomous Functioning; AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; AT 4 = Parcel 4 for AUTO; SREG = Self-Regulation; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; SG 4 = Parcel 4 for SREG, PSYE = Psychological Empowerment; PY 1 = = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; PY 4 = Parcel 4 for PSYE; SREA = Self-Realization; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA; SA 4 = Parcel 4 for SREA.

Second, tests of the homogeneity of the variances and covariances were performed using chi-square difference tests from the initial measurement model as shown in Table 33. As the result showed significant differences in the variances and covariances ($\Delta \chi^2$ (10) = 244.26, p < .001) of the latent constructs across the measurements, the homogeneity of variances ($\Delta \chi^2$ (4) = 104.11, p < .001) was tested from the baseline model and the result also showed significant differences across the ASDA-S and the ASDA. Then, we examined the equality of covariances based on the initial measurement model with phantom constructs. To provide comparable correlational metrics, phantom constructs were created based on the initial model (Little, 2013). In the process of developing phantom constructs, rather freely estimating the standard deviation

of the constructs by estimating the higher level of factor loadings, we fixed their loading to the square root of the estimates in latent variance from the ASDA-S. As a result, the homogeneity of covariances ($\Delta \chi^2$ (6) = 93.609, $p < .001$) was not tenable as showing significant differences across the measures. Based on the results achieved from these analyses, we found that the variance of the ASDA-S in psychological empowerment was two to three times higher than the ASDA. As freeing a psychological empowerment construct, the homogeneity of variances and covariances was accepted ($\Delta \chi^2$ (6) = 0.652, $p = 0.995$).

Table 33
Fit Indices for the Nested Sequence in the ASDA-S and the ASDA

Model	$\chi 2$	*df*	*p*	$\Delta\chi 2$	Δ *df*	*p*	RMSEA	RMSEA 90% CI	CFI	TLI	Constraint Tenable?
Measurement model estimates											
Latent factorial invariance model	1032.439	216	0.000	---	---	---	0.046	0.043 0.049	0.946	0.940	---
Latent model estimates											
Tests of the latent means[2]	1032.456	220	0.000	0.017	4	1	---	---	---	---	Yes
Homogeneity of Var/Cov[2]	1276.698	226	0.000	244.26	10	0.000	---	---	---	---	No
Homogeneity of Var[2]	1136.552	220	0.000	104.11	4	0.000	---	---	---	---	No
Homogeneity of Var/Cov[2] without PSYE	1033.091	222	0.000	0.652	6	0.995	---	---	---	---	Yes
Homogeneity of Var[2] without PSYE	1032.465	219	0.000	0.026	3	0.999	---	---	---	---	Yes

Note. PSYE = Psychological Empowerment construct
1 Evaluated with RMSEA and CFI Model Test, a change in CFI of .01 or less is used.
2 Evaluated with $\chi 2$ Difference Test. Each nested model contains its constraints, plus the constraints of all previous tenable models.

To provide information on the underlying relationships across counterpart constructs between the ASDA-S and the ASDA, correlations of the factor scores are reported in Table 34. Factor scores indicate each person's scores on the unobserved latent constructs and have the advantage of having close patterns of factor correlations observed in the factor analysis itself. The results showed significant strong relationships between the ASDA-S and the ASDA in Autonomous functioning, Self-Regulation, and Self-Realization. To support the result reported previously that homogeneity of var/cor was established without Psychological Empowerment, the result in Table 34 provides an evidence of interrelationship of the Psychological Empowerment across the ASDA-S and the ASDA that there is a significant moderate relationship in this construct.

Table 34

Correlations of Factor Scores between the ASDA-S and the ASDA

	SAUTO	SSREG	SPSYE	SSREA	LAUTO	LSREG	LPSYE	LSREA
SAUTO	1							
SSREG	0.276	1						
SPSYE	0.400	0.332	1					
SSREA	0.151	0.183	0.485	1				
LAUTO	**0.901**	0.267	0.366	0.164	1			
LSREG	0.286	**0.993**	0.321	0.184	0.290	1		
LPSYE	0.207	0.291	**0.538**	0.830	0.224	0.310	1	
LSREA	0.162	0.202	0.485	**0.968**	0.178	0.210	0.925	1

Note. All correlations were significant, $p < .001$. SAUTO = Autonomous functioning for the ASDA-S; SSREG = Self-Regulation for the ASDA-S; SPSYE = Psychological Empowerment for the ASDA-S; and SSREA=Self-Realization for the ASDA-S; LAUTO = Autonomous functioning for the ASDA; LSREG = Self-Regulation for the ASDA; LPSYE = Psychological Empowerment for the ASDA; and LSREA=Self-Realization for the ASDA.

Discussion

The purpose of this study was to examine (a) the relationship between the ASDA-S and the AIR and (b) the relationship between the ASDA-S and the ASDA with adolescents and young adults with and without disabilities. SEM was used to investigate similarities and differences among these self-determination measures. This study is the first to establish the criterion validity of the ASDA-S, especially concurrent validity, which is useful for predicting performance in another situation or measurements, including the AIR-S and the ASDA. In ensuring concurrent validity, the study provides for meaningful implications in research and practice. This discussion is divided into three sections: (a) limitations of the study, (b) summary of the findings, and (c) implications for future research.

Limitations of this Study

There are several limitations that must be considered when interpreting the results from this study. First, there was limited data collected from students without disabilities. As the AIR-S wasn't collected with participants without disabilities, analysis of the ASDA-S and the AIR-S only included youth and young adults with disabilities. Future research is warranted to investigate the relationship between the ASDA-S and the AIR-S for participants without disabilities. In the analysis of the ASDA-S and the ASDA, which did include adolescents and young adults without disabilities, there was limited demographic information for students without disabilities. Second, there were educator and parent forms of the AIR, however, this study only included the student form. Similarly, items from the Home Opportunity section in the AIR-S were not included. It would be helpful in the future to examine the relationship between the ASDA-S and the parent and educator forms of the AIR, as well as conducting research that includes scores from the Home Opportunity subdomain. Third, the limited number of students

with physical and sensory disabilities did not allow inclusion in the analysis. As such, future research is recommended to collect more data with students across all disability categories to ensure that the measure is useful for all students.

Summary of the Findings

These analyses provided several important findings. First, with the examination of the relationship between the ASDA-S and the AIR-S, criterion validity was obtained for the ASDA-S. Criterion-related validity is established by "examining the predictive or concurrent correlations of a focal scale with key variables that are identified as criteria" (Widaman et al., 2011, p. 49). This can be achieved by collecting data on the newly developed scale and conceptually related measures that are administered at the same time. These correlations are recommended to be consistent with past research with similar constructs to report concurrent criterion-validity (Widaman et al., 2011). In this study, latent construct correlations were reported between the ASDA-S and the AIR-S as shown in Table 30. Compared to an earlier study that examined the relationship between the SDS and the AIR-S (Shogren et al., 2008), results in this study showed both similarities and differences. For example, almost all latent correlations in the ASDA-S (autonomous functioning, self-regulation, psychological empowerment, and self-realization) with latent constructs in the AIR-S, including the AIR Student Capacity and AIR Student Opportunity domains, resulted in nearly identical relationships to past research, ranging from 0.173 to 0.37 in this study and ranging from 0.13 to 0.38 in Shogren et al. (2008). The relationship between the Autonomous functioning construct in the ASDA-S and the AIR Student Capacity construct in the AIR-S found a small effect size (r = .3) in this study, compared to a medium effect size (r = .5) in Shogren et al. (2008). After an initial measurement model was established, two higher-orders were created, labeled as ASDA-S

and AIR-S. All four lower order construct loadings in the ASDA-S and two lower order construct loadings in the AIR-S were significant, as seen in Table 31, indicating that these constructs statistically supported the theoretical perspectives in each measurement. The effect size of the latent correlation between the ASDA-S and the AIR-S indicated a medium relationship (r = .644), as seen in Figure 6, which was a marginally increased estimate compared to Shogren et al. (2008)'s study (r = .5), but categorized in the same effect size. After higher-orders were created, we tried to create a third-order comprised with ASDA-S and AIR-S as lower order constructs, however, the model failed to converge. From these results, it was supported that the ASDA-S and the AIR-S represented distinct aspects of self-determination that was a function of their theoretical underpinnings, but that the magnitude of interrelationships between the ASDA-S with the AIR-S reported an analogous pattern to the results of the previous research and contributes to the establishment of concurrent criterion-related validity.

Second, the findings confirm the utility of the ASDA-S with youth with and without disabilities, making it a potentially useful tool for use in schoolwide and inclusive settings. As shown in Table 34, correlations of counterpart latent constructs between the ASDA-S and the ASDA were all significant and reported strong relationship with Autonomous functioning (r = .901), Self-Regulation (r = .993), and Self-Realization (r = .960). In addition, the Psychological Empowerment construct across these measures indicated a statistically significant moderate to strong relationship. Based on past studies that examined the relationship among constructs within the ASDA, the ASDA-S showed a similar degree of latent correlations. For example, Shogren and colleagues (2006) represented the pattern of interrelationships of latent constructs of the ASDA, including autonomous functioning, self-regulation, psychological empowerment, self-realization, and positive psychology constructs with students with and without disabilities.

As seen in Table 34, reported correlations among the four latent constructs ranged from 0.151 to 0.925, which was comparable to interrelationships from the Shogren et al. (2006) study, which reported estimates ranged from 0.14 to 0.77. As such, the overall self-determination constructs from the ASDA-S mirrored those found for the ASDA by previous studies.

Implications for Practice and Future Research

The ASDA-S was developed to meet the demand for a measure taking less time to administer with a wider population (e.g., students with and without disabilities). This study provides evidence of the concurrent criterion validity of the ASDA-S, including its use with youth and young adults with and without disabilities. For measurement development in the field of self-determination, it is important to have reliable and valid measures aligned with theoretical frameworks to further our understanding of the construct and of the effects of interventions to promote self-determination. This study provides an initial effort to establish criterion validity of the ASDA-S. In this section, future recommendations for research and practice are made.

First, from the result of main research question one, theoretical frameworks for the ASDA-S and the AIR-S were supported by the data. The ASDA-S was developed with four essential characteristics of self-determined behavior defined by the functional model of self-determination (Wehmeyer, Little, et al., 2011). These four essential characteristics, such as AUTO, SREG, PSYE, and SREA in Figure 6, were four latent constructs that established a higher-order construct, which was replicated in the ASDA-S. The AIR-S was developed based on self-determined learning theory (Wolman et al., 1994), and its two latent constructs, capacity and opportunity, created a higher-order self-determination construct that represented as AIR-S. As mentioned previously, an interrelationship between higher-orders of the ASDA-S and the AIR-S was similar to those found in a previous study by Shogren et al. (2008), providing

consistent implications for research that the ASDA-S and the AIR-S assess different aspects of self-determination. For example, the functional theory of self-determination sought to conceptualize global self-determination, while self-determined learning theory focused on the process of how students become self-determined learners. Therefore, it is recommended for researchers to determine what self-determination measure will be appropriate for use in their studies by considering their research goals and the theoretical framework of self-determination aligned with each measure.

Second, given the growing emphasis on positive psychology and strengths-based approaches to disability and universal accessibility, having a measure that is valid and reliable with all students can facilitate the implementation of efforts to include students with disabilities in high quality instruction (Shogren, 2013b; Shogren, Wehmeyer, Palmer, Forber-Pratt, et al., 2015). Recently, the U.S. Supreme Court issued a unanimous opinion that, in essence, set a higher standard for the provision of an appropriate education for students receiving special education services (Kamenetz & Turner, 2017, March 22; Walsh, 2017, March 22). In the ruling, U. S. Supreme Court Chief Justice John Roberts said "It requires an educational program reasonably calculated to enable a child to make progress appropriate in light of the child's circumstances." (Walsh, 2017, March 22). Promoting self-determination has been shown to be important (Cobb et al., 2009; Test et al., 2009) and has been shown to be important to achieve more positive outcomes (and, reasonably, to provide an appropriate education). As such, it is critical to have sound measurement tools to enable teachers to assess students' levels of self-determination. In addition, promoting self-determination can be a support that enables students to function more successfully in typical contexts (Shogren, 2013a). Given the potential benefit of promoting self-determination for all students, and not just students with disabilities, a tool to

demonstrate the effectiveness of self-determination interventions with all students would be helpful (Wehmeyer, & Webb, 2012). For example, Shogren, Wehmeyer, and Lane (in press) suggested that self-determination related interventions should be applied within multitiered systems of supports (MTSS) for all students. Within this context, the ASDA-S advances our understandings of the degree to which inclusive school environment that are supportive of self-determination by assessing level of self-determination for all students. In addition, the ASDA-S can be administered in a shorter time and in a variety of settings. Students who have difficulty taking assessment due to attention or motivation issues may benefit from this shorter version. The shorter version may also make repeated data collection easier and more feasible and may facilitate longitudinal research.

Third, research on self-determination across various cultures has been conducted and the SDS has been translated in French, Spanish, and Portuguese (Shogren, 2011; Wehmeyer et al., 2006; Wehmeyer, Peralta, Zulueta, & González-Torres, 2002; Wehmeyer, Lachapelle, Boisvert, Leclerc, & Morissette, 2002), among other languages. A considerable number of users already use the SDS, and may value both the ASDA and the ASDA-s for the same reasons US researchers do so, because of ease of implementation and utility with students with and without disabilities. Ginevra and colleagues (2015) translated the ASDA into Italian and examined cross-cultural comparability of the functional theory of self-determination using the ASDA. Across Italian and American adolescents, the construct of self-determination was comparable and the measure also helped identify some areas in which the two cultures differed. With the increased attention on the importance of self-determination for students with disabilities, culturally validated measurements of self-determination are needed. As the SDS and the ASDA were

culturally validated and widely used, it is recommended for future research and practice to verify the cultural appropriateness of the ASDA-S.

CHAPTER 4: CONCLUSION AND IMPLICATIONS

Over the past three decades, research has linked the self-determination status of youth and young adults with disabilities to multiple positive outcomes, including higher quality of life and better life satisfaction (Lachapelle et al., 2005; Nota et al., 2007; Shogren et al., 2006; Wehmeyer & Schalock, 2001; Wehmeyer & Schwartz, 1998); improved postschool outcomes, including employment and community access (Dean, Burke, Shogren, & Wehmeyer, in press; Shogren, Wehmeyer, Palmer, Rifenbark, & Little, 2015; Wehmeyer & Schwartz, 1997); and more positive academic outcomes, including access to the general education curriculum (Carter, Lane, Pierson, & Stang, 2008; Lee et al., 2008; Palmer, Wehmeyer, Gipson, & Agran, 2004; Shogren et al., 2012). A number of meta-analytic reviews showed the beneficial effects of interventions to promote component elements of self-determined behavior (Algozzine et al., 2001; Cobb et al., 2009; Lee et al., 2015; Test et al.,2009). Individual interventions to promote self-determination have been found to have causal impact on both self-determination and more positive school and post-school outcomes. Recently, Hagiwara and colleagues (2017) reviewed 21 articles on the efficacy of the *Self-Determined Learning Model of Instruction* (SDLMI) (Wehmeyer, Palmer, Agran, Mithaug, & Martin, 2000), an instructional model to enable teachers to teach students to self-regulate problem solving leading to goal attainment, showing the model's efficacy. Self-determination has been identified as a foundational construct in the discipline of positive psychology, referring to the pursuit of optimal human functioning and a better life for all people (Ryan & Deci, 2000; Seligman & Csikszentmihalyi, 2000). Given the construct's importance from multiple perspectives, the importance of assessments of self-determination that are useful for all students has increased (Shogren et al., in press). The Adolescent Self-Determination Assessment-Short form (ASDA-S) (Wehmeyer, Little, et al.,

2011) was developed to provide a valid and reliable tool that was easier and shorter to administer. The ASDA-S is a short version of the Adolescent Self-Determination Assessment (ASDA) (Wehmeyer, Little, Lopez, & Shogren, 2012), which in turn was derived from The Arc's Self-Determination Scale (SDS). The ASDA provided a tool to measure the self-determination of students with and without disabilities. The studies in this dissertation provide important information about the reliability and validity of the ASDA-S.

This dissertation has two primary implications. First, the ASDA-S, as revised from the ASDA, was determined to be a psychometrically-sound measure by providing evidence of reliability and validity for the instrument. In the first study, reported in Chapter 2, three measurement invariance models that performed across gender, age, and disabilities were established by reporting measurement properties of the ASDA-S as invariant with adolescents and young adults with and without disabilities. Specifically, SEM frameworks were conducted to the following analyses: (a) two gender group analysis with female and male, (b) seven age groups analysis of ages from 11 years to 22 years, and (c) six groups of disabilities and students without disabilities. The second study, reported in Chapter 3, addressed criterion validity by examining (a) the relationship between the ASDA-S and the AIR-S and (b) the relationship between the ASDA-S and the ASDA. Criterion validity is "established by examining the predictive or concurrent correlations of a focal scale with key variables that are identified as criteria" (Widaman et al., 2011, p.49). In addition, Widaman and colleagues (2011) asserted that these correlations should be consistent with past research with similar constructs. As results obtained for validity refer to functional consistencies and attributes of groups of a measurement (Messick, 1995), the results of this study were the first to validate the scale.

Second, it is important that the ASDA-S was validated with youth and young adults with and without disabilities. The first study, reported in Chapter 2, established measurement invariance models across students with Attention Deficit Disorder or Attention Deficit Hyperactivity Disorder, Autism, Emotional and Behavioral Disorder, Intellectual Disability, Learning Disabilities, Other Health Impairment and for students without disabilities. It provides evidence that the ASDA-S is measuring the same constructs across these groups, and that it can be generalized for further research with this population. In addition, the second study, reported in Chapter 3, established criterion validity between the ASDA-S and the ASDA with adolescents and young adults with and without disabilities. There has been an effort to include students with disabilities to the general education curriculum by developing evidence-based practices for all students in multi-tiered system of support models (Lane, Menzies, Kalberg, & Oakes, 2012; Shogren et al., 2016). There is good reason to believe that interventions to promote self-determination may have utility for more students than simply students with disabilities. The ASDA-S can provide a means to examine the impact of schoolwide implementations of efforts to promote the self-determination of students with and without disabilities. Further, the ASDA-S can enable educators to plan for interventions based on individual student needs and to identify the supports and resources needed in schools and the community for all students. The fact that the ASDA-S is valid with students without disabilities is important because students without disabilities have been identified as potentially benefitting from interventions to promote self-determination (Shogren, Gross, et al., 2015). As emphasis on promoting self-determination in inclusive settings increases and more students without disabilities are included in studies related to self-determination, the use of a measurement of self-determination for all students, such as the ASDA-S, will prove important. Consistent with this, recently, Shogren and colleagues (in press)

reported the pilot of a measure called the Self-Determination Inventory: Student Report version (SDI-SR), another new measure of self-determination that is based on Causal Agency Theory and which has strong psychometric properties with youth with and without disabilities.

In conclusion, promoting self-determination has been shown to be evidence-based practice in secondary education for over three decades. Along with a range of research activities pertaining to self-determination, including the development of theoretical frameworks, instructional models, and measurements, this dissertation provides important implications by providing information on the sound psychometric properties of the ASDA-S across a variety of age groups and disability groups, including students without disabilities. Emphasis on pursuing optimal human functioning and implementing school-wide interventions so as to promote the self-determination for all students is increasing. Within this context, this dissertation is an initial effort that provides information about a reliable and valid self-determination measurement for all students.

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APPENDICES

Appendix A: Adolescent Self-Determination Assessment (ASDA)

Adolescent Self-Determination Assessment

Michael L. Wehmeyer
University of Kansas

Shane J. Lopez
Karrie A. Shogren
University of Kansas

Student's name_____ Date _____
School _____ Teacher's name _____

Section I

Directions: Check the answer on each question that BEST tells how you act in that situation. There are no right or wrong answers.

1. I make my own meals or snacks.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

2. I care for my own clothes.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

3. I do chores in my home.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

4. I keep my own personal items together.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

5. I do simple first aid or medical care for myself.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

6. I keep good personal care and grooming.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

7. I make friends with other kids my age.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

8. I use the post office.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

9. I keep my appointments and meetings.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

10. I deal with salespeople at stores and restaurants.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

11. I do free-time activities based on my interests.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

12. I plan weekend activities that I like to do.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

13. I am involved in school-related activities.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

14. My friends and I choose activities that we want to do.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

15. I write letters, notes or talk on the phone to friends and family.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

16. I listen to music that I like.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

17. I volunteer in things that I am interested in.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

18. I go to restaurants that I like.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

19. I go to movies, concerts, and dances.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

20. I go shopping or spend time at shopping centers or shopping malls.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

21. I take part in youth groups (like church groups, school clubs)

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

22. I do school and free-time activities based on my career interests.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

23. I work on school work that will improve my career chances.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

24. I make long-range career plans.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

25. I work or have worked to earn money.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

26. I am in or have been in career or job classes or training.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

27. I have looked into job interests by visiting work sites or talking to people in that job.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

28. I choose my clothes and the personal items I use every day.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

29. I choose my own hair style.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

30. I choose gifts to give to family and friends.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

31. I decorate my own room.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

32. I choose how to spend my personal money.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

Section IIA

Directions: Each of the following items tell the beginning and end of a story. Your job is to tell what happened in the middle of the story, to connect the beginning and the end. Read the beginning and ending for each item, then fill in the BEST answer for the middle of the story. There are no right or wrong answers. Remember, fill in the answer that you think BEST completes the story.

33. **Beginning** --You are meeting with your teacher and parents. You want to take a class where you can learn skills to help you work in hotel management. Your parents want you to take the Family and Child Care class. You can only take one of the classes.

Middle -- _____
_____
_____
_____

Ending -- The story ends with you taking a class where you will learn hotel management.

34. **Beginning** -- You hear a friend talking about a new job opening at the local book store. You love books and want a job. You decide you would like to work at the bookstore.

Middle -- _____
_____
_____
_____

Ending -- The story ends with you working at the bookstore.

35. **Beginning** -- Your friends are acting like they are mad at you. You are upset about this.
Middle -- _____
_____
_____
_____
Ending -- The story ends with you and your friends getting along just fine.

36. **Beginning** -- You go to your English class one morning and discover your English book is not in your backpack. You are upset because you need that book to do your homework.
Middle -- _____
_____
_____
_____
Ending -- The story ends with you using your English book for homework.

37. **Beginning** -- You are in a club at school. The club advisor announces that the club members will need to elect new officers at the next meeting. You want to be the president of the club.
Middle -- _____
_____
_____
_____
Ending -- The story ends with you being elected as the club president.

38. **Beginning** -- You are at a new school and you don't know anyone. You want to have friends.
Middle -- _____
_____
_____
_____
Ending -- The story ends with you having many friends at the new school.

Section IIB
Directions: The next three questions ask about your plans for the future. Again, there are no right or wrong answers. For each question, tell if you have made plans for that outcome (by checking the appropriate box) and, if so, what those plans are and how to meet them.

39. Where do you want to live after you graduate from high school?

☐ I have not planned for that yet.

☐ I want to live _____
_____

List four things you should do to meet this goal:

1) _____
2) _____
3) _____
4) _____

40. Where do you want to work after you graduate from high school?

☐ I have not planned for that yet.

☐ I want to work _____
_____

List four things you should do to meet this goal:

1) _____
2) _____
3) _____
4) _____

41. What type of transportation do you plan to use after you graduate from high school?

☐ I have not planned for that yet.

☐ I plan to use _____
_____

List four things you should do to meet this goal:

1) _____
2) _____
3) _____
4) _____

Section III
Directions: Check the answer that BEST describes you. There are no wrong answers.

42. ☐ I usually do what my friends want.	or	☐ I tell my friends if they are doing something I don't want to do.
43. ☐ I tell others when I have new or different ideas or opinions.	or	☐ I usually agree with other peoples' opinions or ideas.
44. ☐ I usually agree with people when they tell me I can't do something.	or	☐ I tell people when I think I can do something that they tell me I can't.
45. ☐ I tell people when they have hurt my feelings.	or	☐ I am afraid to tell people when they have hurt my feelings.
46. ☐ I can make my own decisions.	or	☐ Other people make decisions for me.
47. ☐ Trying hard at school doesn't do me much good.	or	☐ Trying hard at school will help me get a good job.
48. ☐ I can get what I want by working hard.	or	☐ I need good luck to get what I want.
49. ☐ It is no use to keep trying because that won't change things.	or	☐ I keep trying even after I get something wrong.
50. ☐ I have the ability to do the job I want.	or	☐ I cannot do what it takes to do the job I want.
51. ☐ I don't know how to make friends.	or	☐ I know how to make friends.
52. ☐ I am able to work with others.	or	☐ I cannot work well with others.
53. ☐ I do not make good choices.	or	☐ I can make good choices.
54. ☐ If I have the ability, I will be able to get the job I want.	or	☐ I probably will not get the job I want even if I have the ability.
55. ☐ I will have a hard time making new friends.	or	☐ I will be able to make friends in new situations.
56. ☐ I will be able to work with others if I need to.	or	☐ I will not be able to work with others If I need to.
57. ☐ My choices will not be honored.	or	☐ I will be able to make choices that are important to me.

Section IV

Directions: Tell whether each of these statements describes how you feel about yourself or not. There are no right or wrong answers. Choose the one that BEST fits you.

58. I do not feel ashamed of any of my emotions.	☐ Yes	☐ No
59. I feel free to be angry at people I care for.	☐ Yes	☐ No
60. I can show my feelings even when people might see me.	☐ Yes	☐ No
61. I can like people even if I don't agree with them.	☐ Yes	☐ No
62. I am afraid of doing things wrong.	☐ Yes	☐ No
63. It is better to be yourself than to be popular.	☐ Yes	☐ No
64. I am loved because I give love.	☐ Yes	☐ No
65. I know what I do best.	☐ Yes	☐ No
66. I don't accept my own limitations.	☐ Yes	☐ No
67. I feel I cannot do many things.	☐ Yes	☐ No
68. I like myself.	☐ Yes	☐ No
69. I am not an important person.	☐ Yes	☐ No
70. I know how to make up for my limitations.	☐ Yes	☐ No
71. Other people like me.	☐ Yes	☐ No
72. I am confident in my abilities.	☐ Yes	☐ No

Appendix B: Adolescent Self-Determination Assessment-Short Form

Adolescent Self-Determination Assessment-Short Form

Michael L. Wehmeyer
University of Kansas

Todd Little
Texans Tech University

Shane J. Lopez
Clifton Strengths Institute

Karrie A. Shogren
University of Kansas

Student's name_____ Date _____
School _____ Teacher's name _____

Section I

Directions: Check the answer on each question that BEST tells how you act in that situation. There are no right or wrong answers.

1. I plan weekend activities that I like to do.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

2. My friends and I choose activities that we want to do.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

3. I write letters, notes or talk on the phone to friends and family.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

4. I go to restaurants that I like.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

5. I go to movies, concerts, and dances.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

6. I choose gifts to give to family and friends.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

7. I decorate my own room.

☐	☐	☐	☐
I do not do even if I have the chance	I do sometimes when I have the chance	I do most of the time I have the chance	I do every time I have the chance

Section IIA

Directions: Each of the following items tell the beginning and end of a story. Your job is to tell what happened in the middle of the story, to connect the beginning and the end. Read the beginning and ending for each item, then fill in the BEST answer for the middle of the story. There are no right or wrong answers. Remember, fill in the answer that you think BEST completes the story.

8. **Beginning** --You are meeting with your teacher and parents. You want to take a class where you can learn skills to help you work in hotel management. Your parents want you to take the Family and Child Care class. You can only take one of the classes.
   Middle -- _____
   _____
   _____
   _____
   Ending -- The story ends with you taking a class where you will learn hotel management.

9. **Beginning** -- You hear a friend talking about a new job opening at the local book store. You love books and want a job. You decide you would like to work at the bookstore.
   Middle -- _____
   _____
   _____
   _____
   Ending -- The story ends with you working at the bookstore.

10. **Beginning** -- Your friends are acting like they are mad at you. You are upset about this.
    Middle -- _____
    _____
    _____
    _____
    Ending -- The story ends with you and your friends getting along just fine.

11. **Beginning** -- You go to your English class one morning and discover your English book is not in your backpack. You are upset because you need that book to do your homework.
Middle -- _____
_____
_____
_____
Ending -- The story ends with you using your English book for homework.

12. **Beginning** -- You are in a club at school. The club advisor announces that the club members will need to elect new officers at the next meeting. You want to be the president of the club.
Middle -- _____
_____
_____
_____
Ending -- The story ends with you being elected as the club president.

13. **Beginning** -- You are at a new school and you don't know anyone. You want to have friends.
Middle -- _____
_____
_____
_____
Ending -- The story ends with you having many friends at the new school.

Section IIB
Directions: The next three questions ask about your plans for the future. Again, there are no right or wrong answers. For each question, tell if you have made plans for that outcome (by checking the appropriate box) and, if so, what those plans are and how to meet them.

14. What type of transportation do you plan to use after you graduate from high school?

☐ I have not planned for that yet.

☐ I plan to use _____
_____

List four things you should do to meet this goal:
1) _____
2) _____
3) _____
4) _____

Section III
Directions: Check the answer that BEST describes you. There are no wrong answers.

15. ☐ I usually agree with people when they tell me I can't do something.	or	☐ I tell people when I think I can do something that they tell me I can't.
16. ☐ Trying hard at school doesn't do me much good.	or	☐ Trying hard at school will help me get a good job.
17. ☐ It is no use to keep trying because that won't change things.	or	☐ I keep trying even after I get something wrong.
18. ☐ I don't know how to make friends.	or	☐ I know how to make friends.
19. ☐ I do not make good choices.	or	☐ I can make good choices.
20. ☐ I will have a hard time making new friends.	or	☐ I will be able to make friends in new situations.
21. ☐ My choices will not be honored.	or	☐ I will be able to make choices that are important to me.

Section IV
Directions: Tell whether each of these statements describes how you feel about yourself or not. There are no right or wrong answers. Choose the one that BEST fits you.

22. It is better to be yourself than to be popular.	☐ Yes	☐ No
23. I am loved because I give love.	☐ Yes	☐ No
24. I know what I do best.	☐ Yes	☐ No
25. I like myself.	☐ Yes	☐ No
26. I know how to make up for my limitations.	☐ Yes	☐ No
27. Other people like me.	☐ Yes	☐ No
28. I am confident in my abilities.	☐ Yes	☐ No

Appendix C: Means, Standard Deviations, and Correlations among the Parcels for Each Gender Group and Latent Correlations of Self-Determination Constructs for Each Gender Group for Main Research Question 2

C-1: **Means, Standard Deviations, and Correlations among the Parcels for Male Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.662	0.681	0.647	0.505	0.439	0.518	0.827	0.844	0.866	0.792	0.824	0.793
SD	0.244	0.283	0.271	0.246	0.282	0.287	0.246	0.296	0.279	0.316	0.327	0.337
AT1	1											
AT2	0.583	1										
AT3	0.553	0.517	1									
SG1	0.112	0.147	0.093	1								
SG2	0.104	0.147	0.123	0.488	1							
SG3	0.059	0.084	0.038	0.505	0.542	1						
PY1	0.161	0.119	0.083	0.216	0.136	0.150	1					
PY2	0.191	0.163	0.104	0.131	0.073	0.068	0.307	1				
PY3	0.136	0.077	0.065	0.125	0.064	0.040	0.334	0.259	1			
SA1	0.012	0.042	0.019	0.138	0.065	0.147	0.212	0.178	0.209	1		
SA2	0.018	0.000	-0.034	0.096	0.071	0.135	0.192	0.205	0.237	0.685	1	
SA3	0.070	0.057	0.034	0.083	0.018	0.072	0.198	0.140	0.196	0.653	0.644	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

C-2: **Means, Standard Deviations, and Correlations among the Parcels for Female Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.716	0.741	0.712	0.538	0.464	0.534	0.857	0.865	0.926	0.787	0.803	0.807
SD	0.234	0.263	0.267	0.262	0.274	0.269	0.222	0.278	0.203	0.326	0.339	0.340
AT1	1											
AT2	0.539	1										
AT3	0.624	0.497	1									
SG1	0.149	0.222	0.188	1								
SG2	0.163	0.226	0.212	0.563	1							
SG3	0.127	0.219	0.172	0.533	0.516	1						
PY1	0.117	0.222	0.099	0.270	0.244	0.190	1					
PY2	0.173	0.177	0.188	0.143	0.049	0.051	0.216	1				
PY3	0.150	0.206	0.097	0.195	0.119	0.096	0.384	0.238	1			
SA1	0.076	0.109	0.100	0.126	-0.005	0.125	0.079	0.143	0.142	1		
SA2	0.066	0.009	0.010	0.055	-0.065	0.079	0.030	0.122	0.110	0.664	1	
SA3	0.108	0.099	0.091	0.075	-0.027	0.102	0.045	0.100	0.071	0.701	0.667	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

C-3: Latent Correlations of Self-Determination Constructs for Male Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.187	1		
PSYE	0.301	0.301	1	
SREA	0.040	0.162	0.435	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

C-4: Latent Correlations of Self-Determination Constructs for Female Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.327	1		
PSYE	0.358	0.397	1	
SREA	0.126	0.085	0.196	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

Appendix D: Means, Standard Deviations, and Correlations among the Parcels for Each Age Group and Latent Correlations of Self-Determination Constructs for Each Age Group for Main Research Question 3

D-1: **Means, Standard Deviations, and Correlations among the Parcels for 11 to 13 years old Students with Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.673	0.679	0.627	0.446	0.420	0.538	0.770	0.830	0.844	0.830	0.859	0.816
SD	0.266	0.284	0.277	0.233	0.259	0.292	0.277	0.315	0.296	0.249	0.265	0.287
AT1	1											
AT2	0.610	1										
AT3	0.557	0.541	1									
SG1	0.083	-0.040	0.066	1								
SG2	0.096	-0.078	0.022	0.549	1							
SG3	0.099	0.013	-0.006	0.639	0.590	1						
PY1	0.244	0.205	0.178	0.056	-0.027	-0.059	1					
PY2	0.473	0.307	0.259	0.031	0.152	0.083	0.258	1				
PY3	0.221	0.231	0.089	0.064	-0.025	-0.042	0.296	0.173	1			
SA1	0.118	0.292	0.125	0.174	0.070	0.045	0.319	0.175	0.349	1		
SA2	0.230	0.192	0.064	0.105	0.283	0.177	0.288	0.422	0.202	0.330	1	
SA3	0.112	0.272	0.038	0.050	-0.040	0.013	0.322	0.178	0.248	0.381	0.405	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

D-2: **Means, Standard Deviations, and Correlations among the Parcels for 14 years old Students with Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.683	0.707	0.661	0.530	0.412	0.514	0.823	0.847	0.815	0.838	0.891	0.869
SD	0.233	0.284	0.257	0.215	0.269	0.259	0.257	0.292	0.323	0.273	0.248	0.284
AT1	1											
AT2	0.508	1										
AT3	0.559	0.429	1									
SG1	0.082	0.077	0.106	1								
SG2	-0.042	0.027	0.080	0.475	1							
SG3	0.030	-0.137	-0.084	0.504	0.507	1						
PY1	0.250	0.210	0.075	0.246	0.112	0.173	1					
PY2	0.215	0.094	0.139	0.145	0.030	0.223	0.341	1				
PY3	0.181	0.157	0.178	0.213	0.230	0.098	0.587	0.324	1			
SA1	0.110	0.066	0.116	0.201	0.124	0.117	0.421	0.294	0.310	1		
SA2	0.256	0.152	0.148	0.109	0.115	0.078	0.269	0.431	0.205	0.500	1	
SA3	0.331	0.113	0.259	0.155	0.206	-0.038	0.489	0.305	0.503	0.546	0.509	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

D-3: **Means, Standard Deviations, and Correlations among the Parcels for 15 years old Students with Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.708	0.722	0.707	0.548	0.487	0.569	0.836	0.854	0.845	0.753	0.758	0.759
SD	0.239	0.271	0.271	0.257	0.269	0.264	0.244	0.286	0.302	0.347	0.383	0.368
AT1	1											
AT2	0.621	1										
AT3	0.561	0.514	1									
SG1	0.169	0.182	0.105	1								
SG2	0.237	0.191	0.131	0.526	1							
SG3	0.221	0.154	0.129	0.450	0.468	1						
PY1	0.177	0.127	0.049	0.201	0.198	0.161	1					
PY2	0.084	0.076	0.025	0.177	0.153	0.192	0.299	1				
PY3	0.177	-0.010	0.070	0.131	0.062	0.097	0.395	0.281	1			
SA1	0.076	0.027	0.040	0.182	0.098	0.245	0.228	0.115	0.279	1		
SA2	0.055	-0.016	-0.078	0.147	0.038	0.197	0.262	0.161	0.321	0.736	1	
SA3	0.163	0.126	0.018	0.176	0.089	0.169	0.194	0.081	0.242	0.707	0.680	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

D-4: **Means, Standard Deviations, and Correlations among the Parcels for 16 years old Students with Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.691	0.723	0.697	0.544	0.492	0.537	0.866	0.869	0.914	0.737	0.746	0.728
SD	0.228	0.259	0.258	0.254	0.282	0.267	0.214	0.270	0.217	0.366	0.380	0.391
AT1	1											
AT2	0.518	1										
AT3	0.560	0.479	1									
SG1	0.074	0.167	0.100	1								
SG2	0.047	0.087	0.112	0.508	1							
SG3	-0.060	0.010	-0.053	0.449	0.432	1						
PY1	0.025	0.144	0.047	0.348	0.223	0.253	1					
PY2	0.211	0.271	0.178	0.143	0.043	-0.005	0.316	1				
PY3	0.175	0.262	0.116	0.180	0.105	0.081	0.207	0.256	1			
SA1	-0.026	-0.007	-0.021	0.113	0.015	0.135	0.115	0.127	0.085	1		
SA2	-0.036	-0.071	-0.051	0.096	0.012	0.123	0.073	0.146	0.126	0.783	1	
SA3	-0.026	-0.037	-0.016	0.127	-0.008	0.131	0.103	0.125	0.037	0.781	0.744	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

D-5: **Means, Standard Deviations, and Correlations among the Parcels for 17 years old Students with Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.673	0.712	0.664	0.525	0.450	0.538	0.865	0.843	0.928	0.836	0.857	0.843
SD	0.240	0.281	0.275	0.247	0.267	0.275	0.204	0.297	0.203	0.295	0.293	0.311
AT1	1											
AT2	0.558	1										
AT3	0.646	0.509	1									
SG1	0.173	0.271	0.168	1								
SG2	0.140	0.257	0.151	0.478	1							
SG3	0.117	0.259	0.208	0.526	0.593	1						
PY1	0.093	0.097	0.116	0.204	0.245	0.259	1					
PY2	0.162	0.139	0.176	0.170	-0.011	0.113	0.131	1				
PY3	0.072	0.111	0.082	0.105	0.087	0.115	0.304	0.240	1			
SA1	0.149	0.219	0.197	0.124	-0.029	0.156	0.010	0.326	0.060	1		
SA2	0.181	0.178	0.172	0.053	0.046	0.175	0.081	0.211	0.088	0.610	1	
SA3	0.206	0.215	0.207	-0.034	-0.053	0.054	0.015	0.287	0.105	0.711	0.651	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

D-6: **Means, Standard Deviations, and Correlations among the Parcels for 18 years old Students with Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.655	0.659	0.625	0.461	0.361	0.437	0.810	0.841	0.929	0.839	0.912	0.867
SD	0.263	0.303	0.290	0.259	0.291	0.301	0.259	0.314	0.210	0.260	0.217	0.244
AT1	1											
AT2	0.644	1										
AT3	0.653	0.629	1									
SG1	0.135	0.243	0.194	1								
SG2	0.277	0.413	0.326	0.537	1							
SG3	0.177	0.328	0.215	0.556	0.652	1						
PY1	0.273	0.188	0.132	0.086	0.060	0.036	1					
PY2	0.212	0.189	0.163	0.067	0.088	-0.029	0.197	1				
PY3	0.143	0.134	0.109	0.160	0.099	0.034	0.281	0.163	1			
SA1	0.086	0.154	0.195	0.175	0.193	0.102	0.171	0.199	0.288	1		
SA2	0.033	0.056	0.093	0.068	0.071	0.027	0.062	0.142	0.197	0.516	1	
SA3	0.072	-0.003	0.184	-0.089	-0.038	-0.064	0.073	0.145	0.081	0.291	0.295	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

D-7: **Means, Standard Deviations, and Correlations among the Parcels for 19 to 21 years old Students with Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.660	0.661	0.634	0.473	0.387	0.467	0.822	0.841	0.901	0.835	0.887	0.886
SD	0.248	0.291	0.275	0.270	0.283	0.321	0.246	0.292	0.240	0.263	0.257	0.240
AT1	1											
AT2	0.554	1										
AT3	0.535	0.488	1									
SG1	0.186	0.171	0.122	1								
SG2	0.039	0.234	0.171	0.504	1							
SG3	0.039	0.224	0.159	0.645	0.603	1						
PY1	0.121	0.168	0.091	0.343	0.246	0.202	1					
PY2	-0.009	0.040	0.006	0.152	-0.027	-0.085	0.387	1				
PY3	0.110	0.033	-0.017	0.292	0.066	0.061	0.508	0.362	1			
SA1	-0.081	0.076	0.042	0.229	0.136	0.230	0.200	0.108	0.130	1		
SA2	-0.163	-0.086	-0.083	0.160	0.099	0.181	0.139	0.020	0.241	0.349	1	
SA3	0.120	0.290	0.231	0.263	0.251	0.351	0.170	-0.199	0.110	0.372	0.359	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

D-8: Latent Correlations of Self-Determination Constructs for 11 to 13 years old Students with Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.054	1		
PSYE	0.657	0.060	1	
SREA	0.361	0.222	0.934	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

D-9: Latent Correlations of Self-Determination Constructs for 14 years old Students with Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.038	1		
PSYE	0.360	0.357	1	
SREA	0.363	0.231	0.757	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

D-10: Latent Correlations of Self-Determination Constructs for 15 years old Students with Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.335	1		
PSYE	0.227	0.382	1	
SREA	0.085	0.255	0.431	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

D-11: Latent Correlations of Self-Determination Constructs for 16 years old Students with Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.106	1		
PSYE	0.400	0.494	1	
SREA	-0.047	0.141	0.228	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

D-12: Latent Correlations of Self-Determination Constructs for 17 years old Students with Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.320	1		
PSYE	0.275	0.413	1	
SREA	0.305	0.085	0.252	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

D-13: Latent Correlations of Self-Determination Constructs for 18 years old Students with Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.422	1		
PSYE	0.444	0.190	1	
SREA	0.185	0.117	0.531	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

D-14: Latent Correlations of Self-Determination Constructs for 19 to 22 years old Students with Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.252	1		
PSYE	0.150	0.321	1	
SREA	0.099	0.486	0.302	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

Appendix E: Means, Standard Deviations, and Correlations among the Parcels for Each Disability Group and Latent Correlations of Self-Determination Constructs for Each Disability Group for Main Research Question 4

E-1: **Means, Standard Deviations, and Correlations among the Parcels for Adolescents and Adults Without Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.722	0.764	0.817	0.541	0.566	0.549	0.865	0.864	0.833	0.890	0.855	0.849
SD	0.217	0.198	0.263	0.266	0.255	0.294	0.261	0.245	0.374	0.219	0.294	0.270
AT1	1											
AT2	0.649	1										
AT3	0.331	0.499	1									
SG1	0.037	0.082	0.125	1								
SG2	0.142	0.126	0.096	0.581	1							
SG3	0.090	0.077	0.085	0.544	0.609	1						
PY1	0.186	0.240	0.169	0.150	0.096	0.106	1					
PY2	0.209	0.230	0.140	0.194	0.167	0.141	0.618	1				
PY3	0.056	0.124	0.033	0.199	0.129	0.090	0.397	0.361	1			
SA1	0.178	0.221	0.069	0.139	0.093	0.090	0.442	0.381	0.325	1		
SA2	0.255	0.279	0.130	0.172	0.097	0.086	0.356	0.376	0.234	0.565	1	
SA3	0.191	0.177	0.086	0.196	0.137	0.148	0.278	0.269	0.269	0.422	0.405	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

E-2: **Means, Standard Deviations, and Correlations among the Parcels for Adolescents and Adults with Attention Deficit Hyperactivity Disorder Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.711	0.730	0.753	0.558	0.570	0.548	0.854	0.877	0.877	0.877	0.877	0.868
SD	0.253	0.266	0.362	0.228	0.279	0.281	0.252	0.205	0.331	0.233	0.288	0.259
AT1	1											
AT2	0.669	1										
AT3	0.561	0.388	1									
SG1	-0.022	-0.077	0.015	1								
SG2	0.081	0.078	0.159	0.633	1							
SG3	0.032	-0.091	0.023	0.669	0.594	1						
PY1	0.016	0.157	0.032	0.154	0.392	0.265	1					
PY2	-0.005	0.201	0.026	0.029	0.251	0.013	0.642	1				
PY3	-0.105	0.057	0.050	-0.052	0.111	-0.057	0.138	0.299	1			
SA1	0.115	0.258	0.073	0.169	0.206	0.258	0.501	0.384	0.110	1		
SA2	0.053	0.154	0.086	0.007	0.210	0.152	0.650	0.495	0.120	0.749	1	
SA3	0.099	0.029	-0.184	0.127	0.261	0.134	0.472	0.193	0.016	0.517	0.557	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

E-3: **Means, Standard Deviations, and Correlations among the Parcels for Adolescents and Adults with Autism Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.524	0.593	0.505	0.402	0.431	0.500	0.803	0.750	0.815	0.828	0.780	0.765
SD	0.230	0.245	0.376	0.263	0.285	0.331	0.261	0.284	0.391	0.288	0.330	0.364
AT1	1											
AT2	0.623	1										
AT3	0.295	0.437	1									
SG1	0.063	0.074	0.119	1								
SG2	0.010	0.167	0.018	0.609	1							
SG3	0.293	0.202	0.060	0.560	0.605	1						
PY1	0.168	0.178	0.228	0.053	0.046	0.032	1					
PY2	-0.033	0.025	-0.168	0.079	0.271	0.223	0.236	1				
PY3	0.229	0.281	0.191	0.110	0.016	0.081	0.503	0.040	1			
SA1	0.036	-0.038	-0.087	0.131	0.090	0.196	0.043	0.272	0.079	1		
SA2	0.277	0.208	-0.001	-0.007	-0.021	0.180	0.115	0.226	0.398	0.515	1	
SA3	0.143	0.089	0.093	0.014	0.026	0.147	0.315	0.168	0.296	0.686	0.461	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

E-4: **Means, Standard Deviations, and Correlations among the Parcels for Adolescents and Adults with Emotional and Behavior Disorder Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.623	0.689	0.778	0.551	0.544	0.609	0.859	0.825	0.865	0.803	0.815	0.772
SD	0.237	0.228	0.355	0.238	0.220	0.263	0.234	0.255	0.343	0.307	0.332	0.344
AT1	1											
AT2	0.567	1										
AT3	0.304	0.223	1									
SG1	0.015	0.182	0.214	1								
SG2	0.090	0.082	0.108	0.514	1							
SG3	-0.036	0.074	0.123	0.360	0.426	1						
PY1	0.062	0.049	-0.012	0.271	0.124	0.123	1					
PY2	0.190	0.297	0.191	0.300	0.219	0.120	0.403	1				
PY3	0.009	0.057	0.041	0.041	0.064	-0.030	0.377	0.157	1			
SA1	0.038	0.133	0.173	0.253	0.179	0.231	0.203	0.217	0.170	1		
SA2	-0.017	0.205	0.212	0.297	0.343	0.384	0.232	0.282	0.182	0.626	1	
SA3	0.077	0.098	0.170	0.168	0.240	0.210	0.188	0.170	0.159	0.662	0.600	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

E-5: **Means, Standard Deviations, and Correlations among the Parcels for Adolescents and Adults with Intellectual Disability Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.634	0.637	0.639	0.394	0.399	0.408	0.844	0.819	0.917	0.819	0.767	0.833
SD	0.264	0.260	0.397	0.266	0.278	0.290	0.236	0.235	0.276	0.289	0.336	0.301
AT1	1											
AT2	0.669	1										
AT3	0.474	0.540	1									
SG1	0.175	0.112	0.113	1								
SG2	0.091	0.049	0.115	0.563	1							
SG3	0.062	0.069	0.106	0.593	0.620	1						
PY1	0.107	0.069	0.006	0.098	0.129	0.054	1					
PY2	0.138	0.132	0.155	0.198	0.145	0.137	0.296	1				
PY3	0.144	0.086	0.105	0.090	0.124	0.112	0.213	0.231	1			
SA1	-0.036	-0.041	0.002	0.046	0.064	0.075	0.142	0.091	0.159	1		
SA2	0.034	0.009	0.060	0.106	0.051	0.114	0.056	0.105	0.051	0.483	1	
SA3	0.084	0.106	0.122	0.048	0.036	0.072	0.116	0.155	0.101	0.608	0.429	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

E-6: **Means, Standard Deviations, and Correlations among the Parcels for Adolescents and Adults with Learning Disabilities Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.699	0.730	0.809	0.526	0.540	0.574	0.895	0.858	0.866	0.798	0.792	0.783
SD	0.236	0.225	0.315	0.238	0.241	0.250	0.210	0.231	0.340	0.339	0.355	0.353
AT1	1											
AT2	0.618	1										
AT3	0.355	0.401	1									
SG1	0.145	0.208	0.146	1								
SG2	0.078	0.146	0.106	0.526	1							
SG3	0.051	0.098	0.081	0.397	0.464	1						
PY1	0.174	0.170	0.131	0.121	0.137	0.070	1					
PY2	0.177	0.135	0.177	0.181	0.143	0.124	0.394	1				
PY3	0.135	0.159	0.065	0.098	0.093	-0.006	0.301	0.303	1			
SA1	0.017	0.065	0.039	0.067	0.061	0.138	0.190	0.189	0.165	1		
SA2	0.050	0.061	0.009	0.063	0.042	0.106	0.150	0.177	0.190	0.699	1	
SA3	0.085	0.075	0.054	0.064	0.025	0.096	0.092	0.127	0.129	0.740	0.673	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

E-7: **Means, Standard Deviations, and Correlations among the Parcels for Adolescents and Adults with Other Health Impairment Group**

	AT1	AT2	AT3	SG1	SG2	SG3	PY1	PY2	PY3	SA1	SA2	SA3
M	0.671	0.717	0.701	0.500	0.572	0.558	0.851	0.856	0.852	0.755	0.709	0.759
SD	0.209	0.208	0.354	0.237	0.247	0.266	0.260	0.230	0.357	0.372	0.409	0.395
AT1	1											
AT2	0.551	1										
AT3	0.335	0.437	1									
SG1	0.025	0.045	0.320	1								
SG2	0.028	-0.031	0.149	0.464	1							
SG3	-0.020	-0.060	0.177	0.298	0.447	1						
PY1	0.114	0.095	0.262	0.166	0.154	0.126	1					
PY2	0.127	0.206	0.251	0.305	0.179	0.150	0.495	1				
PY3	0.121	0.145	0.279	0.272	0.194	-0.021	0.388	0.534	1			
SA1	-0.059	-0.136	0.074	-0.102	0.053	0.120	0.254	0.182	0.159	1		
SA2	-0.032	-0.054	0.100	0.006	0.129	0.069	0.329	0.212	0.189	0.763	1	
SA3	-0.048	-0.128	0.164	-0.015	0.140	0.166	0.375	0.274	0.221	0.832	0.778	1

Note. AT 1 = Parcel 1 for AUTO; AT 2 = Parcel 2 for AUTO; AT 3 = Parcel 3 for AUTO; SG 1 = Parcel 1 for SREG; SG 2 = Parcel 2 for SREG; SG 3 = Parcel 3 for SREG; PY 1 = PY 1 = Parcel 1 for PSYE; PY 2 = Parcel 2 for PSYE; PY 3 = Parcel 3 for PSYE; SA 1 = Parcel 1 for SREA; SA 2 = Parcel 2 for SREA; SA 3 = Parcel 3 for SREA.

E-8: Latent Correlations of Self-Determination Constructs for Adolescents and Adults Without Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.159	1		
PSYE	0.331	0.247	1	
SREA	0.351	0.218	0.679	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

E-9: Latent Correlations of Self-Determination Constructs for Adolescents and Adults with Attention Deficit Hyperactivity Disorder Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.006	1		
PSYE	0.114	0.248	1	
SREA	0.182	0.267	0.698	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

E-10: Latent Correlations of Self-Determination Constructs for Adolescents and Adults with Autism Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.202	1		
PSYE	0.341	0.211	1	
SREA	0.116	0.150	0.415	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

E-11: Latent Correlations of Self-Determination Constructs for Adolescents and Adults with Emotional and Behavioral Disorder Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.185	1		
PSYE	0.264	0.432	1	
SREA	0.201	0.472	0.417	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

E-12: Latent Correlations of Self-Determination Constructs for Adolescents and Adults with Intellectual Disability Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.143	1		
PSYE	0.256	0.313	1	
SREA	0.037	0.113	0.311	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

E-13: Latent Correlations of Self-Determination Constructs for Adolescents and Adults with Learning Disabilities Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.246	1		
PSYE	0.344	0.282	1	
SREA	0.088	0.122	0.310	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

E-14: Latent Correlations of Self-Determination Constructs for Adolescents and Adults with Other Health Impairment Group

	AUTO	SREG	PSYE	SREA
AUTO	1			
SREG	0.049	1		
PSYE	0.312	0.386	1	
SREA	-0.096	0.092	0.375	1

Note. AUTO = Autonomous Functioning; SREG = Self-Regulation; PSYE = Psychological Empowerment; SREA = Self-Realization.

Appendix F: AIR Self-Determination Scale-Student Form

AIR Self-Determination Scale©

STUDENT FORM

Student's Name _____

Date _____

School Name_____

HOW TO FILL OUT THIS FORM

Please answer these questions about how you go about getting what you want or need. This may occur at school, or after school, or it could be related to your friends, your family, or a job or thing that you like to do. There are no right or wrong answers.

THINGS I DO

1. I know what I need, what I like, and what I'm good at.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
2. I set goals to get what I want or need. I think about what I am good at when I do this.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
3. I figure out how to meet my goals. I make plans and decide what I should do.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
4. I begin working on my plans to meet my goals as soon as possible.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
5. I check how I'm doing when I'm working on my plan. If I need to, I ask others what they think of how I'm doing.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
6. If my plan doesn't work, I try another one to meet my goals.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □

HOW I FEEL

7. I feel good about what I like, what I want, and what I need to do.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
8. I believe that I can set goals to get what I want.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
9. I like to make plans to meet my goals.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
10. I like to begin working on my plans right away.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
11. I like to check on how well I'm doing in meeting my goals.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
12. I am willing to try another way if it helps me to meet my goals.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □

WHAT HAPPENS AT SCHOOL

13. People at school listen to me when I talk about what I want, what I need, or what I'm good at.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
14. People at school let me know that I can set my own goals to get what I want or need.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
15. At school, I have learned how to make plans to meet my goals and to feel good about them.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
16. People at school encourage me to start working on my plans right away.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
17. I have someone at school who can tell me if I am meeting my goals.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
18. People at school understand when I have to change my plan to meet my goals. They offer advice and encourage me when I'm doing this.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □

WHAT HAPPENS AT HOME

19. People at home listen to me when I talk about what I want, what I need, or what I'm good at.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
20. People at home let me know that I can set my own goals to get what I want or need.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
21. At home, I have learned how to make plans to meet my goals and to feel good about them.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
22. People at home encourage me to start working on my plans right away.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
23. I have someone at home who can tell me if I am meeting my goals.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □
24. People at home understand when I have to change my plan to meet my goals. They offer advice and encourage me when I'm doing this.	Never □	Almost Never □	Sometimes □	Almost Always □	Always □

PLEASE WRITE YOUR ANWERS TO THE FOLLOWING QUESTIONS…

25. Give an example of a goal you are working on.

26. What are you doing to reach this goal?

27. How well are you doing in reaching this goal?

THANK YOU!

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