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Research Article

Evaluation of Quality Of Life, Mental Health, Psychological and Neuro-Cognitive Aspects in Young Women Living with HIV Infection: Parallel between Vertically and Behaviorally Acquired HIV Infection

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Abstract

High rates of psychological and psychiatric disorders have been documented in both perinatally (PHIV) and behaviorally (BHIV) acquired HIV adolescents, that can considerably influence their quality of life (QoL) and mental health. Few data are available among HIV-infected adolescents and even fewer among infected women, although they should deserve special attention due to the high incidence rate identified in recent years and the discrimination they suffer. We implemented a cross-sectional study among 22 young women, aged between 15 and 35 years, with HIV infection, evaluating their quality of life (WHOQOL-HIV-BREF), cognitive performance (Wechsler Adult Intelligence Scale), and personality profile (Rorschach Test), focusing on specific subgroups, in order to implement more effective models of HIV care and targeted interventions focusing on subgroups and their particular needs. Most subjects reported a good (45%), or a very good (36%) quality of life, and a very good satisfaction with their health status (68%), however 50% of our cohort reported stigma-related experiences, with no differences between BHIV and PHIV, (p=0.26). Assessment of the Intelligence Quotient showed no difference between the two groups: 86.5 (IQR 79-95) for PHIV versus 92 (IQR 83-97) for BHIV, (p=0.45). On the other hand, Rorschach Test showed for BHIV higher trends of emotional constriction and higher levels of anxiety, (p=0.047), an infantile organization of personality, (p=0.014), a dysfunctional perception, (p=0.07), a poorer control over action, (p=0.021), and a less controlled emotional discharge, (p=0.035). PHIV reported higher fear of disclosing their status to partners, with consequent lower satisfaction in sexual life, (p=0.046). Finally, both groups reported high rates of Depression index itself, with a higher trend in BHIV, (BHIV 75%, PHIV 43%, p=0.15). Our study offers some initial basis, indicating that these patients may truly benefit from integrated mental health evaluations and interventions focused on psychological tuning and on specific subgroups needs.

Keywords: Adolescents and young women; PHIV; BHIV; Quality of life; Mental, sexual, and reproductive health

Abbreviations: ART: Antiretroviral Therapy; BHIV: Behaviorally or Horizontally Acquired HIV; CDI: Coping Deficit Index; EB: Experience Balance; HIV: Human Immunodeficiency Virus; IQ: Full-Scale Intelligence Quotient; IQR: Interquartile Range; PHIV: Perinatally Acquired HIV; PRI: Perceptual Reasoning Index; PSI: Processing Speed Index; QoL: Quality of Life; S-CON: Suicide Constellation Index; SD: Standard Deviation; VCI: Verbal Comprehension Index; WAIS: Wechsler Adult Intelligence Scale; WHOQOL-HIV-BREF: World Health Organization Quality of Life HIV-BREF; WMI: Working Memory Index

Introduction

In 2019, incidence of new HIV infections was the lowest since 1989: globally, 1.7 million new cases/year, marking a decline of 23% since 2010 [1]. Despite progress in reducing HIV infections, girls are still incredibly affected: in Africa, three out of five new HIV infections in 2019 were among women with a 2.5 times higher probability than their male peers. Nowadays, the advent of Antiretroviral Therapy (ART) has made HIV infection a potentially chronic condition, with a consequent increase in prevalence, for a total of 38 million people living with HIV, of which 19.2 million are women over the age of 15 and 2.8 million adolescents (10-19 years) [2]. Although most adolescent cases are currently represented by perinatal or vertical infection (PHIV), thanks to efforts to improve pediatric diagnosis and access to care, there is still an increasing population of acquired HIV behaviorally or horizontally (BHIV) [3]. High rates of psychological and psychiatric disorders have been documented in both PHIV and BHIV adolescents [4-6]. In fact, despite a significant decline in the incidence of severe HIV-associated neurocognitive disorders, youth may still experience neurocognitive and psychological problems that can considerably influence their Quality of Life (QoL) and social relationships [7-9]. Indeed, QoL is a concept that has become a relevant outcome in clinical practice of chronic health conditions and an important tool in HIV treatment [10]. However, few data are available on QoL and mental health among HIV-infected adolescents and even fewer studies focus expressly on infected women. A targeted management on mental health in PHIV and BHIV patients, would increase awareness and would improve, in clinical practice, the doctor-patient relationship, engaging both vulnerable individuals and their providers in integrated care models [11]. It is recognized that optimal HIV care for different groups of adolescents and people living with HIV varies according to the mode of transmission, age, gender, and social factors. Each group with its specific needs should be considered separately and should receive a full, accessible, and appropriate service, including referral to sexual, reproductive, and mental health services according to WHO guidelines [12,13]. Here we report the preliminary results of our study, whose purpose is to evaluate the perceived QoL of women living with HIV, using WHO Quality of Life HIV-BREF (WHOQOL-HIV-BREF), their

cognitive performance, with Wechsler Adult Intelligence Scale (WAIS), and their personality profile, with Rorschach assessment system. Finally, we compare these psychological and neuro-cognitive aspects in two population of young women: BHIV and PHIV, in order to implement more effective models of HIV care and targeted interventions focusing on subgroups and their specific needs.

Materials and Methods

We implemented a cross-sectional study among adolescents and young women living with HIV infection, referring to the Infectious Diseases Outpatients Service at Luigi Sacco University Hospital in Milan. This study was approved by the ASST-FBF-Sacco Institutional Review Board, and it is conformed to the principles embodied in the Declaration of Helsinki. Subjects were eligible if female, aged between 15 and 35 years, with good knowledge of the Italian language, HIV infected, in ART therapy for at least 12 months and without neuropsychiatric disorders. Before study enrolment, all patients underwent a regular clinical visit during which the project was explained, and informed consent was obtained. Study participation was completely voluntary. During the visit, the routine clinical evaluation was performed with the detection of immunovirological parameters: HIV-RNA (lower limit of 37copies/ml) and CD4+ T cells.

Psychological evaluation

Each patient underwent a structured psychological assessment with an experienced psychologist, specialized in the management of chronic diseases and HIV, to confirm the absence of evident neuropsychiatric disorders for the enrolment.

Questionnaires

Patients were asked to complete two questionnaires regarding their perception of QoL. The first was a tool validated by the World Health Organization (WHO) for the assessment of the QoL for people living with HIV proposed in the short version, WHOQoL-HIV BREF, which produces a quality-of-life profile [14,15]. It is possible to derive six domain scores, 29 facet scores, and one general facet score that measures overall quality of life and general health; domain scores range between 4 and 20. The six domain scores denote an individual's perception of quality of life in the following domains: Physical, Psychological, Level of Independence, Social Relationships, Environment, and Spirituality. The second questionnaire derives from the review of others already validated questionnaires (WHOQoL-HIV; the Medical Outcomes Study HIV Health Survey (MOS-HIV); The Sexual Quality of Life–Female (SQOL-F) questionnaire) and from the addition of some more specific items, to collect socio-demographic and clinical data (marital status, education, employment, year of transmission, sexual life, relationship with partner and family and perception of stigma HIV related) [16,17].

Wechsler Adult Intelligence Scale

The Wechsler Adult Intelligence Scale (WAIS IV), a measure of general intellectual ability, is one of the most used assessments

of cognitive abilities in people aged 16 to 90. Evaluations took approximately 1 hour per participant. We refer to the WAIS IV [18-22]. The total scale is composed by 15 subtests, of which we focused on the 10 main ones, fundamental to define the five-composite index: Verbal Comprehension Index (VCI), Perceptual Reasoning Index (PRI), Working Memory Index (WMI), Processing Speed Index (PSI), and Full-Scale Intelligence Quotient (IQ). Scaled scores are derived for each subtest and standard scores are derived for each composite score. The 10 subtests are scored on scale from 1 to 19 with a mean of 10 and a Standard Deviation (SD) of 3, while the five-composite index has a range of 50-150, a mean of 100, and a SD of 15.

Rorschach test

The personality profile of patients was assessed through the Rorschach test, based on the human tendency to project feelings onto ambiguous stimuli, like inkblots. We used ten official inkblot cards: five with black ink on white background, two with both black and red ink, and three multi-colored. Data were analyzed through CHESSSS, an open-source software developed by members of the Comprehensive System International Rorschach Association for the scoring and computing of the Rorschach Comprehensive System, and Supplementary Scales [12]. Currently, the Rorschach Comprehensive System (CS) has been established as the most popular scoring method in terms of standardized administration rules, high inter-rater and test–retest reliability, and high statistical construct validity [23]. As per this system, we considered a protocol valid when subjects answered to ≥ 14 cards and no cards were rejected. For the interpretation we referred to the normative samples identified by Exner [24].

Statistical analysis

Descriptive statistics were first performed to explore the demographic and HIV-related characteristics of the samples and reported as a mean with SD or median and Interquartile Range (IQR), according to their distribution. CD4 count was stratified into three groups: <200 cells/mm^3, 201-499 cells/mm^3, >500 cells/mm^3. Cognitive performance differences were first assessed by calculating the difference in the mean or median of all tool scores between the PHIV and BHIV cohorts, using Fisher's exact test for categorical variables and ANOVA test for continuous variables. All statistical analysis were performed using Stata version 16.1., (StataCorp, College Station, Texas).

Results

Patients' characteristics

We proposed this study to 42 patients aged between 15 and 35 years, of whom 28 PHIV (67%) e 14 BHIV (33%). In total, 22 (56%) patients were included in this preliminary study, of whom 14 (64%) PHIV and 8 (36%) BHIV. In fact, of the 28 PHIV patients, 3 didn't sign the consent, 7 refused psychological evaluation, 2 dropped out because of COVID emergency, and 2 were excluded because of already diagnosed neuropsychiatric disorders. Similarly, of the 14 BHIV patients, 9 (64%) adhered, of whom 1 subsequently withdrew her consent, and 5 refused psychological evaluation.

The mean age was 28.4 ($\pm$5.5) years in BHIV group and 26.2 ($\pm$5.1) in PHIV cohorts (Table 1). In terms of clinical characteristics for the CD4 T cells count, most participants (55%) had more than 500 cells/mm^3. The viral load was undetectable for 20 (90%) participants, detectable for 1 (5%), and more than 100,000 copies/ml for 1 (5%) patient.

N (%)		Total	Horizontally acquired	Vertically acquired	p-value
		22 (100)	**8 (36)**	**14 (64)**	
Age, years means ($\pm$SD)		27 (5.2)	28.4 (5.5)	26.2 (5.1)	0.37
Birthplace, N (%)	Not in Italy	3 (14)	1 (13)	2 (14)	0.91
	Italy	19 (86)	7 (88)	12 (86)	
Education, N (%)	Secondary school	1 (5)	1 (13)	0 (0)	0.24
	University	19 (86)	7 (88)	12 (86)	
	Post-graduate	2 (9)	0 (0)	2 (14)	
Occupation, N (%)	Student	4 (18)	1 (13)	3 (21)	0.13
	Part-time	5 (23)	4 (50)	1 (7)	
	Full-time	12 (55)	3 (38)	9 (64)	
	Unemployed	1 (5)	0 (0)	1 (7)	
Marital status, N (%)	Single	8 (36)	0 (0)	8 (57)	0.034

	Married	4 (18)	1 (13)	3 (21)	
	Living as married	7 (32)	5 (63)	2 (14)	
	Separated	2 (9)	1 (13)	1 (7)	
	Divorced	1 (5)	1 (13)	0 (0)	
Cohabit, N (%)	Parents	6 (27)	1 (13)	5 (36)	0.11
	Alone	6 (27)	1 (13)	5 (36)	
	Partner	10 (45)	6 (75)	4 (29)	
HIV Transmission, N (%)	Sex with a man	7 (32)	7 (88)		
	Blood products	1 (5)	1 (13)		
Age at the diagnosis, years mean (±SD)		7 (8.8)	17.9 (4.1)	0.8 (0.7)	
Age at the communication, years mean (±SD)		14.2 (4.4)	17.8 (4.6)	12.3 (2.9)	
Viral load (cp/mL)	Undetected	20 (90)	8 (100)	12 (86)	0.53
	50 to 100000	1 (5)	0 (0)	1 (7)	
	>100000	1 (5)	0 (0)	1 (7)	
CD4 (n/mmc)	200-500	8 (36)	5 (63)	3 (21)	0.12
	500-1000	12 (55)	3 (38)	9 (64)	
	>1000	2 (9)	0 (0)	2 (14)	
Compliance, N (%)	Always	18 (82)	8 (100)	10 (71)	0.25
	Almost always	3 (14)	0 (0)	3 (21)	
	Sometimes	1 (5)	0 (0)	1 (7)	
Abbreviations: N: Number; SD: Standard Deviation; cp: copies					

Table 1: Sociodemographic and HIV-related characteristics.

Quality of Life

Overall, 8 (36%) patients indicated a very good QoL, of whom 63% PHIV, followed by 10 (45%) patients that stated they had a good QoL, of whom 70% PHIV. Moreover, most subjects (68%) reported a very good satisfaction with their health status (Table 2). Regarding the six domains, no statistically significant differences between PHIV and BHIV were found, probably due to the small sample size, and in all the domains values were found within the average for both PHIV and BHIV. The lowest score was obtained in the social relationship domain. The major differences between the two groups were observed in physical, psychological, and independence domains, where PHIV showed higher scores. In the physical domain, the median score was 16.5 (IQR 15-18) for PHIV versus 14 (IQR 11.5-15.5) for BHIV, (p=0.058); in the psychological domain, 16.5 (IQR 14-17) for PHIV versus 14 (IQR 11.5-15) for BHIV, (p=0.76). As regards level of independence 16.5 (IQR 14-17) for the PHIV versus 14 (IQR 11.5-15.5) for BHIV, (p=0.09). Results of the other domains were instead very similar between the two groups.

		Total	Horizontally acquired	Vertically acquired	p-value
N (%)		**22 (100)**	**8 (36)**	**14 (64)**	
How would you rate your quality of life? N (%)	Poor	1 (5)	1 (13)	0 (0)	0.58
	Neither poor nor good	3 (14)	1 (13)	2 (14)	
	Good	10 (45)	3 (38)	7 (50)	
	Very good	8 (36)	3 (38)	5 (36)	

How satisfied are you with your health? N (%)	Poor	2 (9)	1 (13)	1 (7)	0.88
	Good	15 (68)	5 (63)	10 (71)	
	Very good	5 (23)	2 (25)	3 (21)	
Physical, median (IQR)		16 (13-18)	14 (11.5-15.5)	16.5 (15-18)	0.058
Psychological, median (IQR)		14 (12-16)	15.2 (10.4-16)	13.2 (12-14.4)	0.76
Level of Independence, median (IQR)		15 (13-17)	14 (11.5-15)	16.5 (14-17)	0.099
Social Relationships, median (IQR)		12 (11-15)	13 (10-14.5)	12 (11-16)	0.97
Environment, median (IQR)		14 (13-15)	13.5 (11.25-15)	14 (13.5-15)	0.37
Spirituality, median (IQR)		15 (12-16)	15 (13-16)	14.5 (9-16)	0.78
Abbreviations: N: number; IQR: Interquartile Range.					

Table 2: WHOQoL-HIV BREF.

Stigma, relations, and emotions

Stigma-related experiences were reported by 50% of our cohort, with no differences between the two groups (p=0.26), although 3 PHIV patients preferred not to answer this question. Overall, most patients (50%) reported a neither poor nor good relationship's satisfaction, with 32% and 50% of patients that reported a neither good nor poor support from family and from friends, respectively. Regarding having one or multiple partners, 22% BHIV reported multiple partners versus 50% PHIV (p=0.058). The emotions reported during sexual intercourse were positive (peace and happiness) in basically all BHIV patients, while most (54%) PHIV reported negative emotions (fear, anxiety), (p=0.16). Again, data regarding the fear of transmission show lack or little concern in all BHIV patients, while 49% of PHIV report from moderate to extreme fear of transmission (p=0.27). As for the satisfaction of sexual life: 63% BHIV versus 7% PHIV stated a good satisfaction (p=0.046). Finally, only 2 (14%) PHIV had children versus 6 (75%) BHIV (p=0.024) (Table 3).

		Total	BHIV	PHIV	p-value
N (%)		**22 (100)**	**8 (36)**	**14 (64)**	
Stigma perceived, N (%)	Yes	11 (50)	4 (50)	7 (50)	0.26
	No	6 (27)	2 (25)	4 (29)	
	At the beginning	2 (9)	2 (25)	0 (0)	
	Not answered	3 (14)	0 (0)	3 (21)	
Family's support, N (%)	Very good	5 (23)	2 (25)	3 (21)	0.83
	Good	6 (27)	1 (13)	5 (36)	
	Neither poor nor good	7 (32)	3 (38)	4 (29)	
	Poor	2 (9)	1 (13)	1 (7)	
	Very poor	2 (9)	1 (13)	1 (7)	
Friend's support, N (%)	Very good	2 (9)	1 (13)	1 (7)	0.97
	Good	4 (18)	1 (13)	3 (21)	
	Neither poor nor good	11 (50)	4 (50)	7 (50)	
	Poor	2 (9)	1 (13)	1 (7)	
	Very poor	3 (14)	1 (13)	2 (14)	
Relationship satisfaction, N (%)	Very poor	2 (9)	1 (13)	1 (7)	0.61

	Poor	2 (9)	0 (0)	2 (14)	
	Neither poor nor good	11 (50)	4 (50)	7 (50)	
	Good	3 (14)	2 (25)	1 (7)	
	Very good	4 (18)	1 (13)	3 (21)	
Monogamy, N (%)	No	8 (38)	1 (13)	7 (54)	0.058
	Yes	13 (62)	7 (88)	6 (46)	
Is your partner aware? N (%)	No	7 (33)	1 (13)	6 (46)	0.11
	Yes	14 (67)	7 (88)	7 (54)	
Protected sex, N (%)	No	4 (19)	2 (25)	2 (15)	0.33
	Yes	14 (67)	6 (75)	8 (62)	
	Not answered	3 (14)	0 (0)	3 (23)	
Emotions about sexual life, N (%)	Fear	3 (14)	0 (0)	3 (21)	0.16
	Concern	1 (5)	0 (0)	1 (7)	
	Anxiety	3 (14)	0 (0)	3 (21)	
	Peace	10 (45)	6 (75)	4 (29)	
	Happiness	4 (18)	2 (25)	2 (14)	
	Missing	1 (5)	0 (0)	1 (7)	
Fear of transmitting the virus, N (%)	Not at all	4 (18)	3 (38)	1 (7)	0.27
	A little	10 (45)	4 (50)	6 (43)	
	Moderately	4 (18)	1 (13)	3 (21)	
	Very much	2 (9)	0 (0)	2 (14)	
	Extremely	2 (9)	0 (0)	2 (14)	
Influence on sexual life, N (%)	Not at all	8 (36)	6 (75)	2 (14)	0.049
	A little	5 (23)	2 (25)	3 (21)	
	Moderately	5 (23)	0 (0)	5 (36)	
	Very much	1 (5)	0 (0)	1 (7)	
	Extremely	2 (9)	0 (0)	2 (14)	
	Missing	1 (5)	0 (0)	1 (7)	
Sexual life satisfaction, N (%)	Very poor	2 (10)	1 (13)	1 (8)	0.046
	Poor	5 (24)	0 (0)	5 (38)	
	Neither poor nor good	8 (38)	2 (25)	6 (46)	
	Good	3 (14)	3 (38)	0 (0)	
	Very good	3 (14)	2 (25)	1 (8)	
	Missing	1 (5)	0 (0)	1 (7)	
Sons/Daughters, N (%)	No	14 (64)	2 (25)	12 (86)	0.024
	Yes	8 (36)	6 (75)	2 (14)	

Fear of vertical transmission, N (%)	A little	6 (27)	2 (25)	4 (29)	0.69
	Moderately	9 (41)	4 (50)	5 (36)	
	Very much	2 (9)	0 (0)	2 (14)	
	Extremely	5 (23)	2 (25)	3 (21)	

Table 3: Questionnaire.

Wechsler Adult Intelligence Scale

WAIS yielded no significant differences in the five-composite principal index among the two groups, although we observed a disparity especially in the Working Memory Index with a median of 97 (IQR 83-107.5) by BHIV versus 80 (IQR 72-94) by PHIV, (p=0.1), and in the Perceptual Reasoning Index with a median of 88.5 (IQR 87-92) by BHIV versus 94 (IQR 90-102) by PHIV (p=0.3). Assessment of IQ showed a slightly poorer performance by PHIV 86.5 (IQR 79-95) versus 92 (IQR 83-97) by BHIV, even not significant (p=0.45). Overall, all but 4 patients had an IQ score lower than the mean expected (Table 4).

	Total	BHIV	PHIV	p-value
N (%)	**22 (100)**	**8 (36)**	**14 (64)**	
Similarities, median (IQR)	9 (7-10)	9 (7.5-11)	9 (7-10)	0.6
Vocabulary, median (IQR)	8.5 (6-10)	9.5 (8-10)	8 (6-11)	0.47
Information, median (IQR)	7 (4-10)	7 (3.5-9)	7.5 (6-11)	0.51
Verbal Comprehension Index, median (IQR)	88 (78-102)	87 (81-98)	90 (76-104)	0.95
Block Design, median (IQR)	9 (7-10)	8.5 (7-9.5)	9 (7-10)	0.89
Matrix Reasoning, median (IQR)	10 (9-11)	10.5 (8-11)	10 (9-11)	0.94
Visual Puzzles, median (IQR)	8 (7-10)	7 (7-8)	9 (7-10)	0.12
Perceptual Reasoning Index, median (IQR)	91 (87-98)	88.5 (87-92)	94 (90-102)	0.3
Digit Span, median (IQR)	8 (6-10)	8.5 (6.5-11.5)	8 (5-9)	0.18
Arithmetic, median (IQR)	6 (5-10)	10 (5.5-11)	6 (5-8)	0.23
Working Memory Index, median (IQR)	84.5 (72-100)	97 (83-107.5)	80 (72-94)	0.1
Symbol Search, median (IQR)	8.5 (7-10)	8 (6.5-10.5)	9 (7-10)	0.45
Coding, median (IQR)	9.5 (8-12)	10.5 (9-11.5)	8.5 (8-12)	0.43
Processing Speed Index, median (IQR)	93.5 (89-103)	95 (89-107)	92 (89-103)	0.84
Full Scale IQ, median (IQR)	87.5 (79-95)	92 (83-97)	86.5 (79-95)	0.45
Abbreviations: N: Number; IQR: Interquartile range.				

Table 4: WAIS scale.

Rorschach test

Special index

The main difference among the two groups was found in the Coping Deficit Index (CDI). For CDI, a score greater than 4 signifies a deficit in coping abilities [24]. We found 50% of BHIV versus 0% PHIV with a CDI>4, reflecting an immature organization of the personality with repercussions in the interpersonal domain (p=0.014). For the Suicide constellation index (S-CON), interpreters are inclined to worry over protocols that have S-CON values of 8 [25]. We found that 25% BHIV patients had an S-CON>8 versus 0% PHIV, even though this difference was not significant (p=0.15). Furthermore, 50% BHIV and 14% PHIV had also a high Perceptual-ideational index, indicating dysfunctional perception and/or thinking (p=0.07). Both groups had high percentages of positive Depression index

(BHIV 75%, PHIV 43%, p=0.15).

Capacity for control and stress

We observed that 63% of BHIV versus 14% PHIV (p=0.047) had an achromatic colour (Sum C') >2, that suggest a tendency to emotional constriction and curbing painful feelings, associated with anxiety, sadness, and somatic symptoms disorders. This variable is mostly found in the protocols of depressed patients [26]. Moreover, we observed that 50% BHIV patients versus 7% PHIV (p=0.021) had a low Human Movement (M) response, that is generally an index of higher cognitive functioning and reveals information on the respondent's understanding and thinking about human beings and human relationships: a low value indicates poor control over action. Lastly, we observed a difference, even if not significant (p=0.089), in Experience Balance (EB) indicative of individual preference towards a particular problem-solving style. According to Exner, an Introversive tends to predominantly use inner psychological dynamics, the Extratensive uses the interaction between themselves and the world as the main form of fulfilment, while the Ambitent has no style of coping and may be more vulnerable to less effective solutions for stresses. We found out that most BHIV patients were introversive (25%) and Ambitent (25%), while PHIV were Ambitent (36%) and avoidant (29%).

Affect

The ratio of Form-Dominated Colour (FC: CF+C) provides a measure of the control over impulses. The left side is expected to be greater than the right side. In our cohort, we instead obtained CF>FC in 75% of BHIV versus 25% PHIV (p=0.035), indicating less self-controlled emotional discharge in BHIV group.

Self-perception

In this area we did not observe any statistically significant difference among the two groups. Although, we found that 63% in BHIV group and 43% in PHIV group had a low Egocentricity index (p=0.46), indicating low self-esteem, which may be a precursor of depression. Anatomy (An+Xy) is expected to be zero or one at most, while we observed a An+Xy >2 in 75% BHIV and 50% of PHIV subjects (p=0.25), indicating the possibility of bodily concern, which is easily seen in persons with a disease.

Interpersonal

In this area, there were no significant differences between the group. As for the Isolation index, if the index score is greater than 0.26, it suggests the person may have some troubles related to social isolation. We found it greater than 0.26 in 18% of our cohort (Table 5).

		Total	BHIV	PHIV	p-value
N (%)		**22 (100)**	**8 (36)**	**14 (64)**	
Special Index					
SCON-Suicide constellation, N (%)	Average	13 (59)	4 (50)	9 (64)	0.15
	High	7 (32)	2 (25)	5 (36)	
	Positive (SCON ≥8)	2 (9)	2 (25)	0 (0)	
PTI-Perceptual-ideational index, N (%)	Average	16 (73)	4 (50)	12 (86)	0.07
	High	6 (27)	4 (50)	2 (14)	
DEPI-Depression index, N (%)	Average	10 (45)	2 (25)	8 (57)	0.15
	Positive (DEPI ≥ 5)	12 (55)	6 (75)	6 (43)	
CDI-Coping deficit index, N (%)	Average	9 (41)	2 (25)	7 (50)	0.014
	High	9 (41)	2 (25)	7 (50)	
	Positive (CDI ≥ 4)	4 (18)	4 (50)	0 (0)	
HVI-hypervigilance index, N (%)	Negative	22 (100)	8 (100)	14 (100)	
OBS-obsessive style index, N (%)	Negative	22 (100)	8 (100)	14 (100)	
Capacity for control and stress, N (%)					
Coping style/Experience balance, N (%)	Extratensive trend	2 (9)	0 (0)	2 (14)	0.089
	Extratensive and avoidant	1 (5)	1 (13)	0 (0)	
	Introversive	2 (9)	2 (25)	0 (0)	
	Introversive and avoidant	1 (5)	0 (0)	1 (7)	

	Ambitent	7 (32)	2 (25)	5 (36)	
	Ambitent and avoidant	2 (9)	0 (0)	2 (14)	
	Not evaluable	2 (9)	2 (25)	0 (0)	
	Avoidant	5 (23)	1 (13)	4 (29)	
M-Human movement, N (%)	Low	5 (23)	4 (50)	1 (7)	0.021
	Average	17 (77)	4 (50)	13 (93)	
FM-Animal movement, N (%)	FM<2	9 (41)	3 (38)	6 (43)	0.46
	Average	11 (50)	5 (63)	6 (43)	
	FM>5	2 (9)	0 (0)	2 (14)	
m-Inanimate movement, N (%)	Low	11 (50)	5 (63)	6 (43)	0.19
	Average	10 (45)	2 (25)	8 (57)	
	High	1 (5)	1 (13)	0 (0)	
Sum C'-Achromatic colour, N (%)	Low	3 (14)	0 (0)	3 (21)	0.047
	Average	12 (55)	3 (38)	9 (64)	
	Positive (SumC'>2)	7 (32)	5 (63)	2 (14)	
Sum Y-Diffuse Shading, N (%)	Average	21 (95)	8 (100)	13 (93)	0.44
	Positive (SumY>2)	1 (5)	0 (0)	1 (7)	
Lambda, N (%)	Lambda<0.30	4 (18)	2 (25)	2 (14)	0.51
	Average	9 (41)	4 (50)	5 (36)	
	Lambda>0.99	9 (41)	2 (25)	7 (50)	
EA-Experience actual, N (%)	Low	13 (59)	5 (63)	8 (57)	0.81
	Average	9 (41)	3 (38)	6 (43)	
Affect					
Afr-Affective Ratio coping base, N (%)	Avoidant	9 (41)	3 (38)	6 (43)	0.5
	Low	3 (14)	2 (25)	1 (7)	
	Average	8 (36)	3 (38)	5 (36)	
	High	2 (9)	0 (0)	2 (14)	
FC: CF+C-Form-Dominated Colour, N (%)	Negative	12 (55)	2 (25)	10 (71)	0.035
	Positive (CF>FC)	10 (45)	6 (75)	4 (29)	
Pure C-Pure Colour, N (%)	Negative	20 (91)	7 (88)	13 (93)	0.67
	Positive (C >1)	2 (9)	1 (13)	1 (7)	
SumC'>WSumC-Constriction Ratio, N (%)	Negative	18 (82)	5 (63)	13 (93)	0.076
	Positive (SumC'> WSumC)	4 (18)	3 (38)	1 (7)	
Intellectualization Index, N (%)	Average	20 (91)	7 (88)	13 (93)	0.67
	Positive (>6)	2 (9)	1 (13)	1 (7)	
S-Space, N (%)	Negative	9 (41)	4 (50)	5 (36)	0.51

	Positive (S ≥3)	13 (59)	4 (50)	9 (64)	
Self-perception					
Sum V-Vista (Self-perception/Capacity for control and stress), N (%)	Negative	6 (27)	2 (25)	4 (29)	0.86
	Positive (Sum V>0)	16 (73)	6 (75)	10 (71)	
EI-Egocentricity Index, N (%)	Low	11 (50)	5 (63)	6 (43)	0.46
	Average	9 (41)	3 (38)	6 (43)	
	High	2 (9)	0 (0)	2 (14)	
MOR-Morbid, N (%)	Negative	15 (68)	6 (75)	9 (64)	0.6
	Positive	7 (32)	2 (25)	5 (36)	
An+Xy-Anatomy, N (%)	Negative	9 (41)	2 (25)	7 (50)	0.25
	Positive (An+Xy>2)	13 (59)	6 (75)	7 (50)	
FD-Form-Dimension, N (%)	Negative	21 (95)	8 (100)	13 (93)	0.44
	Positive (FD>2)	1 (5)	0 (0)	1 (7)	
Interpersonal					
Sum T-Texture (Interpersonal/Capacity for control and stress), N (%)	Negative	21 (95)	8 (100)	13 (93)	0.44
	Positive (Sum T>1)	1 (5)	0 (0)	1 (7)	
COP-Cooperative Movement, N (%)	Low	7 (32)	4 (50)	3 (21)	0.17
	Average	15 (68)	4 (50)	11 (79)	
AG-Aggression, N (%)	Average	18 (82)	6 (75)	12 (86)	0.53
	High	4 (18)	2 (25)	2 (14)	
Fd-Food, N (%)	Negative	18 (82)	6 (75)	12 (86)	0.53
	Positive (Fd>0)	4 (18)	2 (25)	2 (14)	
Isolate/R-Isolation Index, N (%)	Negative	18 (82)	6 (75)	12 (86)	0.53
	Positive (Isolate/R>0.26)	4 (18)	2 (25)	2 (14)	

Table 5: Rorschach test.

Discussion

In our study we focused on PHIV and BHIV, since the experience of infection appears different among them. For example, PHIV must manage extra factors which could affect coping, such as their family contest, social isolation, stigmatism since early childhood and secrecy that surrounds an HIV diagnosis [27,28]. In fact, the stigma surrounding HIV encourages those affected to hide the disease and avoid treatment, intensifies stress and anxiety, and reinforces inequality [29]. In our cohort, 50% of patients reported stigma-related experiences, with no differences detected between the two groups, even if 3 (14%) PHIV patients preferred not to answer. Moreover, more frequently PHIV patients have been forced to witness disease and often death of their parents, especially in the pre-ART era. On the other hand, if the parent survives, they could benefit from that shared experience. On the opposite, BHIV may not have such social support and may be particularly vulnerable to discrimination at home and even at health facilities. PHIV have usually established relationships with their HIV health care providers, however recent studies still report a high perceived HIV-related stigma at access to reproductive health services [30].

Compared to their perinatally-infected peers, BHIV may also have pre-existing challenges which placed them at risk of infection in the first place, and, usually, state higher rates of poor clinic experience, worse retention in care and worse rates of adherence to ART [31,32]. In our cohort, no differences were found between the two groups regarding support from family and friends, with the majority stating that the support they received was neither good nor poor. On the contrary, we found differences regarding the influence on sex life, emotions, relationship with the partner and fear of transmitting the infection, with lack or little concern in all BHIV patients compared to PHIV, who indicated

negative emotions with repercussions on sexuality and in their relationship, probably due to their family experience. Besides, PHIV frequently report feelings of anger and injustice, coupled with the fear of disclosing their status to partners. In fact, only 54% PHIV versus 88% BHIV had disclosed their status to sexual partners. This aspect was corroborated also by the WHOQoL-HIV BREF, whose lowest score was obtained precisely in the social relationship domain for both groups. However, in all the domains of the WHOQoL-HIV BREF, values were found within the average for both PHIV and BHIV. Regarding general intellectual and cognitive ability, in our cohort, all but 4 patients had an IQ score lower than the mean expected, and a slight lower QI was observed in PHIV group, probably due to the prolonged exposition to neuropathological effects of HIV infection, especially at the beginning of the ART era [33].

Furthermore, in literature is reported that BHIV reported worse levels of anxiety, higher depression scores and two or more mental health issues concurrently; our results are in agreement particularly in Rorschach test results [34]. We detected a deficit in coping abilities in 50% of BHIV patients, signaling an infantile organization of the personality with strong impacts in the interpersonal sphere, as well as a high Perceptual-ideational index, indicating dysfunctional perception and/or thinking. Moreover, 25% BHIV patients expressed suicidal ideation versus 0% PHIV [35]. Additionally, 63% of BHIV suggested a tendency to emotional constriction and painful binding feelings, with also poor control over emotion and action, with a tendency to act before assessing the situation. BHIV also demonstrated less controlled emotional discharge than PHIV patients. Finally, both groups reported high rates of Depression index itself and of the Anatomy and Egocentricity indexes, which may be precursors of depression and are easily seen in persons with a chronic disease, with a higher trend in BHIV. These data are concordant with what reported by Sherr, et al. BHIV adolescents were more likely to report depression and anxiety [34]. Our results may support the implementation of more effective models of HIV care and targeted interventions focusing on subgroups and their needs, necessity already highlighted by other authors [36]. Women living with HIV deserve special attention due to the discrimination they suffer. Furthermore, the results of this study highlight complex psychological functioning, in addition to all the clinical and therapeutic aspects, including signs of possible clinical depression, mood disorders, and important impacts on different aspects of life, such as relationship with family, partners, sexual life, and, obviously, in overall QoL. These are all indicators that a more integrated approach with attention to the psychological sphere and a 360-degree management of patients can make a significant contribution to the final treatment and care intervention of people living with HIV, as established by literature [37]. Indeed, other investigations suggest that emotional support and a targeted psychotherapy play a role in better clinical outcome, in reducing high risk behaviors, and in the prevention of HIV transmission [11,37-39].

These results must be regarded as preliminary, given the relatively small sample size available and the absence of a control group, which are key limitations of our study. Moreover, a huge difficulty encountered, in addition to COVID-19 emergency, was the reluctance of patients to undergo psychological examinations. In addition to this, there may be some age-inherent adolescent problems that would have needed to be deconstructed, but this sample size did not allow for that [40].

However, although our sample seems small, it is truly unique. This is the first study that addresses the limitations of the literature on such an important topic and offers some initial basis on the neuropsychological features implicated in a disease as complex as chronic HIV infection, indicating that patients may truly benefit from integrated mental health evaluations and interventions that specifically focus on psychological tuning. Furthermore, the strength of this study was the multidisciplinary management of these patients, shared with infectious disease specialists, pediatricians, and three different psychologists each specialized in their field, and that we collaborated with each individual patient individually and in a targeted way.

Further studies are needed to ensure the best strategy for greater acceptance, as well as better management and control of all aspects of HIV infection itself, so that young women living with HIV can make informed decisions about their sexuality, relationships, and lifestyle.

Authors' Contributions

FF, MEA, and VG made substantial contributions to the design of the study. FF, MEA, YG, AC, and NG contributed greatly with the logistics concerning data acquisition. MEA, FF, and NG created the database and data acquisition system. FF provided statistical model and relevant numerical evaluation. VG, FF, MEA, EL, NG, YG, AC contributed with the analysis and interpretation of data. FF and MEA drafted the work. VG, GVZ, PM, MEA,

YG, AC, and EL substantively revised the article and the relevant conclusion. All authors have approved the submitted version.

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