Quality of Life and Emotional Distress among HIV-Positive Women during Transition to Motherhood

Marco Pereira and Maria Cristina Canavarro

Universidade de Coimbra (Portugal)

The purpose of this preliminary study was to describe the quality of life (QOL) and emotional distress during pregnancy and early postpartum, and to examine the ability of psychopathological symptoms to predict QOL at early postpartum. A sample of 75 pregnant women (31 HIV-positive and 44 HIV-negative) was assessed during the second trimester of pregnancy and two to four days postpartum. QOL was assessed with the WHOQOL-Bref. The emotional distress was assessed with the Brief Symptom Inventory, and with the Emotional Assessment Scale. Seropositive women reported increased negative emotional reactivity and lower scores in social relationships and overall QOL during pregnancy than HIV-negative women. Both HIV-positive and HIV-negative women reported better QOL after the birth of their child, when compared with the pregnancy period. Among HIV-positive women, lower anxiety and depressive symptoms during pregnancy were, respectively, significant predictors of better psychological QOL and overall QOL at early postpartum. Less intense somatic symptoms predicted better physical QOL. Longitudinal assessment of QOL and emotional status may provide potentially useful information for tailoring psychological interventions in the maternity care of HIV-infected women, during their transition to motherhood.
Keywords: emotional distress, HIV infection, pregnancy, quality of life.

El objetivo de este estudio preliminar fue describir la calidad de vida (CdV) y la angustia emocional durante el embarazo y el postparto, y examinar la capacidad de los síntomas psicopatológicos para predecir la CdV después del parto. Una muestra de 75 mujeres embarazadas (31 VIH-positivas y 44 VIH-negativas) fue evaluada en el segundo trimestre del embarazo y de dos a cuatro días después del parto. La CdV fue evaluada con el WHOQOL-Bref. La angustia emocional se evaluó con el Brief Symptom Inventory y con la Escala de Evaluación Emocional. Durante el embarazo, las mujeres seropositivas reportaron una reactividad emocional negativa aumentada y puntuaciones más bajas en las relaciones sociales y CdV general que las mujeres VIH-negativas. Las mujeres VIH-positivas e VIH-negativas reportaron mejor CdV posparto, en comparación con el período de embarazo. Entre las mujeres VIH-positivas, menor ansiedad y síntomas depresivos durante el embarazo fueron, respectivamente, predictores significativos de la mejor CdV psicológica y CdV general en el posparto. Síntomas somáticos menos intensos predijeron mejor la CdV física. La evaluación longitudinal de la CdV y estado emocional puede proporcionar información potencialmente útil para adaptar las intervenciones psicológicas en el cuidado de las mujeres seropositivas, durante su transición a la maternidad.
Palabras clave: angustia emocional, infección por VIH, embarazo, calidad de vida.

According to recent estimates (UNAIDS, 2009), approximately 33.4 million people worldwide are infected with HIV. In Portugal, at the end of 2008, there were 34.888 officially notified cases of HIV infection at all stages of infection (DDI-URVE, 2009). Of those, about 25% of people living with HIV/AIDS are women, and of those, approximately 75% are of childbearing age. Because the majority of HIV-infected women are of reproductive age, the issue of the transition to motherhood is currently a matter of greater and increased importance. Therefore, the purpose of this study was to describe quality of life (QOL) and emotional distress during the transition to motherhood, and to examine the ability of psychopathological symptoms to predict maternal QOL at early postpartum.

Within a developmental framework, some transitions are expected and considered normative (e.g., pregnancy, the transition to motherhood), while others are unanticipated or non-normative (e.g., an HIV diagnosis). For the most part, whether normative or non-normative, changes and transitions are accompanied by the individual's stress (Boss, 2002). Although becoming a mother is generally thought of as a positive experience, the transition to motherhood can also present many challenges. Historically, researchers have focused on understanding the factors that increase the likelihood of emotional distress, but fewer have explored positive dimensions, such as QOL. This exploration is necessary because, as a major life transition, becoming a mother also presents women with an opportunity for significant personal growth (Cowan & Cowan, 1988), and may present an opportunity for enhanced wellbeing.

Quality of life has become an increasingly significant outcome when evaluating the impact of specific conditions, and emerged as an important dimension within pregnancy (Da Costa, Dritsa, Rippen, Lowensteyn, & Khalifé, 2006; Jomeen, 2004; Jomeen & Martin, 2005), although the majority of research has been conducted primarily in the postpartum period (e.g., Da Costa, Dritsa, Larouche, & Brender, 2000; Hill, Aldag, Hekel, Riner, & Bloomfield, 2006; Symon, MacDonald, & Ruta, 2002; Zhou, Wang, & Wang, 2009). In fact, psychological status during pregnancy has been traditionally characterized by anxiety and depression, largely ignoring the complex psychological interrelations that characterize pregnancy (Jomeen, 2004), and chiefly ignoring positive dimensions, such as QOL. On this line of thought, consistent with the focus on emotional distress, there was less reporting of positive emotions (Paalberg et al.,1996), though pregnancy is often desired and planned, and there are likely to be feelings of happiness.

Physical symptoms are common in pregnancy, are primarily associated with the normal physiological changes that occur (Jomeen, 2004), and might impact QOL. However, QOL limitations during pregnancy are not restricted to physical functioning or somatic symptoms (Simon, VonKorff, Piccinelli, Fullerton, & Ormel, 1999), but include further impairments in QOL, such as fatigue and emotional distress,

that have also been recognized (Magee et al., 2002). In fact, evidence has shown that emotional status might have a significant role to play in QOL (Heinonen, Aro, Aalto, & Uutela, 2004). Nevertheless, few studies have considered these relationships in pregnant and early post-natal women. Some of these have reported that elevated levels of depressive symptoms are strongly correlated with lower health-related and perceived well-being in pregnant women (e.g., Jomeen & Martin, 2005; McKee, Cunningham, Jankowski, & Zayas, 2001). More recently, Da Costa and colleagues (2006) found that women experiencing postpartum depressed mood scored significantly lower on physical and mental QOL. The severity of depressed mood was not associated to worse physical health but contributed to poorer mental health.

Given that HIV manifests itself differently in women than in men (Anderson, 2001), and that QOL in women living with HIV has been severely understudied (Cowdery & Pesa, 2002), it is important to identify the interrelation between QOL and psychological distress among women and, particularly, among pregnant women. Furthermore, there is less systematic literature regarding QOL and emotional distress in pregnant women and, to our knowledge, none among women with HIV.

These domains of adaptation are particularly relevant to HIV, as well as to the interaction between HIV and pregnancy. First, people with HIV may show a range of psychological distress of lesser or greater intensity in managing HIV-related challenges (Chesney & Folkman, 1994). Second, with the advent of highly active anti-retroviral therapy (HAART), the assessment of QOL has become crucial (Skevington & O'Connell, 2003). Third, the onset of HIV infection in women occurs primarily in their reproductive years, and the diagnosis of this infection means a dramatic change in life (Sherr, 2005). Moreover, the unpredictability of the disease makes planning life, and specifically family planning, rather uncertain. Finally, the diagnosis of HIV infection occurs mostly during prenatal routines (Pereira & Canavarro, 2009; Sherr, 2005).

It is well known that pregnancy and the transition to motherhood are challenging. HIV-positive women face the same parenting issues faced by all women, but may be presented with a set of additional demands, directly or indirectly associated with HIV (Sherr, 2005). Thus, it is possible that their emotional adjustment and QOL during pregnancy and postpartum differ, when compared with HIV-negative controls. However, there are few cross-sectional or longitudinal studies on these topics (Bernatsky, Souza, & de Jong, 2007; Fawzi et al., 2007; Larrabee, Monga, Eriksen, & Helfgott, 1996; Moyer et al., 2008; Nuwagaba-Biribonwoha, Mayon-White, Okong, Carpenter, & Jenkinson, 2006; Pereira & Canavarro, 2009).

Concerning emotional distress, in a study conducted in Angola, Bernatsky and colleagues (2007) found that two-thirds of pregnant HIV-positive women had significant

emotional distress, more than twice of that in the control group. In another study, conducted in Tanzania, Fawzi et al. (2007) observed a substantial prevalence of elevated depressive symptoms in pregnant HIV-positive women. Also, a qualitative study conducted by Sanders (2008) showed that, after the HIV diagnosis, women evoked extreme emotional distress. More recently, Pereira and Canavarro (2009) found no differences between pregnant HIV-infected women and the general population in psychopathological symptoms, however, the authors observed higher scores of contradictory emotional reactivity. Specifically, as in the general population, pregnant HIV-positive women reported high scores in happiness (non-significant difference), but also significantly higher scores of sadness and anxiety.

Larrabee and colleagues (1996) analysed the perceived QOL and functional status of HIV-infected women during the antenatal, perinatal, and postpartum periods. In general, these authors concluded that HIV-negative women reported better QOL in the antepartum, when compared with the perinatal and postpartum periods. This overall tendency was also seen in the HIV-positive population. A more recent study (Nuwagaba-Biribonwoha et al., 2006) showed that HIV-positive women were more likely to have poor scores in feelings, pain, daily activities, and overall QOL during pregnancy. Findings in puerperium were similar to those reported in pregnancy, except regarding social activities and change in health.

In the current pilot study, it was sustained that positive aspects of functioning are also worthy of attention, as a complement to the negative dimensions (such as anxiety and depression), strongly represented in distress measures. Hence, in this study, the authors have attempted to address the role of both positive and negative emotionality, and QOL in the adjustment to the transition to motherhood, among HIV-positive and HIV-negative women. Overall, we hypothesized that: (1) pregnant HIV-positive women would report higher emotional distress, similar levels of happiness, and lower QOL than HIV-negative women; (2) since the transition to motherhood constitutes a moment of crisis that implies change and reorganization in a mother's life (Boss, 2002), it was expected that QOL levels would decrease from pregnancy to postpartum, for both HIV-positive and HIV-negative women; and (3) for both groups, lower emotional distress (particularly depressive symptoms) during pregnancy would predict better QOL at postpartum.

Methods

The present prospective study is part of a longitudinal research project on pregnancy and motherhood among HIV-infected women, conducted between April 2003 and May 2008. In light of the limitations in existing research, in the current study (which is preliminary due to its limited sample size), the authors intended to provide a more complete assessment of pregnant HIV-positive women during the transition to motherhood, by use of a comparison group of pregnant HIV-negative women, statistical methods optimal for the study of change, and integrated measures of emotional distress and QOL. HIV-positive and HIV-negative women were assessed at two different time points: in the second trimester of pregnancy, after the beginning of the anti-retroviral therapy (T1), and two to four days postpartum (T2). Individual adjustment was assessed using psychopathological symptoms, due to the increased risk of psychopathology symptoms during pregnancy and postpartum, and emotional reactivity. Additionally, our study comprised a measure of QOL, which captures more positive functioning dimensions.

Participants

Clinical and control groups were recruited during their routine antenatal obstetric visit and during their Maternity stay, at the Maternity Doutor Daniel de Matos and Maternity Doutor Alfredo da Costa (MAC). The sample was composed using a non-probabilistic and convenience method.

The Ethics Committee of the Hospitais da Universidade de Coimbra (Ref. HUC/69/04) and MAC approved this study. All participants invited to participate in the study signed a letter of consent presenting the objectives of the study, as well as the participants' role and the researchers' obligations. General inclusion criteria were: age (over 18 years) and literacy levels to complete the assessment protocol. The clinical group (CG-HIV) was eligible for inclusion in the study if the following criteria were met: HIV-infected and pregnant. The control group (CG) was eligible if the following inclusion criteria were met: free of any medical condition, including infectious diseases, gestational diabetes, hypertension, and fetal growth retardation. For both groups, the presence of mental disorders was an exclusion criterion.

A total of 100 pregnant women (47 HIV-positive and 53 HIV-negative) were initially contacted. From the HIV group, 44 women filled the completed assessment protocol at T1, and at T2 only 31 women participated, which corresponded to a participation rate at T2 of 70.4%. From the HIV-negative group, 51 and 44 women returned questionnaires at T1 and T2, respectively. The response rate was 86.3%. The most frequent reason for dropping out was a delivery in a different Maternity Hospital. Given that there was a differential dropout among the HIV-positive and HIV-negative women, analyses were conducted to determine whether there were differences between participants completing one or two assessments. No differences emerged within and between-groups.

The final sample consisted of 75 pregnant women: 31 HIV-positive and 44 HIV-negative controls. Sociodemographic and clinical characteristics at T2 are presented in

Table 1
Sociodemographic and clinical characteristics of the sample

	CG-HIV (*n* = 31) n (%)	CG (*n* = 44) n (%)
Mean age (SD)	28.42 (6.19)	29.66 (4.09)
Education, mean (SD)	10.03 (3.75)	12.73 (3.22)
Marital status		
Married/cohabiting	23 (74.2)	41 (93.2)
Single	5 (16.1)	2 (4.5)
Other	3 (9.3)	1 (2.3)
Parity (primiparous)	17 (54.8)	25 (56.8)
Diagnosis during current pregnancy	16 (51.6)	–
Heterosexual transmission	18 (75.0)	–
CD4 count, mean (SD)	367.19 (203.27)	–
Viral load, mean (SD)	24759.31 (40670.98)	–

Table 1. No differences were found regarding age, $t(1, 73)$ = -1.046, p = .299, Cohen's d = .24, marital status, $\chi^2(2, n = 75)$ = 5.253, p = .072, Cramer's V = .27, and parity, $\chi^2(1, n = 75)$ = .029, p = .865, Cramer's V = .02. A significant difference was found regarding education, $t(1, 73)$ = -3.334, p = .001, Cohen's d = .77. Overall, HIV-positive women had fewer years of education than HIV-negative women. Therefore, education was controlled in the multiple analyses of the outcomes.

Regarding HIV-related characteristics, the majority of the clinical group (61.4%) reported HIV infection through heterosexual contact, and 51.6% of women were diagnosed with HIV during the current pregnancy. Two women (4.5%) were diagnosed during a previous pregnancy. Concerning the biological markers, HIV-positive women reported medium counts of CD4+ T cells, and higher levels of viral load.

Instruments

Sociodemographic data included age, education, and marital status. The social and medical grids about pregnancy and HIV comprised information about obstetric history and current pregnancy, mode of transmission, moment of diagnosis, HIV status of the partner, and knowledge of HIV infection in previous pregnancies. Other obstetrical, perinatal and HIV-related data were collected from medical records. In addition, the Portuguese versions of standardized questionnaires on psychosocial and emotional functioning were completed.

Quality of life was assessed by the WHOQOL-Bref (WHOQOL Group, 1998), which is a self-reported generic questionnaire including 26 questions, organised into four domains (Physical, Psychological, Social relationships, and Environment), and 25 facets (24 specific facets, and a general facet regarding the overall QOL and health status).

Individual items are rated on a 5-point scale, where 1 indicates low, a negative perception, and 5 indicates high, a positive perception of QOL. All facet and domain scores are transformed to reflect a 0 to 100 scale (a high score corresponds to better QOL); there is no total score for the WHOQOL-BREF. The Cronbach's a in the current sample ranged from .72 (Psychological) to .80 (Physical) at T1, and from .68 (Social relationships) to .87 (Physical) at T2.

Psychopathological symptoms were assessed with the Brief Symptom Inventory (BSI; Derogatis, 1993). The BSI is a 53-item self-reported inventory associated with psychological distress. Respondents are asked to rate the extent to which each identified problem has caused discomfort in the past week, on a 5-point scale ranging from "Never" (0) to "Very often" (4). The BSI measures nine symptom dimensions and three global indices. In the present study, considering the theoretical relevance, only three dimensions (somatization, depression, and anxiety) were considered. In the current sample, the Cronbach's a ranged from .75 (somatization) to .86 (depression) at T1, and from .72 (somatization) to .87 (depression) at T2.

Emotional reactivity was assessed with the Emotional Assessment Scale (EAS; Carlson et al., 1989). The EAS is a 24-item questionnaire developed to assess emotional reactivity. The EAS consists of 24 emotion descriptors, divided into seven fundamental emotion categories: fear, happiness, sadness, anxiety, anger, surprise, and guilt. In the EAS, subjects rate the intensity of each emotion on a visual analogue scale, ranging from 0 to 100mm. The rating of each emotion is expressed as the distance in millimetres from the lower scale limit, anchored with "The least possible". With the exception of the happiness subscale, lower values indicate a more positive emotional reactivity. The Cronbach's α in the current sample ranged from .68 (surprise) to .81 (happiness) at T1, and from .73 (surprise) to .86 (guilt) at T2.

Statistical analysis

The data were analysed using the Statistical Package for Social Sciences (SPSS 15, SPSS Inc., Chicago, Illinois, USA). In order to explore the characteristics of the sample, analysis of demographics – including frequencies, means, and standard deviations – were first performed. Differences in categorical variables were analysed using the χ^2 test. Since the two groups had education differences, multivariate analyses were carried out controlling for education, with group being the factor and education the covariate. For testing changes across groups (between-subjects) and assessment points (within-subjects), we resorted to the Linear Mixed Models procedure, using only those women with data for both T1 and T2. Repeated-measures multivariate analysis of variance (MANOVA) was used to assess changes in QOL over time, for each group separately. Subsequent univariate analyses of variance (ANOVA) were conducted, in order to identify the source of the significant multivariate effects. Finally, linear regression analysis was used to investigate the contribution of psychopathological symptoms to QOL during early postpartum, controlling for QOL at baseline (T1). In the regression models, the dependent variables were the four domains and *overall QOL*, and the predictor variables were the psychopathological symptoms (as assessed by the BSI). As suggested by Cohen, Cohen, West, and Aiken (2003), the effect size attributable to the increment in R^2 was also assessed. Each one of the models was compared between the HIV-positive and HIV-negative groups using Fisher's Z-transformation; that is, changing correlation (R) values to Z-scores, and then using Fisher's Z test for the statistical comparison.

Table 2

Mean differences of emotional reactivity per group and time (adjusted for education)

| | | | Effects | | | | | |
| | Time | | Time | | Group | | Group x Time | |
Emotion (range)	Pregnancy Mean (SE)	Postpartum Mean (SE)	F[a]	p	F[b]	p	F[b]	p
Happiness[c] (0-100)								
CG-HIV	61.19 (4.39)	76.29 (3.64)	9.641	.004	.006	.939	.453	.503
CG	63.78 (3.72)	74.37 (3.09)	6.637	.014				
Anxiety[d] (0-100)								
CG-HIV	50.52 (4.13)	38.99 (3.87)	8.519	.007	5.488	.022	.663	.418
CG	37.32 (3.50)	30.38 (3.28)	4.188	.047				
Sadness[d] (0-100)								
CG-HIV	31.95 (4.34)	21.08 (4.03)	3.678	.065	1.654	.203	2.847	.096
CG	20.72 (3.68)	19.76 (3.42)	.486	.489				
Fear[d] (0-100)								
CG-HIV	34.96 (3.62)	23.29 (3.38)	7.148	.012	9.428	.003	7.108	.010
CG	15.91 (3.08)	17.02 (2.87)	.029	.865				
Surprise (0-100)								
CG-HIV	35.00 (3.52)	28.30 (3.62)	2.156	.152	3.459	.067	11.543	.001
CG	18.62 (2.99)	29.34 (3.07)	14.877	<.001				
Guilt[d] (0-100)								
CG-HIV	25.17 (2.83)	25.17 (3.19)	.000	.986	5.336	.024	.257	.614
CG	17.86 (2.40)	15.85 (2.71)	1.158	.288				
Anger[d] (0-100)								
CG-HIV	21.07 (3.26)	19.63 (3.73)	.162	.690	1.476	.228	.007	.933
CG	15.80 (2.77)	14.75 (3.17)	.176	.677				

SE: Standard error

[a] F statistics in repeated measures ANOVA

[b] F statistics in repeated measures ANCOVA, with education as covariate

[c] Higher scores indicating positive emotional reactivity

[d] Higher scores indicating negative emotional reactivity

Table 3
Mean differences of quality of life domains and overall facet per group and time (adjusted for education)

| | Time | | Effects | | | | | |
| | | | Time | | Group | | Group x Time | |
Domain (range)	Pregnancy Mean (SE)	Postpartum Mean (SE)	F[a]	p	F[b]	p	F[b]	p
Physical[c] (0-100)								
CG-HIV	54.22 (2.19)	70.61 (3.51)	27.422	<.001	.282	.597	1.534	.220
CG	55.65 (1.62)	66.14 (2.59)	12.977	.001				
Psychological[c] (0-100)								
CG-HIV	69.36 (2.60)	73.88 (2.88)	2.545	.125	.128	.722	.230	.634
CG	69.52 (1.92)	75.83 (2.12)	9.885	.003				
Social relationships[c] (0-100)								
CG-HIV	66.87 (3.06)	63.49 (2.86)	.451	.509	8.140	.006	.099	.754
CG	75.50 (2.26)	73.33 (2.11)	1.853	.181				
Environment[c] (0-100)								
CG-HIV	67.38 (2.62)	62.23 (2.29)	2.080	.163	.815	.370	4.808	.032
CG	67.15 (1.93)	67.61 (1.69)	.088	.769				
Overall QoL[c] (0-100)								
CG-HIV	59.90 (2.84)	64.96 (2.85)	3.541	.073	17.259	<.001	.378	.541
CG	73.72 (2.09)	76.36 (2.10)	.575	.453				

SE: Standard error
[a] F statistics in repeated measures ANOVA
[b] F statistics in repeated measures ANCOVA, with education as covariate
[c] Higher scores indicating better quality of life

Post hoc power calculations made for all parametric statistical analyses performed, with a significance level of .05 and power $\geq$ .80, indicated that medium to large effects could be detected (Faul, Erdfelder, Lang, & Buchner, 2007). Effect sizes were calculated with the Cramer's V for χ^2 test, with Cohen's d for Student's t test, with Eta squared (η^2) for the ANOVA, and with Cohen's f^2 for multiple regression (Cohen et al., 2003). Effect sizes are presented for all analyses (small effects: $\eta^2 \geq$ .01, Cohen's $d \geq$ .20, Cramer's $V \geq$ .01, Cohen's $f^2 \geq$ .02; medium effects: $\eta^2 \geq$ .06, Cohen's $d \geq$ .50, Cramer's $V \geq$ .03, Cohen's $f^2 \geq$ .15; large effects: $\eta^2 \geq$ .14, Cohen's $d \geq$ .80, Cramer's $V \geq$ .05, Cohen's $f^2 \geq$ .35; (Cohen, 1992).

Results

Emotional distress during pregnancy and postpartum

Two separate Linear Mixed Models, controlling for education, were used to determine if there were changes in emotional distress from pregnancy to postpartum. In the first model, time and group differences were examined jointly with psychopathological dimensions. There was not a significant multivariate effect of group (Wilk's λ = .942;

$F(3, 70)$ = 1.438; p = .239) and time (Wilk's λ = .968; $F(3, 70)$ = .722; p = .514) across the psychological distress dimensions. The interaction effect was also not statistically significant (Wilk's λ = .939; $F(3, 70)$ = 1.518; p = .217).

Regarding maternal emotional reactivity during pregnancy, the group effect involving the seven emotions was not statistically significant (Wilk's λ = .839; $F(7, 64)$ = 1.758; p = .111). The effect of time (Wilk's λ = .791; $F(7, 64)$ = 2.422; p < .05), and of the interaction (Wilk's λ = .708; $F(7, 64)$ = 3.771; p < .01) were both statistically significant. The interaction indicated that both groups differed over time. In fact, this time main effect was qualified by an interaction effect of time by group for the emotions *fear* (η^2 = .09) and *surprise* (η^2 = .14), both pointing to an approximation of mean values, through the decrease of HIV-positive women and the increase of the HIV-negative group mean scores.

Table 2 shows estimated mean differences (and standard errors) between HIV-positive and HIV-negative women, and over time, regarding emotional reactivity indicators. Results showed that HIV-positive women reported significantly higher negative emotional reactivity in the subscales *anxiety* (η^2 = .05), *fear* (η^2 = .10), and *guilt* (η^2 = .05). It was also possible to observe that, from the first to the second assessment point, in the HIV-positive group

Table 4

Summary of hierarchical regression models for predicting quality of life at early postpartum

	HIV-positive women									
	Physical		Psychological		Social relationships		Environment		Overall QOL	
	Final β	ΔR^2	Final β	ΔR^2	Final β	ΔR^2	Final β	ΔR^2	Final β	ΔR^2
Step 1										
Baseline QoL	−.012	.000	.225	.129	.422	.174	.618**	.325	.263	.288
Step 2										
Somatization	−.477**		−.170		−.477		−.230		.042	
Depression	.105	.228	−.245	.266	.176	.093a	.531	.093	−.496*	.172
Anxiety	−.081		−.533**		.110		−.394		.131	
Cohen's f^2	0.29		0.50		0.36		0.72		0.85	
	HIV-negative women									
	Physical		Psychological		Social relationships		Environment		Overall QOL	
	Final β	ΔR^2	Final β	ΔR^2	Final β	ΔR^2	Final β	ΔR^2	Final β	ΔR^2
Step 1										
Baseline QoL	.218	.082	.288*	.269	.422**	.245	.690***	.596	.375*	.216
Step 2										
Somatization	.115		.017		.030		.033		.315*	
Depression	−.219	.099	−.522***	.220	−.318	.063	−.135	.015	−.092	.166
Anxiety	−.357**		−.086		.190		−.024		−.375*	
Cohen's f^2	0.22		0.95		0.45		1.57		0.62	

* $p < .05$; ** $p < .01$; *** $p < .001$

a The model was not statistically significant

there was a significant decrease in *anxiety* ($\eta^2 = .22$) and *fear* ($\eta^2 = .19$), and a significant increase in the subscale *happiness* ($\eta^2 = .24$). With respect to the HIV-negative group, there was also a decrease in the emotion *anxiety* ($\eta^2 = .09$), and a significant increase in the subscales *happiness* ($\eta^2 = .14$) and *surprise* ($\eta^2 = .27$).

Quality of life during pregnancy and postpartum

With respect to quality of life, results revealed a significant main effect of time (Wilk's $\lambda = .766$; $F(5, 57) = 3.473$; $p < .01$), and a significant main effect of group (Wilk's $\lambda = .575$; $F(5, 57) = 8.440$; $p < .001$). The multivariate test for the interaction between group and time was not significant (Wilk's $\lambda = .876$; $F(5, 57) = 1.616$; $p = .171$).

Table 3 displays the mean scores on QOL domains and the general facet over time, for HIV-positive women and HIV-negative women. At T1, as can be seen, the examination of mean scores revealed that pregnant HIV-positive women reported poorer QOL in all domains (except in the *Environment* domain). At T2, the trend was similar to the observed at T1, although HIV-positive mothers reported better *Physical* QOL than the controls, and lower QOL in the *Environment* domain. It was also possible to observe that, from pregnancy to postpartum, there was a global increase in QOL in the *Physical* ($\eta^2 = .08$) and *Psychological* ($\eta^2 = .08$) domains, as well as in the *general facet* ($\eta^2 = .12$). This tendency was similar for both groups.

The repeated-measures MANOVA showed that, among HIV-positive women, QOL increased over time with higher scores in *Physical* QOL. The test statistic for equality of *Physical* QOL means over time was highly significant at $p < .001$ ($\eta^2 = .56$). In relation to the control group, significant changes in mean scores across time were found on *Physical* ($\eta^2 = .25$), and *Psychological* QOL ($\eta^2 = .20$). With respect to the group effect, subsequent univariate ANOVAs were conducted in order to identify the source of the significant multivariate effects. The follow-up univariate tests showed that significant differences occurred for *Social relationships* ($\eta^2 = .14$), and *Overall QOL* ($\eta^2 = .30$). In both domains, HIV-positive women reported lower scores of QOL.

Contibution of psychopathological symptoms to QOL domains and overall QOL

To address the contribution of psychopathological symptoms to QOL at postpartum, multiple regression analyses were computed, with QOL domains at T2 as the

dependent variables, and QOL and psychopathological symptoms assessed at T1 (pregnancy). The regression models were built in two steps. In the first step, the baseline score of QOL was introduced, and in the second step the psychopathological symptoms were entered. The regression analysis was conducted for each group separately. The final models are presented in Table 4.

Overall, for HIV-positive women, depressive symptoms during pregancy were a significant contributor to *Overall QOL* after the birth of a child (the effect size attributable to the addition of depression was .32), explaining an additional 17.2% of the variance. Anxiety symptoms during pregancy were a significant contributor to *Psychological* QOL (the effect size attributable to the addition of anxiety was .31), and explained an additional 26.6% of the variance. After controlling for *Physical* QOL, somatization was a significant independent contributor to *Physical* QOL, explaining 22.8% of the variance (the effect size attributable to the addition of somatization was .29). With respect to HIV-negative women, overall, QOL at early postpartum was better explained by QOL during pregnancy. It was also found that depression contributed significantly to *Psychological* QOL. *Physical* and *Overall QOL* were better explained by the anxiety symptoms reported during pregnancy. The effect sizes (Cohen's f^2) attributable to the addition of psychopathological symptoms ranged from .04 (*Environment*) to .39 (*Psychological*).

The comparison of the fit of the model from both groups revealed that there were no significant differences between the respective R^2 values (*Z*-scores ranged from .193 to 1.015, $p > .05$).

Discussion

The purpose of this preliminary study was to examine the relationship between QOL and psychological adaptation of pregnant HIV-infected women. Adaptation was considered in terms of two domains that are likely to be affected by HIV: psychological distress and emotional reactivity. To our knowledge, this is the first study evaluating the relationship between emotional distress and QOL among HIV-positive and HIV-negative women. Furthermore, since the introduction of HAART in 1996, and to our knowledge, this is also the first longitudinal assessment of QOL and emotional status in pregnant HIV-positive women.

The main finding of this study was that pregnancy in the presence of HIV infection revealed to be associated with a different psychosocial functioning (in terms of emotional distress and QOL). Not surprisingly, among HIV-positive women, pregnancy and intersection with HIV infection raised more intense negative emotionality (e.g., anxiety, fear, guilt, sadness), but also positive emotions (e.g., happiness). These results are supported by other

findings (Bernatsky et al., 2007; Carney, 2003; Pereira & Canavarro, 2009), and highlight the notion of the paradoxical effects of motherhood in the context of maternal HIV infection (Sandelowski & Barroso, 2003a, 2003b).

Pregnancy is generally a time when a woman experiences positive mental health. Thus, although less studied, it is easy to understand the presence of positive emotions (Paalberg et al., 1996). At postpartum, lower scores of emotional distress, the presence of positive emotions, and the good scores of perceived QOL demonstrated that the first days postpartum represent a period of good adjustment, and provided some evidence of the beneficial effects both of pregnancy and of the postpartum period. This pattern seemed similar to the *honeymoon* period (Wallace & Gotlib, 1990), commonly experienced immediately after birth, and might reflect the array of positive feelings associated with the birth of a child. Given that most HIV-positive women have been recently diagnosed, these findings are somewhat inquisitive. Different explanations can be drawn to understand these results. First, the lack of psychopathological symptoms and lower emotional reactivity reported in HIV-positive women suggest these women are, to some extent, coping well with the HIV infection. Second, it is possible that pregnancy benefits women's mental health and that pregnancy, and mainly postpartum, may have a protective effect on well-being, i.e., pregnancy and postpartum might have buffered the negative effects of the HIV infection. Third, it is also possible that recently diagnosed women could be in denial (Bedimo, Bessinger, & Kissinger, 1998), which is a common defence mechanism used in such situations. An illustrative statement on this topic was provided by a participant of Sanders' study (2008): "I erased HIV from my mind during pregnancy" (p. 51).

As previously mentioned, QOL emerged as one of the most important dimensions in the assessment of the impact of HIV infection, as well as on pregnancy. Overall, in our study, QOL in both groups improved from pregnancy to postpartum. Comparing the mean scores between the HIV-positive and HIV-negative groups, the results demonstrated that, in general, HIV-positive had worse QOL in almost all domains at both assessment times. However, it is important to underline that during pregnancy, and mainly during postpartum, perceived QOL was within normal limits, as demonstrated by the WHOQOL average scores. The main differences were significant for *Social relationships* and *Overall QOL* at both assessments. Comparing the findings within each group, the analysis showed that the HIV-positive group significantly improved only on *Physical* QOL, while the HIV-negative group improved on *Physical* and *Psychological* health. Both HIV-positive and HIV-negative women reported an increase in their *Physical* and *Psychological* QOL, and a decline, from pregnancy to postpartum, in *Social relationships* (e.g., a significant decrease in *sexual activity* was consistent across the groups)

and *Environmental* QOL (e.g., a decline in *participation in activities of leisure* and *financial resources* was consistent across the groups). The decrease in the *leisure* specific facet seemed rather understandable. In fact, it is possible that the time-consuming nature of babies, added to other demands, allows for less leisure time, and implies more financial constraints. The decline in social activities of HIV-positive women at postpartum was also reported by Nuwagaba-Biribonwoha et al. (2006).

Our hypothesis of an overall poorer QOL among HIV-positive women during pregnancy and postpartum was not fully confirmed. In fact, our findings diverged from those studies that showed diminished scores in *Physical* and *Psychological* health during pregnancy, when compared with the postpartum period (Larrabee et al., 1996). However, the overall tendency over time of perceived QOL was similar to that reported by HIV-negative women, which was consistent with the study of Larrabee et al. (1996). The increase in *Psychological* QOL was understandable in light of the birth of a child (as previously mentioned). The improvement in *Physical* well-being was not expected, but may simply result from the end of the physical demands of pregnancy itself. This aspect deserves more in depth attention. An assessment within the first six months/one year postpartum might clarify these conflicting data.

Since the definition of QOL expresses its direct relationship with mental health (WHOQOL Group, 1998), our purpose of examining the relationship between emotional distress and QOL in HIV-positive and pregnant women was essentially determined by the statement of Jomeen (2004), that "any future assessment of QOL in pregnancy should be complemented with measures of anxiety and depression, in order to establish whether constructs of anxiety and depression and QOL are inter-related" (p. 148). Consistent with prior findings (Da Costa et al., 2006; Jomeen & Martin, 2005; McKee et al., 2001), observations from the regression analysis revealed that, for both groups, with few exceptions, psychopathological symptoms and QOL were significantly and negatively associated. It was observed that, among HIV-positive women, lower anxiety symptoms during pregnancy were essentially associated with better *Psychological* QOL at early postpartum, and lower depressive symptoms were associated with better *Overall QOL* at early postpartum. Regarding HIV-negative women, lower depression was associated with better *Psychological* QOL. Higher anxiety was a significant predictor of lower *Physical* and *Overall QOL* after the birth of a child. The effect sizes attributable to the addition of psychopathological symptoms were more pronounced among HIV-positive women. These findings highlight the association between emotional distress and a broader range of QOL domains, and support the evidence that emotional status may have a major role in the QOL (Heinonen et al., 2004).

In addition, mainly for HIV-negative women, QOL at early postpartum was better explained by QOL during pregnancy. This finding is consistent with the notion of stability and underscores its importance in times of transition. Indeed, the transition to motherhood is potentially stressful, primarily because many changes occur and much reorganization is required (Cowan & Cowan, 2000). However, if these changes take place with a background of overall stability, women are more likely to manage the transition adequately (Menéndez, Hidalgo, Jiménez, & Moreno, 2011). The lower stability reported in the HIV-positive group may be related with the protective effect of the birth of the child. As aforesaid, an assessment within the first six months/one year postpartum may clarify the trajectories of adaptation of HIV-positive women.

Given the associations observed in the current study, the relationship between pregnancy's early emotional status and the early postnatal QOL, as well as the ability that emotional distress has of predicting QOL at postpartum, seemed valuable within this context. In our opinion, these results are, to some extent, consistent with prior findings that showed that the best predictor of postpartum depressed mood were prepartum depression symptoms (Collins, Dunkel-Schetter, Lobel, & Scrimshaw, 1993; Da Costa et al., 2000). These findings also seemed coherent with a study conducted by Martinez-Schallmoser, Telleen, and MacMullen (2003), which considered the opposite relationship, that is, considering QOL and postnatal depressive symptoms, it was found that lower antenatal QOL significantly predicted postnatal depression.

An important contribution of our study to the existing literature is that a unidimensional assessment does not capture mood changes that normally occur during the course of pregnancy. Specifically, the assessment of QOL allowed for the detection of variations not detected by measures directed only for the assessment of emotional distress. In addition, the longitudinal design might have clarified how emotional distress and QOL evolve over time, and allowed for the examination of a relationship direction between emotional distress and QOL outcomes. However, our findings need to be viewed taking some limitations into consideration. First, a major limitation is the very modest sample size, which limits the strength of the conclusions regarding the techniques applied to test the hypotheses of the current study, and limits its power to detect small but potentially important differences. In fact, following Cohen (1992), post hoc power calculations demonstrated that the achieved sample size allowed for the detection of mainly large effects. Thus, this study is to be considered a pilot investigation on which interested researchers should base future, larger studies to confirm and further clarify the findings reported herein. Second, despite our inclusion of psychological variables, other variables that may impact the QOL were not included. These include questions on the marital relationship and pregnancy-related variables. A third limitation is the relatively low total questionnaire response at postpartum among HIV-positive women (70.4%), despite our personal efforts. Since the place

of delivery was not (for some women) the setting of the present research, it was unfeasible to assess all women within the pre-established two to four-day-postpartum period. This attrition rate (and consequent small sample size at T2) may have limited our ability to detect relationships between variables, as well as limit the generalizability of the findings. Replication of these findings in a longitudinal study with a larger sample (and more assessment time points) is needed, to determine if our results can be generalized to HIV-positive women during the transition to motherhood.

Despite these limitations, our results broaden the understanding of the effect of psychopathological symptoms on QoL, in early postpartum, among HIV-infected women. These findings also underscore the importance of identifying emotional distress in early pregnancy and potential opportunities for psychological intervention. Therefore, some clinical implications should be emphasized. Besides disease impact on pregnancy and maternal well-being, the disease impact on family planning also has to be considered. The framework for prevention of mother-to-child transmission of HIV stresses the centrality of family planning. Considering that 51.6% of our sample was diagnosed during the current pregnancy, and that there was an intense emotional reactivity at T1, incorporating voluntary HIV counselling and testing with family planning and reproductive health issues, as a routine (and prior to a pregnancy decision), is critical for both HIV-positive and HIV-negative women. Additionally, the access to quality information and specialized services is equally essential, in order to make their own informed decisions, and consider the variety of options now available in terms of prevention of mother-to-child transmission.

In summary, whilst the purpose of health care (within Maternity services) during pregnancy remains directed at increasing the probability of positive or favourable maternal and birth outcomes, attention should also be given to how a woman's life can be affected by different factors (e.g., physical; psychological; relational; environmental) that take place during pregnancy. An awareness of these factors – the multiple determinants, in the words of Belsky (1984) –, and how they influence a woman's adjustment in the transition to motherhood, may lead to the ability to provide effective interventions, to protect a woman's health-related physical and psychological status, when complications arise during pregnancy, and thereby to reduce the risk of emotional distress. Additionally, as Aranda-Naranjo (2004) pointed out, improving QOL in the HIV population will require a holistic, coordinated approach by all professionals that serve them.

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