

Examining the Relationship Between Self-Determination and Quality of Life in Young Adults with Autism Spectrum Disorder

Keeley White^{1,2}  • Tara D. Flanagan¹ •
Aparna Nadig³

Published online: 18 July 2018

© Springer Science+Business Media, LLC, part of Springer Nature 2018

Abstract Promoting self-determination (SD) in youth with disabilities is positively related to better post-secondary outcomes, such as employment and independence. Despite extensive research into SD and quality of life (QoL) for people with intellectual and developmental disabilities, the relation between the two has not been examined for young adults with autism spectrum disorder (ASD) without intellectual disability (ID). The aim of this pilot study was to examine the relationship between two complementary measures of SD, namely the Arc’s Self-Determination Scale (Wehmeyer and Kelchner 1995) and the AIR Self-Determination Scale (Wolman et al. 1994), and QoL for young adults with ASD without ID. Thirty young adults with ASD without ID living in Canada completed self-report questionnaires of SD and QoL. Correlational analyses indicated that two measures of SD were significantly associated with QoL. Regression analyses revealed that individuals with higher SD scores reported higher perceptions of life satisfaction. Thus, SD, assessed by two complementary measures, was found to be positively associated with QoL. Subsequent research should further elucidate the association between SD and QoL and examine how best to promote SD as a means of enhancing the QoL of young adults with ASD as they transition into adulthood.

Keywords Autism spectrum disorders · Self-determination · Quality of life · Intellectual functioning · Young adults

✉ Keeley White
keeley.white@nuigalway.ie

¹ Educational and Counselling Psychology, McGill University, Montreal, QC, Canada

² Present address: Irish Centre for Autism and Neurodevelopmental Research (ICAN), School of Psychology, National University of Ireland, Galway, Ireland

³ School of Communication Sciences and Disorders, McGill University, Montreal, QC, Canada

Autism Spectrum Disorder (ASD) is a lifespan diagnosis that continues to impact opportunities in the community and quality of life into adulthood. Outcome studies and reviews highlight that adults with ASD are generally faring poorly with respect to employment, community involvement, meaningful relationships with others, and physical and mental health (Howlin 2000, 2003; Howlin and Moss 2012; Taylor and Seltzer 2011; Tsatsanis 2003). For instance, in their review of the literature, Levy and Perry (2011) found that 50–60% of adults with ASD leave school without educational or vocational qualifications, 76% are unable to find gainful employment, and 90–95% do not establish romantic relationships or meaningful friendships. These patterns parallel research from the USA (Farley et al. 2009; Roux et al. 2015; Taylor and Seltzer 2011), the UK (Howlin et al. 2004; 2013), Sweden (Billstedt et al. 2005, 2007, 2011), and Canada (Eaves and Ho 2008; Nicholas et al. 2015). These outcomes are low both when compared to normative expectations based on typically developing peers' educational, employment, and relationship attainment (Howlin 2000, 2003; Howlin and Moss 2012), but also, critically, when compared to the outcomes of young adults with other intellectual and developmental disabilities (Taylor and Seltzer 2011, Roux et al. 2015). Furthermore, amongst young adults with ASD, those without intellectual disability (ID) have access to significantly fewer services than those with ID post completion of high school. This may contribute to poor outcomes upon leaving school, which is particularly pronounced for adults with ASD without ID (Taylor and Seltzer 2011).

Quality of Life (QoL) is a comprehensive and multidimensional concept that incorporates subjective wellbeing (Burgess and Gutstein 2007; Renty and Roeyers 2006). The most prevalent definition refers to QoL as “a concept that reflects a person's desired conditions of living related to eight core dimensions of one's life: emotional well-being, interpersonal relationships, material well-being, personal development, physical well-being, self-determination, social inclusion, and rights” (Schalock 2000, p. 121). With this definition in mind, *quality* makes us think about human values (e.g., happiness, success, wealth, and satisfaction); whereas, *life* suggests that the concept refers to important aspects of the human existence (Brown et al. 2000; Schalock et al. 2002). Focusing on QoL in this study therefore suggests that we value quality and want to improve or maintain things that add to the lives of people with ASD (Schalock 2000).

Recent reviews have demonstrated that individuals with ASD across the lifespan, including those without ID, have poor QoL relative to their peers with other disabilities, as measured by both objective and subjective means (Barneveld et al. 2014; Chiang and Wineman 2014; Jennes-Coussens et al. 2006; Van Heijst and Geurts 2015; Tobin et al. 2014). Although most studies of QoL among individuals with ASD evaluate QoL by proxy (Saldana et al. 2009), the use of self-reported QoL as an outcome measure represents an essential shift towards valuing the views of people with ASD as experts on their own lives, rather than relying solely on others' judgments of their behavior (Felce and Perry 1996). This is important when considering QoL, as what is deemed important to someone may not be important to the individuals with disabilities themselves. For instance, Schalock and colleagues (2005) asked 778 people with ID receiving services, 491 family members of a person with ID, and 773 professionals in the field of ID from Canada, China, Latin America, Spain, and the United States to rank the importance of core indicators of QoL. People with ID ranked the importance of

self-determination (SD) significantly higher than did professionals and family members. Interestingly, of all the QoL core dimensions, professionals and family members rated SD as the lowest in importance to them.

SD is defined as the “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. 177). Particularly, individuals are self-determined if they act *autonomously*, their behaviours are *self-regulated*; they initiate and respond to the events in a *psychologically empowered* manner and act in a *self-realizing* manner (Wehmeyer et al. 2003; Wehmeyer and Palmer 2003). Therefore, SD emphasizes the value of learning skills and developing attitudes that allow causal agency and volitional action. These skills and attitudes are referred to as *component elements* and include choice-making, decision-making, problem-solving, goal setting and attainment, self-monitoring, self-advocacy, an internal locus of control, self-efficacy and outcome expectancy, self-awareness and self-knowledge (Wehmeyer 1996). As Wehmeyer and Schalock (2001) noted, people who are self-determined cause things to change to accomplish a specific goal, such as obtaining employment; and, these changes are theoretically designed to optimize a person’s QoL. As such, creating environments where people can engage in self-determined behaviours (e.g., problem solving, self-regulation, choice making) may be a means to maintain or improve QoL. For instance, students with ID and learning disabilities (LD) with higher levels of SD at the end of high school were found to have more positive employment, career, and community participation outcomes than students with lower levels of SD 1 to 2 years later (Shogren et al. 2015b). Though the impacts of promoting SD to improve QoL are well-researched, the vast majority of our information stems from studies involving students with ID or LD (Algozzine et al. 2001). Wehmeyer et al. (2010) highlighted the lack of research on SD of students with ASD and this is largely still the case.

In fact, the vast majority of existing research focuses on students with ASD as a subsample of an overall study sample of students with disabilities and not ASD as its primary focus. For example, of the 493 middle or high school students with disabilities who participated in an SD intervention study, only 27 reported having ASD (Wehmeyer et al. 2011). It is only recently that there has been research on SD specifically in individuals with ASD (Chou et al. 2017a, b; Wagner et al. 2007). Interestingly, this work has identified differences in SD between individuals with ASD and those with other disabilities. For instance, the National Longitudinal Transition Study-2 (NLTS-2) is a large survey examining transition outcomes for students in the U.S. receiving special education in public schools. Students were included based on the 12 federal special education disability categories. Findings from NLTS-2 revealed lower rates of SD (i.e., psychological empowerment and autonomy) and satisfaction in a sample of youth (13–26 years) with ASD relative to their peers with other disabilities (Wagner et al. 2007). In regards to autonomy, fewer than one-quarter of those with ASD received high scores (23%) relative to 55% of youth with speech or language impairments, 53% of youth with multiple disabilities, and 50% of youth with ID. For psychological empowerment, 64% of those with ASD received high scores relative to 82% of youth with speech or language impairments, 67% of youth with multiple disabilities, and 72% of youth with ID. The finding of lower levels of autonomy, self-regulation, and self-realization for youth with ASD relative to their peers with ID and LD have now been replicated (Chou et al. 2017a). Overall, these findings are not surprising given that

social skills ratings have been shown to be moderately correlated with SD (Nota et al. 2007; Pierson et al. 2008), suggesting that the core social difficulties associated with having an ASD may impact level of SD.

There are two SD frameworks in the disability literature that offer complementary perspectives: the functional theory of SD (Wehmeyer 1999, 2001, 2005; Wehmeyer et al. 2003) focuses on the personal characteristics that lead people to act in a self-determined manner, while the self-determined learning theory (Mithaug et al. 2003b) focuses on the process through which people become self-determined (Shogren et al. 2008). Two primary measures of SD have been developed with the purpose of measuring global SD based on these empirically validated theoretical frameworks: the *ARC's SD Scale (SDS)* (Wehmeyer and Kelchner 1995) and the *American Institutes for Research SD Scale (AIR)* (Wolman et al. 1994). The *SDS* is based on the functional theory of SD, which describes SD as a dispositional characteristic and refers to causal and volitional actions that are identified by the four *essential characteristics* (e.g., *behavioural autonomy, self-regulation, psychological empowerment, and self-realization*). The *AIR*, however, was developed based on the self-determined learning theory, which emphasizes the process by which individuals become self-determined learners (i.e., how people interact with opportunities) rather than on describing the characteristics of SD (Wolman et al. 1994). Shogren et al. (2008) demonstrated that although the *SDS* and the *AIR* are related ($r = .50$), they measure distinct aspects of the SD construct. Shogren and colleagues found that combining these two measures into one global, higher order SD construct was not justified using structural equation modelling when administered to 407 high school students receiving special education services in the U.S. Furthermore, both measures have been shown to be reliable and valid in the measurement of global SD in students with ASD (Chou et al. 2017b). The current study employs both questionnaires as separate overall measures of SD in young adults with ASD with distinct underlying theoretical frameworks (see further discussion of these measures below in [Methods](#)).

This pilot study takes the first step at addressing the limited research on SD in young adults with ASD (Wehmeyer et al. 2010) by exploring the potential relationship between these two measures of SD (i.e., *SDS* and *AIR*) and self-perceived QoL. This information has the potential to address the pressing need of increasing QoL in young adults with ASD without ID, a growing and underserved population (Chambers et al. 2007; Fombonne et al. 2006). Researchers have acknowledged the value of SD and QoL (Chambers et al. 2007) in the lives of people with disabilities. However, there is limited evidence for a causal link between these two constructs (Lachapelle et al. 2005; McDougall et al. 2010; Wehmeyer and Schwartz 1998). McDougall et al. (2010) examined the relationship between SD and various subdomains of QoL for 34 people between the ages 17 and 29 years with chronic health conditions and disabilities (e.g., spina bifida, cerebral palsy, acquired brain injury). Results revealed a significant correlation between SD, as measured by the *SDS*, and overall QoL using the *Life Satisfaction Index – Adolescents* (Reid and Renwick 1994) ($r = .58, p < .01$). Using linear regression analysis, they found that SD was significantly associated with two subdomains of QoL over time. Particularly, those individuals with higher SD at baseline reported higher perceptions of satisfaction with both personal development ($R^2 = .34$) and personal fulfilment ($R^2 = .36$) 1 year later, but not of general wellbeing, interpersonal relations, leisure and recreation activities, or overall QoL.

Wehmeyer and Schwartz (1998) investigated the relationship between SD and QoL for 50 adults between 20 and 69 years old with ID living in group homes. After controlling for level of intelligence and age that were thought to contribute to higher SD (as measured by the *SDS*), they found that higher levels of SD predicted membership in a high QoL group (as measured by the *Quality of Life-Questionnaire*; Schalock and Keith 1993, 2004) using a discriminant function analysis (Wilks Lambda = .89). Finally, total SD was significantly correlated with total QoL ($r = .25, p < .05$). Similarly, an international study conducted by Lachapelle et al. (2005) used the same measures to replicate this finding with 82 adults with mild ID living in community settings in Canada, United States, Belgium and France. Findings from a discriminant function analysis revealed that total SD predicted membership in a high QoL group (Omnibus Wilks' Lambda = 0.76). Furthermore, overall SD and QoL scores were significantly correlated ($r = .49, p < .01$).

There are no studies to our knowledge directly examining the relationship between SD and QoL in young adults with ASD who do not have ID. If a similar relationship exists between SD and QoL as has previously been shown for adults with other disabilities, improved knowledge of the nature of this relationship will not only inform our understanding of the construct of SD and the two respective theoretical frameworks and associated measures, but will have important implications for supporting young adults with ASD as they transition into adulthood. The aim of this pilot study was to explore the relationship between two measures of SD (i.e., the *SDS* and *AIR*) and QoL in a sample of young adults with ASD who do not have concomitant ID. The following research questions were examined:

- a) Are self-determination and quality of life related in a population of young adults with ASD with average intellectual abilities?
- b) Does self-determination predict quality of life for young adults with ASD with average intellectual abilities?

Method

Participants

Thirty young adults (20 males, 10 females) with ASD participated in the study after providing written informed consent. Participants ranged from 18 to 29 years old ($M = 21.27, SD = 3.32$) with verbal IQ ($M = 112.23, SD = 15.16$) and/or nonverbal IQ ($M = 52.33, SD = 4.03$) scores within the average range. Community diagnoses of ASD were confirmed in our study by administration of the Autism Diagnostic Observation Schedule-2 module 4 (ADOS-2; Lord et al. 2012), using the revised algorithm for module 4 (Hus and Lord 2014). Twenty-eight of 30 participants met ASD criteria (scores of 8 or higher) on the ADOS-2. The remaining 2 participants fell short of meeting ADOS-2 criteria based on current functioning, but did meet ASD criteria based on their early development, as reported by their caregiver on the Social Communication Questionnaire-Lifetime (SCQ; Rutter et al. 2003) with scores of 15 or higher. The vast majority of the participants were Caucasian (70%), although participants from other racial or ethnic groups were also represented in the sample (e.g., Asian Canadian,

Multi-ethnic). The primary language was mostly English, though 6.7% were franco-phone with conversational English. There were reportedly low employment rates, with only 13.3% noted having a part-time job. However, approximately 90% of the participants reported having completed or were currently attending postsecondary education (e.g., college, university). Finally, the vast majority of participants were living at home with their parents/caregivers (86.7%), while one individual reported living independently and 3 individuals living independently but with roommates (i.e., sharing expenses).

Recruitment

We recruited young adults across the Greater Montreal Area by contacting service agencies, newsletters, and post-secondary institutions. Young adults who were interested in participating contacted the research team and informed consent was obtained prior to the assessment visit. Consenting participants completed various measures to determine whether they met the criteria for inclusion in a randomized control trial on the impact of a *Transition Support Program (TSP)*. The criteria for inclusion in the *TSP* were: (1) a diagnosis of an ASD (i.e., autistic disorder, Asperger syndrome or pervasive developmental disorder) on the basis of scores on the Social Communication Questionnaire-Lifetime (SCQ; Rutter et al. 2003) or the Autism Diagnostic Observation Schedule-2 (ADOS-2; Lord et al. 1999); (2) no intellectual disability based on non-verbal (Raven's Progressive Matrices; Raven et al. 2004) or verbal (Wechsler Abbreviated Scales of Intelligence, verbal subtests (WASI; Wechsler 1999) tests with IQ scores falling within 1 SD of the typical range; (3) young adults between 18 and 30 years of age; and (4) the ability to communicate in English (given the bilingual community recruiting from). Participants were not eligible to participate in the study if they were enrolled in another similar service (i.e., a group-format service that focused on social interaction and communication, self-determination, and/or professional skills).

Procedures

Prior to participating in the *TSP*, participants completed an intake and pre-program assessment visit (each visit was approximately 1.5 hours in duration). A senior level doctoral student conducted the IQ testing; outcome measures were administered by the research team (ranging from honours undergraduate students to assistant professors), all of whom were trained and experienced in conducting assessments. At the time of the assessment, the third author (AN) and a senior level doctoral student, whom both obtained research reliability, administered the ADOS-2.

Measures

Prior to participating in the *TSP*, participants were administered the following measures, among others.

Nonverbal IQ (NVIQ) The Raven's Progressive Matrices (RPM; Raven et al. 2004) is a norm-referenced assessment of nonverbal intellectual ability (NVIQ). The RPM consists of 60 diagrammatic puzzles that are divided into five sets (A, B, C, and E),

and is suitable for a range of populations with retest reliabilities of .83-.93. The RPM is a widely used measure to estimate nonverbal cognitive ability for matching in studies of individuals with ASD and is considered an appropriate measure for this population (Dawson et al. 2007; Mottron 2004). Raw total scores were used in the analyses, as standard scores are not available.

Verbal IQ (VIQ) The Wechsler Abbreviated Scales of Intelligence (WASI; Wechsler 1999) consists of four subtests (Vocabulary, Similarities, Block Design, and Matrix Reasoning), yields measures of Verbal IQ (VIQ), Performance IQ (PIQ), and a Full Scale IQ. The WASI is used in research setting and can be administered as two (i.e., PIQ or VIQ) or four subtests (i.e., FSIQ). The WASI manual reports excellent internal consistency and test-retest reliabilities for the three IQs. There is also evidence to support the construct validity of the VIQ and PIQ (The Psychological Corporation 1999). For the purpose of the current study, only two subscales (Vocabulary and Similarities) were administered in order to calculate VIQ.

Quality of Life The Quality of Life – Questionnaire (QoL-Q; Schalock and Keith 1993) is a 40-item rating scale designed to measure overall QoL for people with disabilities. The QoL-Q is administered in an interview format and yields data regarding total QoL score, consisting of scores from four sub-scales: satisfaction, competence/productivity, empowerment/independence, and social belonging. The QoL-Q demonstrates very good internal reliability ($\alpha = 0.90$) as well as inter-observer reliability ($r = .83$), test-retest reliability ($r = .87$) as well as evidence of construct and concomitant validity (Schalock and Keith 1993).

Self-determination The Arc's Self-Determination Scale (SDS; Wehmeyer and Kelchner 1995) and the AIR Self-Determination Scale – Student form (AIR-S; Wolman et al. 1994) were administered as measures of SD. The SDS is a 72-item scale self-report consisting of 4 subscales: autonomy, self-regulation, psychological empowerment, and self-realization. The first *Autonomy* section measures a person's level of independence and capacity to act based on their personal beliefs, values, and interests (32 likert-scale items). The second *Self-Regulation* section includes social problem solving (6 items, rated on a scale from 0-2 depending on effectiveness of solution) and goal-setting (3 items, rated on scale of 0 -3 based on presence of goal and number of steps identified to reach that goal). The third *Psychological Empowerment* section measures a person's perceptions of control, efficacy, and outcome expectations (16 dichotomous response items). The final section measures *Self-Realization*, which includes self-awareness and self-knowledge (15 yes/no items). A total of 148 points are possible, with higher scores indicating higher levels of SD. The total SDS score was used in this study. The SDS was normed with 400 adults with intellectual disabilities, and has adequate construct validity, discriminative validity, internal consistency (Chronbach $\alpha = 0.83$) and factorial validity (Wehmeyer and Bolding 2001). Chou et al. (2017b) recently examined the SDS in 95 youth with ASD between the ages of 13 and 21. The SDS as a whole had external internal consistency (Chronbach's α of .90) and adequate discriminate validity of its four factors (Chou et al. 2017b). These findings are consistent with the original psychometric study on the SDS (Wehmeyer 1996) and support the four dimensions of the SDS and functional theory of SD.

The *AIR-S* (Wolman et al. 1994) was also used to measure SD in this study. This 24-item self-report yields three *Capacity* sections (ability, knowledge, and perceptions) and two *Opportunity* sections (opportunity at school and at home) using a scale of 1 (never) to 5 (always). The *AIR-S Capacity* subscale consists of two domains: Things I Do, related to SD, and How I Feel, about performing these behaviours. The *AIR-S Opportunity* subscale includes questions about the opportunities students have to engage in SD behaviours at home and school. The total score of the *AIR-S* was used in this study. The *AIR-S* was developed and normed with 450 students with and without disabilities between the ages of 6 and 25 years of age in California and New York (Wolman et al. 1994). The *AIR-S* was demonstrated to have adequate reliability and validity (Mithaug et al. 2003a) in the measurement of SD for students with and without disabilities. Given that most of the individuals in the current study were in school and under the age of 25, the *AIR-S* was a suitable measure. The recent study by Chou et al. (2017b) with youth with ASD also investigated the validity of the *AIR-S*, demonstrating excellent internal consistency (Cronbach's alpha of .93) and adequate discriminate validity of its two scales, supporting the subscales of capacities and opportunities as well as the self-determined learning theory for youth with ASD.

Each measure defines SD differently. The *SDS* is based on the functional theory of SD which focuses primarily on the personal characteristics that impact a person's self-determined behaviour. The *AIR-S*, based in the self-determined learning theory, captures this notion in its capacities subscale, though capacities are assessed in greater depth using the *SDS*. The *AIR-S* contributes an additional component by explicitly focusing on both opportunities and capacities for SD (Chou et al. 2017b). These measures were shown to measure distinct but related aspects of SD, which are linked to the differences in the underlying theories of SD (Shogren et al. 2008). Given their complementary information, the *SDS* and *AIR-S* are used concurrently with other disability groups (Shogren et al. 2008) and will both be utilized in the current sample of *adults* with ASD as the findings may be relevant for future research into the construct and measurement of SD and its associated practical applications.

Data Analysis

Data were collected in person and later entered into Statistical Package for the Social Sciences (SPSS) for analysis. Trained research assistants entered and double-checked the data for accuracy prior to analyses. Due to the nature of the assessments, there was no missing data as the research assistant checked the measures for completion. Descriptive statistics, Pearson correlation coefficients, and multiple linear regression analyses (one for each SD measure) were employed to investigate whether each measure of SD contributes to QoL.

Results

Participants self-expressed QoL and SD varied widely. The mean and standard deviations for our measures of interest are: *Total QoL-Q* score ($M = 79.23$, $SD = 13.19$,

range = 57-103), *SDS Total* score ($M = 81.40, SD = 19.39$, range = 50-124), and *AIR-S Total* score ($M = 85.63, SD = 16.90$, range = 57-116). See Table 1 for descriptive statistics of the subscales.

Are Self-Determination and Quality of Life Related in a Population of Young Adults with ASD?

Correlational analyses are represented in Table 2 and demonstrated a significant positive correlation between *Total SDS* and *Total AIR-S* scores ($r = .529, p = .003$). See Table 3 for a summary of the *SDS* and *AIR-S* subscale correlations.

In addition, both the *Total SDS* ($r = .426, p = .019$) and the *Total AIR-S* ($r = .435, p = .016$) were positively related to *Total QoL-Q*. To further elucidate these findings, the associations between subscales were examined. *Total QoL-Q* scores were correlated with the *SDS' autonomy* ($r = .477, p = .016$), *psychological empowerment* ($r = .432, p = .031$), and *self-realization* ($r = .530, p = .016$) scales. However, this association was not found for *SDS' self-regulation* subscale. Similarly, there was a significant association with *Capacity* ($r = .482, p = .006$), but not with *Opportunity* ($r = .245, p = .184$) and *Total QoL-Q*. To examine if QoL was related to intellectual functioning in our sample we also conducted correlations between verbal and nonverbal IQ and QoL. Neither of these variables was significantly related to QoL; therefore, verbal IQ ($r = -.305, p = .101$), nonverbal IQ ($r = -.098, p = .606$) were not examined further.

Does Self-Determination Predict Quality of Life for Young Adults with ASD?

Regression models examined the predictive value of each SD scale in explaining variance in *QoL-Q* ratings. See Table 4 for a summary of the results. *SDS* scores

Table 1 Descriptive statistics of the *QoL-Q*, *SDS*, and *AIR-S* (N = 30)

Variable	M	SD	Min	Max
QoL-Q total	79.23	13.19	57	103
Satisfaction	20.53	4.07	14	26
Competence & productivity	15.20	7.18	2	28
Empowerment	24.90	3.27	18	30
Social belonging & community Integration	18.60	4.07	12	27
SDS total	81.40	19.39	50	124
Autonomy	50.73	13.63	22	83
Self-regulation	11.00	4.92	0	19
Psychological empowerment	10.63	4.04	1	16
Self-realization	9.03	3.26	4	15
AIR-S total	85.63	16.90	57	116
Capacity	42.67	9.12	23	58
Opportunity	42.97	10.17	25	58

QoL-Q, quality of life – questionnaire; *SDS*, Arc’s self-determination scale; *AIR-S*, Air’s self-determination scale - student

Table 2 Correlational analyses for IVs and DV (N = 30)

Variable	1	2	3	4	5
1. QoL-Q total score	-	.426*	.435*	-.305	-.098
2. SDS total score		-	.529**	.115	-.007
3. AIR-S total score			-	-.259	-.328
4. Verbal IQ				-	.497**
5. Non-verbal IQ					-

* $p < .05$ ** $p < .01$

explained a significant amount of the variance in QoL ratings ($F(1, 28) = 6.213, p = .019, R^2 = .182, R^2_{Adjusted} = .152$). AIR-S total scores also explained a significant amount of the variance in QoL ratings ($F(1, 28) = 6.520, p = .016, R^2 = .189, R^2_{Adjusted} = .160$).

These results suggest that SD contributes significantly to QoL in young adults with ASD with average or above average intellectual abilities. Both of the SD questionnaires we employed explained approximately 18% of the variance in QoL ratings, suggesting the more self-determined people are, the higher they rate their perceived QoL.

Discussion

QoL has been the center of much debate in research and program development and implementation (Schalock and Verdugo 2002), such that promoting QoL has been considered a best practice in transition services for students with disabilities. We know that the transition to adulthood comes with many uncertainties as young adults leave high school and begin to consider higher education, employment, independently living, and relationships. As is evident in the literature, many young adults with ASD with average intellectual abilities are struggling to navigate these traditional adult roles. Given the empirical support for SD as a means to attaining positive adult outcomes in these various transition areas, we hypothesized a significant relationship between SD and QoL, such that better SD would enable adults with ASD to perceive living a life of quality.

Table 3 Correlational analyses for SDS and AIR Subscales (N = 30).

Variable	1	2	3	4	5	6
1. SDS autonomy	-	.329	.359*	.339	-	-
2. SDS self-regulation		-	.140	.032	-	-
3. SDS psychological empowerment			-	.690**	-	-
4. SDS self-realization				-	-	-
5. AIR capacity					-	.470**
6. AIR opportunity						-

* $p < .05$ ** $p < .01$

Table 4 Summary of hierarchical regression analysis for variables predicting self-determination using SDS and AIR-S ($N = 30$)

Variable	SDS			AIR-S		
	<i>B</i>	<i>SE B</i>	β	<i>B</i>	<i>SE B</i>	β
QoL-Q total score	.626	.251	.426	.557	.218	.435

$R^2 = .182$ ($p < .05$) for SDS and $R^2 = .189$ ($p < .05$) for AIR-S

Relationship Between SD and QoL

In the current study, we examined the association between two complementary measures, both with distinct theoretical frameworks of SD, and self-reported QoL in a sample of young adults with ASD without ID. First, the two measures of SD we used were moderately correlated, which was very similar to the association reported by Shogren et al. (2008) for a US sample of 407 high school students with disabilities (e.g., ID, learning disability, emotional and behavioural disorders, autism). This suggests that the *SDS* and *AIR-S* measuring similar but distinct constructs based on two underlying SD theoretical frameworks in a sample of young adults with ASD, which has been supported in the literature using a confirmatory factor analysis (Chou et al. 2017b). Although related, the *SDS* and *AIR-S* should be further examined as the differences may highlight nuances in the theoretical frameworks on which the measures are based and may point to different avenues for promoting SD in educational environments and support services.

Interestingly, intellectual functioning was not significantly related to QoL, and the associations that were found were in the negative rather than positive direction. This is consistent with findings in the literature (Moss et al. 2017) and with the idea that in this population disability is more accurately captured by the level of adaptive functioning, than by IQ or language ability, with the former falling behind the latter by 2 or 3 standard deviations on standardized tests (Klin et al. 2005). As such, we need to further understand the complicated profiles for individuals with ASD without ID, as higher cognitive levels prove to not always demonstrate more satisfaction or social functioning.

Second, our results indicate a significant positive relationship between SD and QoL, as measured by two common SD measures and frameworks. Given the different profiles of strengths and needs in ASD relative to ID, it is possible that the positive relationship between SD and QoL that has previously been shown for adults with ID (Lachapelle et al. 2005; Wehmeyer and Schwartz 1998) would not hold for the participants in the current study. However, our results indicate a significant positive relationship between SD and QoL for adults with ASD without ID as well. The strength of the associations was moderate and comparable to those found in the literature (Lachapelle et al. 2005; McDougall et al. 2010) yet, stronger than that found a sample of adults with ID with a larger age range (20 to 69 years) (Wehmeyer and Schwartz 1998).

A further exploration of the subcomponents of the two SD measures indicated that only the *autonomy*, *psychological empowerment*, and *self-realization* scales on the *SDS* and *capacity* on the *AIR-S* were significantly and positively associated with overall

QoL. This is consistent with previous findings that highlighted that autonomy, self-realization, and psychological empowerment predicted employment after high school and independent living; psychological empowerment predicted enrolment in higher education; and self-realization approached significance in predicting social engagement (Shogren et al. 2017b).

Although *capacity* was significantly associated with QoL, *opportunity* was not in our sample. This was surprising given that *capacity* and *opportunity* subscales were related ($r = .41$), which is consistent with other samples of students with disabilities (Shogren et al. 2008; and $r = .73$). Opportunities refer to the chances provided to a person to apply their knowledge and abilities related to SD (Wolman et al. 1994). When opportunities are well matched with a person's capacities and offer the potential for positive gains (Mithaug et al. 2003a, b), they are often pursued by self-determined people. Thus, it is apparent that promoting capacity generally does not occur in the absence of opportunities. In fact, Shogren et al. (2015a) indicated that "as people have opportunities to engage self-determined action, they become causal agents, which then influence the degree to which basic needs are met and overall well-being flourishes" (Shogren et al. 2015a, p. 260). Therefore, if opportunities at home and school are not perceived to be related to QoL in our sample, further examination is required to better understand the reasons why. It is possible that the opportunity subscale on the *AIR-S* did not reflect the specific opportunities and life circumstances of our sample.

Moreover, it is possible that young adults with ASD feel that the opportunities and resources offered within a supportive environment (examples from *AIR-S*: "People at home listen to me when I talk about what I want, what I need, or what I'm good at", "People at school encourage me to start working on my plans right away") and the outcomes that they experience are not related. However, this would need to be investigated directly in a future study. This kind of study might tap into the notion of locus of control, or a person's expectation about how much control they have over the outcomes in their lives, which is related to attitudes toward various situations (Rotter 1966) and has been found to be relevant to the context of SD (Shogren et al. 2006). The lack of control or even the perception of loss have been shown to increase the risk for depression and learned helplessness (Clark et al. 2004), which may be related to the high rates of co-morbid mental health issues reported in ASD (Esbensen et al. 2010; Gillberg and Billstedt 2000).

Another possible explanation may be that these two measures are not capturing the environmental supports that impact SD, such as empowering environments that consider and include individuals' needs and voices. In fact, Wehmeyer and colleagues have published a more recent SD theoretical framework, the *Causal Agency Theory* (Shogren et al. 2015a) and an associated measure, the *Self-Determination Inventory* (Shogren et al. 2017b) to address this issue. With an emphasis on person-environment interactions, this theory is similar to the social-ecological model (Bronfenbrenner 1979) and has roots in Positive Psychology. The *Causal Agency Theory* provides a framework for developing and enhancing supports for individuals to engage in agentic action through goal setting and attainment to promote SD and, ultimately, QoL across diverse social-contextual contexts (Shogren et al. 2015a; 2016a). They emphasize that it is within a person-context interaction that individuals become agents of their own actions. This is an extension of their original functional theory of SD that delves deeper into the

process of how someone becomes self-determined and builds upon the original notions of SD dispositions to focus on actions. Thus, *Causal Agency Theory* emphasizes the importance of three domains (volitional action, agentic action, and action-control beliefs and attitudes) and considers the environmental supports and barriers in relation to the growth of causal agency and the *agentic self* (Shogren et al. 2015a).

In a study of the psychometric properties of *Self-Determination Inventory (SDI)*, the new student self-report questionnaire designed based on the *Causal Agency Theory*, Shogren et al. (2017b) administered the measure to 311 youth aged 13 to 22 years with and without disabilities (including 26 youth with ASD). The findings revealed that the *SDI* aligned well with their theoretical framework and demonstrated construct validity. Further, participants with disabilities reported more variable SD scores, though differences among different disability groups were not reported. Thus, this promising work highlights the need to explore how this theory and measurement tool apply to respondents with ASD, and its potential impact on perceived QoL and other outcomes such as employment, independent living, and educational attainment.

SD Predicts QoL

Finally, our most important finding is that SD, as measured by either the *SDS* or the *AIR-S*, was found to be a significant positive predictor of *QoL-Q* ratings in a sample of young adults with ASD without ID. This emphasizes the importance of developing SD skills in young adults with ASD to improve their QoL as they transition to adulthood. Our findings are consistent with emerging literature that highlights that promoting SD skills not only lead to enhanced SD (Wehmeyer et al. 2013) but also adult outcomes after high school (Shogren et al. 2017a). This is not surprising given that people who are more self-determined cause things to happen in their own lives (e.g., obtaining employment, pursuing high education), which in turn may enhance their QoL. Despite the literature on SD and QoL for individuals with disabilities, opportunities to develop SD skills are still not consistently available. The current study demonstrates the benefits of promoting SD on overall QoL, and begins to address the paucity of research on SD and QoL of young adults with ASD without ID. SD might be best recognized as a means to enhancing the lives of individuals with ASD, especially as they transition into adulthood. As Erwin et al. (2009) noted, “promoting self-determination is an intentional and ongoing process” (p. 28). That is, teaching and providing opportunities for SD should become the primary focus and embedded across the home, academic, and community settings throughout the lifespan.

Limitations

Despite the strengths and potential utility of the results of the current study, the limitations should be highlighted as they might impact the findings as well as the generalizability of these findings. The primary limitation of this exploratory pilot study was the small sample described. Despite this limitation, significant relationships were observed. Given the novel area of study we believe our study provides preliminary evidence for the relationships between self-perceived SD and QoL among young adults with ASD without ID. This key finding should spur future research, and if replicated, program development and implementation for young adults with ASD. With respect to

SD measures, the *AIR-S* with its school-related subscale should be used with caution when investigating older adults, as it has been normed for students up to 25 years of age. Fortunately, the majority of participants in the current study were attending school and were able to complete the school opportunities subdomain. Moreover, as most participants reported attending higher education our findings may be biased as researchers have shown that the level of education has an influence on QoL of adults with ASD without ID (Barneveld et al. 2014). Future studies should consider using the *SDS* or removing the school opportunities subdomain of the *AIR* from analyses, as it can underestimate overall SD. Finally, the use of the *QoL-Q* may not accurately capture the wellbeing of those on the autism spectrum, as the measure is not designed for specifically people with ASD but for those with disabilities in general.

Researchers have recommended the need to develop more specific measures that accurately reflect the QoL of people on the spectrum (Tavernor et al. 2013). Tavernor and colleagues argued that QoL indicators developed and normed across various disability categories may be of less relevance to people with ASD as “their interests and enthusiasms may differ from those of typically developing children, which may affect how they value aspects of QoL identified in conceptual models derived from studies of typically developing young people” (p. 2), or people with other disabilities. Arguably, this perspective also applies to the construct of SD. The identity and experiences of an individual with ASD are diverse; as such, researchers should challenge the normative assumptions that come with having a diagnosis of ASD, as they might experience SD and QoL in varying ways across the lifespan.

Future Research

Although researchers are starting to acknowledge the importance of investigating SD and QoL together (Shogren et al. 2017a), more research is warranted. Future studies should explore the relation between SD and QoL for individuals with ASD in larger longitudinal and cross-sectional studies to understand potential causal impacts of SD on QoL across the lifespan. We need to further our understanding of the constructs of SD and QoL and its measurement in an effort to develop, implement, and evaluate interventions to promote SD and QoL. However, to do this, researchers are encouraged to include people with ASD in the design of the study to facilitate the appropriateness of the measures. For example, future research should also examine how the components of SD are valued or expressed in individuals with ASD. We often equate SD with specific objective outcomes (e.g., goals, employment), which is somewhat contradictory to SD because it takes away from the person’s freedom of choice (Browder et al. 2001).

Further, research has begun to document the influence of diverse intra-individual factors and environmental factors that serve as mediating or moderating variables in efforts to promote SD (Nota et al. 2007; Shogren et al. 2016a; Stancliffe et al. 2000; Wehmeyer and Bolding 2001). For instance, Shogren et al. (2016a) revealed that gender, inclusion status, and cognitive functioning significantly predicted SD among youth with disabilities. Less is known about the factors that influence QoL for individuals with ASD. Further research is required to develop a framework that promotes careful consideration of contextual factors when designing, implementing, and evaluating supports to enhance SD and QoL.

Implications for Practice

Our findings indicate a need to provide authentic opportunities for young adults with ASD to develop SD. As such, SD and QoL might be best viewed together as constructs to guide policy and practice in order to improve life conditions and to empower people with ASD to live the life that they desire. This is consistent with recommendations in the literature that suggest that intervention take a more holistic approach (Jennes-Coussens et al. 2006; Tobin et al. 2014) in order to provide adults with ASD with the tools to improve their QoL. SD-focused services and supports may ensure the QoL of young adults with ASD as they transition to adulthood. In fact, Wehmeyer and Schalock (2001) argue that, if educational, health, and social service professionals are serious about promoting QoL among individuals with disabilities, they should use SD as an organizing theme to examine personal outcomes.

The provision of services, especially within education, should incorporate goals that target SD behaviours and build on capacity. Based on our preliminary findings, promoting autonomy, psychological empowerment, and self-realization might contribute to better QoL for adults with ASD; however, further research is required. Although there are no existing models that explain how to use SD and QoL jointly in the provision of services, given the empirical link between the two and our finding that SD predicts QoL, practitioners are encouraged to make a concerted and early effort to promote SD. Based on the existing literature and our findings, we hypothesize that emphasizing SD in interventions would have a collateral effect on multiple adult outcomes such as employment and educational attainment.

In practice, educators could use the *SDS* or the *AIR-S* to assess their students' level of SD based on a framework that aligns with their assessment aims (Shogren et al. 2008). Generally, educators have used these measures to assess and monitor progress on the impact of SD-based interventions. Nevertheless, if an educator's aim is to understand the personal characteristics that impact a person's self-determined behavior (e.g., behavioral autonomy, self-regulation, psychological empowerment, and self-realization) they should consider utilizing the *SDS*. Whereas, if they would rather focus on how people become self-determined learners or on providing opportunities for SD, they might consider the *AIR-S*. With the recent developments of the Causal Agency Theory and its associated *Self-Determination Inventory*, educators and practitioners can better position themselves to analyze the supports and barriers in the environment that affect SD so that they can facilitate positive change. Educators could also use this knowledge to identify their students' SD needs and use existing SD-focused intervention models/programs to target those skills (Wehmeyer et al. 2013). For instance, a common model used in schools in the U.S. is the Self-Determined Learning Model of Instruction (SDLMI; Wehmeyer et al. 2000). The SDLMI is a self-regulated problem-solving process that helps students with goal setting and attainment (Wehmeyer et al. 2000). However, given the multitude of instructional priorities including academics, social and behavioural needs of students with ASD, SD learning opportunities have been suggested to be infused throughout the day rather than treating it like an add-on to the curriculum (Wehmeyer et al. 2004a, b). This would demonstrate a more universal design approach or multi-tiered system of support models (Sugai et al. 2012; Wehmeyer 2015; Shogren et al. 2016b), promoting the development of SD for all students.

Conclusions

Given the history of service practices that compromised the QoL of people with disabilities (e.g., large segregated institutions), many organizations' policies now aim to increase QoL, yet a gap between policy and practice remains (Townsend-White et al. 2011). The current results suggest that SD-focused services and supports could be an effective method of promoting QoL by encouraging more SD acquisitions and opportunities for young adults with ASD as they transition to adulthood. Although further research with adults with ASD without ID is warranted, SD should be considered an essential element of high-quality transition services and disability supports for young adults with ASD, given their empirical link to better QoL.

Acknowledgements This project was made possible through funding from the Max Bell Foundation to the second and third authors. We would like to thank our participants and stakeholders in the larger research study. Thank you to our dedicated facilitators Janet Bang, Victoria Doobay, Roberta Konen, Amanda Saxe, and Céliane Trudel, research assistants Mélissa Ferland, Ana Maria Gonzalez Barrero, and Jesse Burns, and stakeholder event coordinators Valérie Martin and Jillian Mills for their efforts. We appreciate the collaboration of the CRDI-TED de Montréal, Dawson College, and Inspirations Newspaper in our recruitment efforts.

Compliance with Ethical Standards

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was provided by all participants in writing as per protocol approved by McGill University's Research Ethics Board.

Conflict of Interests None of the authors have a conflict of interest to declare.

References

- Algozzine, B., Browder, D., Karvonen, M., Test, D. W., & Wood, W. (2001). Effects of interventions to promote self-determination for individuals with disabilities. *Review of Educational Research, 71*, 219–277.
- Barneveld, P. S., Swaab, H., Fagel, S., Van Engeland, H., & de Sonneville, L. M. (2014). Quality of life: a case-controlled long-term follow up study, comparing young high-functioning adults with autism spectrum disorders with adults with other psychiatric disorders diagnosed in childhood. *Comprehensive Psychiatry, 55*(2), 302–310. <https://doi.org/10.1016/j.comppsy.2013.08.001>.
- Billstedt, E., Gillberg, I., & Gillberg, C. (2005). Autism after adolescence: population-based 13-to 22-year follow-up study of 120 individuals with autism diagnosed in childhood. *Journal of Autism and Developmental Disorders, 35*(3), 351–360. <https://doi.org/10.1007/s10803-005-3302-5>.
- Billstedt, E., Gillberg, I. C., & Gillberg, C. (2011). Aspects of quality of life in adults diagnosed with autism in childhood: A population-based study. *Autism, 15*(1), 7–20. <https://doi.org/10.1177/1362361309346066>.
- Billstedt, E., Gillberg, I., & Gillberg, C. (2007). Autism in adults: symptom patterns and early childhood predictors. Use of the DISCO in a community sample followed from childhood. *Journal of Child Psychology and Psychiatry, 48*(11), 1102–1110. <https://doi.org/10.1111/j.1469-7610.2007.01774.x>.
- Bronfenbrenner, U. (1979). *The ecology of human development: experiments by nature and design*. Cambridge: Harvard University Press.
- Browder, D. M., Wood, W. M., Test, D. W., Karvonen, M., & Algozzine, B. (2001). Reviewing resources on self-determination: A map for teachers. *Remedial and Special Education, 22*, 233–244.
- Brown, I., Brown, R. I., Cummins, R. A., Felce, D., Matikka, L., Keith, K ... Schalock, R. (2000). *Quality of life: It's conceptualization, measurement and application: A consensus document*. (WHOIASSID Work

- Plan). Retrieved from http://www.ibrarian.net/navon/paper/QUALITY_OF_LIFE__ITS_CONCEPTUALIZATION__MEASUREME.pdf?paperid=1264259
- Burgess, A. F., & Gutstein, S. E. (2007). Quality of life for people with Autism: Raising the standard for evaluating successful outcomes. *Child and Adolescent Mental Health*, 12(2), 80–86. <https://doi.org/10.1111/j.1475-3588.2006.00432.x>.
- Chambers, C. R., Wehmeyer, M. L., Saito, Y., Lida, K. M., Lee, Y., & Singh, V. (2007). Self-determination: What do we know? Where do we go? *Exceptionality*, 15(1), 3–15. <https://doi.org/10.1080/09362830709336922>.
- Chiang, H., & Wineman, I. (2014). Factors associated with quality of life in individuals with autism spectrum disorders: a review of literature. *Research in Autism Spectrum Disorders*, 8(8), 974–986.
- Chou, Y. C., Wehmeyer, M. L., Palmer, S. B., & Lee, J. (2017a). Comparisons of self-determination among students with autism, intellectual disability, and learning disabilities: A multivariate analysis. *Focus on Autism and Other Developmental Disabilities*, 32(2), 124–132.
- Chou, Y. C., Wehmeyer, M. L., Shogren, K. A., Palmer, S. B., & Lee, J. H. (2017b). Autism and self-determination: Factor analysis of two measures of self-determination. *Focus on Autism and Other Developmental Disabilities*, 32(3), 163–175.
- Clark, E., Olympia, D. E., Jensen, J., Heathfield, L. T., & Jenson, W. R. (2004). Striving for autonomy in a contingency-governed world: Another challenge for individuals with developmental disabilities. *Psychology in the Schools*, 41(1), 143–153. <https://doi.org/10.1002/pits.10146>.
- Dawson, M., Soulières, I., Gernsbacher, M. A., & Mottron, L. (2007). The level and nature of autistic intelligence. *Psychological Science*, 18(8), 657–662. <https://doi.org/10.1111/j.1467-9280.2007.01954.x>.
- Eaves, L. C., & Ho, H. H. (2008). Young adult outcome of autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 38(4), 739–747. <https://doi.org/10.1007/s10803-007-0441-x>.
- Erwin, E. J., Brotherson, M. J., Palmer, S. B., Cook, C. C., & Summers, J. A. (2009). How to promote self-determination for young children with disabilities: Evidence-based strategies for early childhood practitioners and families. *Young Exceptional Children*, 12(2), 27–37.
- Esbensen, A. J., Bishop, S., Seltzer, M. M., Greenberg, J. S., & Taylor, J. L. (2010). Comparisons between individuals with autism spectrum disorders and individuals with down syndrome in adulthood. *American Journal of Intellectual and Developmental Disabilities*, 115(4), 277–290. <https://doi.org/10.1352/1944-7558-115.4.277>.
- Farley, M. A., McMahon, W. M., Fombonne, E., Jenson, W. R., Miller, J., Gardner, M., ... & Coon, H. (2009). Twenty-year outcome for individuals with autism and average or near-average cognitive abilities. *Autism Research*, 2(2), 109–118. <https://doi.org/10.1002/aur.69>
- Felce, D., & Perry, J. (1996). Assessment of quality of life. In R. L. Schalock (Ed.), *Quality of life: Vol. 1. Conceptualization and measurement* (pp. 63–72). Washington: American Association on Mental Retardation.
- Fombonne, E., Zakarian, R., Bennett, A., Meng, L., & McLean-Heywood, D. (2006). Pervasive Developmental Disorders in Montreal, Quebec, Canada: Prevalence and Links With Immunizations. *Pediatrics*, 118(1), e139–e150.
- Gillberg, C., & Billstedt, E. (2000). Autism and Asperger syndrome: Coexistence with other clinical disorders. *Acta Psychiatrica Scandinavica*, 102(5), 321–330. <https://doi.org/10.1034/j.1600-0447.2000.102005321.x>.
- Howlin, P. (2000). Outcome in adult life for more able individuals with autism or Asperger syndrome. *Autism*, 4(1), 63–83.
- Howlin, P. (2003). Outcome in high-functioning adults with autism with and without early language delays: implications for the differentiation between autism and Asperger syndrome. *Journal of Autism and Developmental Disorders*, 33(1), 3–13. <https://doi.org/10.1023/A:1022270118899>.
- Howlin, P., & Moss, P. (2012). Adults with autism spectrum disorders. *Canadian Journal of Psychiatry*, 57(5), 275 Retrieved from <http://search.proquest.com/openview/851d6db63c828ebcac5266d780cb5dd/1?pq-origsite=gscholar>.
- Howlin, P., Goode, S., Hutton, J., & Rutter, M. (2004). Adult outcome for children with autism. *Journal of Child Psychology and Psychiatry*, 45(2), 212–229. <https://doi.org/10.1111/j.1469-7610.2004.00215.x>.
- Hus, V., & Lord, C. (2014). The autism diagnostic observation schedule, module 4: revised algorithm and standardized severity scores. *Journal of Autism and Developmental Disorders*, 44(8), 1996–2012. <https://doi.org/10.1007/s10803-014-2080-3>.
- Jennes-Coussens, M., Magill-Evans, J., & Koning, C. (2006). The quality of life of young men with Asperger syndrome: A brief report. *Autism*, 10, 403–414. <https://doi.org/10.1177/1362361306064432>.

- Klin, A., Saulnier, C., Tsatsanis, K., & Volkmar, F. (2005). Clinical evaluation in autism spectrum disorders. In F. Volkmar, R. Paul, A. Klin, & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders* (3rd ed., pp. 772–798). Hoboken: Wiley.
- Lachapelle, Y., Wehmeyer, M. L., Haelewyck, M. C., Courbois, Y., Keith, K. D., Schalock, R., et al. (2005). The relationship between quality of life and self-determination: an international study. *Journal of Intellectual Disability Research*, 49(10), 740–744. <https://doi.org/10.1111/j.1365-2788.2005.00743.x>.
- Levy, A., & Perry, A. (2011). Outcomes in adolescents and adults with autism: A review of the literature. *Research in Autism Spectrum Disorders*, 5(4), 1271–1282. <https://doi.org/10.1016/j.rasd.2011.01.023>.
- Lord, C., Rutter, M., DiLavore, P. C., & Risi, S. (1999). *Autism Diagnostic Observation Schedule-WPS (ADOSWPS)*. Los Angeles: Western Psychological Services.
- Lord, C., Rutter, M., DiLavore, P. C., Risi, S., Gotham, K., & Bishop, S. (2012). *Autism diagnostic observation schedule: ADOS-2*. Los Angeles: Western Psychological Services.
- McDougall, J., Evans, J., & Baldwin, P. (2010). The importance of self-determination to perceived quality of life for youth and young adults with chronic conditions and disabilities. *Remedial and Special Education*, 31, 252–260.
- Mithaug, D. E., Campeau, P. L., & Wolman, J. M. (2003a). Assessing self-determination prospects among students with and without disabilities. In D. E. Mithaug, D. K. Mithaug, M. Agran, J. E. Martin, & M. L. Wehmeyer (Eds.), *Self determined learning theory: Construction, verification, and evaluation* (pp. 61–76). Mahwah: Lawrence Erlbaum.
- Mithaug, D. E., Mithaug, D. K., Agran, M., Martin, J. E., & Wehmeyer, M. L. (2003b). *Self-determined learning theory: Construction, verification, and evaluation*. Mahwah: Erlbaum.
- Moss, P., Mandy, W., & Howlin, P. (2017). Child and adult factors related to quality of life in adults with autism. *Journal of Autism and Developmental Disorders*, 47, 1830–1837. <https://doi.org/10.1007/s10803-017-3105-5>.
- Mottron, L. (2004). Matching strategies in cognitive research with individuals with high-functioning autism: Current practices, instrument biases, and recommendations. *Journal of Autism and Developmental Disorders*, 34(1), 19–27. <https://doi.org/10.1023/B:JADD.0000018070.88380.83>.
- Nicholas, D. B., Attridge, M., Zwaigembaum, L., & Clarke, M. (2015). Vocational support approaches in autism spectrum disorder: A synthesis review of the literature. *Autism*, 19(2), 235–245.
- Nota, L., Ferrari, L., Soresi, S., & Wehmeyer, M. (2007). Self-determination, social abilities and the quality of life of people with intellectual disability. *Journal of Intellectual Disability Research*, 51(11), 850–865. <https://doi.org/10.1111/j.1365-2788.2006.00939.x>.
- Pierson, M. R., Carter, E. W., Lane, K. L., & Glaeser, B. C. (2008). Factors influencing the self-determination of transition-age youth with high-incidence disabilities. *Career Development for Exceptional Individuals*, 31, 115–125.
- Raven, J., Raven, J.C., & Court, J.H. (2003, updated 2004) *Manual for Raven's progressive matrices and vocabulary scales*. San Antonio: Harcourt Assessment.
- Reid, D. T., & Renwick, R. M. (1994). Preliminary validation of a new instrument to measure life satisfaction in adolescents with neuromuscular disorders. *International Journal of Rehabilitation Research*, 7(2), 184–188.
- Renty, J. O., & Roeyers, H. (2006). Quality of life in high-functioning adults with autism spectrum disorder: The predictive value of disability and support characteristics. *Autism*, 10(5), 511–524. <https://doi.org/10.1177/1362361306066604>.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied*, 80(1), 1–28. <https://doi.org/10.1037/h0092976>.
- Roux, A. M., Shattuck, P. T., Rast, J. E., Rava, J. A., & Anderson, K. A. (2015). *National Autism Indicators Report: Transition into Young Adulthood*. Philadelphia: Life Course Outcomes Research Program, A.J. Drexel Autism Institute, Drexel University.
- Rutter, M., Bailey, A., Lord, C., & Berument, S. K. (2003). *Social communication questionnaire*. Los Angeles: Western Psychological Services.
- Saldana, D., Alvarez, R. M., Lobaton, S., Lopez, A. M., Moreno, M., & Rojano, M. (2009). Objective and subjective quality of life in adults with autism spectrum disorders in southern Spain. *Autism*, 13(3), 303–316. <https://doi.org/10.1177/1362361309103792>.
- Schalock, R. L. (2000). Three decades of quality of life. *Focus on Autism and Other Developmental Disabilities*, 15(2), 116–127. <https://doi.org/10.1177/108835760001500207>.
- Schalock, R., & Keith, K. (1993, 2004 Revision). *Quality of life questionnaire*. Worthington: IDS Publishing.
- Schalock, R. L., & Verdugo, M. A. (2002). *Handbook on quality of life for human support practitioners*. Washington: American Association on Mental Retardation.

- Schalock, R. L., Brown, I., Brown, R., Cummins, R. A., Felce, D., Matikka, L., ... & Parmenter, T. (2002). Conceptualization, measurement, and application of quality of life for persons with intellectual disabilities: Report of an international panel of experts. *Mental Retardation*, 40(6), 457–470. [https://doi.org/10.1352/0047-6765\(2002\)040<0457:CMAAOQ>2.0.CO;2](https://doi.org/10.1352/0047-6765(2002)040<0457:CMAAOQ>2.0.CO;2)
- Schalock, R. L., Verdugo, M. A., Jenaro, C., Wang, M., Wehmeyer, M., Jiancheng, X., & Lachapelle, Y. (2005). Cross-cultural study of quality of life indicators. *American Journal on Mental Retardation*, 110(4), 298–311.
- Shogren, K. A., Lopez, S. J., Wehmeyer, M. L., Little, T. D., & Pressgrove, C. L. (2006). The role of positive psychology constructs in predicting life satisfaction in adolescents with and without cognitive disabilities: An exploratory study. *The Journal of Positive Psychology*, 1(1), 37–52. <https://doi.org/10.1080/17439760500373174>.
- Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Soukup, J. H., Little, T. D., Garner, N., & Lawrence, M. (2008). Understanding the construct of self-determination examining the relationship between the arc's self-determination scale and the american institutes for research self-determination scale. *Assessment for Effective Intervention*, 33(2), 94–107. <https://doi.org/10.1177/1534508407311395>.
- Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Forber-Pratt, A. J., Little, T. J., & Lopez, S. (2015a). Causal Agency Theory: Reconceptualizing a functional model of self-determination. *Education and Training in Autism and Developmental Disabilities*, 50(3), 251–263.
- Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Rifenshark, G., & Little, T. (2015b). Relationships between self-determination and postschool outcomes for youth with disabilities. *The Journal of Special Education*, 48, 256–267.
- Shogren, K. A., Wehmeyer, M. L., Palmer, S. B., Soukup, J. H., Little, T. D., Garner, N., & Lawrence, M. (2016a). Examining individual and ecological predictors of the self-determination of students with disabilities. *Exceptional Children*, 73(4), 488–510.
- Shogren, K. A., Wehmeyer, M. L., & Lane, K. L. (2016b). Embedding interventions to promote self-determination within multi-tiered systems of supports. *Exceptionality*, 1–12. doi: <https://doi.org/10.1080/09362835.2015.1064421>.
- Shogren, K. A., Lee, J., & Panko, P. (2017a). An examination of the relationship between post-school outcomes and autonomy, psychological empowerment, and self-realization. *The Journal of Special Education*, 51(2), 115–124.
- Shogren, K. A., Wehmeyer, M. L., Little, T. D., Forber-Pratt, A. J., Palmer, S. B., & Seo, H. (2017b). Preliminary validity and reliability of scores on the self-determination inventory: Student report version. *Career Development and Transition for Exceptional Individuals*, 40(2), 92–103.
- Stancilffe, R. J., Avery, B. H., & Smith, J. (2000). Personal control and the ecology of community living settings: Beyond living-unit size and type. *Mental Retardation*, 105, 431–454.
- Sugai, G., O'Keefe, B. V., & Fallon, L. M. (2012). A contextual consideration of culture and school-wide positive behavior support. *Journal of Positive Behavior Interventions*, 14(4), 197–208. <https://doi.org/10.1177/109830070000200302>.
- Tavernor, L., Barron, E., Rodgers, J., & McConachie, H. (2013). Finding out what matters: Validity of quality of life measurement in young people with ASD. *Child: Care, Health and Development*, 39(4), 592–601.
- Taylor, J. L., & Seltzer, M. M. (2011). Employment and post-secondary educational activities for young adults with autism spectrum disorders during the transition to adulthood. *Journal of Autism and Developmental Disorders*, 41(5), 566–574. <https://doi.org/10.1007/s10803-010-1070-3>.
- The Psychological Corporation. (1999). *Manual for the Wechsler Abbreviated Scale of intelligence*. San Antonio: Author.
- Tobin, M. C., Drager, K. D. R., & Richardson, L. F. (2014). A systematic review of social participation for adults with autism spectrum disorders: support, social functioning, and quality of life. *Research in Autism Spectrum Disorders*, 8(3), 214–229.
- Townsend-White, C., Pham, A. N. T., & Vassos, M. V. (2011). Review: A systematic review of quality of life measures for people with intellectual disabilities and challenging behaviours. *Journal of Intellectual Disability Research*, 56(3), 270–284. <https://doi.org/10.1111/j.1365-2788.2011.01427.x>.
- Tsatsanis, K. D. (2003). Outcome research in Asperger syndrome and autism. *Child and Adolescent Psychiatric Clinics of North America*, 12(1), 47–63.
- van Heijst, B., & Geurts, H. M. (2015). Quality of life in autism across the lifespan: a meta-analysis. *Autism*, 19(2), 158–167. <https://doi.org/10.1177/1362361313517053>.
- Wagner, M., Newman, L., Cameto, R., Levine, P., & Marder, C. (2007). *Perceptions and expectations of youth with disabilities. A special topic report of findings from the National Longitudinal Transition Study-2 (NLTS2) (NCSE 2007- 3006)*. Washington: National Center for Special Education Research.

- Wechsler, D. (1999). *Wechsler abbreviated scales of intelligence (WASI)*. San Antonio: The Psychological Corporation/Harcourt Assessment.
- Wehmeyer, M. L. (1996). A self-report measure of self-determination for adolescents with cognitive disabilities. *Education and Training in Mental Retardation and Developmental Disabilities*, 31, 282–293.
- Wehmeyer, M. L. (1999). A functional model of self-determination describing development and implementing instruction. *Focus on Autism and Other Developmental Disabilities*, 14(1), 53–61. <https://doi.org/10.1177/108835769901400107>.
- Wehmeyer, M. L. (2001). Self-determination and mental retardation. In L. M. Glidden (Ed.), *International review of research in mental retardation* (Vol. 24, pp. 1–48). San Diego: Academic Press.
- Wehmeyer, M. L. (2005). Self-determination and individuals with severe disabilities: Re-examining meanings and misinterpretations. *Research and Practice for Persons with Severe Disabilities*, 30(3), 113–120. <https://doi.org/10.2511/rpsd.30.3.113>.
- Wehmeyer, M. L. (2015). Framing the future: self-determination. *Remedial and Special Education*, 36(1), 20–23. <https://doi.org/10.1177/0741932514551281>.
- Wehmeyer, M. L., & Bolding, N. (2001). Enhanced self-determination of adults with intellectual disability as an outcome of moving to community-based work or living environments. *Journal of Intellectual Disability Research*, 45(5), 371–383. <https://doi.org/10.1046/j.1365-2788.2001.00342.x>.
- Wehmeyer, M. L., & Kelchner, K. (1995). *The arc's self-determination scale*. Arlington: Arc National Headquarters.
- Wehmeyer, M. L., & Palmer, S. B. (2003). Adult outcomes for students with cognitive disabilities three-years after high school: The impact of self-determination. *Education and Training in Developmental Disabilities*, 38(2), 131–144 Retrieved from <http://www.jstor.org/stable/23879591>.
- Wehmeyer, M. L., & Schalock, R. L. (2001). Self-determination and quality of life: Implications for special education services and supports. *Focus on Exceptional Children*, 33(8), 1–16 Retrieved from <http://search.proquest.com/openview/61dcf06bfeaa1e7a6fd6fb97db5164ee1?pq-origsite=gscholar>.
- Wehmeyer, M., & Schwartz, M. (1998). The relationship between self-determination and quality of life for adults with mental retardation. *Education and Training in Mental Retardation and Developmental Disabilities*, 33(1), 3–12 Retrieved from https://kuscholarworks.ku.edu/bitstream/handle/1808/6237/SD4_Relationship%20between%20SD%20and%20QOL.pdf?sequence=1.
- Wehmeyer, M. L., Palmer, S. B., Agran, M., Mithaug, D. E., & Martin, J. E. (2000). Promoting causal agency: The self-determined learning model of instruction. *Exceptional Children*, 66(4), 439–453. <https://doi.org/10.1177/001440290006600401>.
- Wehmeyer, M. L., Abery, B., Mithaug, D. E., & Stancliffe, R. J. (2003). *Theory in self-determination: Foundations for educational practice*. Springfield: Charles C Thomas Publisher, LTD.
- Wehmeyer, M. L., Field, S., Doren, B., Jones, B., & Mason, C. (2004a). Self-Determination and student involvement in standards-based reform. *Exceptional Children*, 70(4), 413–425. <https://doi.org/10.1177/001440290407000402>.
- Wehmeyer, M., Lawrence, M., Kelchner, K., Palmer, S., Garner, N., & Soukup, J. (2004b). *Whose future is it anyway? A student directed transition planning process* (2nd ed.). Lawrence: Beach Center on Disability.
- Wehmeyer, M. L., Shogren, K. A., Zager, D., Smith, T. E. C., & Simpson, R. (2010). Research-based principles and practices for educating students with autism: Self-determination and social interactions. *Education and Training in Autism and Developmental Disabilities*, 45, 475–486.
- Wehmeyer, M. L., Palmer, S. B., Lee, Y., Williams-Diehm, K., & Shogren, K. (2011). A randomized-trial evaluation of the effect of Whose Future Is It Anyway? On self-determination. *Career Development for Exceptional Individuals*, 34(1), 45–56.
- Wehmeyer, M. L., Palmer, S. B., Shogren, K., Williams-Diehm, K., & Soukup, J. H. (2013). Establishing a causal relationship between intervention to promote self-determination and enhanced student self-determination. *The Journal of Special Education*, 46, 195–210. <https://doi.org/10.1177/0022466910392377>.
- Wolman, J., Campeau, P., Dubois, P., Mithaug, D., & Stolarski, V. (1994). *AIR self-determination Scale and user guide*. Palo Alto: American Institute for Research.