The Reliability of the Zulliger Test (2009-2019): Case Studies

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ABSTRACT – This study aimed to verify the reliability of the Zulliger test (ZSC) and the individuals' personality characteristics over 10 years (2009-2019), using a (test-retest) design. Four adults, non-patients, between 18 and 52 years of age participated in this study. Instruments: structured interview, the ZSC and the Social Skills Inventory (IHS2-Del-Prette). The analyses considered the interpretative differences of 59 ZSC variables between the first (2009) and second (2019) applications, the interview data and the IHS2-Del-Prette. The results demonstrated temporal stability for most (70%) of the variables of the ZSC after 10 years of testing and contemplated the main interpretative findings. The interview data and the IHS2-Del-Prette added to the data of the ZSC regarding the individuals' personality characteristics and emotional state.

KEYWORDS: psychological assessment, personality traits, longitudinal studies, projective techniques, adults

A Fidedignidade do Teste de Zulliger (2009-2019): Estudos de Casos

RESUMO – Este estudo buscou verificar a fidedignidade de Zulliger (ZSC) e as características de personalidade dos indivíduos, ao longo de 10 anos (2009-2019), teste – reteste. Participaram quatro adultos, não pacientes, idades entre 18 e 52 anos. Instrumentos: Entrevista estruturada, ZSC e o Inventário de Habilidades Sociais (IHS2-Del-Prette). As análises consideraram as diferenças interpretativas de 59 variáveis do ZSC entre a primeira (2009) e segunda (2019) aplicação, os dados da entrevista e do IHS2-Del-Prette. Os resultados demonstraram estabilidade temporal para a maior parte das variáveis do ZSC (70%), após 10 anos de realização do teste, e contemplaram os principais achados interpretativos. A entrevista e o IHS2-Del-Prette incrementaram os dados do ZSC referentes às características da personalidade e do estado emocional dos indivíduos.

PALAVRAS-CHAVE: avaliação psicológica, traços de personalidade, estudos longitudinais, técnicas projetivas, adultos

As a structured investigation process of psychological phenomena, psychological assessment plays a central role in the domains of empirical psychology. When responding to demands originating in diverse contexts and providing information for decision making, the procedures for this purpose should focus on available research and on the choice of instruments with proven validity (Bornstein, 2017; Wechsler et al., 2019). Projective instruments are relevant in the assessment of personality, but they usually generate difficulties in the search for psychometric properties, as they are complex and with variations in individual responses, and should be included in research more broadly (Meyer, 2017).

Studies on the quality of the instruments provide evidence of their properties and help the researcher choose the best tool to use. One of the main measurement properties that is fundamental to ensure the quality of the results obtained is reliability. One may say that a test is qualified as reliable when it can reproduce consistent results over time or based on different observers, and indicate aspects such as coherence, precision, stability, equivalence and homogeneity (Souza et al., 2017).

When the interval between tests (test-retest) is short, in days up to six months, people are more likely to show no changes in the main characteristics evaluated. But, when the interval between the tests is long, from six months up to years, these characteristics may be more likely to undergo changes (Exner Jr., 2003; Exner Jr. et al., 1978; Gronnerod, 2003; Villemor-Amaral et al., 2009).

The term temporal stability indicates how stable the personality characteristics evaluated are over time (Gronnerod, 2003). Results of tests that assess stable personality characteristics, such as the inkblot test, are usually stable, even at relatively long intervals, indicating that measurement errors are small (Exner Jr. et al., 1978). Nevertheless, it should take into account that the variables of instruments such as the Rorschach method, with a narrow range of values and asymmetry, can result in artificially low test-retest correlations, which do not reflect the magnitude of the associations. Therefore, the temporal stability and the number of participants who remain in the same interpretive range in the test-retest should be analyzed, rather than calculating the correlation (Meyer & Archer, 2001). In addition, Gronnerod (2003) recommends studies to verify individual variability because, in the test-retest analysis, individual variability not perceived in the group can occur.

Overall, there are some similarities between the Rorschach and Zulliger in the Comprehensive System. Through stimuli using unstructured inkblots indirectly, they permit to obtain information on the individual's mental functioning. They can trigger a series of cognitive and emotional processes, involved in a task of problem solving and behavioral performance; and can reveal specificities of the inner world and enhance the results obtained through self-reports (Villemor-Amaral & Primi, 2009; Meyer, 2017). Thus, the selection of answers provided depends on the respondents' personality traits. The fact that a person gives the same answers in a retest seems to indicate, beyond a simple recall, the repetition of the personality's characteristic functioning, especially in case of long intervals between the first and second test. The sensitivity of an instrument can therefore be observed in the ability to capture personality changes over time (Exner Jr., 2003; Exner Jr. et al., 1978; Villemor-Amaral et al., 2009).

Some studies have demonstrated the sensitivity of the inkblot methods in the Comprehensive System. Exner Jr. et al. (1978) performed a retest study in 100 non-patients three years after the test. Most of the 19 correlations reported showed coefficients superior to 0.75, indicating good temporal stability. The variables that showed differences in temporal consistency were classified into two large groups: those that were highly stable over time; and those that were considerably unstable over time.

The first group, considered as basic personality response styles or traits, tends to permeate much of the behavior. The second group represents characteristics that are less stable over time, indicating response trends that occur under given conditions or states, in unusual situations of stress. Human movement (M) and four of the five proportions analyzed demonstrated greater stability over time: experience style (EB), effective experience and stimulation felt (EA:es), form-color (FC:CF+C), active and passive movement (a:p). Other variables also demonstrated stability over time, the Z frequency (Zf), the pure form responses (F), the perceptual precision responses (X+%) and the index of egocentrism

[3r+(2)]. What was evidenced is that, when the temporal stability is low, the construct can be attributed to a state and, conversely, when the stability is high, it can be considered a trait.

Another study, developed with Rorschach in the comprehensive system ([RSC] Exner Jr., 1986), involving North American non-patient adults retested after one year (N = 50) and retested after three weeks (N = 35) evidenced that diffuse shading (SumY) and inanimate movement (m) variables have low temporal stability (r = 0.20 to 0.40), because they are associated with state characteristics. Other variables (FM+m; SumC´; CF; Blends) showed moderate temporal stability (r = 0.60), being considered predominantly trait, but with a state component. The other variables [R, F, M, WSumC, EA, SumT, SumV, Adjes, D-score, AdjD, FC, Afr, COP, A G, Isolate/R, (2), Fr+rF, ZF, XA%, WDA%, Popular, X+%, XU%, X-%, a, p, 2AB+(Art+Ay), Sum 6, WSum6], showed high correlations, equal or superior to 0.75, being associated with personality traits.

The meta-analysis by Gronnerod (2003) aimed to compare different systems of the Rorschach method and the temporal stability in a review of articles published between 1921 and 2002. The results showed higher levels of reliability of the RSC (Exner Jr., 2003). The combined weighted temporal stability levels for a mean retest period of little more than three years ranged from 0.68 to 0.73 in the different datasets analyzed. Of the 39 variables analyzed in the RSC, only seven presented correlations inferior to 0.70 and three of them were indices that include diffuse shading (Y) and inanimate movement (m). The combined stability of 36 variables was r = 0.79. Methodological problems and sample size restrictions stood out as reasons for the low levels of temporal stability found in some variables. A larger number of participants showed to be associated with higher levels of temporal stability, and longer retest periods were associated with lower levels.

Sultan et al. (2006) investigated the temporal stability of the RSC variables in 75 French non-patient adults, who agreed to take the retest after three months. The coefficients found were much lower than in the North American studies (M = 0.53; SD = 0.15). Only nine variables showed correlations equal or superior to 0.70 [R, Zf, F, M, S, (2), lambda, EA, 3r+(2)/R]. Justifications for lower temporal stability coefficients were: a) Distribution of variable coefficients; b) Low inter-coder reliability; c) Low occurrence of some variables; changes when taking the retest due to the fact that the participants already knew the Rorschach method; d) Participants' lower defensiveness on the retest; e) Greater complexity of the French sample, that is, greater emotional suffering and lower perceptual adequacy.

In a subsequent study, Sultan and Meyer (2009) aimed to determine to what extent the frequency of the number of responses (R) can affect the stability levels of the RSC scores (Exner Jr., 2003) in non-patients. The researchers examined the variables in the lower section of the Structural Summary,

which affect the interpretation process more strongly. High levels of stability were found in the variables stimulation felt (es), Color-Form ratio (FC: CF+C) and frequency of Z-score (Zf), the latter being lowered when the mean response frequency was higher. The authors concluded that the impact of productivity showed importance, with high productivity negatively impacting the stability of the RSC scores.

Hartmann et al. (2013) conducted a study with 46 individuals with different histories of major depressive episodes (MDEs), who completed the RSC (Exner Jr., 2003) at two assessment points (T1, T2) during nine years of follow-up. At T1, the MDE history and the MOR variable of the RSC emerged as significant predictors of the number of MDEs throughout the follow-up. At T2, the RSC variables of vulnerability and depression signs were identified (WSum6, Y, X+%, X%, MQ– and MOR). The analysis of the test-retest variables showed significant temporal stability, with *r* ranging from 0.34 (Y) to 0.67 (MOR). The findings highlight the number of MDEs as a risk factor for future depressions and the RSC variables as markers of vulnerability and depression signs.

In order to verify the accuracy of the Zulliger Test in the comprehensive system (ZSC), Villemor-Amaral et al. (2009) conducted a test-retest study with a five-month interval. The participants were 25 male non-patient subjects and lived in the interior of the state of São Paulo. Among the 16 ZSC indicators selected, 10 presented satisfactory accuracy indices, ranging between 0.60 and 0.99; four showed accuracy between 0.40 and 0.60 (low to moderate stability). The indicators (R, S, D, Dd, C, H and Hd) obtained correlation coefficients superior to 0.80 (high stability). Other variables [M, (H), Hd] scored correlation coefficients between 0.60 and 0.80 (moderate to high stability). The variables [H:(H)+(Hd)+Hd, W and CF] showed correlation coefficients between 0.40 and 0.60 and FC presented 0.38 (low stability).

Recent literature reviews on ZSC (Cardoso et al., 2018; Grazziotin & Scortegagna, 2016) involving non-patients (Grazziotin & Scortegagna, 2018; 2021; Miguel et al., 2017) and based on contributions of Rorschach Performance Assessment System R-PAS (Gonçalves et al., 2019; Villemor-Amaral et al., 2016; Villemor-Amaral & Gomes, 2020) highlight the contributions and the need for advances in research on the psychometric properties of ZSC. It is noteworthy that studies on temporal stability are still rare, showing only the study by Villemor-Amaral et al. (2009) thus far.

An assessment based on different psychological, self-report and projective tests, observing significant convergences and divergences, which results in an interpretation that contextualizes the findings, provides an incremental and complementary view of individual psychological functioning (Bornstein, 2017). In this perspective, empirical studies demonstrate the validity and applicability of the Social Skills Inventory, IHS-Del-Prette in employment and health contexts (Del Prette et al., 2020; Grazziotin & Scortegagna, 2018). The basis of validity and reliability indicators for a current version of the Social Skills Inventory (IHS2-Del Prette) mainly consists of Brazilian and international publications of studies that used the previous version of the IHS-Del Prette (Del Prette et al., 2020; Del Prette & Del Prette, 2018).

Considering that social skills and coping with stressful events tend to play a predictive role of individuals' mental health, in the provision, professional growth and job stability (Mathieu et al., 2019; Perreault et al., 2020); the importance of reliability studies of psychological tests in order to ensure a valid and reliable psychological evaluation; the lack of longitudinal studies on the reliability of ZSC (Cardoso et al., 2018; Grazziotin & Scortegagna, 2016), this study aimed to verify the reliability of Zulliger over 10 years (2009-2019), using a qualitative longitudinal (test–retest) design, and check the results obtained with the personality characteristics of four non-patient individuals.

METHOD

Participants

The sample consisted of four individuals, aged between 18 and 42 years (Test), 27 and 52 years (Retest), male and female, workers in commerce, married, with basic and secondary education, belonging to the economic middle class and residents in a city in the interior of the state of Rio Grande do Sul. Eligibility: four workers who held commercial roles for a long period (2009 to 2019) in the same company were invited to participate in the study and had responded in 2009 (database): 1) Structured interview protocol, 2) Zulliger Test and 3) Social Skills Inventory (IHS-Del Prette). All participants underwent periodic medical and psychological examinations, being considered fit to work and perform

commercial functions (Occupational Health Medical Control Program – PCMSO).

Instruments

A structured interview protocol was used with the objective of collecting information about age, gender, marital status, education, socioeconomic class, profession or occupation, health conditions. Inclusion criteria: a) be working in the company since the first test, b) age up to 59 years. Exclusion criteria: a) history of stressful situations resulting from the diagnosis of disease or physical and mental disability, b) demonstrate visual or hearing impairment that interfered in the execution of the tests. In order to assess the economic class, the Economic Classification Criterion Brasil (CEBB)

was used, based on the Socioeconomic Survey (NSE), in force as from 2015 - IBOPE (Associação Brasileira de Empresas de Pesquisa, 2016).

Zulliger Test in the Comprehensive System ([ZSC] Villemor-Amaral & Primi, 2009) permits the interpretation of the personality dynamics through five domains that result in seven groupings (Resources and control; Affect; Relationship; Self-image and Cognitive Processing, Mediation and Ideation). The test consists of a set of three cards containing the drawing of a symmetrical inkblot, different for each card. The inkblots have biased and incomplete characteristics that stimulate the person to shape the stimulus. The test is applied in two stages: first, the participants respond to what the inkblots look like in their opinion. After doing this on the three cards, they are asked about where on the card they saw their answer, and what gave them the idea of what they saw. The reliability studies of the test, through the test and retest method and reliability among evaluators, indicated a value above 0.70 for agreement between judges and correlation above 0.60 of the first with the second application, indicating a high association.

Variables from seven groupings were selected and are described in the results section (Tables 1, 2 and 3). Some variables (proportion) needed to be separated to perform the interpretative analyzes (W:D:Dd; W:M). Other variables that are repeated were listed in one of the groupings (a;p; MOR). According to Villemor-Amaral et al. (2016), the protocols of our study present optimized modeling, minimum of nine answers.

Concerning the Social Skills Inventory (IHS 2; Del Prette & Del Prette, 2018), IHS 2-Del Prette is composed of 38 items and it was updated using a sample of 4,250 respondents between 18 and 59 years old. The participants were divided into two broad age groups, from 18 to 38 years old and from 39 to 59 years old. The factor structure is as follows: a) Factor 1 (F1): Assertive conversation; b) Factor 2 (F2): Sexual-affective approach; c) Factor 3 (F3): Positive feeling expression; d) Factor 4 (F4): Self-control coping; e) Factor 5 (F5): Social resourcefulness. The total score of the current factor structure is strongly correlated with the total score of the previous version ($r = 0.975$). Therefore, the results of

Table 1

Comparisons Between the Zulliger Scores of the Resource, Control and Affect Variable Groupings in the Test and Retest with the Brazilian Norms

Variables	Case A		Case B		Case C		Case D		Villemor-Amaral & Primi (2009)	
	Test	Retest	Test	Retest	Test	Retest	Test	Retest	(N 220)	
Zulliger	2009	2019	2009	2019	2009	2019	2009	2019	M	SD
Resources and Control										
R	9	15*↑	14↑	17↑	9	10	9	9	8.2	3.1
F%	22.0↓	20.0↓	35.7	52.9	78.0↑	50.0*	33.3	44.4	53.1	25
EA	1.5	2.5	1.5	1	1	0.5	3.5↑	3.5 ↑	1.6	1.5
EB	1.5	-1.5*	1.5	1	1	0.5	0.5	0.5	1,4	1,3
es	9↑	10↑	↑9	↑5	1	4*	2	2	2.6	2.3
Adjes	7↑	9↑	↑7	↑5	1	4*	1	1	2.4	1.9
D-score	-7.5↓	-7.5 ↓	-7.5↓	-4↓	0	-3.5*↓	1.5↑	1.5↑	-1.1	2.4
AdjD	-5.5↓	- 6.5↓	-5.5↓	-4↓	1	-3.5*↓	2.5↑	2.5↑	-0.8	2.2
FM	5↑	6↑	3↑	↑3	1	2	1	1	1	1.3
m	2↑	0*	1	0	0	0	0	1	0.3	0.7
Sum y	1	1	2↑	0*	0	0	1	0	0.6	0.8
Affect										
FC	1	1	2	2	0	1	1	1	0.4	0.7
CF	1	0*	1	0	1	0	1	1	0	1
C	0	0	0	0	0	0	0	0	0.1	0.3
Afr	0.5	0.5	0.4	0.4	0.4	0.4	0.5	0.5	0.5	0.2
S	3↑	1*	3↑	3↑	2	0	0	1	1.4	1.2
Blends:R	0.4	0.3	0.2	0.1	0	0.1	0.1	0	0.2	0.2
Sum C´	0	0	1	1	0	2*↑	0	0	0.6	0.8
Wsum C	1.5	0.5	1.5	1	1	0.5	1.5	1.5	0.7	0.9
CP	0	0	0	0	0	0	0	0	0.0	0.0

Note. Zulliger variables: R (number of responses); F% (pure form); EA (effective experience); EB (types of experience); es (stimulation felt); Adjes (adjusted es); D-score (degree of control and tolerance to stress); AdjD (adjusted D-score); FM (animal movement); m (inanimate movement); Sum y (sum of diffuse shading); FC (form color); CF (color form); C (color without form); Afr (proportion of R on card II and R on card I + III); S (response in white space); Blends:R (Sum of Blends divided by number of responses); Sum C´(Sum of achromatic color); WSum C (Sum of color); CP(Color projection); Obs: Qualitative interpretation: * Difference in the retest; ↑ or ↓ increase or decrease considering the normative table.

previous studies would also be valid for the current version, at least in terms of the total score. Regarding the factor scores, the new scores maintain moderate to strong correlations with the overall score (F1 = 0.726, F2 = 0.593, F3 = 0.639, F4 = 0.577, F5 = 0.791), all with satisfactory and high indicators of reliability (Cronbach's alpha between 0.774 and 0.934).

Procedures

Data Collection

The participants answered the structured interview protocol, the ZSC test and the IHS in 2009, first application/test (1); and in 2019, second application/retest (2). The time to apply the instruments was approximately one hour. The main author of this study performed both applications/test-retest and discussed the codings of the ZSC protocols with the second author. The protocols are part of a research sample investigated in a master's thesis and extended for a doctoral dissertation. For the sake of reliability of ZSC data, the data were forwarded for recoding by an independent judge, followed by *a posteriori* analysis of the Kappa coefficient. For most of the test variables, the coefficients were superior to 0.82 (n = 52). These were Incom, MOR, Hd (0.79) and Ay, a, Sum T (0.74). ZSC variables obtained between good (0.74) and excellent (0.99) reliability indicators (Landis & Koch, 1977).

Data Analysis

The interpretative differences of 59 ZSC variables were considered between the first (2009/test) and second application (2019/retest), Checking the Brazilian norms of non pacientes (Villemor-Amaral & Primi, 2009), the interview data and the data of the IHS2-Del Prette. The Social Skills Inventory has a computerized correction and interpretation. Finally, the analyzes followed the parameters of Levitt et al. (2018).

Ethical Considerations

Approval for the study was obtained from the Research Ethics Committee at the University of Passo Fundo (UPF) under opinion 042/2013. The study complies with National Health Council Resolution 510/2016 and Federal Psychology Council Resolution 09/2018. Participants signed the Free and Informed Consent Term.

Table 2

Comparisons Between the Zulliger Scores of the Relationship and Self-image Variable Groupings in the Test and Retest and the Brazilian Norms

Variables	Case A		Case B		Case C		Case D		Villemor-Amaral & Primi (2009)	
	Test	Retest	Test	Retest	Test	Retest	Test	Retest	(N 220)	
Zulliger	2009	2019	2009	2019	2009	2019	2009	2019	M	SD
Relationship										
COP	0	0	0	0	0	0	1	1	0.3	0.5
AG	3↑	3↑	1	1	0	0	0	0	0.3	0.5
GHR	0	0	0	1*	0	1	2	2	1.1	1
PHR	2	3↑	3↑	1*	0	0	0	0	0.9	1.2
Food	0	0	0	0	0	0	0	0	0.1	0.3
SumT	1↑	1↑	1↑	1↑	0	0	0	0	0	0.2
SumH	1	1	3	1*	0↓	1*	2	2	1.7	1.5
PureH	1	1	0	0	0	0	1	1	0.8	1
PER	1	3*↑	0	0	0	0	0	0	0.2	0.7
Isolate	2	6*↑	1	2	3↑	5↑	4↑	3↑	1.3	1.6
Self-image										
3r+(2)	1	5 *↑	2	3	2	4 *	4	5↑	2.1	1.9
Fr+rF	0	0	0	0	0	0	0	0	0,1	0,3
SumV	0	2 *↑	1↑	0	0	0	0	0	0.1	0.4
FD	1	3* ↑	1	1	0	1*	1	0*	0.1	0.4
An+ Xy	0	1	2↑	4*↑	0	0	0	0	0.6	0.8
Mor	1↑	1↑	0	0	0	0	0	0	0.3	0.5
H:(H)+Hd+(Hd)	-1	1*	-3↓	-1*	0	-1	0	0	-0.1	1.5

Note. Zulliger variables: *COP* (cooperative movement); *AG* (aggressive movement); *GHR* (good human representation); *PHR* (poor human representation); *Fd* (food responses); *SumT* (sum of texture responses); *Sum H* (sum of human contents); *H* (pure-human); *Hd* (human detail); *(H)* (complete para-human); *(Hd)* (para-human detail); *PER* (personal knowledge justification); *isolate* (isolation); 3r+(2) (sum of highlighted contents with symmetrical responses); Fr+rF (reflex responses); Sum V (sum of vista responses); FD (form dimension); An + Xy (sum of anatomy response and x ray); MOR (morbid contents); Obs: Qualitative interpretation: * Difference in the retest; ↑ or ↓ increase or decrease considering the normative table.

Table 3

Comparisons Between the Zulliger Scores of the Cognitive Processing, Mediation and Ideation Variable Groupings in the Test and Retest and the Brazilian Norms

Variables	Case A		Case B		Case C		Case D		Villemor-Amaral & Primi (2009)	
	Test	Retest	Test	Retest	Test	Retest	Test	Retest	(N 220)	
Zulliger	2009	2019	2009	2019	2009	2019	2009	2019	M	SD
Cognitive Processing										
Zf	5	8	4	3	3	3	4	3	None	
W	4↑	4↑	2	4*↑	1	2	2	1	1.3	1.1
D	4	8*	11↑	10↑	5	7	7	8	5.0	2.5
Dd	1	3	1	4*↑	3	1	0	0	1.6	2.0
M	0	2.*	0	0	0	0	2	2	0.9	1.1
PSV	0	0	0	0	0	0	1↑	1↑	0.0	0.1
DQ+	3↑	6*↑	2	1	1	2	2	2	1.4	1.4
DQV	0	0	0	0	0	0	1	0*	0.2	0.6
Mediation										
XA%	66.6	60.0	50.0↓	76.5*	77.8	90.0	88.8	88.8	73.0	21.0
WDA%	55.5	53.3	50.0	76,5*	55.6	80.0*	88.8	88.8	65.9	20.2
X-%	33.3	40.0↑	50.0↑	23.5*	22.2	10.0	11.1	11.1	21.0	15.9
S-	0	0	2↑	0	0	0	0	0	0.3	0.5
P	0↓	0↓	1	2	2	2	2	2	1.4	1.1
X+%	22.0↓	20.0↓	35.7	41.2	44.4	50.0	66.7	55.5	47.2	21.3
XU%	44.0↑	40.0↑	14.2	35.3*	33.3	40↑	22.2	33.3	25.7	17.8
Ideation										
a:p	- 1	0	-2	-1	1	- 2*↓	-1	-1	0.5	1.6
Ma:Mp	0	2	0	0	0	0	0	0	0.4	0.9
2AB+(Art+Ay)	2↑	0*	1	1	0	0	0	0	0.4	0.8
Sum 6	0	0	2↑	1	0	0	0	0	0.3	0.6
WSum6	0	0	5↑	2*	0	0	0	0	0.7	1.7
M-	0	1	0	0	0	0	0	0	0.2	0.5
Mnone	0	0	0	0	0	0	0	0	None	

Note. Zulliger variables :*Zf* (organizational activity); W (global response); D (detail); Dd (unusual detail); *PSV* (perseverance); M (human movement); *DQv (vague responses); DQ+ (synthesized responses); X-% (responses with distorted form); Xu% (unusual form); X+% (conventional form); XA% (appropriate form with minimum distortions); WDA% (sum of XA% in W and D, excluding Dd); S- (distorted form with inclusion of white space) P (popular responses); MOR (morbid content) a (active movement) p (passive movement); 2AB+(Art+Ay), (index of intellectualization); Sum6 (critical special codes); WSum6 (weighted sum of special codes); M-, (human movement with distorted quality of the form); Mnone (formless human movement); Obs: Qualitative interpretation: * Difference in the retest; ↑ or ↓ increase or decrease considering the normative table.*

RESULTS

First, the interview data and IHS 2-Del Prette are presented for each case. In IHS 2, the percentile indicators referring to the general scores and factors for each case are listed. Thus, the results of ZSC are displayed according to the groupings: Resources and Control; Affect (Table 1); Relationship; Self-image (Table 2); Cognitive Processing, Mediation and Ideation (Table 3). The data are presented and discussed according to the different interpretations of ZSC between the test phase (2009) and the retest phase (2019) of each case. Interview data and previous Social Skills Inventory (IHS-Del Prette) in current versions (IHS 2-Del Prette):

Case A: Male. Elementary School - from the countryside, worked in agricultural service and took care of animals. First application (2009): 39 years old, commerce clerk, lower middle class, first marriage, four children. Stressful situation: marital quarrels and financial difficulties. Second application (2019): 49 years old, head of commercial sector, middle class, second marriage. Stressful situations: A son got involved with illicit drugs and car theft in the past two years.

The overall social skills score on IHS2 was lower in the test (I), and increased to the average in the retest (M). Thus, F1 (MI), F3 (I), and F5 (I) exhibited an increase in retest,

being F1 (MS), F3 (MI), and F5 (MS). F2 was elaborated (S), decreased (MI), and F4 (M) remained the same in the retest.

Case B: Male. Finished high school - First application (2009): 32 years, commerce clerk, first marriage, one son. Lower middle class. Stressful situation: alcoholic father, marital quarrels. Second application (2019): 42 years old, head of commercial sector, middle class, second marriage. Stressful situations: lost his brother three years earlier in a car accident and his mother two years ago due to health problems; alcoholic father. Practices martial arts and gaucho dances.

The overall score on IHS2, which was above average (MS), slightly decreased on the retest (M) and remained average. Thus, F3 was elaborate (S), showed a decrease (M), but F2, F4, F5 were elaborated (S) and F1 low (I) remained the same.

Case C: Female. Finished high school - First application (2009): 42 years old, commerce clerk, married, two children, lower middle class. Stressful situation: death of her father. Second application (2019): 52 years old, commercial supervisor, two children, three grandchildren, middle class. Stressful situations: supports the family financially and with care for her grandchildren; husband was unemployed for three months.

The overall social skills score on IHS2 was lower in the test (I) and increased to the average in the retest (M). Particularly F2, F3 and F4, which were lower (I), increased and reached the average (M). F5 remained low (I).

Case D, Female. Finished high school - First application (2009): 18 years old, commercial operator, single, lived with her sister, lower middle class. Stressful situation: leaving the countryside and coming to live in the city to work, living away from her parents. Second application (2019): 27 years old, married, head of the commercial sector in a shop, one son, middle class. Stressful situations: family conflicts; financial problems with the sister.

The overall social skills score on IHS2 was low (I) and remained the same on the retest (l). Thus, F1 (MI) and F4 (I) remained the same. But F2 (I) and F3 (MI), which were low, increased and reached the average (M), while F5, which was slightly below-average (MI), showed a drop (I).

Table 1 below shows ZSC scores (test-retest) compared to Brazilian norms for non-patients, in the groupings of the Resources and Control and Affect variables.

On the test-retest (2009-2019), in Case A and B, variables with the results superior (FM; es; Adjes) and inferior to the normative average (D-score; AdjD) remained similar. In Case A, the variable pure form (F%) continued to be inferior. In case B, other variables continued slightly higher (FC, S). In case D, the variables that were increased in the test (EA, D-score, AdjD) showed equal results in the retest.

On the retest (2019), Cases A and B presented an increase in the number of responses (R), which were above the average. In Case A, the variable inanimate movement decreased (m), reaching the normative mean, no color-form responses were given (CF) and the style of experience changed from

extrovert to introvert (EB), the variable white space (*S*) decreased, showing itself average. In Case B, there was no diffuse shading (Sum Y). In case C, the percentage of form decreased (F%) and reached the normative mean; the variables stimulation felt increased (es/Adjes) and negative results were found for the D-score (D score/Adj D). Case C presented no white space (S), but pure achromatic color (C'). In case D, there was inanimate movement (m) and there was no diffuse shading (Sum y).

Considering the four cases, there were interpretative changes in the variables (S, SumY, m n=2), (R, EB, F%, es/Adjes, D-score/AdjD, CF, SumC´ n=1) and no interpretative changes (EA, FM, FC, C, Afr, Blends:R, CP, WSumC n=0). Table 2 below shows ZSC scores (test-retest) compared to the Brazilian norms for non-patients, in the groupings of the Relationship and Self-image variables.

On the test-retest (2009-2019), in Case A, the variables with the results superior (AG; PHR, MOR, SumT) and inferior (GHR) to the normative average remained similar. In case Case B, other variables (FD, SumT, AG) were again present. In case D, the index of egocentrism [3r+(2)] remained above average.

On the retest (2019), in Case A, the variables personal knowledge Justification (PER), Isolation (Isolate), Form-Dimension (FD), Vista sum (SumV) and egocentrism index [3r+(2)] increased with above-average results; the results of human content responses changed [H<(H)+Hd+ (Hd), H>(H)+Hd+(Hd)].

In Case B, the variables of poor human representation, the sum of human responses and of vista shading decreased (PHR, SumH, SumV) and the responses of good human representations increased (GHR, H:(H)+Hd+(Hd)] reaching the normative average. The sum of anatomy and X-ray content responses increased, reaching above-average scores (An+Xy). In Case C, the isolation (isolate) increased, reaching parameters above the normative average. The Form-Dimension, sum of human responses (FD, SumH), only occurred in the retest and the results of the egocentrism index increased, reaching parameters above the normative average [3r+(2)]. In Case D, the Form-Dimension responses did not occur in the retest (FD).

There were interpretative changes in the variables (FD n=3); (H:(H)+Hd+(Hd, SumH), Isolation, SumV n=2); (An+Xy, PER, GHR, PHR, (3r+(2) n=1) and no interpretative changes for (AG, COP, Food, SumT PureH, MOR, Fr+rF n=0). Table 3 shows ZSC scores (test-retest) in comparison with the Brazilian norms of non-patients, in the groupings of variables of the cognitive triad (cognitive processing, mediation and ideation).

On the test-retest (2009-2019), in Case A, the variables that were superior (W, X-%, Xu) and inferior (P, X+%) to the normative average remained similar. In Case B, the usual detail variable (D) continued above average. In Case C, the unusual form (Xu%) continued to slightly increase. In Case D, the response with perseverance continued (PSV).

On the retest (2019), in Case A, the usual detail responses (D) and synthesized responses (DQ+) increased, scoring above the normative average. Human movement responses (M) emerged and no intellectualization responses [2AB+(Art+Ay)] were noted in the retest. In Case B, there was an increase in global responses (W), of unusual detail (Dd), and responses of unusual formal quality (Xu%) remained above average. The adequate form responses (XA% and WDA%) increased, while the distorted form (X-%), distorted form including white space (S-), sum of weighted responses of critical special codes (WSum6) decreased and were average on the retest.

In Case C, there was an increase in the number of responses located on the whole and in parts of the blot, (WDA%), and a decrease in the proportion of differences in the active and passive movement responses (a:p), which resulted in a<p. In Case D, there were no responses of vague evolutionary quality (DQv).

There were interpretative changes in variables (WDA% n = 2); (D, DQ+, Mp, W, Dd, DQv, XA%, Xu% X-%, S-, a:p, 2AB+(Art+Ay), Sum6/WSum6 n = 1) and no interpretative changes for (Zf, PSV, P, X+%, M-, Mnone, CP n = 0).

DISCUSSION

The objective of this study was to verify the reliability of ZSC over 10 years (2009-2019) through test–retest, as well as to check the results obtained with the personality characteristics of four non-patient individuals. In the discussion of the results, first, the groupings of ZSC variables will be considered, as demonstrated by interpretative differences in relation to the normative data and between the test (2009) and retest (2019) of each Case. Next, the results of ZSC are discussed in relation to the interview and IHS2, considering the agreements and disagreements found and the context of the findings, in line with Bornstein's (2017) recommendations for multimethod assessment procedures.

ZSC grouping Resources and Control (Table 1) demonstrates individual's possibilities available to his/her use, formulate decisions and face any increased discomfort (Exner Jr., 2003). The variables in the Affect grouping grant the necessary dynamism for mental functioning and intervene in the formulation of judgments and decision making (Villemor-Amaral & Primi, 2009). In Cases A and B, on test-retest (2009-2019), the variables that were superior (FM, es/Adjes) and those that were inferior to the normative average (D-score/ AdjD) remained similar at both moments, suggesting concentration difficulties and demanding greater than the capacity of implementation (Villemor-Amaral & Primi, 2009). At both moments (2009-2019), Case A showed openness to the experience (F%) and Case B affective characteristics, anxiety (FC; S) and high productivity (R).

These first results seem to demonstrate personality traits in Cases A and B, anxiety, unmet needs and affective tensions. It is noticed that, even ten years after the first evaluation, they showed no changes in the variables that indicate the presence of these characteristics in the behavior. Thus, research is based on the hypothesis that individuals present clearly preferred response styles, which are manifested in most of their responses, and that evidence of such response styles should appear consistently in the course of repeated applications (Exner Jr., 1986). The es variable, for example, indicated stability in the study by Sultan and Meyer (2009), even in protocols affected by extended responses.

In the retest (2019), Case A presented increased productivity and motivation (R), beyond the normative average. In Case B, this variable was already increased in the test and followed this upward course in the retest. Also, Case A presented a decreased feeling of impotence towards unpleasant events (m) and anxiety (S), going from extrovert to introvert (EB, CF), denoting a more contemplative and rational attitude. In Case B, which had shown increased anxiety related to affective tensions (SumY) in the test, this variable decreased to the normative average in the retest. About these findings, studies using RSC indicate that the variables of inanimate movement (m) and diffuse shading (Y) are less consistent over time and indicate state characteristics (Exner Jr., 1986; Gronnerd, 2003; Hartmann et al., 2013). On the other hand, CF variable seems to be predominantly trait, but with a state component (Exner Jr., 1986) that is, it presents moderate stability,. although the number of responses (R) is considered stable (Exner Jr., 1986; Sultan et al., 2006; Villemor-Amaral et al., 2009).

The data found in this study seem to point to the participants' professional development (Case A and Case B), engagement and skill of the participants in performance tasks, considering that, over 10 years, they began to occupy professional positions with greater responsibilities (sector head). At a second time, individuals may have produced more in ZSC and presented protocols with a higher number of responses (Villemor-Amaral et al., 2009). In this sense, studies raise the possibility of control for the number of responses in the use of Zulliger (Gonçalves et al., 2019; Villemor-Amaral et al., 2016).

In Case C, there were interpretative differences regarding stress control and tolerance. Variables that scored the normative average in the test (es/Adjes, D-score/AdjD, F%) were below average in the retest. Although these variables have demonstrated stability over time in previous studies (Exner Jr., 1986; Sultan & Meyer, 2009), the findings of this study may derive from the emergence of situations and needs that may have led to emotional instability (care for grandchildren, spouse's debt). Also, Case C may have

been less defensive (F%) in the retest, and anxiety (S) may have gained the form of feelings of sadness (C´). In case D, there were changes from emotional to ideational discomfort, (Sumy, m) but the variables that were above average in the test (EA, D-score/AdjD) remained the same in the retest. The results seem to show personality traits, linked to the ability to control and tolerate stress. According to Exner Jr. (2003) and Exner Jr. et al. (1978), in a retest, the selection of answers that are given seem to indicate more than a simple recall, but the repetition of the characteristic personality functioning.

As it can be observed, in the grouping Resources and Control, of the 44 different possibilities (eleven variables and four cases) there were interpretative changes in nine possibilities (20%), namely in Case A (R, m, EB = 27%); Case B (SumY = 9%); Case C (F%, es/Adjes, D-score/AdjD = 27%); Case D (SumY, m = 18%). For variables that indicated relations with issues of behavioral and situational changes that occurred over time, personality traits in this grouping remained between 73% and 100%. In the Affect grouping, of the 36 possibilities (nine variables and four cases) there were interpretative changes in four situations (11%), in Case A (CF, S = 22 %) and Case C (S, C'= 22%). The personality traits in this grouping remained between 78% and 82%.

The grouping of Relationship variables is the field of interactions and relationships with others; on the other hand, the grouping of Self-image represents value elements that the person has about himself (Villemor-Amaral & Primi, 2009). In the test-retest (2009-2019), Case A indicated difficulties in interpersonal relationships, confusing representations, feelings of sadness, affective lack and need for self-affirmation (AG, PHR>GHR, MOR SumT, PER). These results may be due to traces of their mental functioning, which are manifested in everyday life situations (marital quarrels and financial difficulties/pretest; difficulties with the child/post-test). Hartmann et al. (2013) consider, for example, that the MOR variable indicates depressive signs and has moderate temporal stability.

In the retest (2009), in Case A, the presence of isolation, and use of more authoritarian defense towards difficulties (PER) are observed. In this line of thought, considering the self-image, Case A indicated less fearful interest in people [H>(H)+Hd+(Hd)], increased introspection, self-criticism and self-concern [FD, SumV, (3r+(2)], aspects that seem to meet his conflictive state, as well as the signs of introversion (EB) previously reported. Nevertheless, Exner Jr. (1986) considers that the variables isolate, Sum V and 3r+(2) possess high temporal stability, so the increase of these variables may also derive from the increase in the number of responses (R) occurred in Case A. In the study by Sultan & Meyer (2009), productivity was relevant, negatively affecting the temporal stability of the scores.

In the test-retest (2009-2019), Case B showed signs of introspection, aggressiveness, affective lack and concern with self-image (FD, AG, SumT, An+Xy). These data indicate characteristic traits of his behavior, that is, the presence of anxiety and discomfort, verified in the Relationship and self-image group, seems to be linked to assertiveness, bodily concerns and affective introspection (alcoholic father and loss of mother due to health problems). In the retest (2019), Case B showed less interest in interpersonal contacts (Sum H) and increased body concern , but these relationships were less conflicting [PHR,GHR, H:(H)+Hd+(Hd)] and did not show negative self-criticism in the retest (SumV). These results seem to indicate the state of movement of Case B towards sublimation behaviors (martial arts and gaucho dances) and selectivity in interpersonal relationships. In this sense, according to Villemor-Amaral et al. (2009), the variables [H:(H)+Hd+(Hd)] present moderate stability, with some state components.

At both moments of the evaluations (2009-2019), Cases C and D showed signs of social isolation. This result shows that the participants' relational interests are more restricted and corroborate everyday situations, reported in the interview as maternal care, care for the household and the husband. Particularly Case D presented concern with her own needs [3r + (2)], data that denote a characteristic trait of being more with oneself.

In the retest (2019), Case C denoted signs of reflection (FD), increased concern with oneself [3r+(2)] and isolation, but also fearful interest in people (Sum H). These interpretative data seem to signal the internalization of the already reported affects (Sum C'), but also the desire to look at themselves with a fearful perspective of expanding their relationships. The findings by Gronnerod (2003) should be highlighted here, which show the possibility of individual variability in the test-retest analyses, which goes by unnoticed in the group.

In the Relationship grouping, out of 40 possibilities (ten variables and four cases), interpretative changes happened in seven situations (17.5%): in Case A (PER, Isolation = 20%); Case B [GHR, PHR, SumH = 30%]; Case C (SumH, Isolation = 20%). The personality traits in this grouping remained between 70% and 100%. In the Self-image grouping, of the 28 possibilities (seven variables and four cases), there were interpretative changes in eight situations (29%): in Case A [H:(H)+Hd+(Hd); FD; SumV; (3r+(2) = 57%]; Case B [H:(H)+Hd+(Hd); SumV = 29%]; Case C (FD = 14%); Case D (FD = 14%). The personality traits in this grouping remained between 43% and 86%.

The Cognitive Triad grouping consists of information processing, mediation and ideation. This grouping consists of variables that inform how the individual incorporates information, how he perceives reality, and organizes his thoughts (Exner Jr., 1999). At both moments (2009-2019), Case A demonstrated leadership characteristics, analysis-synthesis skills and creativity above the normative average (W, DQ+). He also presented difficulties in relation to mediational aspects, perceiving reality in a more idiosyncratic manner (X- %, Xu%), and with low social adequacy (P, X+%). This information signals the particularities of his behavior. In

the retest (2019), Case A demonstrated increased practicality and logical reasoning (D, DQ+), presence of empathy (M) and decreased intellectualization [2AB+(Art+Ay)]. These data suggest portraying aspects of the current moment in his professional life (occupation of leadership position), although these variables are considered highly stable over time [M and 2AB+(Art + Ay)] by Exner Jr. (1986) and variable D is considered stable by Villemor-Amaral et al. (2009).

In the test-retest (2009-2019), Case B maintained behavioral characteristics of practicality and efficiency above the normative average (D). In the retest (2019), the person signaled leadership capacity, concern with details (W, Dd, Xu%) and more appropriate perception of the facts (XA%, X-%, WDA%, S-, WSum6). These data seem to reflect the current state of Case B, his engagement in his leadership assignments and social adequacy.

In case C, in the retest (2009), there was evidence of greater conventionality, passivity (WDA%, a < p). In the test-retest (2009-2019), perseverance (PSV) was present in Case D, indicating a possible rigid processing. In the retest (2019), however, the results suggest less problem-solving difficulties (DQv). Therefore, in the Cognitive Triad, of the 88 possibilities (22 variables and four cases) listed, changes occurred in 14 situations (15%): in Case A [D, M, DQ+, 2AB+(Art+Ay) = 18%]; in Case B (W, Dd, Xu%, WDA%, XA%, X-%, WSum6 = 27%); in Case C (WDA%, a:p = 14%); in Case D (DQV = 4.5%). The personality traits in this grouping remained between 73% and 95,5%.

In short, considering the four cases, there were interpretative changes in the ZSC variables (FD n = 3); [S, m, SumY, SumH, Isolation, SumV, H:(H)+Hd+(Hd), WDA% n = 2]; [R, EB, , F%, es/Adjes, D-score/AdjD, CF, SumC′, PER, GHR, PHR, (3r+(2), An+Xy, D, DQ+, M/Ma:Mp, W, Dd, DQv, XA%, Xu%, X-%, S-, a:p, 2AB+(Art+Ay), Sum6/WSum6 n = 1]. There were no interpretative changes in the ZSC variables (EA, FM, FC, C, Afr, Blends:R, CP, WSum C, AG, COP, Food, SumT, PureH, Fr+rf, MOR, ZF, PSV, P, X%, M-, Mnone, n = 0).

Case A, at the two moments (2009-2019) ZSC was applied, denoted problems of stress control and tolerance, concerns with self-image (FM, S, es, Adjes, F%; D score; AdjD, An+Xy), Relationship and social adequacy difficulties (SumT, PHR, X-%, Xu, P, X+%). The person presented leadership and creativity (W, DQ+), characteristics that may have granted conditions to develop social skills resources, which was lower in the test (2009) using IHS2 and average in the retest (2019). In this line of reasoning, the retest (2019) demonstrated increased productivity, motivation, practicality, introspection ability, empathy and concern with oneself [R, D, FD, M, [H>(H)+Hd+(Hd), 3r+(2)], less feelings of impotence and intellectualized defenses [2AB+(Art+Ay), m] which may have culminated in the increase in the social skills repertoire, becoming satisfactory and providing balance between resources and deficits.

Also, in Case A, the signs of social withdrawal, negative self-criticism and authoritarian defenses (isolation, EB, SumV, PER) signaled in the retest of ZSC (2019), denote corroborating indicators of need for social adjustment in IHS2 (Expression of positive feeling; Sexual-affective approach). Thus, of the 59 variables listed in ZSC, Case A had interpretative modifications in 15 (25%) of the variables [R, m, S, EB, CF, PER, Isolation, [H>(H)+Hd+(Hd), D, M, DQ+ 2AB+(Art +Ay), FD, 3r+(2), SumV] over 10 years, demonstrating that around 75% of his structural personality characteristics continued.

In Case B, the difficulties of Stress control and tolerance and the concerns with Self-image presented in the test-retest using ZSC (FM, es/Adjes, F%, D-score/AdjD, An+Xy, S) seem to corroborate the deficits indicated in IHS2 for assertive conversation (F1). Nevertheless, the affective characteristics, productivity, practicality, and reflection, suggested in ZSC (FC, R, S, D, FD), denote clarifying the resources in the Sexual-affective approach (F2), Self-control coping (F4) and Social resourcefulness (F5) skills of IHS2.

Furthermore, in case B, in the retest (2019) of ZSC, anxiety related to affective tensions, negative self-criticism (S-, SumY, SumV) and interest in personal contacts decreased (Sum H). Nevertheless, the relationships were less conflicting [PHR, GHR, H: (H) +Hd +(Hd)]. There was an increase in leadership, concern with details and more adequate perception of the facts (W, Dd, Xu%, XA%, X-%, WSum6). On the opposite, in IHS2, the expression of positive feelings (F3), which was highly elaborated in the test (S), was satisfactory in the retest. The negative self-criticism and some perceptual difficulties in the test stage of ZSC (2009) may have favored the social desirability and distorted self-perception related to the expression of positive feelings and interpersonal relationships.

Case B presented interpretative modifications in 14 (24%) of the variables [SumY, GHR, PHR, SumH, H:(H)+Hd,+(Hd), W, Dd, Xu%, XA%, X-%, S-, WSum6, SumV, An+Xy]. This means that 76% of them showed stability over the 10-year period. In this sense, the results of IHS2 also corroborated the findings of ZSC.

On the test-retest, Case C presented signs of social isolation in ZSC, supporting the continuation of social resourcefulness deficits, as appointed in IHS2. In the retest (2019), she showed signs of reflection (FD), increased concern with oneself [3r+(2)], but also interest in people, flexibility and social adequacy in the use of their leadership assignments (Sum H, F%, WDA%). These data may have contributed to gain resources in the social skills related to the Sexual-affective approach, the Expression of positive feelings and Self-control of coping.

Although ZSC points to decreased Control and tolerance to stress, signs of sadness and passivity (es, Adjes, D-score and AdjD, C′, a < p), the data are possibly associated with the movement of introspection (FD) and the need for personal,

social and professional development. Therefore, Case C presented interpretative modifications in 12 (20%) of the variables (es/Adjes, D-score/AdjD, F%, S, SumC′, SumH, isolation, WDA%, a:p, FD), demonstrating temporal stability in 80% of its characteristics.

In Case D, the retest (2019) of ZSC denoted less elusive and immature cognitive functioning (DQV). This seems to have contributed to the results of the sexual-affective approach/F2 and positive feelings expression/F3 skills in IHS2 (from a lower to a satisfactory repertoire) and seems to corroborate the new marital and maternal status. Social resourcefulness/F5, however, which scored a lower average on the test, dropped on the retest, reaching unsatisfactory results, which may be related to the decrease of reflection signs in ZSC (FD). Thus, Case D presented interpretative modifications in four (7%) of the variables (m, SumY, DQV, FD) in ZSC, demonstrating that personality traits remained around 93%. Case D seems to present a more orthodox and less spontaneous or flexible personality structure, an aspect in line with the findings of IHS2 and with the person's professional history, but also with high control and tolerance to stress (EA, D-score, AdjD).

As it can be observed, the complementarity between the results of the instruments points to a more complete picture of the individual, which can reveal specificities of the inner world and enhance the results obtained through self-reports (Bornstein, 2017; Meyer, 2017). The sensitivity of an instrument can capture changes in the characteristic functioning of the personality (Exner Jr., 2003; Exner Jr. et al., 1978; Villemor-Amaral et al., 2009). Thus, the mental health conditions, personality and emotional state characteristics (Grazziotin & Scortegagna, 2018; Miguel et al., 2017; Perreault et al., 2020), the resources or deficits of social skills and emotional support (Mathieu et al., 2019; Perreault et al., 2020) can be better assessed and directed towards personal and professional development.

The results are promising, demonstrating temporal stability for most of ZSC variables after 10 years of testing, considered a long time and more difficult for personality characteristics to continue. Also, the results covered the specificities of the type of variable related to the inkblot test (stable/trait; unstable/state). The interpretation of the findings gained strength in the integration of data related to the interview and the additional use of self-report tests (IHS 2-Del Prette), which may enhance the awareness about the impact of assumptions, stereotypes, and other sources of bias not declared in the evaluation results (Bornstein, 2017).

Although favorable, the results on the reliability of ZSC in this study come with limitations and should be restricted to the research sample. Therefore, the changes found in the study participants' personality characteristics should also be understood according to the uniqueness of each case. Therefore, the expansion of this study is strongly recommended, observing interdependence of the variables, using a more representative sample number of non-patients, in addition to other studies that include clinical samples and that aim to optimize the number of Zulliger responses.

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