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The Drawing of the Human Figure in Madeira Island: Evidence of Validity

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ABSTRACT – Human figure drawing (DFH) is one of the most used ways to assess children's intellectual development. This study investigated the evidence for the validity and accuracy of the Wechsler DFH correction system for children on Madeira Island. The sample included 489 children (49% girls); 5-13 years old from elementary schools of the Portuguese educational system. The instruments were the DFH, Raven Colored Progressive Matrices (CPM) test, and school grades (Portuguese and Mathematics). There are differences in age, sex, and the figure drawn. Correlations between DFH, CPM, and school grades were significant. Precision was satisfactory (> .80). In conclusion, this DFH test has evidence of validity and precision indicating the possibility of use after obtaining Portuguese standards.

KEYWORDS: drawing; human figure; validity

O Desenho da Figura Humana na Ilha da Madeira: Evidências de Validade

RESUMO – O desenho da figura humana (DFH) é uma das formas mais utilizadas para avaliar o desenvolvimento intelectual infantil. Este estudo investigou as evidências da validade e precisão do sistema Wechsler de correção do DFH para as crianças da Madeira. A amostra incluiu 489 crianças (49% meninas), com entre 5 e 13 anos de idade, de escolas do 1º e 2º ciclos do sistema educativo. Os instrumentos foram: DFH, teste de Matrizes Progressivas Coloridas de Raven (MPCR) e notas escolares (Português e Matemática). Existem diferenças por idade, sexo e da figura desenhada. As correlações entre DFH, MPCR e notas escolares foram significativas. A precisão foi satisfatória (>0,80). Concluindo, este teste DFH possui evidências de validade e precisão, indicando a possibilidade de utilização após obtenção de normas portuguesas.

PALAVRAS-CHAVE: desenho; figura humana; validade

As a child develops, drawing emerges as the first form of expression, long before the mastery of reading and writing, that is, drawing is part of the growth and development process among other skills learned from birth (Hutz & Bandeira, 2000). In this way, we can see that children's drawing occurs alongside the child's cognitive development, in the sense that by producing images, the child recognizes that he /she can create his physical, mental, and emotional world, the world of ideas, imagination, dreams and memories (Nunes et al., 2012).

The use of drawing as a measure of intelligence assumes that it is familiar to all cultures, regardless of previous academic skills and motor coordination (Oakland et al., 2016). Another important fact to remind is that this type of measure has been popularized all over the world due to its usefulness and readiness, being present in children of different age groups and cultures (Piotrowski, 2016). The link between the drawing of human figure and performance in intelligence tests has been the subject of many investigations. The results demonstrate the effectiveness of drawing as an instrument for measuring psychological functions (Benson et al, 2019; Rueda et al., 2020).

However, we must not forget that there is a wide variety of psychometric tests aimed at measuring intelligence, such as: Raven's Progressive Matrices, Stanford-Binet Intelligence Scale, WISC-V, among others (Suehiro et al., 2015).

However, although we can count on this wide range of tests, we must not forget the complexity of intelligence. This way, we emphasize that the complementarity between the most varied intelligence tests is essential, as each one assesses different skills, thus allowing a more rigorous and more feasible result (Nakano & Wechsler, 2012).

Psychology's interest in children's representations followed a movement originated by the philosopher Jean-Jacques Rousseau (Short DeGraff et al., 1989). It was only in the twentieth century that studies took a scientific turn, in the sense that the use of children's drawing as a psychological technique began, and its apogee took place between 1900 and 1915 with the studies of Lamprecht and Claparède (Arteche & Bandeira, 2006). Although there has been research on children's drawing that has resulted in the construction of new graphic techniques for psychological assessment, still the Human Figure Drawing Test (HFD) became one of the most used tests in the assessment of non-verbal skills due to its attractiveness and the fact that its application is performed in a relaxed way (Meerbeke et al., 2011).

Florence Goodenough, in 1926, was the pioneer in the attempt to evaluate children's drawings through an organized system. She constructed a first test based on human figure considering that this is a simple task for younger children and sufficiently complex due to its details (Goodenough, 1964). In 1963, this test was revised by Dale Harris as he disagreed with the use of the terminology "intelligence" for the analysis of drawings and argued that the drawing of human figure should be seen as a measure of "intellectual or conceptual maturity", thus developing a scale known as "Harris-Goodenough" (Harris, 1963). However, his greatest contribution was the fact that he introduced the drawing of the female figure to this test to obtain a more feasible measure of children's cognitive development.

Other systems emerged for the interpretation of children's drawings from the 60s onwards. In 1968, Elisabeth Koppitz presented two types of analysis, one that contemplated this test as a projective technique to reveal unconscious conflicts and personality traits, and the other, which evaluated cognitive maturation through drawing (Koppitz, 1984). In this sense, she identified 30 items considered to be of evolutionary origin and divided them into four distinct types according to their frequency: a) Expected items (items that are found in children's drawings between 85% and 100% in each age group) b) Common items (those that are present 51 – 84% of the time), c) Uncommon items (those that are found 16% to 50% of the time), and d) Exceptional items (they appear only 1 to 15% of the time in children's drawings (Bandeira et al., 2008).

At national level, Goodenough and Koppitz systems have been widely used, especially in the 1990s, as pointed out by Wechsler et al. (2018). For example, in 1981, Alves used the drawing of the human figure as a cognitive measure and concluded that the systems of Goodenough and Harris were highly correlated. The evaluation of drawing as a cognitive measure was proposed by Sisto (2005), based on Goodenough and Kopitz systems, excluding items that presented maladjustments by the Rash model and verifying the validity of this system by comparison with the Raven scale and reading and writing measures.

The evidence of validity by contrasting groups, using the HFD correction system proposed by Sisto, was also investigated by Oliveira et al. (2015), comparing their results with Bender scores. Wechsler (2003) created another well-studied Brazilian system for assessing HFD as a cognitive measure, based on the studies by Harris, Koppitz and Naglieri. The internal validity was confirmed by the significant differences by age group and the validity with external variables was verified by comparing its results with the Beery Visual Motor test and with the spatial and logical reasoning subtests from the Woodcock-Johnson Battery, while its reliability was also significant by the test-retest method (Wechsler, 1996). Another study conducted by Wechsler (2000) aimed to analyze whether there were cultural differences in the performance of Brazilian and Argentinian children, and the results pointed to a significant effect only for age and not for country, thus indicating that the analysis of HFD by this system could be used in different cultural contexts.

The importance of Wechsler's system and its validity for understanding children's intellectual functioning has also been confirmed in several other studies. For example, Bandeira et al. (2008) found that HFD corrected by this system had significant relationships with scores in Raven's test and school grades. The discrimination between creativity and intelligence in HFD was observed by Nakano (2012) and by Oliveira and Wechsler (2016). It should be noted that this system is one of the most used systems in Brazil, as pointed out in the 3 reviews of publications in journals by Oliveira et al. (2015), Suehiro et al. (2015) and Rueda et al. (2020).

Considering the relevance of HFD by Wechsler system and the fact that it has not yet been studied with the Portuguese population, the aim of this study was to verify its validity evidence for children in Madeira Island. In this sense, the hypotheses were that HFD could present evidence of validity by the internal structure when discriminating significant gains by age and that it would have significant relationships with external variables, when compared with another intelligence test and with school grades of Madeira children. In addition, it was proposed that HFD, corrected by this system, would provide evidence of reliability.

METHOD

Participants

The sample consists of 489 students, 243 (49.7%) girls and 246 (50.3%) boys, aged five to 13 years, distributed in 13 age groups ranging from six months, from five to 11 years old. These children attended Pre-School and Basic Education (1st, 2nd, 3rd, 4th, and 5th grades) of 4 public schools and 3 private schools in Funchal (capital of Madeira).

Instruments

Drawing of the Human Figure – HFD III (Wechsler, 2003)is a non-verbal test that aims to assess the cognitive development and conceptual maturity of children, being an ideal test for assessing the general factor of intelligence. HFD proposed by Wechsler consists of the elaboration of two drawings, the female figure and the male figure. The drawing of the female figure is made up of 17 subdivided items and the drawing of the male figure is made up of 18 equally subdivided items. Research attesting to the evidence of validity by the internal structure and relationships with external variables, in addition to its reliability, has already been carried out (Bandeira et al., 2008; Nakano, 2012; Oliveira & Wechsler, 2016; Wechsler, 1996, 2000; Wechsler & Schelini, 2006).

Raven Colored Progressive Matrices – CPM (Raven et al., 2009). In order to evaluate concurrent validity, we used CPM that measure intelligence, more specifically the G factor defined by Spearman in 1927. Each set consists of 12 items in which they present a matrix of abstract geometric figures in black and white or, in some cases, colored, and each item is composed of an incomplete matrix that needs to be filled in. This test has already been validated for the Portuguese population.

School report card. The final grades in Portuguese and Mathematics were obtained in the third and last period of the school year (corresponding to one semester).

Procedures

A formal request for authorization was made to the Regional Directorate of Education of the Autonomous Region of Madeira for the application of the instruments in schools and surrounding areas. After authorization, schools were contacted and, after their approval, the informed consent was sent and signed. HFD test was administered between May and June, in the context of the classroom, collectively. CPM was individually applied. Portuguese and Math grades were provided by teachers of children already in elementary school.

Data analysis

After testing normality (*Kolmogorov-Smirnov test*) and homogeneity (Levene test) of the sample, it was decided to opt for parametric or non-parametric statistics according to the needs of data analysis. Thus, *Student*'s *t-test* and ANOVA and *Pearson*'s correlations were used when the samples were normal and homogeneous, and *Kruskal-Wallis test* was used in cases where this was not verified.

RESULTS

As shown in Table 1, girls presented statistically higher results ($p \leq 0.00$) than boys for the female figure ($t = 4.29$), for the male figure ($t = 3.09$) and for the total figure ($t = 3.81$). Thus, we can conclude that HFD significantly distinguishes the type of figure drawn and that, in general, girls draw the human figure in more detail than boys.

The mean values of the boys, when drawing the two figures, gradually increase over the age groups, as shown in Tables 2 and 3. However, there is a slight drop in scores for both men's and women's drawing in the 9.1 – 9.5 age group followed by a further increase. However, it should be noted that there are differences in this regard in the two designs. Thus, we can see that while in the male drawing after this band there are constant peaks of scores with considerable differences, the same does not happen with the female drawing in such a marked way. In fact, there is a small drop between 9.6-10.00 and 10.01 to 10.5 range. As in males, girls' averages increase with increasing age. However, there are some drops in girls' scores when drawing the male and female figures in the age groups, which are common in both in the following groups 10, 11 and 13.

It is possible to verify the existence of significant differences ($p \leq 0.01$) in the way children draw the human figure in different age groups, (F = 51.48), male figure and (X2 = 266.22) female figure (X2 = 266.22). Thus, there is evidence of validity of HFD internal structure by significant increases by age.

The analysis of the correlations between the results in HFD with Raven's test and the children's classifications in Portuguese and Mathematics, for both the female and

Table 1 – *Comparison of means by child's sex in drawing female and male figures*

HFD	Sex	N	M (SD)
Female Figure	Female	242	31.87 (9.19)
	Male	246	28.22 (9.54)
Male Figure	Female	242	32.87 (8.90)
	Male	246	30.31 (9.37)
Total Score	Female	242	64.74 (17.67)
	Male	246	58.53 (18.24)

Table 2 – *Means and standard deviations in boys' drawing of male and female figures*

	Male Figure				Female Figure			
Age group	**M**	**SD**	**Min.**	**Max.**	**M**	**SD**	**Min**	**Max**
5.0 – 5.5	14.20	2.040	11	16	15	1.581	13	17
5.6 – 6.0	18.78	5.615	6	31	17.72	5.069	9	35
6.1 – 6.5	22.15	6.974	14	37	20.69	8.509	9	35
6.6 – 7.0	26.65	5.176	13	37	24.58	5.045	13	32
7.1 – 7.5	27.82	7.923	9	45	25.94	6.74	8	41
7.6 – 8. 0	30.15	7.092	14	45	27.54	9.266	0	45
8.1 – 8.5	32.43	6.665	21	42	28.71	8.722	14	43
8.6 – 9.0	33.00	6.767	16	43	30.05	7.287	16	45
9.1 – 9.5	30.86	8.375	16	42	26.43	7.300	13	36
9.6 – 0.0	35.75	8.185	19	52	31.88	8.785	20	45
10.1 – 10.5	33.27	6.813	24	44	31.82	7.167	21	40
10.6 – 11.0	39.27	5.952	29	52	38.24	7.065	21	49
≥ 11.1	37.185	5.440	27	47	35.14	4.931	24	44

Table 3 – *Means and standard deviations in girls' drawings of male and female figures*

	Male Figure				Female Figure			
Age range	**M**	**SD**	**Min**	**Max**	**M**	**SD**	**Min**	**Max**
5.0 – 5.5	21.25	5.56	16	27	21.75	6.99	15	30
5.6 – 6.0	20.89	4.45	12	30	19.33	5.99	12	33
6.1 – 6.5	23.71	6.01	12	33	20.90	5.32	11	33
6.6 – 7.0	30.79	5.97	17	42	29.53	6.33	17	41
7.1 – 7.5	29.68	4.84	21	37	29.47	5.136	20	36
7.6 – 8. 0	29.47	5.951	18	43	29.87	6.323	15	40
8.1 – 8.5	31.89	5.587	23	42	31.11	5.577	20	40
8.6 – 9.0	37.00	5.906	27	47	35.29	6.018	28	47
9.1 – 9.5	37.93	5.690	27	47	35.86	7.273	22	47
9.6 – 0.0	37.14	4.259	29	41	35.14	3.625	29	40
10.1 – 10.5	35.33	8.316	23	46	33.92	8.350	22	47
10.6 – 11.0	41.87	5.350	25	52	41.42	4.605	30	51
≥ 11.1	38.35	5.662	24	49	38.48	4.728	29	46

male figures, are presented in Table 4. As it can be seen, all correlations were highly significant ($p \leq 0.01$), reaching levels over 0.70. These results demonstrate the evidence of validity of HFD with external variables.

The reliability by HFD internal consistency was calculated with all the items of the drawing, using *Cronbach*'s *Alpha*, whose value is excellent ($\alpha = 0.92$) in the total figure and very good in the female and male figure, with $\alpha = 0.85$ and $\alpha = 0.86$, respectively. This way we can verify the reliability of Wechsler correction system.

Table 4 – *Pearson correlations between the Human Figure Drawing Test, Raven's Matrices and Portuguese and Mathematics classifications according to the children's sex*

Sex	Items	Fem.Fig	Male Fig.	Portug.	Math.	Raven
	Female Fig.	1	0.908**	0.642**	0.636**	0.718**
	Male Fig.		1	0.636**	0.630**	0.732**
Fem.	Portuguese			1	0.953**	0.731**
	Math.				1	0.753**
	Raven					1
	Female Fig.	1	0.861**	0.557**	0.516**	0.643**
	Male Fig.		1	0.597**	0.588**	0.633**
Mal.	Portuguese			1	0.958**	0.720**
	Math.				1	0.709**
	Raven					1

DISCUSSION

The objective of this investigation was to verify the validity evidence of human figure drawing test for children in Madeira Island. Based on the premise that the drawing test is a universal measure that can assess the developmental and conceptual aspects of children, we considered this assumption to investigate whether the evidence of HFD validity obtained with Brazilian and Argentine samples (Wechsler, 2000) could also be confirmed with Portuguese children.

The results obtained in this study, using the Wechsler's correction system, showed that the raw scores of each figure increase gradually and significantly throughout the age groups, with small peaks. As such, we can affirm that children's cognitive development does not occur continuously. It was also observed that the drawing does not discriminate cognitive increases from the age group above 11 years of age. These results are like those obtained by Wechsler (1996, 2003) with Brazilian children, indicating evidence of the validity of the system's internal structure.

Then, to prove that human figure drawing test is a developmental measure, the existence of significant differences in the various age groups was analyzed. Results obtained confirmed the existence of significant differences in the various ranges, that is, the concept of the human body evolves according to cognitive development (Sisto, 2005). These results indicate the importance of HFD, as already pointed out in 3 reviews in Brazilian journals on this topic (Oliveira et al., 2015; Rueda et al., 2020; Suehiro et al., 2015)

That said, with a comparison of parametric means, it was found that the scores obtained by the girls differ significantly from the scores of the boys in the two figures, as suggested by literature with studies by Koppitz (1984). This way, it was observed that girls tend to include more body parts and clothing in their figures than boys. However, with our study, we found that, in some age groups (7.1 – 7.5 and 7.6 – 8.0), boys outperform girls by a small distance, with a further decrease in scores for the following groups. Thus, it is necessary to establish distinct parameters for the two types of figures, male and female, where the sex and age of the subject who draws should be considered, as already recommended by Harris (1963) and confirmed by Wechsler and Schelini (2006).

Regarding the validity evidence with external variables, we obtained high and significant relationships between the results arising from the correlations between Raven's Colored Progressive Matrices (CPM) and HFD Test. These results confirmed those previously observed by Bandeira et al. (2008), when comparing HFD results with those obtained in Raven and Bender. In this sense, we can affirm that the results obtained in the present study are in line with the investigations regarding the high relationship of the raw results of the drawings with another measure of non-verbal intelligence, thus adding other components to the understanding of children's cognition (Oliveira et al., 2015).

The relationships between HFD test, Raven's Progressive Matrices test and the classifications of Portuguese and Mathematics were also analyzed. The data collected at this level indicate high levels of relationship between these variables. On closer examination of the correlations between HFD and the grades in Portuguese and Mathematics for females and males, it is found that the correlation coefficients are greater than 0.50. Thus, we conclude that there are significant relationships between the level of intelligence in HFD and academic performance, indicating that the child's intellectual potential facilitates their performance at school, as already observed by Bandeira et al. (2008). With the results obtained, we can affirm that, at a general level, for both sexes, HFD test is a good tool in the prediction of academic performance, and that it has evidence of external validity by Wechsler system. Likewise, reliability obtained by internal consistency proved to be at adequate levels.

In the analysis of the differences between public and private education in the way of drawing the human figure, it was found that children who attend public education have superior results in relation to students from private education institutions. Thus, public school students demonstrate a more evolved concept of the human figure than private school students, contrary to what has been observed with Brazilian samples (Wechsler & Schelini, 2006). Such results possibly indicate better teaching and stimulation qualities in Portuguese public schools and the need for specific standards for public and private students.

In conclusion, the results obtained demonstrate that HFD, corrected by the Wechsler system, has evidence of validity and reliability for Portuguese children, in the same way as it had already been observed with Argentine and Brazilian children (Wechsler, 2000). These data reflect universally cognitive development in children (Oakland et al., 2016) and the importance of this instrument in children's intellectual assessment (Oliveira et al., 2015; Suehiro et al., 2015). However, it is recommended that studies with other Portuguese regions can be carried out considering that only Madeiran children participated in the research. On the other hand, a limitation of this study should be commented since the authorization was granted at the end of the school year, so that it was not possible to obtain a wider and more representative sample in the different age groups. Considering the differences in the quality of education in Portuguese public schools, the expansion of this sample is necessary to norm this test for the Portuguese population.

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Conflict of interest
The authors have no conflicts of interest to declare.

Data availability statement
The data supporting the findings of this study can be requested from the corresponding author upon reasonable request

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