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What is the relevance of mental health to HIV/AIDS care and treatment programs in developing countries? A systematic review

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Abstract

The expansion of AIDS treatment initiatives in resource-poor settings provides an opportunity for integrating mental health care into these programs. This systematic review of the literature on HIV and mental illness in developing countries examines the mental health risk factors for HIV, mental health consequences of HIV, psychosocial interventions of relevance for HIV-infected and affected populations, and highlights the relevance of these data for HIV care and treatment programs. We reviewed seven studies that measured the prevalence of HIV infection among clinic and hospital-based populations of people with mental illness or assessed sexual risk behavior in these populations; 30 studies that described the mental health consequences of HIV infection; and two reports of psychosocial interventions. The review demonstrates the need for methodologically sound studies of mental health throughout the course of HIV, including factors that support good mental health, and interventions that employ identified variables (e.g. coping, family support) for efficacy in reducing symptoms of mental illness. Promising intervention findings should encourage investigators to begin to study the implementation of these interventions in HIV service settings.

Keywords

mental health; HIV; AIDS; developing countries; HIV treatment programs

Introduction

The World Health Organization (WHO) estimates that 450 million people live with a mental illness or behavioral disorder worldwide [1]. The World Health Report 2002 indicates that neuropsychiatric disorders account for 13% of disability-adjusted life years [2]. Studies attribute this burden, in part, to the chronicity of illness and the lack of, or limited access to,

mental health services around the world [3]. This limited access has become more salient in the context of the AIDS epidemic.

The expansion of AIDS treatment initiatives in resource-poor settings provides an opportunity for integrating mental health care into HIV treatment [4]. The WHO recommends that attention to the psychosocial needs of people with AIDS should be an integral part of HIV care [5]. This includes assistance with employment, income, housing, informed decision-making, coping with illness and discrimination, and prevention and treatment of mild and serious mental health problems [5].

Mental health care has been integrated into HIV programs in rich countries for many years as a result of substantial evidence of linkages between mental health and HIV [6,7]. North American and European studies suggest that people with HIV often suffer from depression and anxiety disorders as they adjust to the diagnosis, struggle with the meaning of a positive HIV test result, adapt to life with a chronic, life-threatening illness, anticipate and receive news of the disease's advance, and witness the death of friends and family [6,8,9]. Bing *et al.* [10] found a 36% 1-year prevalence of depression and 16% prevalence of anxiety among a large national sample of HIV-positive men and women in the United States. A meta-analysis of studies comparing HIV-positive and HIV-negative samples showed that major depressive disorder occurred nearly twice as often among HIV-positive than HIV-negative patients [11]. Depression can reduce the motivation to seek health care, impair adherence to treatment, decrease quality of life, and increase mortality [12]. The neuropsychiatric effects of the virus can lead to dementia and motor disorders that further affect quality of life [8].

Mental illness can also be a risk factor for HIV infection. Certain psychiatric disorders, including substance abuse, increase vulnerability to HIV infection [8,13]. In North America, HIV risk among people with serious mental illness has been associated with lack of condom use, multiple sexual partners, and injection drug use [14,15]. The social exclusion that often accompanies life with a severe mental illness may also increase vulnerability to infection, leading to exchange of sex for money or goods and an increase in coercive sexual encounters. Cognitive deficits associated with certain mental disorders may impair judgment and the ability to negotiate safe sexual encounters.

To our knowledge, there has been no systematic review of existing evidence for the link between mental illness and HIV in developing country settings. Such research will be crucial in order to inform the provision of HIV care services in these settings. In this review we summarize the existing evidence on the mental health implications of HIV/AIDS in developing countries in order to generate recommendations for how mental health care may be integrated into global and national programs for HIV/AIDS in developing countries; identify key gaps in the research evidence; and recommend the priority research agenda for HIV/AIDS and mental health. Our review seeks to address the following research questions.

What are the mental health risk factors for HIV?

What are the mental health consequences of HIV?

What is the impact of current HIV-related psychosocial interventions on mental health and HIV outcomes?

What is the impact of specific mental illness-focused interventions on mental health and HIV outcomes?

Methods

We searched the MEDLINE and PsycINFO databases using combinations of the following search terms: *developing countries* (including Africa, Caribbean, Central America or Latin America or South America, Asia, Pacific Islands, Eastern Europe, and Russia) AND *HIV infections* and *AIDS* (8988 records) To these we added the search terms: *mental disorders*, *mental illness*, *mental health*, *anxiety disorders*, *mood disorders*, *adjustment disorders*, *schizophrenia and disorders with psychotic features*, *AIDS dementia complex*, or *neuropsychiatric disorders*; *mental health services or community mental health services*, and *psychiatric hospitals* (30 English language records). We subsequently added the terms *patient compliance* and *adherence* and expanded the search by using various combinations of the search terms. We also performed a manual search of the references cited in relevant studies. We identified English language empirical studies published from 1990–2005 and selected those that focused on the mental health of HIV-positive people and people with mental illness in developing countries. Specifically, we reviewed studies that included a quantitative or qualitative assessment of specific neuropsychiatric symptoms and/or diagnoses. We omitted case studies, review articles, and letters; duplicates of studies; qualitative or quantitative studies in which analytic procedures were not reported in the methods section; and studies reporting pharmacologic or psychotherapeutic interventions that did not use randomization. We briefly review key findings and make recommendations for service provision and future research.

Results

We reviewed 39 studies. Seven studies reported on risk factors for HIV infection or prevalence of HIV infection among samples of men and women with mental illness. Thirty studies examined the mental health consequences of HIV infection. Two studies reported on psychosocial intervention trials. We found no studies that described mental health interventions with HIV disease-related outcomes. The study sites represented countries in Eastern Europe, sub-Saharan Africa, Asia and Latin America.

Mental health risk factors for HIV

Five studies measured seroprevalence among study participants in psychiatric hospitals. HIV seroprevalence ranged from 0 to 23.8% (Table 1). The lowest prevalences (0.0 and 1.03%) were reported in the two earliest studies (published in 1993 and 1994) conducted in Taiwan and South India, respectively [17,21]. Low seroprevalence in Asian sites in comparison with higher seroprevalence in a study from Zimbabwe appear to reflect the prevalence in the general population of these settings [17,20–22]. HIV testing in the Caribbean site occurred when patients' sexual histories suggested high risk [18].

Two Indian studies from the same institution reported sexual or drug-related HIV risk behaviors among psychiatric in-patients [16,19]. The earlier pilot study used a convenience sample of 59 in-patients and found that 69% of the participants had been sexually active within the last 2 years and 51% reported sexual risk behavior during that time [19]. The most common high-risk behavior was unprotected heterosexual sex with a high-risk partner. The subsequent study systematically sampled 618 participants and found that 42% reported sexual activity in the past year [16]. Five percent engaged in sexual risk behavior in the last year; 16% had done so in the last 10 years. The authors observed that participants most commonly reported having a risky sexual partner, multiple sexual partners, and exchanging sex as risk behaviors [16]. Male sex, being single, and using or abusing substances predicted high-risk sexual behaviour [16].

Mental health consequences of HIV

We reviewed 30 studies that described the mental health consequences of HIV infection (Table 2). Thirteen studies used a validated screening instrument, diagnostic instrument, or clinical interview to ascertain rates of depression, anxiety or other mental illness; one study tested the validity of a screening instrument; eight examined quality of life or other psychosocial variables and mental health; four explored psychological predictors of adherence to antiretroviral therapy (ART); and four reported on cognitive and neuropsychological findings. Study participants were recruited in Brazil, China, Costa Rica, India, Kenya, Nepal, Russia, Rwanda, South Africa, Taiwan, Tanzania, Thailand, Uganda, Zaire, and Zimbabwe.

Study populations and sampling

The majority of studies used convenience samples of HIV-positive people recruited from hospitals, clinics, service organizations, or defined communities. Eight studies sampled women only, five focused on pregnant or post-partum populations, and one studied female commercial sex workers. Studies also varied in the timing of psychiatric assessment with respect to participants learning their HIV serostatus. Six studies specified the time since diagnosis, and their assessment of psychological variables ranged from immediately after receiving the test result [44] to several years after learning the diagnosis [41]. One study reported findings at three time points: before, immediately after, and 3 months after learning of HIV seroconversion [36]. The rates of disorder presented reflect samples of persons who have recently learned their serostatus, persons adjusting to pregnancy or recent delivery and HIV, those learning the status of an infant, and those who have had more time for adjustment to their status.

Findings from prevalence and validity studies

We found thirteen studies from middle or low-income countries that reported rates of psychiatric disorder based on diagnostic interviews or psychiatric symptom scales. Rates of depression ranged from 0 to 63.3% among HIV-positive participants (see Table 2). In the largest of these studies, investigators recruited every third subject seeking medical services in Bangkok, Kinshasa, Nairobi, Sao Paolo, and Munich. Investigators administered the Composite International Diagnostic Interview, a structured diagnostic interview developed by the WHO and validated for cross-cultural use, to ascertain psychiatric diagnoses [35]. They also assessed depressive symptoms using the Montgomery–Asberg Depression Rating Scale (MADRS). Rates of depression among asymptomatic HIV-positive people in the four developing country sites averaged 6.0% (range: 0% in Kinshasa to 10.9% in Sao Paolo). Symptomatic HIV-positive patients had rates of depression, ranging from 4.4% in Kinshasa to 19.6% in Sao Paolo. Depression was the only diagnosis for which a higher prevalence among symptomatic HIV-positive patients reached significance compared with HIV-negative controls at one site; however, the experience of depressive symptoms, assessed using the MADRS, was significantly greater in symptomatic seropositive participants than in matched seronegative controls in all centers. In two sites (Bangkok and Sao Paolo) the rates of *any current mental disorder* among symptomatic HIV-positive participants were significantly higher than those of HIV-negative controls. One longitudinal study compared people with AIDS and asymptomatic HIV prior to and post notification of HIV serostatus [36]. High rates (38%) of adjustment disorder with depressed mood or major depression decreased in asymptomatic individuals from the immediate post-notification period to the 3-month follow-up (16.7%).

Accurate rates of mental illness can only be ascertained with proper tools. Kaaya *et al.* [30] emphasized the need for simple, culturally appropriate screening tools for assessing depression in high-risk populations with HIV. They examined the validity of the Hopkins Symptom Checklist-25 for use as a depression screen for pregnant, HIV-positive women in Tanzania. Symptoms endorsed most frequently by participants included feeling blue (26%), loss of sexual

interest or pleasure (20%), followed by worrying too much about things (18%), headaches (18%), and feeling trapped (17%).

Quality of life and mental health

We reviewed seven studies that examined quality of life and reported on mental health variables [23,24,26,37,38,41,43]. Two studies showed that mood disturbance was a strong predictor of poorer quality of life [24,41]. Increased physical symptoms of HIV were related to poorer quality of life and greater anxiety [23]. Depression correlated with fatigue, higher uncertainty in illness, and was associated with lower scores on psychological, social and environment subscales of a quality of life assessment [43]. Compared with uninfected controls, women with HIV reported lower scores in all domains of quality of life, including mental health [38]. Among infected women with greater than four HIV-related symptoms, 28% felt 'so depressed nothing could cheer them up' [38]. A study of disclosure, quality of life, and mental health showed that positive outcomes in disclosing HIV status were related to higher total quality of life scores and to higher scores in the social and environmental domains [26]. Disclosure outcomes were not related to anxiety or depression.

Other psychosocial correlates of mental health

Psychosocial correlates that were significantly related to mental health outcomes included family relationships and social support, coping styles, and HIV-related worry and stressors. Chandra *et al.* [26] observed that poor family relationships, AIDS in a spouse, and current alcohol abuse or dependence were related to elevated depression and anxiety. Anxiety and depression scores, in turn, were related to suicidal ideation. Lack of a relationship with a partner or having a partner who was ill was associated with high depression scores for women who had recently given birth in Thailand [32]. Depression was associated with being in a serodiscordant partnership in a Russian sample. Among those with serodiscordant partners, more than half reported some unprotected vaginal or anal sex [25]. Three studies demonstrated a relationship between participants' coping styles and depressive symptoms [27,32,43]. HIV-related stress was also related to elevated depression and anxiety in a Hong Kong sample [23]. The main stressors endorsed by the population were disclosing HIV status, financial stressors, and problems with family [23]. Perceived stress among Nepali former commercial sex workers was also correlated with anxiety and depression [27].

Depression also predicted health behaviors among pregnant Thai women with and without HIV [40]. Poorer self-care practices were associated with depression, and this relationship was mediated by learned resourcefulness, the personal skills that enable women to manage depressive symptoms and care for themselves adequately [40].

Adherence to antiretroviral therapy and psychological correlates

Four studies examined the relationship between psychological factors and adherence to antiretroviral therapy [49–52] (Table 2). Among Ugandan patients assessed for depression with the CES-D, no relationship between depression and adherence was found [49]. Although non-adherent Brazilian patients had significantly higher scores on perceived negative effects and physical concerns (e.g. 'I have been feeling sad and down.'), after adjustment for education and dosing of ART no significant relationship was seen [51]. Attitudinal factors (e.g. not maintaining a good attitude or mental state) were also related to adherence in a Costa Rican sample prior to adjustment [52]. After multivariate analysis, no significant relationship remained. Anxiety and depression ratings, however, decreased significantly among South African patients after 1 year on ART [50].

Cognitive and neuropsychological studies

We found no studies that examined depression and anxiety among children with HIV in developing countries; however, three studies examined the cognitive and neurodevelopmental effects of HIV in children in Zaire, Uganda, and Rwanda [45,46,48]. These studies demonstrated that infants and children with HIV infection experienced deficits in motor and cognitive development compared with HIV-negative children. Drotar *et al.* noted that HIV-associated differences in their study were not attributable to home environment or caretaker–infant interaction [45]. Boivin *et al.* [46] showed that children who were HIV-negative, but born to seropositive mothers experienced fewer delays than HIV-infected children, but more deficits than those born to seronegative mothers. They highlighted the impact of deprivation on children and their environment secondary to having a mother with a serious, chronic illness. These effects are particularly salient for families with unstable financial resources [46].

A multi-site study of adults showed that cognitive impairment affects those with symptomatic HIV-infection significantly more than controls [47]. Symptomatic seropositive individuals most frequently complained of memory disturbance, concentration problems, and slowness of thinking. In Kinshasa and Nairobi asymptomatic HIV-positive participants with low education level showed greater impairment in comparison with controls. At two developing country sites subjective cognitive complaints were significantly related to the presence of depressive symptoms among asymptomatic and symptomatic seropositive participants. Among asymptomatic patients, these subjective complaints did not correlate with objective neuropsychological deficits on examination.

Community perceptions of mental health and HIV

Wilk and Bolton [42] interviewed key informants in a rural Ugandan community to explore the mental health consequences of HIV. Among the problems identified were ‘hatred of self, life, and God and desire for vengeance on the world; loss of hope; and worry and self pity’. Stress and grief were perceived to precipitate ‘madness’. Participants described two distinct syndromes, Yo ‘*kwekyawa* (hating oneself) and *Okwekubaziga* (pitying oneself), that overlapped with the DSM-IV diagnosis of depression.

Mental illness intervention studies

Two studies reported on trials of psychosocial interventions with mental health outcomes. One assessed a cognitive-behavioral group program (CBP) for HIV-positive Chinese men in Hong Kong [53]. They randomized 16 patients from a general hospital AIDS service to CBP or a wait-list control. The treatment group attended seven weekly sessions of cognitive behavioral therapy focused on AIDS-specific concerns. Post-treatment, this group showed significant reduction in depressive symptoms as assessed by the Medical Outcomes Study 36-item short form health study (SF-36) mental health subscale ($F = 8.28$, $P < 0.05$) and the CES-D ($F = 12.18$, $P < 0.01$). Another tested the efficacy of group interpersonal psychotherapy (IPT) in rural Ugandan communities with high HIV prevalence and high HIV-related mortality, and showed that the intervention was effective in reducing depressive symptoms and feasible in a community setting [54]. They randomized 30 villages to receive sixteen weekly sessions IPT or to a control arm. The mean reduction in depression severity was 17.47 points for the intervention groups and 3.55 points for controls ($P < 0.001$).

Discussion

We describe a systematic review aimed at answering four research questions relating to the mental health implications of HIV/AIDS in developing countries. The literature available to respond to these questions was limited in quantity and heterogeneous with respect to methodologies, study populations, and assessment of mental health outcomes. Despite these

limitations the studies provide data that may be applicable to HIV treatment programs in resource-poor settings.

What are the mental health risk factors for HIV?

Numerous studies in high-income countries have demonstrated high HIV prevalence among people with chronic and persistent mental illness. Prevalence of infection ranges from 3.1–22.9% [8,14,55]. The seven studies we reviewed established the prevalence of HIV infection among clinic and hospital-based populations of people with mental illness or assessed sexual risk behavior in these populations. The studies used a variety of sampling frames and sample sizes, making generalizable conclusions difficult. The results suggest that in contrast to high-income, low HIV prevalence settings, the HIV seroprevalence among people with mental illness in these settings may not be greater than rates in the general population. Regional variations in the stage of the epidemic may account for some differences; others may be related to greater family involvement or tighter institutional control over the lives of people with mental illness. More recent studies from high-prevalence countries in this review showed high rates of HIV in persons with mental illness, suggesting that this population is vulnerable in these settings. The lack of appropriate community care for people with mental illness may add additional risks to their health as a consequence of the double burden (and stigma) of comorbidity.

What are the mental health consequences of HIV?

Studies that focused on mental health and other psychosocial variables among people with HIV were among the most heterogeneous. The variation in mental health instruments, sampling, study design, and timing of the assessment in relation to receiving the HIV diagnosis most likely influenced the prevalence of mental illness reported. Many of these studies focused on specialized populations for whom factors other than HIV/AIDS might contribute to depressive and anxiety symptoms. Despite this variation, the results suggest that increased psychological distress (especially depression) among people with HIV infection occurs commonly. Two large studies in our sample that used control groups and representative sampling demonstrated a significantly higher prevalence of depressive symptoms among HIV-positive people compared with controls [35,38]. Other findings suggested that levels of distress may be related to the severity of physical symptoms. Coping styles and learned resourcefulness may shape the experience of depressive symptoms and the ability to care for oneself. Family relationships and the support of a partner can also influence mental health.

In contrast to the evidence documented in studies from high-income countries [56–58], the studies in our review did not find an independent relationship between depression (or other symptoms) and adherence to ART. Given that only one study used a diagnostic assessment for depression, this finding should be interpreted cautiously. Among studies that did not meet our inclusion criteria, psychosocial issues such as stigma and disclosure were salient. Fear of rejection or violence by a sexual partner was associated with less than 95% adherence to ART in a South African study [59]. Similarly, a qualitative study in India linked fear of stigma with lack of disclosure of HIV infection and consequently, reduced options for social support [60].

What is the impact of current psychosocial interventions on mental health and HIV disease outcomes?

Despite its small sample size, the study reported by Chan *et al.* suggests that a cognitive behavioral group intervention for people living with AIDS can reduce depressive symptoms [53]. Although the study participants showed some culturally specific responses to living with HIV and experiencing depression, they shared much in common with people living with HIV/AIDS in other cultural settings. The community-based randomized control trial conducted in rural Uganda was a methodologically sound study that demonstrated the efficacy of

interpersonal psychotherapy in a region with high HIV prevalence. Group IPT presents a low-cost intervention for people with HIV and those affected by HIV that does not require specialist mental health care providers to implement. With adaptation, such interventions may be usefully implemented in multiple cultural settings.

Implications for research and practice in developing countries

This review demonstrates the need for methodologically sound studies of mental health throughout the course of HIV and interventions that employ identified variables (e.g. coping, family support) for efficacy in reducing symptoms of mental illness. The promising intervention findings should encourage investigators to study the implementation of these interventions in HIV service settings, to examine how and where people with HIV/AIDS receive mental health services, and to explore mental health issues as they affect HIV treatment access and adherence. As the ART roll-out extends in Africa and other developing countries, behavioral factors are likely to be a major determinant [61,62]. Our review suggests that stigma, disclosure, and self-efficacy will be among the psychological factors that have particular relevance for the success of these programs, in addition to economic factors. Research should describe the mental health-related predictors of adherence and the impact of mental health interventions (for improving adherence as well as interventions for frank mental disorders) on adherence and clinical outcomes.

The studies in this review suggest that counseling and treatment teams should be aware of vulnerable periods in the course of HIV illness (e.g. periods of increased symptoms or pain) during which patients may have a greater need for support or be at greater risk for experiencing symptoms of mental illness. Interventions that help to support family and other significant relationships or encourage adaptive coping styles in the cultural context may positively affect mental health. Individual, family, couple's counseling and other mental health services are often well-received and requested by people with HIV in low-income settings [24,44,63].

A US study showed that depression was rarely recognized in the setting of HIV treatment [64]. The same is likely to be true in poor countries. The lack of mental health care services, human resources, and funding each present formidable barriers to training of providers and treatment of mental illness in these settings. Counseling teams in place in most HIV treatment settings may provide a source of mental health care providers. We have suggested that frontline primary care workers can be trained to treat mild psychological distress (through counseling) and to recognize depressive, anxiety, and other symptoms that warrant referral to mental health services [4]. There is now a growing body of evidence pointing to the efficacy and cost-effectiveness of affordable and feasible interventions for depression in developing countries [65]. Where feasible, a process of referral to mental health services must be built into the infrastructure of local and district healthcare centers to address the mental health needs of HIV-positive patients. In low-income countries this requires the collaboration of HIV services and mental health services (where they exist) so that specialist mental health care providers can offer supervision and treatment, preferably in the HIV service setting. In middle-income countries in which specialist services are more plentiful, AIDS treatment programs should consider including an HIV mental health specialist as part of a multi-disciplinary treatment team. These HIV and mental health service collaborations will be particularly critical for addressing the prevention and treatment needs of people with serious mental illness.

Conclusions

Although lacking, mental health care in HIV programs in developing countries has not been completely disregarded. The WHO 3 × 5 Initiative mental health working group developed a five-part series of training materials and resources for provision of mental health services as an integral part of HIV care. Training on the use of these materials is underway. Clinical

management guidelines in other HIV care initiatives also include information on the diagnosis and treatment of depression [66]. These advances are promising, but the dearth of mental health care resources in these settings make it unlikely that people seeking HIV care receive, in practice, adequate treatment or follow-up for their mental health needs.

We recommend that, first, resources and time be dedicated to establishing and strengthening relationships to existing mental health services and HIV care programs. This can be achieved as donors and program directors recognize the importance of allocating funds for mental health services in HIV care (including procurement of psychopharmacological medications) and stipulate mental health integration. Psychosocial services in existing programs were probably influenced by donor requirements. Second, researchers should take into account the urgent need for action in the epidemic by studying the implementation of effective psychosocial interventions on a range of outcomes, including adherence. Simultaneously, ongoing clinical, policy, and services research that will provide an evidence base for continued improvement of service delivery should be encouraged.

Gaps remain between the acknowledgment of psychosocial factors as critical to the lives of people with HIV and the application of adequate resources to provide quality mental health care in poor countries. Poverty in these regions influences access to services and the individual's ability to adhere to care. The stigma of mental illness and HIV intensify these challenges. The large-scale training of counselors, the growing use of multidisciplinary treatment teams, and the inclusion of psychosocial care in selected initiatives are tremendous strengths upon which to build.

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Table 1

HIV risk and seroprevalence among people with mental illness.

Author	Study site	Sample	Study design	Main findings
Chandra <i>et al.</i> (2003) [16]	India: psychiatric hospital	618 consecutive inpatients	Cross-sectional study	5% high-risk behavior in the past year
Tharyan <i>et al.</i> (2003) [17]	South India: psychiatric hospital	1160 consecutive patients	Seroprevalence Study	1.03% HIV seroprevalence
Hutchinson and Simeon (1999) [18]	Trinidad and Tobago: psychiatric hospital	1227 patients tested between 1991 and 1995	Review of hospital records from 1991–1995	6.9% HIV seroprevalence
Chopra (1998) [19]	India: psychiatric hospital	59 consecutive inpatients	Cross-sectional study	51% high-risk behavior in the past 2 years
Acuda and Sebit (1996) [20]	Zimbabwe: psychiatric hospital	143 consecutive inpatients	Seroprevalence study	23.8% HIV seroprevalence
Chen (1994) [21]	Taiwan: two psychiatric hospitals	834 inpatients	Seroprevalence study	No patients were HIV-positive.
Dasananjali (1994) [22]	Thailand: forensic psychiatric hospital	325 inpatients	Seroprevalence study	1.85% HIV seroprevalence

Table 2**Mental health consequences of HIV.**

Authors	Study site	Samples	Study design	Main findings
<i>Prevalence and validity studies among HIV-positive samples</i>				
Au <i>et al.</i> (2004) [23]	China, general hospital AIDS service	<i>N</i> = 55 men and women	Cross-sectional study No comparison group Diagnostic/screening measures: Hospital Anxiety and Depression Scale (HADS)	10.91% with clinical anxiety; 22% sub-clinical anxiety; 10.91% clinical depression; 16% sub-clinical depression.
Tostes <i>et al.</i> (2004) [24]	Brazil, hospital-based HIV treatment centers	<i>N</i> = 76 women	Cross-sectional study No comparison group Diagnostic/screening measures: HADS Clinical Interview Schedule, revised (CIS-R)	37% with 30.3% with anxiety; depression; 48.7% with conspicuous psychiatric morbidity (CIS-R)
Amirkhanian <i>et al.</i> (2003) [25]	Russia; HIV service/care agencies	<i>N</i> = 470 men and women	Cross-sectional study No comparison group Diagnostic/screening measures: Center for Epidemiologic Studies Depression Scale (CES-D) State-Trait anxiety inventory	42% with elevated anxiety scores and 36.5% with probable major depression
Chandra <i>et al.</i> (2003) [26]	South India, HIV counseling clinic and respite care centers	<i>N</i> = 68 men and women	Cross-sectional study No comparison group Diagnostic/screening measures: HADS	47% with depressive disorder, 25% anxiety disorder
Eller and Mahat (2003) [27]	Nepal, NGO service recipients	<i>N</i> = 98 women commercial sex workers	Cross-sectional study No comparison group Diagnostic/screening measures: CES-D Symptoms Checklist 90-R, Anxiety Subscale	3% with depression; 18% with depression using the somatic subscale
Olley <i>et al.</i> (2003) [28]	South Africa, infectious disease clinic	<i>N</i> = 149 men and women	Cross-sectional study No comparison group Diagnostic/screening measures: MINI International Neuropsychiatric Interview	56% with at least one psychiatric disorder; 34.9% with depression; 21.5% with dysthymic disorder; 14.8% with post-traumatic stress disorder; 10.1% with alcohol dependence
Sebit <i>et al.</i> (2003) [29]	Zimbabwe, peri-urban community	<i>N</i> = 194 community members: 115 HIVP and 79 HIVN	Cross-sectional study with comparison group Diagnostic/screening measures: Brief Psychiatric Rating Scale Montgomery–Asberg Depression Rating Scale (MADRS) Mini Mental State Test	71% of HIVP vs. 44.3% HIVN sample with psychiatric disorder (OR = 3.12). 57.4% of HIVP vs. 31.6% of HIVN with depression (OR = 2.91). 24.3% of HIVP vs. 16.5% of

Authors	Study site	Samples	Study design	Main findings
Kaaya <i>et al.</i> (2002) [30]	Tanzania, antenatal clinic patients	903 HIVP pregnant women	Cross-sectional validity study Diagnostic/ screening measures: Hopkins Symptom Checklist-25 (HSCL-25) SF-36 Structured Clinical Interview for Diagnosis (SCID)	HIVN used or misused alcohol. The HSCL-25 screened depression, but could not gauge severity of symptoms in the Tanzanian cultural context.
Mfusi and Mahabeer, (2000) [31]	South Africa, antenatal clinic	<i>N</i> = 30 HIVP and <i>N</i> = 30 HIVN pregnant women	Cross-sectional study with comparison group Diagnostic/ screening measures: Beck's Depression Inventory IPAT Anxiety Scale Questionnaire	23% HIVP pregnant women vs. 6.6% of HIVN pregnant women with severe anxiety; Moderate/ severe depression in 63.3% of HIVP vs. 56.7% of HIVN women.
Bennetts <i>et al.</i> (1999) [32]	Thailand, hospital-based antenatal clinics	<i>N</i> = 129 post-partum women	Cross-sectional study No comparison group Diagnostic/ screening measures: CES-D	43% symptomatic for depression; 29% with severe depressive symptoms
Chandra <i>et al.</i> (1998) [33]	India, HIV clinic	<i>N</i> = 51 men and women	Cross-sectional study No comparison group Diagnostic/ screening measures: HADS Clinical Interview for ICD-10 diagnosis	40% with depression, 36% with anxiety by HADS; 35% per cent with moderate anxiety and depressive disorders by ICD-10; 14% with persistent suicidal intent or attempt
Ahuja <i>et al.</i> (1998) [34]	India, general medical ward	<i>N</i> = 18 men and women	Cross-sectional study No comparison group Diagnostic/ screening measures: Structured Clinical Interview for Diagnosis (SCID)	33.3% with major depressive disorders; 27.8% with adjustment disorder; 5% with psychotic disorder; 44.4% with alcohol dependence
Maj <i>et al.</i> ^a (1994) [35]	Thailand, Brazil, Zaire, Kenya, Germany, clinic	<i>N</i> = 955 (186 Bangkok; 205 Kinshasa, Zaire; 183 Munich; 203 Nairobi; 178 Sao Paulo)	Cross-sectional study with two comparison groups Diagnostic/ screening measures: Composite International Diagnostic Interview (CIDI) Brief Psychiatric Rating Scale MADRS	Any mental d/o: HIVN: 0–9.1%; AHIVP: 1.9–14.7%; and SHIVP: 5.9–26.2%; Depression: HIVN: 0–7.8%; AHIVP: 0–10.9%; SHIVP: 4.4–21.0% Significantly higher rate of mental disorders among SHIVP compared with HIVN controls in Bangkok and Sao Paolo.
Jacob <i>et al.</i> (1991) [36]	India, AIDS Reference and Surveillance Center	<i>N</i> = 46; PWA (<i>N</i> = 4) and HIVP (<i>N</i> = 42) men and women	Longitudinal study with two groups Diagnostic/ screening measures:	Baseline: 75% of PWA with any psychiatric morbidity (delirium or

Authors	Study site	Samples	Study design	Main findings
			Psychiatric clinical interview	adjustment d/o); 21% of HIVP with any psychiatric morbidity. After knowledge of status: PWA, no change; 47.6 % HIVP with any psychiatric morbidity.
<i>Quality of life, community perceptions, and other psychosocial correlates</i>				
Hughes <i>et al.</i> (2004) [37]	South Africa, clinic and community	<i>N</i> = 123 HIV-positive patients, <i>N</i> = 108 age-matched community controls	Cross-sectional study with comparison group	33% of PWA vs. 24.2% of controls with some/severe anxiety or depression (<i>P</i> = 0.123).
Mast <i>et al.</i> (2004) [38]	Uganda, community sample	<i>N</i> = 803 women (239 HIVP; 564 HIVN)	Cross-sectional study with comparison group	HIVP women report significantly poorer functioning and well-being than HIVN women on all scales: 22% HIVP reported feeling depressed; 35% of HIVP women with > 4 HIV symptoms report feeling depressed.
Olley <i>et al.</i> (2004) [39]	South Africa, infectious disease clinic	<i>N</i> = 149 men and women	Cross-sectional study No comparison group	Being a female HIV-positive patient (OR = 1.23), the impact of negative life events (OR = 1.13), and increased disability (OR = 1.51) predicted current major depression.
Boonpongmanee <i>et al.</i> (2003) [40]	Thailand, antenatal clinics	<i>N</i> = 153 pregnant HIVP and HIVN women	Cross-sectional study with comparison group	Depression was a significant predictor of self-care among pregnant, HIVP women. The effect of depression on prenatal self-care was mediated by learned resourcefulness. HIV status did not predict prenatal self-care.
Yang <i>et al.</i> (2003) [41]	Northern Taiwan, four hospitals	<i>N</i> = 114 men and women	Cross-sectional study No comparison group	Mood disturbance was strongest predictor of quality of life. Reduced physical symptom distress, and higher levels of social support were also associated with higher quality of life.
Wilk and Bolton (2002) [42]	Uganda, community sample	<i>N</i> = 50 men and women	Cross-sectional qualitative study	Identified eight psychological

Authors	Study site	Samples	Study design	Main findings
				consequences of HIV: loss of hope, worry and self-pity, drunkenness to escape reality, stigmatization and social isolation, hatred of life and God, grief, madness or irrational behavior, and suicide
Molassiotis <i>et al.</i> (2001) [43]	Hong Kong, China; AIDS specialist clinic	<i>N</i> = 46 men and women	Cross-sectional study No comparison group	Moderate QOL; Considerable mood disturbances, esp. depression, fatigue, and tension/anxiety. High uncertainty and fatigue predicted lower overall QOL. Internal coping correlated with higher QOL scores.
Keogh (1994) [44]	Rwanda, pediatric and antenatal clinics	<i>N</i> = 55 women; <i>N</i> = 47 at F/U	Longitudinal study No comparison group	Housing, employment, money, food, and child care were expressed needs; At baseline and F/U preferred sources of support were individual counselling. 47% reported loss of pleasure in normally enjoyable activities, 6/47 reported suicidal ideation at F/U.
<i>Cognitive and neuropsychological studies</i>				
Drotar <i>et al.</i> (1999) [45]	Uganda, antenatal clinic	<i>N</i> = 61 HIVP infants, 243 UI infants of HIVP mothers, 115 UI infants of HIVN mothers	Prospective cohort study Comparison groups: HIVP infants, seroreverters, and infants of HIVN mothers	HIVP infants show slower mental and motor development and greater deceleration in rate of motor development. HIVP infants with abnormal neurologic exams had lower motor and mental test scores vs. HIVP infants with normal neurologic exams. No differences in visual recognition memory (information processing ability)
Boivin <i>et al.</i> 1995 [46]	Zaire, antenatal clinics, hospital and community	Study 1: <i>N</i> = 14 HIVP, 20 seroreverters, 16 children of HIVN mothers Study 2:	Study 1: Prospective cohort study with three comparison groups Study 2: Cross-sectional study with	HIVP children show deficits in personal social, language, fine motor, and gross motor development compared with HIVN

Authors	Study site	Samples	Study design	Main findings
		<i>N</i> = 11 HIVP children, 15 seroreverters, 15 children of HIVN mothers	three comparison groups	children of seropositive and seronegative mothers. Study 2: HIVP children show sequential motor and visual-spatial memory deficits and motor development deficits.
Maj <i>et al.</i> (1994) [47]	Thailand, Brazil, Zaire, Kenya, Germany; clinics	<i>N</i> = 955 AHIVP, SHIVP, HIVN patients (186 Bangkok; 205 Kinshasa, Zaire; 183 Munich ^a ; 203 Nairobi; 178 Sao Paulo)	Cross-sectional study with longitudinal follow-up	Prevalence of dementia was 0% in Bangkok, 5.9% in Kinshasa, 6.5% in Brazil, and 6.9% in Nairobi among SHIVP participants. SHIVP individuals showed a greater prevalence of global neuropsychological impairment than seronegative controls in all centers.
Msellati <i>et al.</i> (1993) [48]	Rwanda	<i>N</i> = 218 infants of HIVP mothers matched with 218 infants of HIVN mothers	Prospective cohort study with follow-up to 24 months	Higher proportion of abnormal neurologic examinations in HIV-infected children compared with HIV-uninfected children born to HIVP and HIVN mothers at the 6, 12, 18, and 24 month follow-ups. Gross motor scores were significantly lower at each time point.
<i>Psychological correlates and adherence to antiretroviral therapy</i>				
Byakika-Tusiimi <i>et al.</i> (2005) [49]	Uganda; three AIDS treatment centers	<i>N</i> = 304 men and women	Cross-sectional study No comparison group Diagnostic/screening measures: CES-D	Depression, social support, drug and alcohol use, regimen characteristics did not predict adherence to ART. Lack of money was the leading predictor.
Jelsma <i>et al.</i> (2005) [50]	South Africa; HIV clinics	<i>N</i> = 117 men and women	Longitudinal study with Reference sample comparison	Anxiety/depression domain on the Euro Quality of Life-5 Dimensions (EQ-5D) showed significant improvement at 12-months compared to baseline among people receiving antiretroviral therapy.
Pinheiro <i>et al.</i> (2002) [51]	Brazil; specialist clinic	<i>N</i> = 195 men and women	Cross-sectional study	Self-efficacy expectation was an

Authors	Study site	Samples	Study design	Main findings
Stout <i>et al.</i> (2004) [52]	Costa Rica; hospital	<i>N</i> = 88 men and women	Cross-sectional study	independent predictor of adherence. Perception of negative affect was not an independent predictor. Depression and 'not maintaining a good attitude or mental state' were not independently associated with adherence.

AHIVP, asymptomatic HIV positive; ART, antiretroviral therapy; F/U, follow-up; HIVN, HIV negative; HIVP, HIV positive; NGO, non-governmental organization; OR, odds ratio; PWA, people with AIDS; QOL, quality of life; SHIVP, symptomatic HIV positive; UI, uninfected.

^a Findings from Munich omitted.