

Investigating Imagination in Adults With Autism Spectrum Disorder With Art-Based Assessments

Abstract

This mixed-methods convergent study examined whether the Scribble Drawing, Bridge Drawing with Path (BDP), and Future Trip Drawing art-based assessments from the field of art therapy, could be utilized as creative methods in evaluating imagination and symbolic development of drawings in adults with autism spectrum disorder (ASD). Fourteen (N = 14) adults with medium- to high-functioning ASD (M_{age} = 27.7 years) participated in a single individual study session during which they completed the three aforementioned imaginative drawings. The results showed that the three art-based assessments with supporting written and verbal narrative associations can be considered as effective creative methods to measure imagination and symbolic development in adults with ASD. Most of the participants envisioned, developed, and described more non-social symbols representing real places and objects from their world than social (self and people) symbols in their Scribble Drawing (79%; n = 11) and Future Trip Drawing (86%; n = 12). One compelling Scribble Drawing finding was that half of the participants' scribble lines directly embodied symbols not present to their senses; as a result, there was no need for them to add to their scribble lines to create their concrete symbols. This finding supports previous literature that certain individuals with ASD have detail-focused cognitive processing and drawing styles. A noteworthy BDP finding was that participants' BDP end points led to things that made their life feel meaningful (i.e., art program, nature, theatre). This finding calls upon developmental service providers to implement recreation programs and organize excursions to local art galleries and museums for adults with ASD. The authors believe that the results of this study will inspire future art-based assessment research investigating imagination, symbolic development, and executive function abilities in adults with ASD.

Imagination is a complex cognitive construct that involves an individual's ability to create mental images of people, places, and objects that are not present to their senses (Chodorow, 1997). Our mental images are based on our past memory (episodic memory), current life experiences, and future visions also known as episodic foresight (EpF; Suddendorf & Moore, 2011). Individuals with autism spectrum disorder (ASD) tend to display signs of impairment in communication, social engagement, and imagination (American Psychiatric Association, 2013; Wing, Gould, & Gillberg, 2011). Some individuals with ASD also exhibit difficulties with executive function (EF): completing tasks in a timely man-

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ner, remembering the sequence of a multi-step activity, and transitioning from one activity to another (Hill, 2004). Since symbols in drawings are the visible external products of one's internal mental images (Kast, 1990/1992; Pelaprat & Cole, 2011), a number of studies have used the impossible-person drawing task (Karmiloff-Smith, 1990), with or without adaptations to measure imagination in children with ASD (e.g., Hollis & Low, 2005; Leavers & Harris, 1998). The Karmiloff-Smith's impossible-person drawing task first presents participants with a picture of people walking towards a magic door which opens to a path leading to a planet in space. Participants are informed that when the people walk through the door they change into funny and strange looking people which they have not seen before. Participants are then directed to draw pictures of the changed people after they have walked through the magic door. Early impossible person drawing studies supported the idea that children with ASD have deficits in drawing imaginative symbolic content (Craig, Baron-Cohen, & Scott, 2001; Low, Goddard, & Melser, 2009; Scott & Baron-Cohen, 1996). However, recent impossible person drawing studies have concluded that the social aspect (i.e., draw people) of the drawing directive restricts participants with ASD to express their imagination (Allen & Craig, 2016; Ten Eycke & Müller, 2015). A number of researchers have underscored that the social impairment of children with ASD affects their drawings of symbols of people and social scenes (Celani, 2002; Jolley, O'Kelly, Barlow, & Jarrold, 2013). Furthermore, due to executive function planning deficits, they tend to depict familiar and local symbols from their real world rather than fantasy or unreal symbols in their drawings (Leavers & Harris, 1998; Scott, 2013). Other drawing task studies have also concluded that individuals with ASD have a tendency to generate detail-focused drawings (Booth, Charlton, Hughes, & Happé, 2003; Happé & Frith, 2006).

To date, the vast majority of imaginative drawing studies in the literature have been conducted with children with ASD. Since imagination expands the entire developmental lifespan of individuals and not only childhood, there is a need for further drawing studies investigating imagination in adults with ASD.

Materials and Methods

The purpose of this mixed-methods convergent study with an interrater agreement and art-based element was to better understand the imaginative and symbolic formation abilities of adults with ASD, and to determine if the Scribble Drawing (Cane, 1951), Bridge Drawing with Path (BDP; Darewych, 2013), and Future Trip Drawing (Liebmann, 1986) art-based assessments from the field of art therapy, could be used as creative methods to measure imagination and symbolic development in adults with ASD. All three art-based assessments, also known as projective drawings, have the potential to indirectly tap into an individual's imaginative cognitive and drawing abilities. The research questions for this study were:

1. Will adults with ASD depict and describe symbols in their drawings not present to their senses?
2. Will adults with ASD generate more non-social (places and objects) than social (self and people) symbols in their drawings?

Convenience sampling was used in this study and participants were recruited from an Autism Centre located in Southern Ontario. Soft and hard copies of the recruitment flyer and informed consent were distributed to potential participants by the Autism Centre to its membership and partnering agencies. Fourteen adults (11 male, three female) with a chronological age range of 21 to 34 ($M_{\text{age}} = 27.7$ years, $SD = 4.50$) and a formal diagnosis of medium- to high- functioning autism with verbal and/or written expressive communication skills volunteered to participate in this study. Participants' self-identified their ethnic background as Canadian (57%; $n = 8$), Canadian-Dutch (14%; $n = 2$), Middle-Eastern (14%; $n = 2$), Italian (7%; $n = 1$), and Portuguese (7%; $n = 1$). At the time of the study, half of the participants (50%; $n = 7$) were enrolled in a community-based art program. All participants were right-handed and most of the participants (86%; $n = 12$) used digital devices at home as communication and leisure tools.

Prior to commencing the study, participants completed a consent form with the support of a family member or case worker which highlighted the purpose of the research, anticipated

study benefits, potential emotional risks, and participants' ability to terminate study participation at any time. Participants also completed a demographic form requesting the following information: age, gender, ethnicity, handedness, and hobbies. Each participant attended a single one hour study session which was facilitated by a professional art therapist (third author). Eleven participants attended the study session independently whereas three participants chose to have their family member or support worker present to help with understanding the art directives. During the single study session, each participant was directed to complete the Scribble Drawing (Cane, 1951), Bridge Drawing with Path (BDP; Darewych, 2013), and Future Trip Drawing (Liebmann, 1986).

The Scribble Drawing (Cane, 1951) is a two-step, open-ended art-based assessment that directs an individual to create a spontaneous image out of a scribble. The drawing can be used to examine if an individual has the cognitive and drawing capacity to develop symbolic representations of people, places, or objects not present to their senses from their abstract scribble lines. The verbal instructions given to participants were: "With your eyes opened or closed, draw a scribble. When finished drawing your scribble, look at your scribble at different angles. Do you see anything in your scribble? Develop your scribble into something and provide a title for your image." The instructions were not given at once but step by step. A Scribble Drawing interval coding system developed for this study rated the following symbolic image content variables: symbol transformation and symbol type.

The Bridge Drawing with Path (BDP; Darewych, 2013) is a three-step, goal-oriented art-based assessment which guides an individual to imagine and draw a bridge which is connected to a path. It is theorized that the path depicted in the drawing symbolically represents the creator's past, present, or future life pathway which leads them to meaningful people, places or objects. The bridge and path can be perceived as local and global symbols. Participants were directed to "Draw a bridge from someplace to someplace. The bridge connects to a path. Draw the path and write or say where it leads you to. Provide a title for your image." The following five BDP symbolic image content variables were measured

using the BDP interval coding system: bridge type, bridge connection, path quadrant, matter under bridge, and self-depiction. The BDP written and verbal narrative association results from this study were compared to the BDP normative sample database (Darewych, 2014).

The Future Trip Drawing (Liebmann, 1986) is a one-step art-based assessment that prompts an individual to imagine and draw an image of a trip they would like to take in the future. Participants were directed to "Imagine you are going on a trip next week. Where would you like to travel? With the materials provided, draw the place you would like to visit. Provide a title for your image." A Future Trip Drawing interval coding system developed for this study rated the following symbolic image content variables: symbol type and self-depiction.

Participants completed the BDP drawing with an HB No. 2 pencil on an off-white 8.5 in. × 11 in. paper but had a choice to complete the Scribble Drawing and Future Trip Drawing with traditional art materials (i.e., coloured markers, coloured pencils, crayons, HB No. 2 pencils, off white 8.5 in. × 11 in. paper) or on a password protected digital touchscreen laptop with the user-friendly Windows 8 FreshPaint art-making application. Creating digital images is suitable for high sensory sensitive adults with ASD who prefer using mess-free and texture-free art materials (Darewych, Carlton, & Farrugie, 2015).

Two independent raters who were professional art therapists, and blind to the study research questions, coded the de-identified drawings. The raters were trained to code symbolic image variables by the principle investigator (first author). Interrater agreement analysis using SPSS Cohen's Kappa (Landis & Koch, 1977) was used to determine consistency between the two image raters. For this study, a Kappa value of 0.6 or greater was adopted as a good level of agreement. The second author conducted the SPSS-Kappa analysis. The expert rater's (rater two) data was used for data analysis and the first two authors conducted a thematic analysis of the narratives which were elicited by participants' drawings. Participants' de-identified demographic information form, drawings, writings, verbal comments, and session progress notes were the raw research data. The study was approved by Wilfrid Laurier University's research ethics board.

Results

During the single one hour study session, participants were directed to complete the Scribble Drawing first. All participants created a Scribble Drawing and more than half (64%; $n = 9$) of participants chose to create their Scribble Drawing on the digital touchscreen device. Three-quarters (79%; $n = 11$) of the participants developed their abstract scribble lines into a visible non-social symbol. One participant depicted themselves in their Scribble Drawing. Half of the participants' (50%; $n = 7$) meandering scribble lines directly embodied symbols. Figure 1 depicts a digital scribble drawing created by Tim (pseudonym) whose meandering lines straightforwardly represented mountains. Based on a thematic analysis of the narratives associated with the Scribble Drawings, one major theme was identified: concrete symbols. Participants described concrete symbols such as nature (e.g., mountain, water) or objects (e.g., hearts, quilt, train, and square). Figure 2 illustrates Paul's (pseudonym) Scribble Drawing which he developed into a golf course. In examining the Scribble Drawing interrater agreement scores, relatively substantial agreement ($k = .66$) was obtained for symbol transformation and moderate agreement ($k = .52$) was obtained for symbol type.

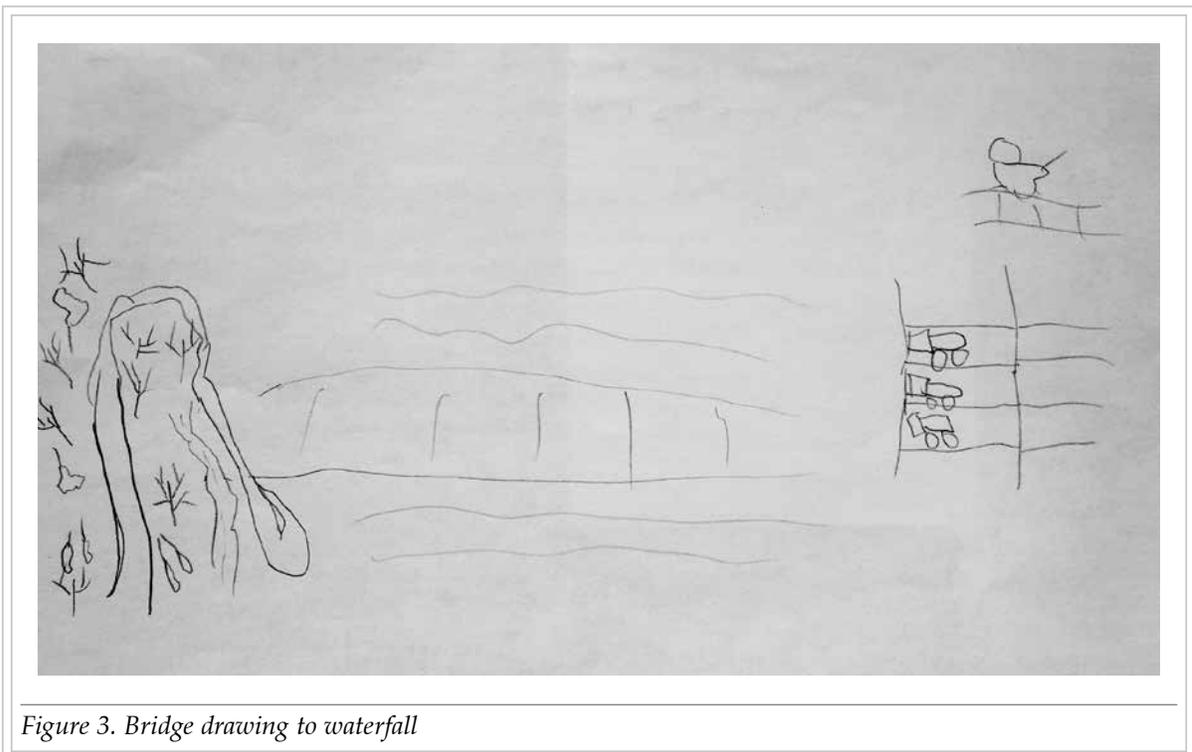
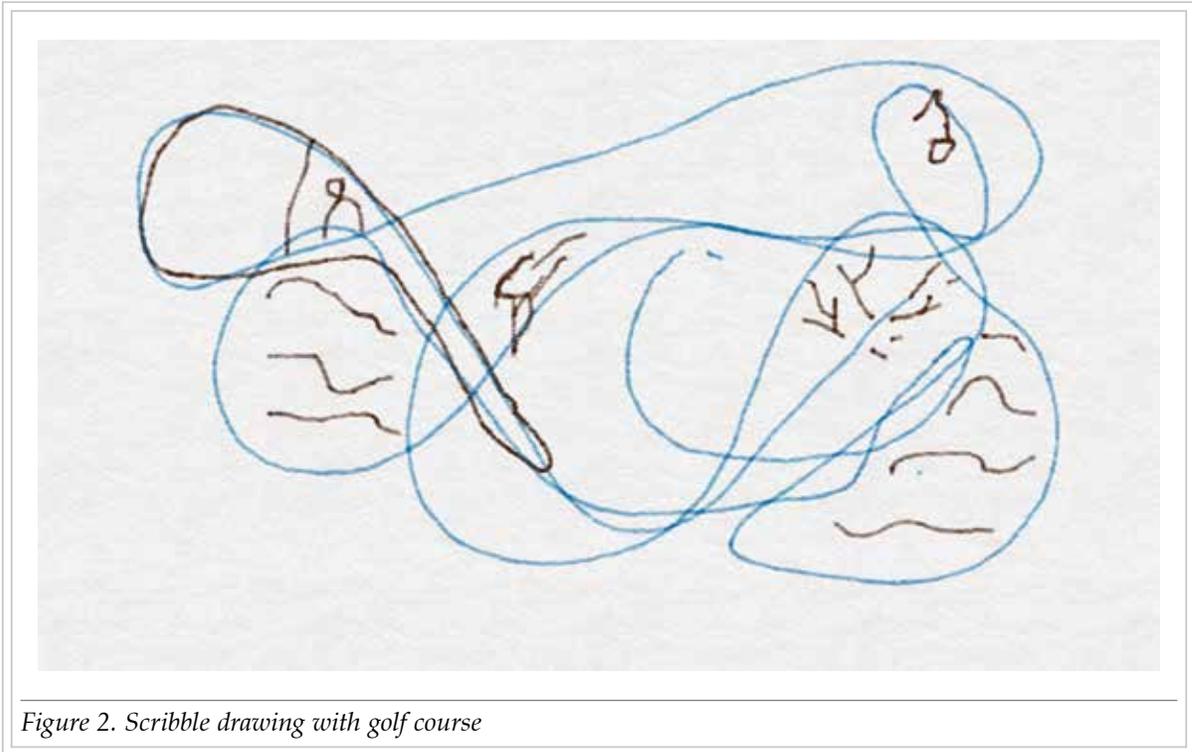
Upon completion of the Scribble Drawing, participants were prompted to complete the BDP. Eighty-six percent (86%; $n = 12$) completed the BDP leading to a goal-oriented endpoint (e.g., art program, city, home). One participant decided not to complete a drawing and another participant chose to draw a person instead. The two participants with medium functioning ASD who did not complete the BDP may not have understood the multi-step BDP directive or may not have grasped the bridge and path symbols. More than half (64%; $n = 9$) of participants depicted a simple bridge symbol or a path symbol in their BDP but not both. Three participants (21%; $n = 3$) depicted themselves in their BDP. Image raters struggled with coding BDP symbolic variables into the themes of bridge connection ($k = .20$), bridge type ($k = .36$), path quadrant ($k = .17$) and matter under bridge ($k = .32$), due to uncertainty about whether the simple symbol depiction was a bridge or a path. Relatively substantial agreement ($k = .64$) was obtained for axis of paper and perfect agreement ($k = 1.0$) was obtained for self-depiction. The two most common BDP narrative themes generated by participants were: local bridges and famous bridges. Figure 3 shows Kristina's (pseudonym) BDP depicting a local park bridge leading to a waterfall whereas Figure 4 portrays Daniel's (pseudonym) BDP illustrating the famous Niagara Falls Rainbow Bridge.



Figure 1. Scribble drawing with mountains

The third and final drawing was the Future Trip Drawing. One participant was not comfortable with travelling or flying outside of his city therefore; the directive was modified for them from “Where would you travel” to “Where would you

go” which prompted the participant to draw a local theatre. Only one participant did not complete a Future Trip Drawing, choosing to draw a square shape instead. Three-quarters (79%; $n = 11$) of participants decided to create their



Future Trip Drawing on the digital touchscreen device. The majority of participants (79%; $n = 11$) depicted non-social symbols in their Future Trip Drawing. Two participants ($n = 2$) depicted themselves and non-social symbols in their Future

Trip Drawing. The two most common Future Trip narrative themes generated by participants were: vacation destinations and community programs. Andrew (pseudonym) created a digital Future Trip Drawing to a Cuban beach resort (see

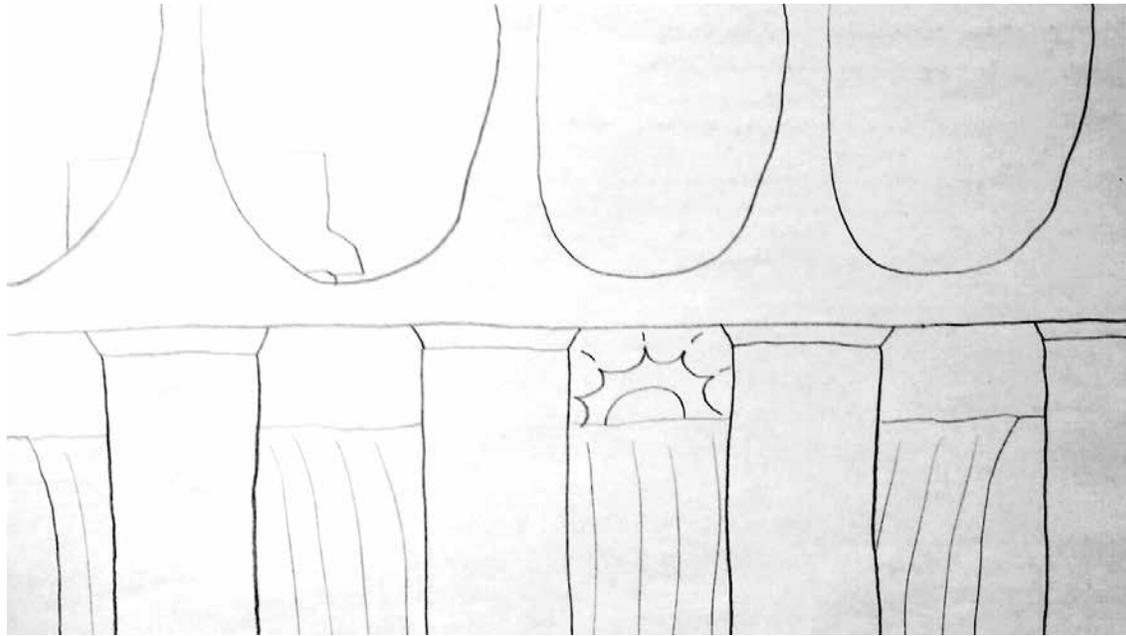


Figure 4. Niagara Rainbow Bridge



Figure 5. Future trip drawing to Cuban resort

Figure 5) while Luke (pseudonym) drew a future trip with pencil and paper to his favourite community indoor bowling alley. In examining the Future Trip Drawing interrater agreement scores, moderate agreement ($k = .63$) was obtained for symbol type and substantial agreement ($k = .76$) was obtained for self-depiction.

The complete image variable results for the three drawings are presented in Table 1 whereas the Kappa results of the interrater analysis for the three drawings are displayed in Table 2.

Table 1. Drawing Variables

Drawing Variables	N = 14 79% M Age 21-34
Scribble drawing	
Scribble completion	100%
Non-social symbols	79%
Self symbols	7%
Direct embodied symbols	50%
Digital media preference	64%
Bridge drawing with path (BDP)	
BDP completion	86%
Bridge or Path symbol	64%
Self symbol	21%
Future trip drawing	
Future trip completion	93%
Non-social symbols	79%
Non-social and self symbols	14%
Digital media preference	79%

Table 2. Interrater Kappa Agreement for Drawings

Drawing Variables	Raters Average	Kappa Agreement*
Scribble drawing		
Symbol transformation	.66	Substantial agreement
Symbol type	.52	Moderate agreement
Bridge drawing with path (BDP)		
Axis of paper	.64	Substantial agreement
Bridge connection	.2	Slight agreement
Bridge type	.36	Fair agreement
Path quadrant	.17	Slight agreement
Matter under bridge	.32	Fair agreement
Self depiction	1	Perfect agreement
Future trip drawing		
Symbol type	.63	Moderate agreement
Self depiction	.76	Substantial agreement

* Landis and Koch (1977).

Discussion

The first research question for this study was: Will adults with ASD depict and describe symbols in their drawings not present to their senses? Most participants imagined and depicted symbols in their three drawings not present to their senses and described the symbolic meaning verbally or in writing. One compelling Scribble Drawing finding was that half of the participants' scribble lines directly embodied symbols not present to their senses; as a result, there was no need for them to add or fill in their scribble to create their concrete symbol (see Figure 1). Perhaps this straightforward representation of symbols is due to individuals with ASD having detail-focused cognitive processing and drawing styles (Booth, et al., 2003; Happé & Frith, 2006). Since the concrete symbols were not explicitly visible to the raters until they read the narrative associated with each Scribble Drawing, it is important that researchers and clinicians specifically request individuals with ASD to express the symbolic content of their drawings verbally or in writing.

The second research question was: Will adults with ASD generate more non-social (places and objects) than social (self and people) symbols in their drawings? Participants in this study generated more concrete non-social symbols representing real places and objects from their world than social symbols in their drawings. This finding supports the idea that certain adults with ASD have unique imaginative, cognitive, and drawing abilities, and that their imagination may be restricted when drawing tasks include social content (Allen & Craig, 2016; Ten Eycke & Müller, 2015). Furthermore, this finding supports Celani's (2002), Jolley et al.'s (2013), and Ten Eycke's and Müller's (2015) notion that social deficits in individuals with ASD extend to their imaginative drawings.

One interesting BDP finding was that more than half of participants depicted a bridge symbol or a path symbol, but not both. These results validate the notion that some individuals with ASD have challenges with executive function, particularly with organizing and remembering steps in a multi-step task (Hill, 2004). The multi-step BDP results emphasize the importance for clinicians to design clinical treatment plans that take into account the maintenance and development of executive function in adults with ASD. Another noteworthy BDP finding was that sim-

ilar to previous BDP studies (Darewych, 2013; Darewych, 2014), participants' BDP end points led to things that made their life feel meaningful (i.e., art program, city, home, local theatre, nature). This finding calls upon service providers to implement recreation programs and organize excursions to local art galleries and museums for adults with ASD which enhance their well-being and inclusion in society.

Overall, the drawing task results of this study are suggestive that the Scribble Drawing (Cane, 1951), Bridge Drawing with Path (BDP; Darewych, 2013), and Future Trip Drawing (Liebmann, 1986) art-based assessments from the field of art therapy can be considered as effective creative methods to measure imagination and symbolic development in adults with medium- to high-functioning ASD with verbal and/or written expressive communication abilities. The two-step, open-ended Scribble Drawing can provide information about an individual's ability to imagine and then draw concrete symbols within abstract meandering lines. The three-step BDP can explicitly be used in therapy to assess, maintain, and develop imagination and executive function in adults with ASD. The one-step Future Trip Drawing in the research and clinical realm can provide greater understanding of imagination and episodic foresight in adults with ASD. Imagining and drawing the future allows individuals with ASD to cognitively prepare themselves for upcoming events (Suddendorf & Corballis, 2007). There is some evidence now that adults with ASD exhibit deficits in episodic foresight (Crane, Lind, & Bowler, 2013; Lind & Bowler, 2010). Since one-time drawings simply provide snapshot presentations of participants' imaginative thinking and symbolic abilities, future studies administering a series of the three drawings over time would increase the reliability of the art-based assessments as measures of imaginative and symbolic content. One striking art form finding was that most participants chose to create their Scribble Drawing and Future Trip Drawing on the digital device with the user-friendly FreshPaint art-making application rather than with the traditional materials. This finding justifies Darewych et al.'s (2015) call for further studies in our current digital age that examine this technology as a new creative media in clinical settings.

The limitations of the present study include a relatively small sample size ($N = 14$) and no control group. In future research, the use of larger

samples of adults with ASD and neurotypical (adults without ASD) comparison groups is recommended in order to provide more robust findings. A third limitation was that the art-based directives were only administered verbally. The administration of the art-based directives in multiple ways – verbally, and in written script, may have helped participants fully understand the drawing instructions. Despite the methodological limitations, the present study is the first to explore imagination in adults with ASD utilizing the three open-ended and non-social content arts-based assessments from the field of art therapy. The authors invite researchers to replicate and extend this study with children and adolescents with medium- to high- functioning ASD.

Key Messages From This Article

Persons with disabilities. You have unique creative talents and visual imaginative abilities.

Professionals. Implement arts programs for individuals with autism and other developmental disabilities to maintain their active imagination and further develop their creative and executive function faculties.

Policymakers. Continue advocating and financially supporting arts and other social inclusion programs for adults with ASD that make their life feel meaningful.

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