

Drawing Assessments and Adults with Developmental Delays:
Research and Development

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A Research Paper

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Abstract

Drawing Assessments and Adults with Developmental Delays: Research and Development

Allan Brent Rosales

Using historical-documentary method the literature with respect to art-based research and psychological assessments with developmentally delayed populations was investigated. Additional emphasis was made towards the dominant trends in the research and the approaches to demonstrate assessment reliability and validity. Consequent recommendations are made for developing an empirically informed drawing test for developmentally delayed adults.

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Drawing Assessments and Adults with Developmental Delays: Research and Development

Introduction

The art produced by people with developmental delays is symbolic of their creative capabilities (Selfe, 1977), their self-esteem (Calhoun, Whitley, & Ansolabehere, 1978; Klager, 1996; Ottenbacher, 1981), and their quality of life (Klager, 1996) demonstrating their rich visual life worked out on paper (Winner, 1996). The spectrum of developmental delays includes such disorders as Down's syndrome, Fragile X, Epilepsy, William's syndrome, Autism, intellectual delays, and physical impairments. These disorders are considered a variation of human condition and can range from mild to more severe delays (Sturmey, 2002).

Assessment research with developmentally delayed populations has focused on such phenomena as intelligence (IQ), challenging behaviour, personality, and psychiatric disorder. Increasingly, the trend in the research is to assess quality of life and adaptive behaviours. These areas are concerned with well being (physical, emotional and social) (Felce & Perry, 1995, 1996), autonomy (Kearney & McKnight, 1997), and responsibility (Horn & Fuchs, 1987).

The historical application of formal drawing tests as an approach to psychological assessment spans great depth and breadth, including a wide range of ages and populations. There is approximately 80 years of research with respect to drawing tests exploring samples from paediatrics to geriatrics and measuring such phenomenon as IQ, psychiatric disorder, and interpersonal functioning. To date however, there is a dearth in the literature with respect to art-based assessments for use with developmentally delayed

populations. As a result, I researched the literature with respect to psychological assessments and art-based tests in developmentally delayed populations using historical-documentary method. Specifically, I examined the dominant trends in the literature and investigated the reliability and validity of these assessments. The goal of the research was to generate recommendations for developing an empirically driven art-based drawing test for developmentally delayed adults.

Primary Research Questions

A) How can historical research inform the development of prospective drawing tests for the psychological assessment of adults with developmental delays?

Secondary Research Questions

A) What historical research is there in the psychological assessment of developmentally delayed populations?

B) What historical art-based research is there with developmentally delayed populations?

Methodology

The literature with respect to adult populations with developmental delays including those with Down's syndrome, Fragile X, Epilepsy, William's syndrome, and Autism were investigated. Data collection focused on historical literature from 1900 to 2005. They included searches on MEDLINE, PSYCINFO, ERIC databases, and relevant

reference searches. Data analysis followed Historical-Documentary Method comparing traditional psychological assessments with drawing research in developmentally delayed populations.

Assessment of People with Developmental Delays

The history of assessment with adults with developmental delays is reviewed with respect to the domains of IQ, behaviour, personality, psychopathology, mood disorders, and quality of life. Highlighted are the dominant trends and the challenges in the research. Additional emphasis is placed on assessment of reliability and validity. The features that make these tests suitable to the assessment of developmentally delayed populations are also described.

A Historical Perspective

Formal psychological evaluation first came into prominence in the early 1900s with the goal to improve the educational system (White, 2000). Early assessment of people with developmental delays focused on their significant intellectual deficits with particular focus on negative behaviours such as aggression, self-injury, non-compliance, and tantrums. The majority of developmentally delayed populations lived in institutions to which treatment approach was congruent with the negative perspective of these people. In the 1960s and 1970s, the civil liberties of people with developmental delays were addressed and efforts were made to increase their quality of life (Kanaya, Ceci, & Scullin, 2003).

Prior to the 1980s, it was believed that people with developmental delays lacked any emotions (Sovner & DesNoyers Hurley, 1983). Current research disavowed that perception demonstrating that in fact, people with developmental delays are at greater risk for psychiatric disorder than "normal" functioning populations (Sturmey; Szymanski & King, 1999). Increasingly, the assessment of mood and psychiatric diagnosis has become a considerable area of research. Quality of life and attention to adaptive behaviours, which includes communication skills, interpersonal functioning, and living skills are also areas of substantial research.

Multidisciplinary Assessment

The assessment of adults with developmental delays is complicated by language delays, dual diagnosis, physical limitations, and perceptual impairments (Esbensen, Rojahn, Aman, & Ruderich, 2003). Psychologists, pediatricians, clinical geneticists, and psychiatrists are all required to conduct a full assessment for people with developmental delays (Szymanski & King, 1999). Psychologists evaluate IQ and adaptive skills, pediatricians and clinical geneticists assess biomedical evaluations, and psychiatrists examine psychological and behavioral functioning prescribing medication when necessary (Szymanski & King). Also important to the assessment of adults with developmental delays are social workers, educators, therapists, and caregivers, who work on an on-going basis with clients. Assessment of adults with developmental delays takes multiple forms. Clinical interviews, self-report tests, observation, and ratings by an educator or substantial care giver are all methods to provide information to the multidisciplinary team helping to determine individual treatment and programming.

Assessment of IQ

The dawn of the 20th century observed a shift from rural living to urban living in North America. It also marked the beginning of institutionalization for people with developmental delays, as they were perceived as a genetic threat to prospective generations (White, 2000). In this way, institutionalization of people with developmental delays became a method of discriminating and controlling people who were regarded as “inferior human beings” (White). The deficits of people with developmental delays were confirmed by poor performance on IQ tests. Consequently, the current diagnosis of mental retardation includes the criteria of below average intellectual functioning (American Psychiatric Association [APA], 1994) perpetuating the lack perceived in developmentally delayed populations

The standard in IQ testing is the Stanford-Binet and the Wechsler Intelligence Scale for Children (Groth-Marnat, 2003; Kanaya et al. 2003). According to Groth-Marnat, IQ tests excel at predicting future behaviour in academic and occupational domains. In addition, they give insight into cognitive strengths and weaknesses. IQ tests have also demonstrated that they correlate with level of education, income, and socio-economic status all of which are problematic issues for developmentally delayed populations (White, 2000). Consequently, the validity of these measures for use with developmentally delayed populations is questionable as IQ tests are culturally biased and dependent on verbal abilities. Increasingly however, the evaluation of people with developmental delays is less concerned with their deficits and more focused with their capabilities.

Assessment of Behaviours

The assessment of behaviour became popular in the 1960s during the height of psychoanalytic approaches to human understanding and the perspective that these behaviours were related to the expression of unconsciousness neurosis (Sturmey, 2002). Since that time however, the approach to behavioural assessment has become more pragmatic focusing on the situational determinants of behaviour. To that end, these tests include the antecedents and the consequences that reinforce or diminish the identified behaviours (Groth-Marnat, 2003).

Behavioural assessment is a considerable area of research with developmentally delayed populations. Initially, these tests focused on negative conduct including such detrimental behaviours as aggression, self-injury, and stereotypies (the excess or lack of variation in ideas, movement, and patterns of speech). Overtime however, behavioural assessment has expanded to include adaptive behaviours to the extent that a person demonstrates personal responsibility for his/her independence and interpersonal relationships (Horn & Fuchs, 1987). Specific examples of adaptive behaviours include sustaining employment, maintaining a residence, and nurturing an interpersonal life with friends and family.

There are many examples of behavioural assessments with developmentally delayed populations. Reviewed here are the Aberrant Behaviour Checklist (ABC) (Aman, Burrow, & Wolford, 1995), The Disability Assessment Schedule (DAS) (Holmes, Shah, & Wing, 1982), the Matson Evaluation of Social Skills in Persons with Severe Retardation (MESSIER) (Matson, Carlsle, & Bamburg, 1998), and the Vineland

Adaptive Behaviour Scales (VABS) (Carter et al. 1998). These are among the most extensive assessments used in the literature.

The Aberrant Behaviour Checklist (ABC) (Aman et al. 1995) was designed to measure the effectiveness of treatment for behaviour disorders in adults with mental retardation. It consists of 58 items that measure irritability/agitation and crying, lethargy/social withdrawal, stereotypic behaviour, and hyperactivity/compliance. An earlier version of the test also examined inappropriate speech; however, the most recent version takes into account self-injurious behaviours. Rojahn, Aman, Matson, and Mayville (2003) demonstrated convergent validity of the ABC by comparing it to the scores of the Behavior Problems Inventory (BPI) (Rojahn, Matson, Lott, Ebensen, & Smalls, 2001) in a population of 226 adults with severe and profound intellectual delays from a developmental center. The authors found a significant correlation between the two measures demonstrating a positive predictive power between (.87-.91).

The Disability Assessment Schedule (DAS) (Holmes et al. 1982) and the Matson Evaluation of Social Skills in Persons with Severe Retardation (MESSIER) (Matson et al. 1998) are two assessments that measure both the positive and negative aspects of behaviour in people with developmental delays. The DAS measures behavioural problems and competence in individuals with mental retardation from child to adult ages. The DAS has 44 questions divided into two parts. The first section examines physical and developmental skills such as self-help, vision, hearing, communication, literacy, domestic capabilities, and practical skills. The second section examines behavioural abnormalities including behaviour problems, stereotypies, echolalia (repetitive speech), and abnormalities of speech and play. Meins and Sussman (1993) examined the convergent

validity of the DAS in a population of 119 adults with mental retardation demonstrating high correlation with the Coloured Matrices IQ (Raven, 1965) and the Columbia Mental Maturity Scale (Burgemeister, Blum, & Lorge, 1994).

The MESSIER (Matson, et al. 1998) was designed to measure social strengths and weaknesses in people with severe to profound mental retardation. It measures positive and negative social skills and maladaptive behaviours. The MESSIER consists of 85 items on a 4-point Likert scale measuring positive-negative verbal, positive-negative non-verbal, and positive-negative general responses. Convergent validity of the MESSIER was demonstrated on a population of 892 individuals with profound and severe mental retardation in comparison to the Vineland Adaptive Behaviour Scales (VABS) (Carter et al. 1998) to which the authors found a significant correlation when comparing both verbal and non-verbal social behaviours ($p < .01$).

The Vineland Adaptive Behaviour Scales (VABS) (Carter et al. 1998) is one of the more commonly used instruments with people with developmental delays. It measures adaptive behaviour in children and adults with developmental delays via a semi-structured interview format. It can be used as a screening device for placement and diagnostic purposes, as well as for developing education and treatment plans. The Vineland measures communication, daily living skills, and socialization. Middleton, Keene, & Brown (1990) examined the convergent validity of the VABS in comparison to the Scales of Independent Behavior (SIB) (Bruininks, Woodcock, Weatherman, & Hill, 1985), in a population of 53 handicapped children aged 3-7 years old. The authors found a strong ($r = .83$) correlation between the two tests demonstrating its validity.

The assessment of behaviour in developmentally delayed populations is a very practical approach to the evaluation of people with developmental delays. However, the danger in these types of assessments is that they can reduce a person to the simple sum of their behaviours disregarding other areas of psychological functioning. Currently, these tests are concerned with the elimination of dysfunctional behaviours and the assessment of adaptive and pro-social behaviours, which in turn, are used to create treatment plans and goals for the individual.

Personality Tests

Formal personality tests were first introduced in World War I (Murphy & Davidshofer, 2001). They were used to predict the adjustment of military recruits drafted at wartime (Butcher, Derksen, Sloore, & Sirigatti, 2003; Murphy & Davidshofer). These initial tests were limited to measuring only one facet of a person's functioning. To date however, personality tests have expanded to measure multiple domains of a person's character such as individual's developmental level, his/her approach to learning styles, teaching styles, conflict resolution, problem solving, and stress management (Butcher, et al.; Murphy & Davidshofer).

Personality tests typically are either structured or ambiguous. Structured personality tests have a standardized format, response recordings, and are developed on the basis of empirical research (Murphy & Davidshofer, 2001; Butcher et al. 2003). The most popular structured personality test to date is the Minnesota Multiphasic Personality Inventory (MMPI) (Graham, 2000) having upwards of 10, 000 investigations using this instrument (Butcher et al.). Ambiguous tests involve the presentation of a vague stimulus

to which the client responds by “projecting” their personality characteristics upon the stimuli (Butcher, et al.). Examples of ambiguous personality tests include the Rorschach Ink Blot test (Klopfer, 1942) and most art-based drawing tests.

The MMPI (Graham, 2000) is a personality assessment that measures psychiatric, psychological, neurological, and physical domains of functioning. In 1997, McDaniel adapted it for adolescents and adults with intellectual delays using an abbreviated version of the MMPI-168(L). The items were read to the client with simpler variations of the themes provided when necessary, and clients responded either ‘yes’ or ‘no’ rather than true or false as in the original administration of the MMPI. McDaniel used it as a screening device for psychiatric disorder. Criterion validity and test-retest reliability was investigated in a group of 63 persons with mild to moderate intellectual delays and co-morbid psychiatric disorders residing in a hospital institution in comparison to a control group with schizophrenia or an organic mental disorder. Significant differences were observed between the two groups validating the assessment. In addition, the test-retest reliability of the MMPI-168(L) was also significant with a minimum period between tests equaling 4 months.

The assessment of personality with people with developmentally delayed populations has been limited to psychiatric diagnosis. As mentioned later, several assessments for psychiatric disorder are available to clinicians for this population, so using the MMPI as a psychiatric screening device seems unnecessary. More tests that actually assess personality in developmentally delayed populations need to be developed in this area.

Assessment of General Psychopathology

People with developmental delays are at greater risk for a psychiatric disorder than normal functioning populations (Sturmeiy, 2002). As a result, dual diagnosis (a developmental delay with a psychiatric disorder) is common in developmentally delayed populations. According to Cowley et al. (2004), psychopathology in people with developmental delays is related to many things including: level of intellectual delay (mild, moderate, severe), ethnicity (with South Asians having higher incidences of developmental delays), increased age, and history of epilepsy. Numerous assessments have been developed for the purpose of dual diagnosis including the Reiss Screen for Maladaptive Behaviour (RSMB) (Reiss, 1988), Psychopathology Inventory for Mentally Retarded Adults (PIMRA) (Senatore, Matson, & Kazdin, 1985), The Psychiatric Assessment Schedule for Adults with a Developmental Disability (PAS-ADD) (Moss et al. 1993), and The Diagnostic Assessment for Severely Handicapped II (DASH II) (Matson, 1995).

The Reiss screen is a 38-item questionnaire that was designed to identify psychopathology in adults with mental retardation (Reiss, 1988). Administered by caretakers, teachers, or other health professionals, it was developed over a 10-year period and assessed seven factors including aggressive behaviour, psychosis, autism, avoidant disorder, dependent personality disorder, paranoia and depression (the behavioral and physical signs). Single item questions also give insight into such things as substance abuse disorders, stealing and sexual dysfunction. Using samples having a full range of mental retardation, the manual describes a series of research populations that include a national sample (n = 306), a Chicago sample (n = 205), and three smaller samples. The

Reiss screen was validated comparing clinical diagnosis in the case files with test scores. Reliability ranged between .57 to .84 and interrater reliability ranged between .61 and .84.

The Psychiatric Assessment Schedule for Adults with a Developmental Disability (PAS-ADD) (Moss et al. 1993) is another screening device for detection of psychopathology. The checklist consists of 29 symptom items scored on a four-point scale examining life-events. It is user friendly in that it was written in a language comprehensible to non-clinicians and psychoeducators. It examines the individuals in such areas as: 1) appetite and sleep; 2) tension and worry; 3) phobias and panics; 4) depression and hypomania; 5) obsessions and compulsions; 6) psychosis; and 7) autism. The inter-rater reliability of the PAS-ASS was considered fairly low (Kappa= 0.42), while validity in relation to clinical diagnosis was judged as satisfactory (Moss et al. 1998).

The Psychopathology Inventory for Mentally Retarded Adults (PIMRA) (Senatore et al. 1985) was also designed to detect and diagnose psychopathology in adults with mental retardation. The PIMRA consists of 56 dual answer items for use in the assessment of schizophrenia, depression, psychosexual disorders, adjustment disorders, anxiety, somatoform disorders, and personality problems. Formulation of diagnosis is in accordance with the criteria of the DSM-III. Like the Reiss screen health care professionals, teachers, and caregivers can administer it, but the PIMRA also has a self-report version for higher functioning individuals. Reliability scales were rated as high and the author reported significant construct validity, as the PIMRA was able to significantly

discriminate between persons having depression or schizophrenia in comparison to a control group matched for age, gender and IQ.

The Diagnostic Assessment for Severely Handicapped II (DASH II) (Matson, 1995) is a behaviourally based rating scale that assesses the severity, frequency, and duration of DSM-IV based disorders. It was designed for severe and profoundly developmentally delayed populations. The DASH II consists of 84 items representing 13 diagnostic categories including 1) stereotypies and tics, 2) self injurious behaviour, 3) pervasive developmental disorders, 4) organic syndromes, 5) anxiety, 6) depression/mood, 7) mania, 8) schizophrenia, 9) elimination disorders, 10) eating disorders, 11) sleep disorders, 12) sexual disorders, 13) impulse control disorders and other miscellaneous disorders. Sturmey, Matson, & Lott (2004) demonstrated convergent and discriminant validity with the DASH II, in comparison to the Aberrant Behaviour Checklist (ABC) (Aman et al. 1995), the MESSIER (Matson et al. 1998), and the Vineland Adaptive Behavior Scale (VABS) (Carter et al. 1998).

Dual diagnosis is common among adults with developmental delays. Consequently, numerous assessments have been developed to identify this problem. The majority of the assessments mentioned are screening devices used for referral and subsequent diagnosis by a physician. The assessment of psychiatric disorder is important insofar as increasing our knowledge about the epidemiology of these diseases in developmentally delayed populations. The limitations of these kinds of tests are there emphasis on pathologizing the person while overlooking the developmental assets and resilience of the individual.

Assessment of Mood Disorders

Prior to the 1980s, the emotional expression of adults with developmental delays was ignored as it was the perception that intellectual delays also included emotional deficits. However, research in the 1980s found that people with intellectual delays were at greater risk for mood disorders than normal populations (Brampton & Fogarty, 2000).

The evaluation of mood disorders includes the assessment of such things as anxiety, depression, anger, and stress. These tests give indication to the emotional lives of people with developmental delays. Two instruments that measure mood in developmental delayed populations include the Anxiety, Depression, and Mood Scale (ADAMS) (Ebensen et al. 2003) and the Subjective Stress Scale (SSS) (Brampton & Bostick, 1994). The ADAMS categorized individuals into five categories of functioning including “Manic/Hyperactive Behaviour”, “Depressed Mood”, “Social Avoidance”, “General Anxiety”, and “Compulsive Behaviour”. The instrument was normed on a mixed population of 265 individuals aged 10-79 years, living in group homes or institutional settings. The authors demonstrated validity via factor analysis and also found test-retest reliability high and interrater reliability satisfactory.

The Subjective Stress Scale (SSS) (Brampton & Bostick, 1994) was designed to assess the perceived stress levels of people with mild intellectual delays. The 31-item scale was validated using factor analysis on a sample of 221 adults between the ages of 20-30 years old living in either group homes or with their families.

The study of anger and depression in adults with developmental delays typically use measures that were originally designed for non-developmentally delayed populations. For example, to examine anger across different levels of intellectual delays, Benson and

Ivins (1992) used an adapted version of Children's Inventory for Anger (Finch, Saylor, & Nelson, 1987) in a sample of 130 adults with intellectual delays who lived in the community. The investigators found that self-esteem was negatively correlated level of anger and depression. Similarly, Baker and Bramston (1997) used an adapted version of the State-Trait Anger Expression Inventory (Spielberger, 1991) on a population 103 adults with mild intellectual delay from educational workshop programs for people with developmental delays. The investigators found that adults who were chronically aggressive and angry also had hostile attitudes and personalities.

Currently, the standard diagnosis for depression found in the DSM-IV and the ICD-10 are considered appropriate for people with mild to moderate developmental delays (APA, 1994; World Health Organization [WHO], 1992). However, McBrien (2003) suggests deleting the cognitive self-report symptoms and the adding 'aggressive tantrums' or 'maladaptive behaviours', and past history of the resistance to the treatment of either depression or mania using antidepressant medication. Adapted rating scales and interview measures designed to measure the severity of the depression in mild to moderate people with developmental delays include Kazdin, Matson & Senatore (1983), who modified versions of the Zung Self-Rating Scale Depression Scale (Zung, 1965) and the Beck Depression Inventory (Beck, Ward, Mendelson, Mock & Erbaugh, 1961). However the reliability and validity of these adapted tests for use with these populations has not been properly demonstrated (Ross & Oliver, 2003). Rating scales and interviews developed specifically for developmentally delayed populations include Matson et al. (1999), who validated a depression subscale of the DASH II in comparison to the DSM-IV depression criteria, and Meins (1996) who, developed a depression scale designed for

use with all levels of disabilities called the Mental Retardation Depression Scale (MRDS) based on the Comprehensive Psychopathological Rating scale (Asberg, Perris, Schalling & Sedvall (1978).

In general, mood is a relatively new area of research with respect to developmentally delayed populations. To that end, not much is known about the emotional lives of these people. The majority of the assessments available for adults with developmentally delayed adults are adapted versions of other tests designed for non-developmentally delayed populations or assessments for paediatric populations. Although the initial reliability and validity testing of these assessments are encouraging, more assessments designed to meet the criteria of mood disorders specific to people with developmental delays are necessary.

Quality of Life Assessments

Changes in services over the past four decades have profoundly impacted the lives of people with developmental delays. Namely, the effort to normalize their working and living arrangements have resulted in deinstitutionalization and consequent placement in residential group homes and community programs. This further facilitated discussions about “quality of life” including the development of the physical, social, and emotional well being for the individual (Felce & Perry, 1995, 1996). As a result, care for people with disabilities began to focus on the client’s expressions of preference, choice making, and choice availability. In the late 1980s, assessments were developed to maximize individual autonomy. These typically involved direct questioning of the individual, staff worker questioning the individual, or direct questioning of staff (Kearney & McKnight,

1997). As many of these assessments are quite new their psychometric properties lack investigation, but their description is important, as this is the most exciting area of assessment with respect to people with developmental delays.

Some examples of direct interviews having some psychometric rigor include a 28-item measure called the Quality of Life Questionnaire (Schalock, Keith, Hoffman, & Karan, 1989), which assesses the person's level of environmental control, the Consent Screening Interview (Lindsey & Luckasson, 1991), which measures the competence of a person to choose their living arrangement, the Consumer Satisfaction Survey (Sands & Kozleski, 1994), which measures a person's level of choice in their day to day activities, and Outcome Based Performance Measures (Accreditation Council on Services for People with Disabilities, 1993), which gives insight to experiential, social, and creative contexts.

The Resident Lifestyle Inventory (Newton, Horner, & Lund, 1991) designed to identify client preferences among 144 choices of activities is an example of a staff worker's client interview, and an interview used simply for staff to rate clients' preferences through observation. Further examples of staff rated interviews include The Reinforcer Assessment for Individuals with Severe Disabilities (Fisher, Piazza, Bowman, & Amari, 1996), which rates client's preference for toys that are more visual, olfactory, tactile, edible, or social, and the Resident Choice Assessment scale (Kearny, Durand, & Mindell, 1995), which measures staff members rating of choice of living environment.

A number of assessments used to measure choice and preference include ones that use pictorial presentations, technological apparatus, or use direct observation. Examples of assessments that use pictures or photographs with respect to career placement include

the Huran Vocational Preference Inventory (Rudrud, Ferrera, Wendelglass, & Markve, 1986), and the Reading-Free Vocational Inventory (Becker, 1973). Investigations that use pictures for daily activities include ones by March (1992) and Foxx, Faw, Taylor, Davis, and Fulia (1993), who paired photographs with questions about lifestyle preference and living arrangement. Using pictures increased time and efficiency for clients with poor expressive language skills.

Technological-based assessments involve the use of switches attached to such equipment as a computer, a tape recorder, joysticks, or arm-pull device. For severely handicapped children and adults these are excellent for measuring such things as visual, auditory, and food preferences.

To date, the main method of assessing preference and choice for adults with developmental disabilities is direct observation (Kearney & McKnight, 1997). Often two stimuli or more stimuli are presented to the individual for their approval. Choice is measured several ways including verbally via a positive vocalization or facial expression, pointing, or even approach towards an item. The advantages of such an approach includes time and cost efficiency, easy adaptation to work and home environments, ease of training for test administrators, and limitless number of stimuli that can be presented to clients. In addition, these tests are developed for the people who are affected the most including the clients and staff. There is also the opportunity to explore the items further during the interview, while also assessing verbal and nonverbal methods of expressing preference. Disadvantages include difficulty for people with perceptual disabilities, the limitation to staff's administration of tests, which can be incomplete, and poor reliability and validity testing (Kearney & McKnight, 1997).

Review of the Research

Assessment research with developmentally delayed adults focused on IQ, negative behaviours and psychiatric disorder. Initially, these areas of functioning were integral to the assessment of people with developmental delays; however, their emphasis has decreased because of the limitations they serve to place on people with developmental delays, and reduce them to what they cannot do with a focus on mental illness and negative behaviours. Increasingly, adaptive behaviours are emphasized in people with developmental delays. This area of research focuses on the life skills of an individual and what he/she needs to increase independent functioning. Assessments for mood and quality of life have also been adapted and designed for this population. Quality of life is a substantial area of research. This area looks at health and well being of the individual in several domains of psychosocial functioning. To that end, quality of life tests investigate preference and choice with respect to activities, work placement, and living arrangements. They are designed for all levels of functioning and even use technology for populations with limited physical capacities and verbal expression

Current trends in the research has demonstrated the development of broad screening instruments to detect psychiatric dysfunction and more specialized instruments adapted or designed to assess such things as depression, anger, and stress in people with developmental delays. Increasingly, interviews are used with the individual as the assessment of choice for clinicians. An adult with a mild to moderate developmental delay is often the primary informant in a clinical interview or self-report assessment. In

contrast, adults with severe to profound developmental delays require a caregiver, a family member, or an educator as an informant for assessment.

The assessment of adults with developmental delays is complicated by language delays, dual diagnosis, physical limitations including gross and fine motor difficulties and perceptual impairments. Furthermore, self-report evaluations should be interpreted with caution because of the language deficits inherent in this population. Similarly, ratings by caregivers, family members, and educators should also be considered carefully, as their reports can be flawed depending on the insights and knowledge of the individual.

Adults who have mild to moderate levels of delays are evaluated differently than adults with severe and profound levels of disabilities. The DSM-IV (APA, 1994) and the ICD 10 (WHO, 1992) criteria for psychiatric diagnosis are appropriate in the assessment of people with mild to moderate developmental delays, but not for people with severe and profound disabilities. Currently, there is a dearth in the literature with respect to the assessment of mood disorders in people who are nonverbal, or have severe to profound developmental delays. Furthermore, the criterion for psychiatric diagnosis in these populations are not of consensus.

A number of tests used in the assessments of developmentally delayed populations were adapted for children or other non-developmentally delayed populations. Increasingly, assessments are designed specifically for adults with developmental delays. They are typically validated using factor analysis, or convergent and discriminant approaches. Another approach to validity testing compared the notes in the case files of the individual with the assessments outcome. Quality of life assessments, which are early in their development require further reliability and validity testing.

Art Based Assessments - General

The historical development of drawings research is investigated with particular focus on human figure drawing tests, Buck's (1948) House-Tree-Person Test, and Gantt's and (2001) Formal Elements Art Therapy Scales (FEATS). The two primary approaches to drawing analysis are reviewed in addition to the methodology to demonstrate reliability and validity.

A Historical Perspective

The first formal drawing tests were introduced in the 1920s as an alternative method of measuring children's intelligence (Groth-Marnat, 1997). In the 1950s and 1960s, during the dominance of psychoanalytic theory, drawing tests rose to their peak of research and clinical application. Proponents of drawing tests at the time theorized that these types of assessments symbolically gave insight into a person's developmental level, personality structure, and emotional distresses. As a result, numerous art therapy assessments were introduced for clinical application. Some of these tests included Kwiatowska's Family Art Evaluation (Kwiatowska, 1978) and Landgarten's Family Art Psychotherapy Assessment (Landgarten, 1987). These tests lacked standardization and reports of reliability and validity, but in the hands of an astute clinician revealed considerable information.

In the 1970s and 1980s, the application of drawing tests in adult populations declined as a result of poor empirical reviews, decreased prominence of psychoanalytic theories, and greater emphasis on situation specific determinants of behaviour (Groth-

Marnat, 1997). Despite this, the application of drawing tests to the clinical evaluation of paediatric populations remained popular (Groth-Marnat).

Human Figure Assessments

Human figure drawing tests are the most researched drawing assessment. For an excellent review of these studies see Swensen (1957), Swensen (1968), and Kahill (1984). The first formal human figure drawing test was the Draw-A-Man (DAM) Test, which was first developed by Goodenough (1926), and subsequently revised by Harris (1963). The DAM was grounded in intellectualist theory (Troeger, 1992), which suggested that the gross number of features drawn on the face and body (i.e. ears, nose, mouth, fingers, toes) was indication of cognitive developmental level. The DAM was normed on a population of 2,975 children aged 5-15 years old and demonstrated greatest accuracy of intelligence in children aged three- to ten-years-old (Groth-Marnat, 1997).

In 1949, Machover developed the Draw-A-Person test (DAP) as an alternative approach to the DAM. Unlike the DAM however, the DAP was designed as a projective personality test. According to Machover (1949), the symbols that appeared in DAP revealed a person's personality insofar as character and emotional problems. However, the symbolic interpretation of the DAP was based on what Chapman and Chapman (1967) called "illusionary correlation", the erroneous interpretation of drawings based on single case observations and intuitive judgements. Subsequently, Naglieri (1988) developed the Draw-A- Person: Quantitative Scoring System and the Draw-A-Person: Screening Procedure for Emotional Disturbance (DAP:SPED). The standardized administration procedures asked the individual to "Draw a man", "Draw a Woman", and

then “Draw a picture of yourself”. Each of the drawings were given a time limit of five minutes.

The DAP:SPED positively correlated with a child’s cognitive developmental level and alerted clinician’s to the presence of any emotional disturbance. Naglieri’s scoring systems were standardized on a population of 2,355 children aged 6-17 years old and his symbolic interpretation was the result of empirically informed data, such that the presence of an item was verified in the case notes with an emotional problem in the original sample’s drawings.

The House-Tree-Person Drawing Test

In 1948, Buck introduced the House-Tree-Person (H-T-P) drawing test as a tool to provide clinician’s with information with respect to a person’s level of maturity, flexibility, integration, and sensitivity. To that end, house, tree and person drawings indicated a different part of a person’s personality. According to Buck, the house represented one’s home-life and intra-familial relationships; the tree signified a one’s relationship with the environment; and the person denoted one’s interpersonal relationships. Interpretation of the H-T-P was the result of comparing case histories of the psychiatric patients with qualities found in their drawings. The H-T-P was rooted in personality theory (Troeger, 1992), which states that art is an expression of unconscious functioning and thus, the H-T-P has a psychodynamic approach to its interpretation. The standardized administration procedures included two phases. In phase one, the individual was asked to create a house, a tree, and a person on separate sheets of paper. In phase two, the individual was given the same instructions except that he/she was asked to use

crayons to complete the drawings. Standardized materials for the H-T-P included six sheets of 8.5 × 11-inch paper, several number two lead pencils, crayons, and a stopwatch.

The H-T-P was standardized on a population of adults in a psychiatric setting (n= 150) and compared to an unmatched sample of normal controls (n= 140). The author established neither validity, nor reliability of the instrument. However, Jolles (1989) has since published a broad catalogue for the qualitative interpretation of symbols that might appear in H-T-P drawing tests. The H-T-P lacks empirical validation on large samples and its use remains restricted to mostly psychiatric populations. The H-T-P has not been tested with developmentally delayed populations, but remains one of the most significant art-based assessments available because of its approach to symbolic interpretation as a manifestation of personality.

Since the DAP and the H-T-P, numerous other art-based assessments have emerged in the literature. Art therapists have championed the development of more current art-based assessments. These include the Silver Drawing Test of Cognitive Skills and Adjustment (SDT) (Silver, 1990) and the Diagnostic Drawing Series (DDS) (Cohen, 1986). Other art-based assessments developed by non-art therapists include the Children's Human Figure Drawing Test (HFDT) (Koppitz, 1968) and the Kinetic-House-Tree-Person Drawing Test (K-H-T-P) (Burns, 1987). They are mentioned without further description because of their non-application to developmentally delayed populations. Still, their prospective use might yield important information with respect to increasing reliability and validity of drawing tests adapted or designed for adults with developmental delays.

The Formal Elements Art Therapy Scale

Another art-based assessment developed by an art therapist is the Formal Elements Art Therapy Scale (FEATS) (Gantt, 2001). It is one of the few assessment tools piloted using a small sample of people with developmental delays. However, it was not designed as a drawing assessment for this population. Rather, the FEATS was designed to detect differences in psychiatric populations using the DSM III-R criteria. According to Gantt, people with psychological disorders are distinguishable in the formal elements of their drawings. That is to say, analysis of such variables as colour, energy, space, integration, and logic of a person's drawing indicate psychological disorder. The standardized administration procedures asked the individual to "Draw a person picking an apple from a tree". Standardized materials included 12 × 18 white paper and 12 felt tip markers.

Validity of the FEATS was tested in a pilot study using a small sample of psychiatric patients (n= 20), who were compared to normal controls (n= 5). The author found that 10 of the 12 scales distinguished between schizophrenia, depression, and mania. Inter-rater reliability scores were reported in the .90 range by test developers. Analysis of the FEATS is based on the formal elements of the drawing, rather than the symbols that appear in the drawing. That is, administrator's look at *how* the picture is drawn, rather than *what* symbols are drawn. The limitation of the FEATS is the small sample population used to demonstrate its validity. However, the formal elements approach to analysis of drawings is objectively scored and interpreted, thus increasing its reliability and validity.

Review of the Research

Drawing tests have been in existence for approximately 80 years. They were initially used as IQ tests and later as personality tests. Their popularity was greatest when psychoanalytic approaches were in vogue. In recent years their use has declined mirroring a decrease in research investigations and clinical application.

The empirical validation of any psychological assessment is dependent on its psychometric properties. Drawing tests are no different. To date, Human figure drawing tests are the most researched art-based tests. Naglieri's (1988) scoring system has reports of reliability and validity and its symbolic interpretation is empirically informed. Analysis of the formal elements of the drawing is another approach to analysis, although, this method has been limited to the detection of psychiatric illness. The most reputable art-based assessments give clear administration instructions, mention necessary materials, and scoring methods. They also report tests of reliability and validity. More research is needed to demonstrate the efficacy of art-based drawing assessments.

Art-Based Research - Developmentally Delayed Populations

Art-based research with developmentally delayed populations is reviewed. In addition, two areas of research are examined: 1) analysis of formal elements; and 2) quantitative investigations.

A Historical Perspective

Research in the domain of drawing with developmentally delayed populations came to prominence in the late 1970s just as sweeping social changes saw individuals

being de-institutionalized and integrated into community settings. Illustrative case studies were the initial method of investigating the drawing capabilities of people with developmental delays (Selfe, 1977). Subsequent, inquiries examined the formal elements of the drawings in relationship to the type of developmental disorder (i.e. autism, intellectual delay, Down's Syndrome, and William's Syndrome) (Bertrand & Mervis, 1996; Golomb & Scmeling, 1996; Klager, 1996; Milbrath & Siegel, 1996; Winner, 1996). Similarly, other research studies examined the characteristics of how people with developmental delays draw using art-based assessments (Brink & Grindling, 1976; Gant, 2001; Wysocki & Wysocki, 1973).

Prior to the social changes of 1960s and 1970s, people with developmental delays were often thought of as inferior human beings (White, 2000). However, the case study of "Nadia" (Selfe, 1977) was exceptional in that it demonstrated the capabilities of people with developmental delays. Nadia was diagnosed with autism and her drawing level at the age three-and-a-half was well beyond her intellectual delays. Nadia's drawings of horses displayed qualities of extraordinary representational realism displaying form, volume, depth, and movement to such a degree that she even surpassed the drawing abilities of most normal functioning adults.

Analysis of Formal Elements - Research

Two investigations by Milbrath and Siegel (1996) and Golomb and Schmeling (1996) further examined the drawing development of autistic populations. Milbrath and Siegel investigated the artistic development of "Alex", a 6.5-year-old child who had features of autism, mental retardation, and some mild neuromotor delays. Alex was

administered the Weschler Pre-School and Primary Scales of Intelligence (Weschler, 1974) and demonstrated a verbal IQ of 62, a performance IQ of 77, and a full scale IQ of 66. Like Nadia, Alex drew from memory having drawing skills well beyond his age. However, it was also noted that Alex often superimposed one drawing over another with no regard to his previous drawings. The authors concluded that some people with autism have excellent visual memory skills combined with advanced visual motor development, which increased their drawing ability.

Golomb and Schmeling (1996) compared the drawings of nine autistic children with a mean mental age of 6-years-old and a mixed group of eight children with mental retardation and Down's syndrome having a mean mental age of 7-years-old. The authors found that the autistic group was superior to the mixed group in that the former demonstrated increased graphic form, detail, attention to occlusions (lines that are hidden from view in three dimensional objects), and were more likely to include the depiction of perspective. Golomb and Schmeling concluded that the autistic group demonstrated exceptional visual analysis and drawing capabilities, while the Down's syndrome group as a whole displayed comparatively poor drawing skills.

Klager (1996) and Brink and Grundlingh (1976) also examined the drawing development of Down's syndrome populations. Klager studied the drawings of two people with mental retardation for over 20 years. Klager characterized the sum of their drawings as flat without any depiction of perspective, and having mixed profile shapes and symmetries. Furthermore, Klager stated that the steady development of artistic competence in these two individuals demonstrated their self-esteem and quality of life.

Brink and Grundlingh (1976) compared the IQ scores (using the Stanford Binet) and Human Figure Drawing (HFD) Test scores (using the Harris method) of a sample of 21 participants with Down's syndrome (Group 1) and 21 participants without Down's syndrome but still having a developmental delay (Group 2). The two groups were matched for gender having no significant difference for mental age or chronological age. The authors found that Group 2 (the no Down's syndrome group) produced drawings with greater HFD scores that were more indicative of their mental age, while Group 1 (the Down's Syndrome) produced many drawings that were almost unrecognizable and thus unscorable. Group 1 yielded significantly lower HFD scores further confirming the low drawing developmental level of people with Down's Syndrome.

People with William's syndrome are typically poor drawers (Wang, Doherty, Rourke, & Bellugi, 1995). Bertrand and Mervis (1996) investigated the drawing development of children with William's syndrome. The authors studied six children with William's syndrome and asked them to make drawings of common objects (i.e. house, flowers, etc) at the ages of nine to ten and then again later when they were 12 - 14. They found that the children had difficulty integrating the smaller parts of the objects into the greater cohesive whole of the drawing, but that they improved over time.

Wysocki and Wysocki (1973) and Gantt (2001) used art-based assessments as a method to study the drawings of people with developmental delays. Wysocki and Wysocki compared the DAP drawings of 60 adolescents with mild mental retardation to 60 adolescents in a control group that did not have mental retardation. Participants were both male and female between the ages of 8-12 years old. Investigators examined the variables of size, number of erasures, environment, clothing, details, fingers, symmetry,

and arm position. The authors found that participants in the experimental group were less likely to draw fingers ($p < .001$), draw large figures ($p < .001$), were more likely to draw figures with rigid or horizontal arms ($p < .001$), had less erasures, drew less clothing, and made no differences in the depiction of the environment.

Gantt (2001) examined the artistic manifestation of people with different psychiatric disorders in comparison to normal controls and a group with an organic developmental delay. She administered the FEATS to small sample of individuals ($n = 20$) with organic mental disorder, major depression, bipolar mood disorder, and schizophrenia. Their drawings were compared to a control group ($n = 4$) that consisted of students, visitors, and family members. Gantt found that the group with the organic disorder had drawings that were easily distinguishable from the other groups. The group with an organic disorder used relatively little colour (often inappropriate to the object), demonstrated minimal details, and showed less energy in their drawings. In addition, they had drawings that used a minimal amount of page space, were of a low drawing developmental level, and lacked clear logic to the construction of the elements in the drawing.

Initially, research with respect to the drawings of people with developmental delays demonstrated the creative capabilities inherent in these populations contrary to the dominating perspective that they were inferior human beings. Subsequent studies investigated the drawings of people with developmental delays and revealed that each disorder manifest different drawing characteristics. For example, some autistic populations demonstrated remarkable drawing skills, while people with intellectual delays, William's syndrome and Down's syndrome demonstrated poor drawings

capabilities. Further research with people with developmental delays suggests that endeavouring in artistic activities increased self-esteem and improved quality of life.

Quantitative Investigations

Eight quantitative studies investigated drawing tests with developmentally delayed populations (Bellamy & Dally, 1969; Byrd & Springfield, 1969; Calhoun et al. 1978; Dykens, 1995; Gayton, Basett, & Bishop, 1970; Griffith & Lemely, 1967; Maloney & Payne, 1969; Ottenbacher, 1981;). These studies applied different approaches to scoring and analyzing the drawings. In summary, investigators used the Goodenough (1926) system, the Harris (1963) system, the Naglieri (1988) system, or some combination of these methods (which may be considered a limitation). Investigators have also examined the relationship between drawing scores and IQ, in addition to the formal elements and symbols present in the drawings as evidence of personality characteristics.

Byrd and Springfield (1969), Gayton, et al. (1970) and Dykens (1995) examined the relationship between DAP scores and intelligence tests. Byrd and Springfield administered the full WISC and the DAP using the Goodenough-Harris scoring method to a sample of 80 males and females with intellectual delays aged 12–15 years. They found that DAP scores correlated poorly with the full WISC ($r = .42$), thus making it a poor discriminator of mild, moderate, and severe levels of IQ in adolescent developmentally delayed populations. In a similar study, Gayton, et al. examined the influence of intelligence on drawing the human figure. The authors administered the Stanford Binet, the WISC and the DAP to 36 institutionalized individuals having intellectual delays. Investigators compared the sample's IQ scores with two methods of

scoring the DAP test using the Harris (1963) system versus the Goodenough (1926) system. Participants were between the ages of 6-18 years old and had IQ scores in the range of 39-83. No mention was made of the participant's gender, but it is presumed it was a mixed population of both males and females. The investigators found a higher correlation between IQ and the Harris scoring system ($r = .48$) in comparison to the Goodenough scoring method ($r = .37$) and it was concluded that it was a poor measure IQ in developmentally delayed children.

Similarly, Dykens (1996) administered the DAP, the Kaufman Brief Intelligence test (Kaufman & Kaufman, 1990), the Vineland Adaptive Behavior Scales (Carter et al. 1998), the Child Behavior Checklist (Achenbach, 1991) to 108 adolescents and adults with intellectual delays. He used the Naglieri (1988) scoring method to examine the relationship between the sample's drawing score, intelligence, and level of emotional disturbance. Dykens found that the DAP correlated poorly with the IQ tests ($r = .34 - .41$) and even less so with the adaptive and behaviour scales ($r = .24$).

Bellamy and Dally (1969), Calhoun et al. (1978), Griffith and Lemely (1967), Maloney and Payne (1969), and Ottenbacher (1981) examined the formal elements and the appearance of particular symbols in the drawings of people with developmental delays. Bellamy and Dally (1969) administered the Stanford Binet, the WISC, and the DAP to 129 institutionalized males ($n = 73$) and females ($n = 56$) aged 13-20 years old. The study compared the participant's IQ scores and chronological age (CA) with the height and gender of their drawings. They found a significant positive correlation between the participants IQ and the height of their drawings ($p < .05$), but not for CA, gender, and height of DAP drawings. The authors concluded that the greater the IQ, the

larger the drawings. Calhoun et al. (1978), administered the DAP (using the Goodenough-Harris method) and the Coopersmith Self-Esteem Inventory (Coopersmith, 1981) to a small sample of children between the ages of 6 to 12 years old with developmental delays ($n= 8$). The authors found a ($r= .63-.67$) correlation between DAP scores and self-esteem scores. In a similar study, Ottenbacher (1981) administered the DAP and also the Piers-Harris Self-Concept Scale (Piers, 1984) to a population of 31 adolescents (aged 11-22 years) with a developmental delay. The authors used the Goodenough-Harris scoring method to score the drawings and found a positive correlation between the sizes of the drawings, DAP scores and the self-concept scale. Griffith and Lemely (1967) administered the DAM to 46 males and 44 females who lived in an institution with intellectual delays. Participants were between the ages of 8-20 years. In addition, the researchers administered two categories of Buss and Durkee's Inventory for verbal aggression and physical aggression (Buss & Durkee, 1957). The investigators found a correlation between verbal aggression scores and in the participants whose drawings had both teeth and threatening look in their drawings ($p< .05$). Together these four studies suggest that the formal elements and symbols present in the human figure drawings of people with developmental delays indicate level of IQ, self-esteem and aggression.

Maloney and Payne (1969) investigated the relationship of the DAP using an adapted scoring version of the Goodenough-Harris system, and two body awareness tests including the Eye, Hand, and Ear Test, and the Personal Orientation Test in a sample of 57 randomly selected moderately to severely institutionalized males with an intellectual delay. The males were divided into three groups (an experimental group who was

exposed to a body awareness intervention, another group who participated in sedentary activities, and a non intervention group). The researchers found that the DAP scores were not significantly related to body awareness scores suggesting that human figure drawing in developmentally delayed populations are not related to a person's sense of their own body.

Research using drawing assessments with adult developmentally delayed populations revealed that regardless of scoring system, human figure drawing tests are weak indicators of intelligence, behaviour, and body awareness. However, the formal elements approach to analysis demonstrated a useful measure of self-esteem for people with developmental delays. In addition, the presence of particular symbols in the human figure drawings of people with developmental delays indicated levels of IQ, self-esteem, and aggression suggesting that these populations have symbols that are different from non-developmentally delayed populations.

Review of the Research

Drawing research with developmentally delayed populations first came into prominence in the late 1970's. The single case studies dominant at the time demonstrated the potential creativity not normally associated with this group of people. Subsequent research demonstrated that each of the developmentally delayed disorders drew differently from one another.

The bulk of investigations named in the literature used some form of human figure drawing test with various approaches to analysing the drawings. These were poor indicators of intelligence using traditional approaches to drawing analysis. However, the

research suggests that they might indicate other personality characteristics in developmentally delayed populations. Unfortunately, these tests are limited in that they do not take into consideration the drawing developmental level and drawing skill level of the individuals assessed.

Comparing Research - Art-Based Research and Assessments for People with Developmental Delays

Trends in the Research

The first formal assessments were intelligence tests. They were first introduced in the 1900s for academic placement of children in school settings. Intelligence tests ensured that the best and brightest children received “proper” education. At the same time, these tests were used to discriminate against people with developmental delays and maintain the prevailing attitude that they were less than human. Consequently, people with developmental delays were treated poorly and institutionalized to prevent genetic disorders from spreading.

In the 1960s and 1970s, the approach to people with developmental delays saw vast and sweeping social changes with regards to healthcare management and quality of life. Concomitantly, the institutional placement of people with developmental delays saw changes to community residence and programming.

A full spectrum of assessment instruments has been developed for people with developmental delays. Previous research focused on negative behaviours, but recent research has investigated adaptive behaviours and psychiatric disorders. The least investigated area with developmental delays is personality assessment and more research

is necessary in that area. The most progressive research with developmentally delayed populations is in the areas of quality of life and adaptive behaviours. These areas consider health, wellness, and psychosocial functioning in multiple domains. Specifically, these tests examine such areas as preference and choice with respect to activities, work placement, and living arrangements with the intention to maximize autonomy and independence in developmentally delayed populations.

As previously mentioned, the first formal drawing test was the Draw-A-Man test developed by Goodenough (1923). In keeping with the times, it was designed as an intelligence test and was subsequently updated by Harris (1963). Its application to developmentally delayed populations first became popular in the late 1960's. Research using these scoring systems demonstrated that they were poor indicators of intelligence for developmentally delayed populations. The research also suggests that the interpretation of symbols found in the human figure drawings of people with developmental delays were different than non-developmentally delayed populations. In addition, the research demonstrates that the formal elements approach to the analysis of the human figure drawings in developmentally delayed populations gives indication of cognitive developmental level and self-esteem.

Drawing research in the 1970s promoted the amazing artistic capabilities of people with developmental delays. It also demonstrated that the formal elements of each of the developmental disorders were manifest differently in their drawings.

Reliability and Validity Testing

Assessments with developmentally delayed populations have been validated using convergent validity, discriminant validity, factor analysis, and verification with the individual and their case notes. Tests of reliability are also described. Similarly, art-based drawing tests have used convergent validity and verification with the individual and their case notes to demonstrate validity. Reliability testing is also reported. Historically, art-based tests have used two approaches to drawing interpretation. Symbol analysis when considered correctly is empirically informed, but infrequently undertaken in the literature. The analysis of formal elements is objective in its scoring, but limited to distinguishing between psychiatric disorders and often tested using small sample populations.

Discussion

Recommendations

According to Winner (1996), the drawings of people with developmental delays demonstrate their rich visual life worked out on paper. As such, an art-based drawing test for this population informed by empirical research would significantly contribute to the greater assessment of adults with developmental delays. Here is a list of my recommendations for such a test.

- An art therapy drawing test should focus on the assessment of quality of life and adaptive behaviors, as these domains of research are currently the most progressive areas of research in the literature.

- Standardized drawing test instructions should include a human figure drawing, as this is the most researched area of drawing assessment. Previous studies could inform some of the symbolic interpretation in this population's drawings.
- Consideration must also be taken of the various developmental delays and the affect that has on drawing outcome. The research suggests that the differing developmental disorders each draw uniquely. Consequently, investigators should not use mixed developmentally delayed samples in their investigations.
- Drawing analysis should take into consideration the increased number of co-morbid psychiatric diagnosis in adults with developmental delays. To that end, the application of some of the FEATS scales might be useful insofar as screening for some psychiatric disorders.
- The materials of the art based drawing test must be standardized. That is, assessment designers must make informed decisions about drawing instructions, paper size, and drawing materials. Instructions should be simple to account for language delays. Paper should be large enough and heavy enough to take into account the gross motors difficulties noted in developmental delayed populations. Drawing materials should also be large and uncomplicated for people with developmental delays to manipulate with maximum ease.

- Scoring procedures must also be standardized. The theoretical approach to analyzing and thus scoring the drawing must be taken into consideration carefully. The symbolic interpretation of these tests should be approached with some caution, as the research suggests that populations with developmental delays have symbols that are different from non-developmentally delayed populations. Consequently, symbol analysis should be empirically informed. Furthermore, the drawing test should also examine the formal elements of the drawings, which suggests an individual's cognitive developmental level and self-esteem.
- Consideration should be made towards the administration of the drawing test. The drawing test should be arranged in such a way that the individual is comfortable and each drawing instrument is equally accessible so to ensure the person is making a conscious choice rather than a random one.
- Drawing instructions should be clear and concise. Often people with developmental delays have language delays and hearing impairments. As a result, the drawing instructions should use simple language and even be read with the individual to ensure they understand what they are asked to do.
- A kinetic component to the drawing instructions might be of interest to researchers. This would demonstrate the adaptive and negative behaviours of the individual. Such a component added to an art-based drawing test, would give

insight into the day to day functioning, assertiveness, and quality of life of the person.

- A standardized questionnaire should be implemented in conjunction with the drawing test. Researchers may even want to record the number and type of nouns and verbs uttered in the individual's responses and see how these change pre and post therapeutic intervention.

- Non-verbal drawing behaviour should be considered in assessment design, as these would aid in the testing of people with more profound and severe developmental delays. To that end, researchers should examine the DASH II to see which behaviours are worth noting in these populations and how to integrate these responses into the scoring of the drawing assessment.

Conclusion

The above review is limited to the research that is published in the literature. In general, art-based research has decreased significantly in recent years. Furthermore, there is a dearth in the literature with respect to arts-based research with adults having developmental delays. The lack of empirical validation causes primary investigators to shy away from using arts-based drawing tests. In a similar vein, art therapists are ill equipped to develop and administer arts-based drawing tests for special populations.

More research for reliable and valid art therapy assessments is necessary. These tests have the potential to provide insightful information with respect to an individual's

life perceptions and resulting psychosocial functioning. For art-based drawing assessments that have demonstrated some empirical validity, replication studies are necessary. Consequently, an empirically informed and validated art-based drawing test for adults with developmental delays is of utmost importance. Such an assessment would increase the reputation of drawing tests and inform professionals with respect to the healthcare management and evaluation of treatment programs for adults with developmental delays further increasing their quality of life.

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