Thesis Title: Studying depression and stress in relation to viral load & CD4 counts of HIV+ individuals. An association study in a Greek sample.

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...to Sofia who helped this trial come true....

Μελετώντας την κατάθλιψη και το στρες σε σχέση με το ιολογικό φορτίο και τα επίπεδα των CD4 οροθετικών ατόμων. Μια μελέτη συσχέτισης σε δείγμα Ελλήνων.

Σκοπός της μελέτης: Σκοπός της παρούσας μελέτης ήταν η προσπάθεια να συσχετιστούν ψυχολογικές μεταβλητές όπως η κατάθλιψη και το στρες, με τον CD4 δείκτη του ανοσοποιητικού συστήματος και τους ιολογικούς δείκτες 70 οροθετικών HIV+ ατόμων. Πρόκειται για μια μελέτη συνάφειας σε δείγμα Ελλήνων οροθετικών. Τελικός στόχος υπήρξε η δημιουργία ενός προβλεπτικού μοντέλου των ασθενών με HIV. Στην παρούσα μελέτη, δόθηκε ιδιαίτερη βαρύτητα στην ποικιλία των δημογραφικών χαρακτηριστικών του πειράματος.
Μεθοδολογία της έρευνας: Για την πιθανή ανίχνευση της κατάθλιψης χρησιμοποιήθηκε το Beck Depression Inventory (BDI), ενώ αντίστοιχα για το στρες, το State-Trait-Anxiety Inventory (STAI), ενώ έγινε χρήση των τακτικών ετήσιων αιμοληπτικών ελέγχων για τα επίπεδα των CD4 και των ιικών τους φορτίων. Η παρούσα έρευνα έκανε χρήση συσχετισμών και αναλύσεις παλινδρόμησης με στόχο τη δημιουργία προβλεπτικών μοντέλων της υγείας των ασθενών.
Αποτελέσματα: Δεν παρατηρήθηκαν βασικές συσχετίσεις ανάμεσα στους ιολογικούς δείκτες και στις ψυχοκοινωνικές μεταβλητές, τόσο πρίν όσο και μετά από την χρήση κριτηρίων αποκλεισμού. Στο παρόν δείγμα, βρέθηκαν δευτερογενείς συσχετίσεις όπως: στην μεταβλητή ηλικία με την χρονιότητα του ιού στον οργανισμό [Pearson's r (7)= .31, p< 0.01], ανάμεσα στα επίπεδα της κατάθλιψης και στο στρες επί του παρόντος [r (70)= .55, p< 0.01], ανάμεσα στα επίπεδα της κατάθλιψης και στο στρες προσωπικότητας [r (70)= .56, p< 0.01], και τέλος ανάμεσα στα επίπεδα της κατάθλιψης και του γενικού άγχους που τα άτομα βιώνουν [r (70)= .56, p< 0.01]. Τέλος, βρέθηκε μια αρνητική συσχέτιση ανάμεσα στα CD4 και το ιολογικό φορτίο των ασθενών [r (70)= -.47, p< 0.01]. Η χρήση των μοντέλων πρόβλεψης, πραγματοποιήθηκε κατ' επέκταση, αποκλειστικά για χάρη της παρούσας διπλωματικής.
Συμπεράσματα: Παρόλο που η παρούσα μελέτη δεν επιβεβαίωσε τη διεθνή βιβλιογραφία αναφορικά με τις συσχετίσεις ψυχοκοινωνικών μεταβλητών και δεικτών του ανοσοποιητικού συστήματος, για πρώτη φορά έγινε προσπάθεια δημιουργίας προβλεπτικών μοντέλων στην έκβαση της υγείας των HIV+ οροθετικών ατόμων για το Ηράκλειο της Κρήτης. Είναι σημαντική η περαιτέρω διερεύνηση των ψυχοκοινωνικών μεταβλητών στην υγεία των HIV+ ατόμων με επαναληπτικές τεχνικές και βελτιώσεις τόσο για τους ίδιους όσο και για το εθνικό σύστημα υγείας της χώρας.

CHAPTER 3

Results

CHAPTER 4

Abstract

Objective: The present experiment tried to understand the associations between different psychoneuroimmunological variables in HIV + Cretan Individuals. Specifically, the CD4+ Accounts and Viral Loads of 70 seropositives were treated as indicators of immunity and associated with their overall D*epression* and A*nxiety*. Additional Demographic Variables were also considered. The aim of the present study was to dictate associations between psychoneuroimmunal entities and whether these associations could create a predictive linear model of the variance of health outcomes of HIV+ individuals.

Methods: Our experiment met the agreed criteria of the ethic committees of both, the University of Crete, Department of Psychology, and the PAGNH Hospital in the capital of Heraklion of Crete. 170 HIV+ individuals were debriefed in order to take part in the experimental procedure. Seventy of them agreed to participate, while the rest refused, without giving reasons for the lack of their participation. Individuals were all informed for the real purpose of the present study. They were administered with two sets of questionnaires, one for Depression (using the **B**eck **D**epression **I**nventory, BDI) and the other for A*nxiety* (using: **S**tate – **T**rait **A**nxiety **I**nventory, STAI), as well as informed that their CD4+ and Viral Load Measures will be accounted by the experimenter. Correlation analyses as well as regression models ran, in order to reveal potential associations.

Results: No main correlations were apparent in our study neither before, nor after the application of exclusion criteria [that was for a 7% (n=5) of them, who were under medication for psychiatric reasons]. Depression and Anxiety were not correlated neither with the CD4+ Counts nor with the Viral Loads for this particular sample. However, our study came out with *positive associations*: a) between Age and HIV+ Temporal Distance [*Pearson's r* (70)= .31, $p< 0.01$], b) between Depression and State Anxiety [r (70)= .55, $p< 0.01$], c) between Depression and Trait Anxiety [r (70)= .56, $p< 0.01$], d) between Depression and Total Anxiety [r (70)= .56, $p< 0.01$], and finally with a *negative association* between: a) CD4+ Counts and Viral Loads [r (70)= -.47, $p< 0.01$]. None of our predictive Linear Models, revealed any statistical significances when Viral Loads and CD4+ Counts were treated as predictors of both Depression and Anxiety.

Conclusions: There is a great variability in the course of HIV infection, both in the morbidity and mortality of the disorder, suggesting that different cultural differences may be apparent among HIV+ heterogeneities. Further research should include extra variables of immunity as well as estimations of local quality of life instruments.

Key words: CD4-count; HAART; BDI-Scores; STAI-Scores; Viral Load; Psyconeuroimmunology; Correlation; Multiple Regression Analysis.

"….despair and an
attitude of hopelessness resulted in loss of all powers of resistance to the plague…."
Thucydides in his History of the Peloponnesian War

CHAPTER 1

Introduction

1.1.1 An introduction to HIV-AIDS

A few years ago, the field of psychosomatic medicine was not considered to have the growth and respect (or impact) it appears to have in nowadays. Psychological and behavioural factors did not seem for research to reflect any equivalent importance as "purely" physiological did. Clinicians and researchers, conflicted, still try to better understand and define the diverged mechanisms underlying the mystifying sets of symptoms and diseases, composing what is so called to as Acquired Immunodeficiency Syndrome (AIDS), looking at it from different perspectives. Psycho-neuro-immunology studies may be a potential answer key to better understand AIDS.

Many hypotheses so far, have been tested, rising from the time of infection of the HIV virus, onwards, examining the idea of contribution of plethorius factors that seem to co-play for the progression of the disorder. It still remains evasive this multifactorial concept of HIV infection as well as its progression, and much research has been focused on differentiating variables following longitudinal measures. Within the context of financial economic crisis of my country, it has been clearly shown that there is a significant decline in quality of life, a rapid increase in HIV + infections as well as suicides and/or ideation, across the country, according to recent estimations of Kentikelenis[1] et al., 2012. In contrast the risk for infections with transfusion-transmitted viruses has been reduced remarkably in previous estimations concerning Greek populations[2]. The necessity for intervention and preventive techniques across the Hellenic "continent" has been emerged and should be seen as a challenge for improvement. The psychosocial estimations and variability in Greece as far as HIV is concerned has not been heavily accounted up to now.

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[1] www.thelancet.com Vol: 379 March 17, 2012, Department of Sociology, University of Cambridge**.**

[2] Zervou et al., (2003)

1.1.2 Defining *A*cquired *I*mmune *D*eficiency *S*yndrome

«*Acquired immune deficiency syndrome or acquired immunodeficiency syndrome (AIDS) is a disease of the human immune system caused by the human immunodeficiency virus (HIV).*

This condition progressively reduces the effectiveness of the immune system and leaves individuals susceptible to opportunistic infections and tumours. HIV is transmitted through direct contact of a mucous membrane or the bloodstream with a bodily fluid containing HIV, such as blood, semen, vaginal fluid, preseminal fluid, and breast milk.

This transmission can involve anal, vaginal or oral sex, blood transfusion, contaminated hypodermic needles, exchange between mother and baby during pregnancy, childbirth, breastfeeding or other exposure to one of the above bodily fluids.

AIDS is now a pandemic. In 2007, it was estimated that 33.2 million people lived with the disease worldwide, and that AIDS killed an estimated 2.1 million people, including 330,000 children. Over three-quarters of these deaths occurred in sub-Saharan Africa, retarding economic growth and destroying human capital.

Genetic research indicates that HIV originated in west-central Africa during the late nineteenth or early twentieth century. AIDS was first recognized by the U.S. Centres for Disease Control and Prevention in 1981 and its cause, HIV, identified in the early 1980s.

Although treatments for AIDS and HIV can slow the course of the disease, there is currently no vaccine or cure. Antiretroviral treatment reduces both the mortality and the morbidity of HIV infection, but these drugs are expensive and routine access to antiretroviral medication is not available in all countries. Due to the difficulty in treating HIV infection, preventing infection is a key aim in controlling the AIDS pandemic, with health organizations promoting safe sex and needle-exchange programmes in attempts to slow the spread of the virus»[3].

[3] wikipedia, (2012)

1.1.3 Stages of Human Immunodeficiency Virus (HIV); the HIV Lifecycle

Centers for Disease Control[4] (CDC) initially grouped HIV infection into four different groups based on the presence or absence of disease and clinical or laboratory findings: *an acute infection*, *an asymptomatic infection*, *persistent generalized lymphadenopathy*, and finally, *AIDS*.

Acute phase (CDC group 1):
Soon after the exposure to the HIV virus, infected individuals will eventually develop high levels of plasma HIV RNA and mount a HIV-specific immune response. In this initial phase, no measurable antibodies are found. During this early phase, the virus enters and spreads throughout the lymphoid tissues (such as the lymph nodes, spleen and tonsils), and various organs containing lymphatic tissues (e.g. intestines) or resident macrophage cells (e.g. brain microglia). After that, a persistent viral replication begins, which continuous throughout the course of the disease. The Initial called: *viraemia* is partially controlled by the immune response to the virus (still strong enough to fight against a new virus in the body), in particular by CD8 cells, until eventual immune depletion occurs.

Asymptomatic phase:
After the acute phase is over (varying from individual to individual), the person enters into what may be a prolonged asymptomatic phase (CDC group 2). During this time the infected individual has antibodies to HIV (seroconversion), and is asymptomatic; yet 90% of those infected experience some form of CD4 (helper T) cell decline within 5 years[5]. This is a dangerous period to spread the virus around, exactly because of this prolonged asymptomatic phase; infected individuals are mostly unaware of their HIV health condition.

The next phase (CDC group 3) is characterized by: *persistent generalized lymphadenopathy*, which does not occur in all individuals. As CD4 cells drop below 500/mm3 (normal CD4 lymphocyte values range from 800 to 1200/mm3), individuals may experience prodromial AIDS symptoms (category B, CDC 1997 definition (previously known as ARC) such as diarrhea, fatigue, oral candidiasis, fever, night sweats and weight loss).

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[4] cited in: Balbin et al., (1999)

[5] Fauci A.S. (1988)

The final stage (CDC group 4) is characterized by an *AIDS* diagnosis. Diagnosis of AIDS can be made by a drop in CD4 counts below 200 or by clinical manifestations of category C symptoms (1987) such as hairy leukoplakia, pneumocystis carinii pneumonia (PCP), and Kaposi's sarcoma, non-Hodgkin's lymphoma, or AIDS-related dementia. During this last phase of the virus outcome the viral load of the patients raises up (quickly replicates), and so does infectivity. Before protease inhibitor drugs became widely available, it was estimated that, from initial exposure, 30% of HIV-infected individuals would progress to AIDS in 5 years time. Within 15 years, 90% of those infected would be diagnosed with AIDS[6], and the average length of time to development of symptomatic AIDS was about 10 years.

Treating individuals with HIV has been a challenge for the last couple of decades, by many points of view. It has been changed from a virtual death sentence, to a chronic condition eliciting the *progressive* deterioration of the immune system. Treatment began with the introduction of the first antiretroviral agent, zidovudine (AZT) in 1987[7]. With the advent of combination therapies that include newer reverse transcriptase inhibitors and HIV- specific protease inhibitors (PI), referred to as highly active antiretroviral therapy (HAART), significant further improvement has been made in delaying AIDS and mortality[8]. In fact, about 80-90% of individuals who adhere to protease-inhibitor - containing regimens can achieve undetectable plasma HIV viral loads over a period of 6-12 months[9]. While these drugs are very successful, viral resistance may develop, especially when doses of these complex regimens are missed. When drug resistance occurs, genotyping may be used to guide the choice of salvage regimen. This strategy has led to improved selection of medications successful in reducing viral load[10].

It is quite outstanding, why do some people stay healthy for so many years that they are called “long-term survivors” or “long-term nonprogressors” (persons with known HIV infection of 8–10 years who maintain a CD4_ cell count over 500 in the absence of therapy), while others show a rapid decline in immunity and succumb within a year or two of first showing symptoms to opportunistic infections?

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[6] Stine G.J. (1996)

[7] Blaxhult A & Lidman K. (1998)

[8] Sendi et al., (1999)

[9] Chaisson R.E., (1998)

[10] Durant et al., (1999)

1.1.4 HIV - *progression* and variables to heavily account…

HIV is a viral infection, contaminating and growing in the majority of population among Western and non-Western societies[11,12] late by the end of the previous century. Many theories have been promoted in the little history of its origin, however the most significant among them, that the HIV-virus causes the AIDS (Leserman J., (2003). Recent studies have been focused on the different progression patterns the virus follows, as an attempt to establish the physiological and psychosocial mechanisms underlying the mediating follow up pathway of the disorder[13,14,15]. Moderating and mediating factors come to the table of negotiations, and scientific society, has seen HIV as a rather controversial contingency[16].

There, has been a long scientific debate, on whether HIV moderates itself the immunodefiency syndrome or, whether there are other factors including HIV, that all together covariate, for the morbidity and the mortality of the disorder. In a Greek cohort study of 21 years follow up, the period of HAART era indicated significant changes in the patients morbidity and mortality profiles[17]. There was an estimation of 56% risk reduction for developing clinical AIDS in the post - compared to pre- HAART era. HAART era has been apparent by studies as rather controversial[18]. The pattern of Anti retroviral medication on the body has been tested for variables such as, cytomegalovirus in blood and identified via PCRs that the patients with a poor prognosis, even in the era of HAART is raised up.

The use of antiretroviral drugs became crucial for many governmental budgets around the world, while many Non Governmental trials have been attempted to organize and welfarly (or

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[11] Huanguang et al., (2007)

[12] Ironson et al., (2005). **P**sychosocial Factors Predict CD4 and Viral Load Change in Men and Women With Human Immunodeficiency Virus in the Era of Highly Active Antiretroviral Treatment.

[13] Leserman J., 2003

[14] Ironson et al., (2005). Dispositional Optimism and the Mechanisms by Which It Predicts Slower Disease Progression in HIV: Proactive Behavior, Avoidant Coping, and Depression.

[15] Breslau et al., (2000)

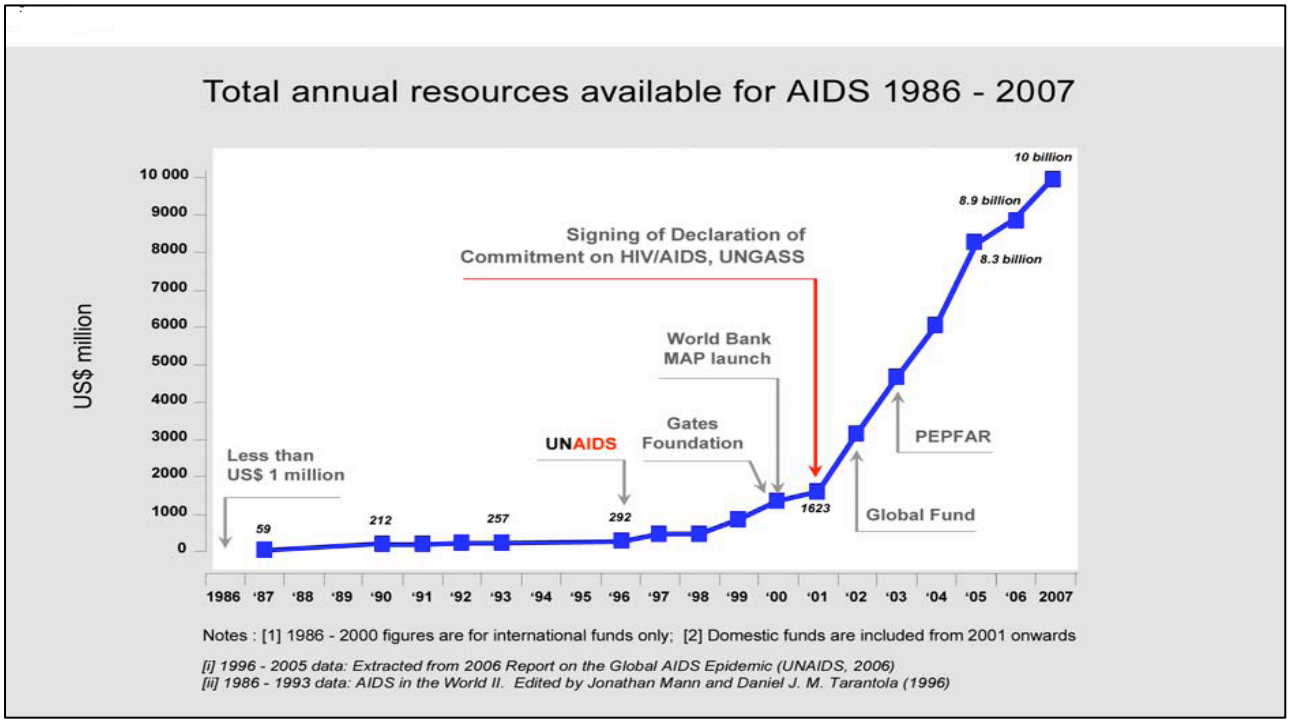
[16] The Duesberg Phenomenon, (1994)

[17] Katsarou et al., (2005)

[18] Deayton et al., (2004)

psychosocially) support HIV-positive patients[19]. The following graph represents up to recently the annual available resources for medication purposes.

Graph 1.1



Graph 1.1: This graph shows the total annual resources available for AIS 1986 – 2007 as far as US million dollars are concerned, recorded by UNAIDS[20].

The cost of these drugs, is high for the governmental budget[21], and pharmacological industries keep on insisting, boycotaging Asian mostly countries, trying to copy antiretroviral drugs for non-western populations[22]. The truth beyond the HIV still remains elusive and vague. Researchers have been focused on the mediating effects of psychosocial entities, affecting the progression of the disorder, and that finally endorse the progression of AIDS (CD4+ T Lymphocytes, less than 200:

[19] www.unaids.org, Switcherland , 2007

[20] The Joint United Nations Programme on HIV/AIDS (UNAIDS) brings together ten UN agencies in a common effort to fight the epidemic: the Office of the United Nations High Commissioner for Refugees (UNHCR), the United Nations Children's Fund (UNICEF), the World Food Programme (WFP), the United Nations Development Programme (UNDP), the United Nations Population Fund (UNFPA), the United Nations Office on Drugs and Crime (UNODC), the International Labour Organization (ILO), the United Nations Educational, Scientific and Cultural Organization (UNESCO), the World Health Organization (WHO), and the World Bank.

[21] www.unaids.org, Switcherland , (2007)

[22] Medicine sans frontiers: for further information, visit: http://www.msf.org.hk/public/contents/news?ha=&wc=0&hb=&hc=&revision_id=28281&item_id=28280

indicator condition[23]). Among them, *depression* and *stress* have been mainly characterised as significant contributors adding much on the progression[24] of the HIV infection, onwards to the AIDS[25].

There is a large body of literature pointing to the harmful effects of stress and depression on *cellular immunity*, including those aspects of the immune system affected by HIV (Evans et al 1989; Herbert et al 1993a, 1993b; Stein et al 1991; Weisse 1992). Depression and stress have been associated with a worsening course of plethorious diseases that affect the immunity of the body. For example, among cancer patients, severe life stress has been associated with a greater probability of relapse (Ramirez et al., 1989), and psychosocial interventions to improve coping with stress, resulting in longer survival and better well being (Fawzy et al., 1993; Spiegel et al., 1989). (Cited in Leserman, 2003).

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[23] Leserman J., (2003); there has been a scientific debate across the years on weather less that 200 CD4+ Count expresses an indicator condition, so, categorization of CD4+ count became a necessity: (CD4+, >500 cells/lL), mid-stage (CD4+, 200–
500 cells/lL), advanced (CD4+, 50–200 cells/lL), and end-stage disease (CD4+, <50 cells/lL), cited in: Kopnisky et al., (2004).

[24] Huanguang et al., (2004)

[25] Carrico et al., (2006)

1.2 Immune system and psychosocial correlates

1.2.1 CD4+ Count: T – helper cells; an indicator of immunity

Lets first see how stress influences the immune system, of non-HIV patients, in order to enlighten the basic biological mechanisms, stress, and stress-like behaviours, swap into the homeostatic immunity of the human body. In a psychoneuroimmunology study (PNI)[26], Bachen, et al., (2007) suggested that stress is a potential crucial factor for alterations of the immune system's normal functionality or homeostasis. In their theory, they accounted different *kinds of stressors* and how they "behave" on the body, in order to elucidate the relations between psychosocial factors, nervous, endocrine and immune system and health. This can be done though different ways, even though, it is still not clear enough. Under stress, the *alterations* of the immune system can be seen as an adoption of coping behaviours such as smoking or drinking alcohol, not exercising, resulting as an adaptation of the immune system on those behaviours[27]. This *direct* mechanism of influence suggests, an activation of *neuroendocrine* pathways that will eventually lead to the release of various *hormones* and *neurotransmitters*, such as cortisol and cateholamines. Nerves from the sympathetic system, are connected to lymphoid organs and the peripheral bloodstream, and include receptors and neurotransmitters that activate under stress circumstances[28]. In PNI studies, the "behaviour" of the immune system, is measured through the immune cells, named as white blood cells (WBCs) or leukocytes. Even though, there are different types of immune cells that keep the immune system activated and balanced, leukocytes produce substances called cytokines (a subset of T-helper cells[29]). Cytokines include the Th1 & Th2 helper – cells. These cytokines selectively activate T-cytotoxic cells and NK (natural killer) cells and thus promote cellular immunity. Cytokines produced by Th2 helper - cells include IL-4, IL-5, IL-6 and IL-13; they selectively activate B-cells and induce antibody production, thus promoting humoral immunity. Alterations in

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[26] cited in Ayers et al., (2007)

[27] Glaser et al., (1988)

[28] Plaut, 1987, cited in: Ayers et al., (2007)

[29] there has been an enormous understanding to our knowledge up to now, as to how T-helper or follicular B helper T cells produce long lasting protection and immunity (Deenick et al., 2011)

cytokine secretion[30] can be seen as an enhancement or suppression of the immune response, in respect to different kinds of stressing stimuli. Because the cytokines of Th1 and Th2 cells antagonize each other, a suppression of one response may result in enhanced production of the other. The following illustrations are from a T – helper cell covered by HIV & an entrance of the virus into the cell via CD4 cell receptors:

Illustration 1

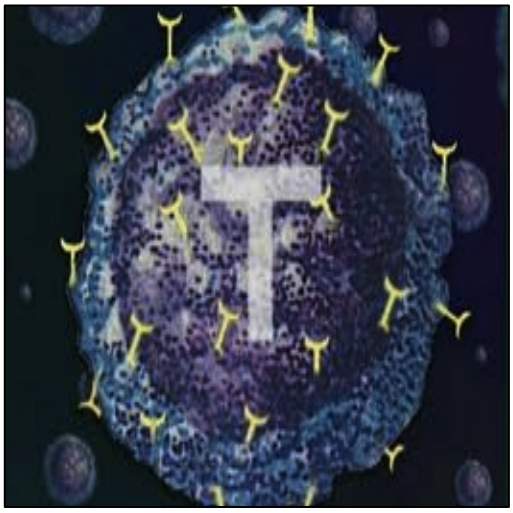

Illustration 1: shows the surface of a CD4 T- helper cell host, all dominated by the virus HIV.

Illustration 2

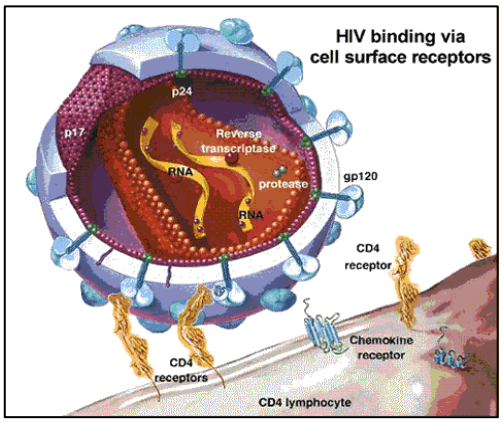

Illustration 2: shows the host binding process of the HIV Virus entrance via cell surface receptors.

[30] There is a long debate nowadays, concerning the term **cytokine-induced depression**. It has been argued (cited in: Loftis et al., 2010), the hyperactivity of HPA axis causes increase in pro-inflammatory cytokines associated with major depression, which seems as direct pathway of immunity due to psychological mediators

It has been indicated that under academic stress, over the period of examinations, students may be led to immunosupression via the decrease of lymphocyte response to mitogenic stimulation, reduced NK cell activity, alterations in T-cell populations, increased plasma levels of circulating antibodies and changes in cytokine production (cited in Bachen et al., 2007). In HIV- positive populations, the biological markers seem to follow more or less similar physiological patterns[31]. It is quite clear from a large literature that stressful experiences, both acute and chronic, have the potential to elicit immunosuppression, and that there are numerous of mechanisms by which this can be achieved. Some of them, we will try to analyze and understand, as much as science, provides us with, up to now. Moreover, as it has been indicated by relevant fields, among several immunological markers, the absolute number of CD4+ cell count remains the most powerful predictor of HIV-1 disease progression[32].

[31] Pioneers of PNI concept were Dunbar (1943) and Alexander (1950), who stimulated interest in psychosomatic phenomena, and the subsequent work of Solomon and Moos (1964), cited in Nott et al., (1995).

[32] Cited in Touloumi et al., (2000)

1.2.2 *Physiological* versus *Psychological* arousal and vice versa. A reciprocal exchange?

A HIV – positive diagnosis, in an extremely stressful event, which evokes strong negative feelings, such as shock, guilt, fear and helplessness[33]. As very clearly stated in many health psychology texts, the diagnosis of HIV is just the start of consecutive disfuncionalities and illness-related stressors, like disclosure of one's status, a decrease of general health, several hospitalizations, frequent check ups, adherence therapy problems and many other, adding a lot to one's general health & quality of life-style. The diagnosis of HIV may trigger severe psychological - physiological arousals, and stress-copying mechanisms is necessary to be adopted making slower the progression of the virus. Scientific - clinical research, as far as HIV understanding is concerned, can broadly be divided into *cross-sectional*, *longitudinal*, and *interventional* studies as well as studies of *long-term survivors*[34]. Stress-related research address the significance of diverged stressing stimuli such as: *bereavement*, other trauma and stress life events, experimental stress, sexual abuse[35], PTSD, chronic fatigue syndrome, as potential mediating mechanisms for the morbidity of the HIV debate. Many studies provide strong evidence that different types of stressors independently contribute to poor health outcomes[36]. Not confident, how reliable and mostly accurate, their measures might be, through very subtle variations they have to encounter, like: depression, stress, PTSD, and other. They can all be merged in two basic biological-physiological mechanisms-categories, both interfere and underlie the HIV progression: the *Neuroendocrine* pathway, and the *Sympathetic Nervous System* pathway (Leserman J., Temoshok L.R., 2008). They argue, that a response of the High autonomic nervous system may cause poorer suppression of plasma viral load and poorer CD4 T cell recovery over 3–11 months of therapy with antiretroviral medication[37]. It has been indicated that i.e. norepinephrine, a natural neurotransmitter of the Autonomous Nervous System, enhances the viral gene expression *in vitro*, through the pathway of chemokine receptor up-regulation. This suggests the possibility that neural activity directly promotes residual viral replication.

Quite early in research as for HIV progression and psyco-social variability is concerned, Cole et al., 2003, indicated that among 54 HIV asymptomatic, seropositive gay men, plasma viral load set-

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[33] cited in: Anagnostopoulos F. & Karademas E. (2007)

[34] Nott et al., (1995)

[35] Liebschutz *et al.,* (2000)

[36] Leserman et al., (1999)

[37] Cole et al., (2001)

point was elevated eight-fold in *socially inhibited* individuals, and these individuals showed poorer virologic and immunologic response to initiation of highly active antiretroviral therapy (HAART). Moreover, following Psychophysiological assessments (by monitoring palmary skin conductance, brachial artery systolic blood pressure, electrocardiogram, interbeat interval, finger photoplethysmograph, pulse peak amplitude, and peripheral pulse transit) time documented elevated ANS (Autonomous Nervous System) activity in socially inhibited individuals, and mediational analyses showed that such differences could account for 64%–92% of the covariance between social inhibition and virologic parameters.

In a more improved version, the same research team, 5 years after, explained the HIV-1 pathogenesis, in the era of effective antiretroviral therapy[38,39], in terms of the hypothalamus-pituitary-adrenal (HPA) axis and/or the sympathetic nervous system (SNS), as potential mediators of alternated bio-behavioral responses. According to their *in vivo* research, both humans and animals, show that HPA and SNS effector molecules can enhance HIV-1 replication in cellular models via effects on viral infectivity, viral gene expression, and the innate immune response to infection. The following illustration (figure 1&2) summarizes the linkage of hormonal (figure 1) - SNS (figure 2) outcomes and psychosocial factors in the disease progression through two, at least, different pathways:

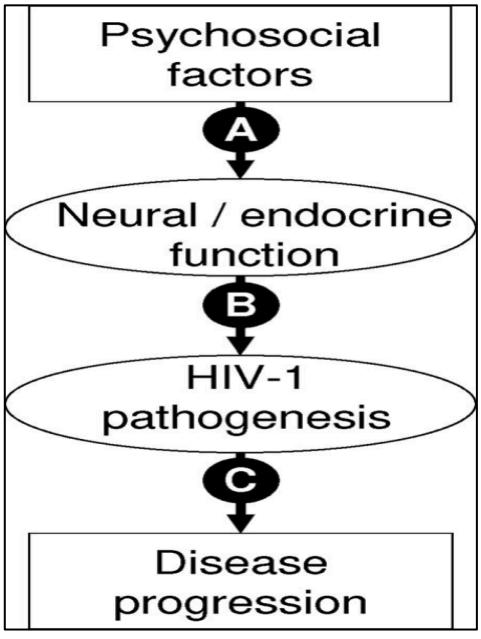

Figure 1. Theoretical model of biobehavioral influences on HIV-1 disease progression. Psychosocial factors: stress, depression, coping, social support, temperament, and other CNS-mediated influences on neural and endocrine activity, (**A**) CNS-mediated effects

[38] Cole S.W., (2008)

[39] Similar patterns of immunosupresion via SNS Hyperactivity in non HIV populations have also been recorded: Kimura et al., (2005)

of psychosocial factors on neural/endocrine activity, (**B**) neural/endocrine influences on HIV-1 replication, (**C**) effects of HIV-1 replication on clinical disease progression.

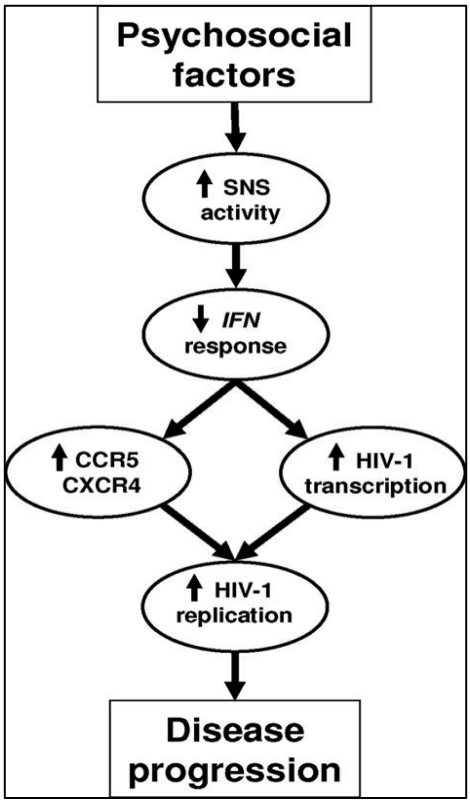

Figure 2. Theoretical model of SNS mediation of psychosocial influences on HIV-1 disease progression. SNS _ sympathetic nervous system, IFN _ Type I interferon. CCR5 and CXCR4 _ cell surface expression of cellular coreceptors that complement CD4 as mediators of HIV-1 infection[40].

Autonomic nervous system activity in HIV+ individuals, found those with constitutively high levels of SNS activity to show *elevated* plasma viral load set-points and *impaired* virologic response to the initiation of combination antiretroviral therapy[41,42]. In most of the HPA axis studies[43] it has been supported that Catecholamines significantly enhance HIV-1 replication. Several molecular mechanisms of this effect have been identified, including up-regulated cell surface expression of the viral CoReceptors, CXCR4 and CCR5, enhanced transcription of HIV-1 genes by cellular transcription factors, and catecholamine - mediated suppression of Type I interferon responses to infection. Signal transduction analyses identified beta adrenergic receptor activation of the cAMP/ PKA signaling pathway as the key mediator of catecholamine effects on HIV-1 replication, and

[40] Figures 1 & 2, cited in: Cole S.W., (2008)

[41] Cole et al., (2001)

[42] Cole S.W., (2008)

[43] Glover et al., (2010)

showed that pharmacologic blockade of beta adrenergic receptors can abrogate those effects[44]. Both kinds of research SNS & hormonal have as an aim to accurately measure cross cultural agreements on variances like depression, stress, and other psychopathologies. As Leserman (2003) points out, alterations in *glucocorticoids and catecholamines* very well explain the *psychoimmune relationships* between stress, depression and immunity. What is not very well known up to now, is the exact pathways those hormones follow or any alterations, when HIV comes into play. For these systems to be involved in mediating the psycho immune relationships in HIV, these hormones of the HPA axis and SNS are affected by stress and depression causing deregulation of these systems and in turn may have negative immunologic and disease progression consequences in HIV infection.

A basic parameter these researches do not take into account is individual differences as continually changing aspects that exhibit different biological - behavioural symptoms, according to individuality. This can be seen in research outcomes, as a rather controversial contingency, resulting in heteroclite differences about same measures on same or similar variables.

[44] Physiological mechanisms and progression, Cited in Cole S.W., (2008)

1.3 Stress related research and HIV progression

In a relatively recent meta-analytic review[45], up to 2009, there have been found 36 articles concerning positive associations of adverse psychosocial factors and HIV disease progression in 36 articles from three different data sources: p

Pub-Med, Psych-Info, Med-line. Notably, sensitivity analyses revealed that personality types or coping styles and psychological distress were more strongly associated with greater HIV disease progression than stress stimuli per se, and that all of the immunological and clinical outcome indicators (acquired immunodeficiency syndrome stage, CD4+ T-cell decline, acquired immunodeficiency syndrome diagnosis, acquired immunodeficiency syndrome mortality, and human immunodeficiency virus disease or acquired immunodeficiency syndrome symptoms) except for viral load, exhibited detrimental effects by adverse psychosocial factors. Various studies tested the hypothesis on whether stress life events predict a poor outcome of HIV+ individuals, however, from different theoretical perspectives. Table 1 indicates all the recent advances in the era of HIV-progression as well as their measure techniques and time varied repeated measurements.

Table 1: **Summary of Longitudinal Studies Examining Stressful Life Events and Trauma With HIV Disease Progression**

Study HIV-Infected Population	HIV-Infected Population	Follow-up Years	Measure of Stress/Trauma	Findings With Stress and/or Trauma
Kemeny and Dean, 1995	85 gay males	4	AIDS-related bereavement before baseline	↓ CD4 count
Kemeny et al., 1995	42 gay males	1	AIDS-related bereavement before baseline	↑ Neopterin (immune activation marker) ↓ Mitogen response
Goodkin et al., 1996	79 gay males	<1	AIDS-related bereavement before baseline	↓ NK cell cytoxicity ↓ Mitogen response
Evans et al., 1997b	93 gay males	3.5	Interview-based ratings of PERI severe stressful life events and difficulties: mean before disease change	↑ HIV disease stage

[45] Chida et al., (2009)

Leserman et al., 1999[b]	82 gay males	5.5	Interview-based ratings of PERI stressful life events and difficulties: timevarying cumulative scores	↑ AIDS
Leserman et al., 2000[b]	82 gay males	7.5	Interview based ratings of PERI stressful life events and difficulties: timevarying cumulative scores	↑ AIDS
Leserman et al., 2002[b]	82 to 96 gay males	9	Interview-based ratings of PERI stressful life events and difficulties: timevarying cumulative scores	↑ AIDS ↑ Clinical AIDS condition
Howland et al., 2000	618 children	1	Total of 8 recent stressful life events (e.g., parent's desertion, major illness, death, lost employment, sibling's death, housing change)	↓ CD4%
Kimerling et al., 1999	67 African-American females	1	Lifetime trauma including sexual and physical assault, and child death	↓ CD4 to CD8 ratio
Patterson et al., 1996	414 gay males	5	Total self-reported negative ratings of stressful life events (PERI) at baseline	(X) CD4 count (X) AIDS (X) Mortality
Perry et al., 1992 221	221 mostly males	1	Total number of stressful life events (PERI) at baseline	(X) CD4 count (X) CD4% (X) CD4 to CD8 ratio
Leserman et al., 2007[c]	490 males and females[a]	3.4	Total of 15 lifetime trauma categories (e.g., sexual/physical abuse, childhood neglect)	↑ AIDS-related mortality ↑ All-cause mortality
Mugavero et al., 2007[c]	489 males and females[a]	3.4	Total of 15 lifetime trauma categories (e.g., sexual/physical abuse, childhood neglect)	↑ Opportunistic infection and/or AIDSrelated mortality

Ironson et al., 2005	177 males and females[a]	2	Cumulative mean on↑ VL LES: Sum of weighted negative life events	(X) CD4 count

NK _ natural killer; PERI _ Psychiatric Epidemiology Research Interview; LES _ Life Experiences Survey; VL _ HIV RNA viral load; (X) _ stress/ trauma not related to outcome; 2 _ decrease; 1 _ increase.

[a] Studies include substantial number of subjects on highly active antiretroviral therapies.

[b] CHIP _ Coping in Health and Illness Study.

[c] CHASE _ Coping with HIV/AIDS in the Southeast.[46]

In an early study, conducted by Evans et al., (1997)[47], it was indicated the significance of stress life events on HIV replication, using a sample of 93 homosexual men for a total of 42 months. Interestingly, for *every one severe stress* per 6-month study interval, the risk of early disease progression was *doubled*. Even thought the sample size was small for the current study, Evans, repeatedly measured stress every six months using the Psychiatric Epidemiology Research Interview and managed to get a basic line across the basic mystery of stress, concluding that stress is as a crucial contributor on the progression of the infection. In a similar study, Leserman et al., (1999)[48], tested the hypothesis of stress-depressive symptoms and social support, on the HIV infection outcomes. Leserman, who is a "mentor" on the HIV progression field, found that stress and social support were the greater markers for progression, at 5.5 years. Similarly, Evans et al., (1997), showed that for every 4 point increase in cumulative average stressful life events, equivalent to one severe stressor two moderate stressors, the risk of AIDS was *doubled*. Five point five years after, the probability of getting the immunodefiency was two to three times higher for individuals above the median on stress, or below the median on social support, compared with those below the median on stress or above the median on support. A basic restriction in early Psycho-behavioural studies concerned the absence of any biological correlates in psychosocial estimations and HIV. Using improved research advances, Leserman[49]tested more or less similar psychometric estimations on progression, including *cortisol* levels this time, as an extra covariate stress-measurement factor.

The methodology of their experiment, included a 6 month follow up measures on stress (with a modified *Psychiatric Epidemiology Research Interview)* depression (with *Hamilton Depression*

[46] cited in: Leserman J., (2008)

[47] Dwight et al., (1997)

[48] Leserman et al., (1999)

[49] Leserman et al., (2000)

Rating Scale) and social support measures, including the administration of the *Brief Social Support Questionnaire of Sarason et al.,* (1989), once a year, and finally cortisol levels, measured by using a commercial radioimmunoassay kit, 7.5 years longitudinally. Their study, was applied to a sample of 82 homosexual HIV + men. According to their findings, men with more cumulative stressful life events, greater use of denial as a coping mechanism, less social support, and higher cortisol levels may be *at greater risk for HIV-1 disease progression*. However, as Leserman herself points out, the issue of ethnicity was not taken into account, which may reflect a basic restriction for further outcome generalizations.

Many studies come in accordance with the notion of HPA-activation under stress, can accurately be measured via increase of cortisol levels, as a strong biological marker of anxiety. Stress has been thoroughly seen as a trigger that may influence the immune system thereby altering host susceptibility to viral[50]. It has been suggested that both, the combination of genotype and phenotype of an individual will therefore create his disease status and the progression of the virus, accordingly. Some, detected protective genes such as CCR5, Δ32, CCR2 64I, HLA alleles B*27, B*57, and alleles of the B*35Px group (cited in Kopnisky et al., 2004) in non progressors HIV+ individuals, but as very well noted, these protective genes account for only a small fraction of the variability seen in HIV-1 disease progression. As it can be debated from the above, the relationship between anxiety and CD4 counts may not be a linear one. For example, Rabkin et al. (1997) found that rates of anxiety symptoms and anxiety disorders among HIV positive homosexual men did not raise up over a four-year period, despite lowered CD4 counts, and Sewell et al. (2000) found no significant increase in anxiety symptoms in HIV-positive homosexual men in spite of lowered CD4 counts (Fincham et al., 2008). Glover et al., (2010) tried to better understand potential pathways stress biomarkers follow on HIV seropositive mothers living with the virus. In their model, they included the urine samples of 133 seropositive mothers in order to create a composite biomarker index (CBI) measuring cortisol and catecholamines. According to their findings, the CBI predicted CD4 counts independently after controlling for age, years since diagnosis, prior CD4 counts, medication adherence, and depression symptoms.

Further research needs in order to examine whether stress-induced activation of the neuroendocrine system affects the immune system in a manner that negatively influences HIV disease progression, and whether HIV infection influences the central nervous system and behavior.

In more rigid and extensive forms of anxiety like post-traumatic stress disorder (PTSD), research came out with more apparent outcomes.

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[50] Turner – Cobb J.M., 2005.

1.3.1 Post Traumatic Stress Disorder (PTSD) and HIV progression…

PTSD has mainly characterized in DSM-III and subsequent DSM editions (American Psychiatric Association 1980). The definition of PTSD implies catastrophic views or traumatic events that distinguish from everyday ordinary stressful stimuli, such as loss of a job, or marital divorce. Much research is carried both on PTSD and depression, though they discriminate them as different entities[51]. Even though, depression and PTSD seem to accompany each other, in many cases the former seems more apparent than the other, and/or vice versa.

Physical and/or sexual abuse has been thought to be associated with increased medical disease and health care utilization, among HIV-infected women[52], with apparent PTSD symptoms. Using multiple regression analysis, Liebschutz et al., (2000) were able to demonstrate that HIV- infected women who had a prior traumatic experience of sexual and/or physical abuse, recorded higher rates of episodic disease, chronic pain syndrome, and sexually transmitted disease. At 2 years, episodic disease, chronic disease, injuries, emergency department visits, and hospitalizations were all more likely in abused women, which seems quite *profound* for women being sexually abused and thereafter, *infected* with HIV.

Sexual and physical abuse has been seen to contribute to the elevated levels of Post Traumatic Stress Disorder, depression, suicide ideation and external locus of control, low self-esteem[53].

Moreover, those reported as been early in life assaulted, appeared with a higher risk predisposing factor in HIV and AIDS prevention and control.

It has been suggested that HIV- patients with more lifetime trauma, stressful events, and PTSD symptoms reported more bodily pain, and poorer physical, role, and poor cognitive functioning[54], in a 611-patient study in the Southern rural States. Interestingly, the 53% of their patients, endorsed having experienced sexual and/or physical abuse history in their lifetime, associated with poor health-related physical functioning, before the onset of the infection. Moreover, older patients and less educated patients tended to have worse health-related quality of life and were more likely to visit an emergency room while appeared with a decline in their cognitive functioning.

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[51] Breslau et al., (2000)

[52] Liebschutz et al., (2000)

[53] Gwandure C., (2007)

[54] Leserman et al., (2005)

Others[55], attributed this poor cognitive outcome of the HIV infected individuals on specific cell apoptotic death, especially astrocyte cells. Using various techniques, among them, immunohistochemical, in situ polymerase chain reactions they showed that post mortem HIV infected individual brain portions, significantly differ from HIV negative ones. As noted, progressive cognitive decline, motor dysfunction, and behavioral abnormalities typifies this subcortical dementia due to vast asctrocyte cell death, which eventually affects 15 to 20% of AIDS patients. It is very likely; those appear with poor cognitions to experience other psychiatric conditions, as well as higher incidences of suicidal ideation.

Likewise, the risk was found to be higher in another study, among HIV-infected homosexual and bisexual men, for factors associated with suicidal ideation included being HIV-positive, the presence of current psychiatric disorder, higher neuroticism scores, external locus of control, and current unemployment[56]. The issue of PTSD on HIV progression and change in disease outcome has been finally, controversial. It is interesting that HIV+ patients with PTSD have typically been found to have higher immune functioning than non-PTSD (cited in: Sledjeski et al., 2005). From the other hand, as Sledjeski et al., 2005, noted, PTSD symptoms were significantly correlated to self-reported CD4 counts. Similarly, Kimerling et al., (1999) reported that PTSD symptoms were related to lower CD4 to CD8 cell ratios in a sample of African American women with HIV.

Psychological correlates include various studies from different domains of interest, like PTSD or stress related perceptions, acting as *mediators*, however, their significance seems to *moderate* than mediate the diseases outcomes, like AIDS. Other form of acute stress is due to bereavement reasons and will be further discussed. Similar to other types of stress, physio-behavioural patterns included in this case.

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[55] Thompson et al., (2000)

[56] Kelly et al., (1998)

1.3.2 Stress of bereavement and HIV progression

Stress of bereavement, has been thought to be a strong indicator of changes in disease status[57,58]. Since especially gay HIV-infected men are at a high risk of loosing a partner or close friend, it has been indicated that CD4+ count shows a rapid decrease three to four years follow up[59]. Interestingly, bereaved men are found with increased a neoprotin (an immune activation marker, linked to increased AIDS risk) and decreased NK cell cytotoxicity and lymphocyte proliferative response to phytohemagglutinin, when compared with non bereaved persons[60].

1.3.3 Stressful Life Events, Trauma, and HIV Progression

Investigators have consistently reported adverse immunological and health effects of stressful life events during 9 years following a cohort of 96 gay men [61] . The CHIP measure of stressful life events was based on interviewer contextual ratings of 111 possible stressful events and difficulties (e.g., deaths, change in employment, relationships, finances, and health). It excluded stresses that could have resulted from disease progression (e.g., retirement due to HIV worsening), and omitted patient's ratings of distress to reduce the possibility that worsening disease could lead to poor coping and thus higher stress scores.

Faster progression to AIDS was predicted from higher stress scores for many long time varying follow up measures[62,63,64].

The risk of AIDS was about *doubled*, and the risk of developing an AIDS clinical condition was about tripled. Immune suppression was found to be associated with a high stress episode, such as death, lost employment, desertion, sexual/physical assault, death of child, PTSD, as well as decline in CD4%es. As older studies indicate, no such correlation seems apparent, maybe due to

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[57] Leserman et al., (2003)

[58] Leserman J., (2008)

[59] Kemeny M.E., Dean L., (1995)

[60] Goodkin et al., (1996)

[61] Leserman et al., (2002) *b at table 1 pg 11.*

[62] Leserman et al., (1999)

[63] Leserman et al., (2000)

[64] Leserman et al., (2002)

methodological issues[65]. Most of these studies however, as leserman J., 2008 points out, concerning the role of bereavement, stress, and trauma are limited in that they *were all* completed before the widespread use of High Antiretroviral Active Therapy (HAART).

1.3.4 Trauma and HIV Disease Progression After HAART

As CHASE (Coping with HIV/AIDS in the Southeast) study group proposes, 490 HIV infected individuals (men and women) from Southern States, with categories of life trauma after 41 month, had a faster all cause and AIDS related mortality[66], or increased rate of opportunistic infections and AIDS related death[67].

In the only other study examining stressors in the HAART era (as pointed out in Leserman J., 2008), Ironson et al. showed that HIV-infected persons with more life events (measured by questionnaire) had greater increases in viral load, but not change in CD4, during a 2-year follow-up.

[65] Kessler et al., (1991).

[66] Leserman et al., (2007), cited in Leserman J., (2008)

[67] Mugavero et al., (2007), cited in Leserman J., (2008)

1.4 Depression

Depression in HIV has been a rather challenging approach for scientists. It has been debated that depression may be due to purely biological constellations such as neurodegeneration following HIV. In a study of Imaging Serotonergic Transmission techniques[68] between Depressed and Non-Depressed Patients, Infected with HIV, brain portions appeared with significant differences in binding affinity of 5 HT, suggesting a possible role for dysregulated serotonergic transmission in HIV-associated depression.

The issue of depression has been seen over the last couple of decades, to importantly mediate or moderate, many health-related disfunctionalities. Potentially, due to higher percentages of depressed individuals, depression may be seen as "the penalty" westerns (mostly) pay for «quality» and technological development. While, technology developes, the rythms of life become very fast, so, one may be inadequate to catch up, with this global «hurryness». Depression and stress are in many occasions interconnected with each other, in terms that the former may precedes the later , and significantly affect it, and vice versa. The scales (i.e. Hamilton Depression Rating Scale[69]) created, appear sometimes not to be subtle enough for the distinction among depressed individuals. So, one should take into account that most of the research in the field, accompanies both foci of interest, at the same time, or when depression itself is only mentioned, there is some stress, acute or chronic, following or preceding depression. Depression, or depressive-like symptoms, or depressive personalities are quite frequently cited in most of the HIV research field.

When depression comes into play, alongside with stress or PTSD, the progression of HIV appears with a quick decline. The following Table summarizes most of the recent advances on the field of depression concerning the progression of HIV including different parameters:

Table 2: **Summary of Longitudinal Studies Examining Depression and HIV Disease Progression**

Study	HIV-infected population	Follow-up Years	Measure of Depression	Findings

[68] Hammoud et al., (2010)

[69] Hamilton M., (1960)

Burack et al 1993a	277 gay men	5.5	Baseline CES-D	Depressed had more rapid decline in CD4 count; depression not related to AIDS or mortality
Page-Shafer et al 1996a	395 gay men	9	Baseline CES-D	Depressed had 1.4 years faster progression to AIDS; depression did not predict mortality in multivariate model
Mayne et al 1996a	402 gay men	7	Time-varying CES-D	Men with elevated depression at each visit had 1.67 greater risk for mortality compared with men who never had elevated depression
Lyketsos et al 1993b	1339 gay men	8	Baseline CES-D	Depression not related to change in CD4 count, AIDS, or mortality
Lyketsos et al 1996b	911 gay men	10	CES-D	During the 6–18 months before diagnosis with AIDS, there is a dramatic rise in depression
Leserman et al 1997c	66 gay men	2	HDRS modified to exclude HIV-type symptoms	Depressive symptoms during the preceding 2 years were related to greater decline in CD8_ T cells, and CD56_ and CD16_ NK cells; depression effects were more pronounced among those with more stressful events.
Leserman et al 1999c	82 gay men	5.5	ime-varying HDRS modified to exclude HIV-type symptoms	The risk of AIDS was doubled for every cumulative average increase of one severe depressive symptom

Leserman et al 2000c	82 gay men	7.5	Time-varying HDRS modified to exclude HIV-type symptoms	Trend for depressive symptoms to be related to AIDS progression (p _ .06) when other psychosocial variables were not in the model
Leserman et al 2002c	82–96 gay men	9	Time-varying HDRS modified to exclude HIV-type symptoms	Depressive symptoms were not related to AIDS progression but were predictive of faster development of an AIDS indicator or clinical condition
Patterson et al 1996	414 gay men	5	Baseline HDRS	Depressive symptoms associated with faster mortality but not to change in CD4 count or AIDS
Ickovics et al 2001	765 women	7	CES-D	Chronic depressive symptoms (CES-D elevated at 75% or more of visits) associated with two times the risk of death and greater decline in CD4 count compared with limited or no depressive symptoms (CES-D elevated 0% to 25% of visits)

HIV, human immunodeficiency virus; CES-D, Center for Epidemiologic Studies Depression Scale; HDRS, Hamilton Depression Rating Scale; AIDS, acquired immunodeficiency syndrome.

A San Francisco Men's Health Study

B Multicenter AIDS Cohort Study

C Coping in Health and Illness Study [70]

As it can be seen from Table 2, the most recent studies addressing the issue of depression appear rather controversial, as far as CD4 cell count and thereafter mortality of the disorder is concerned. As very well stated in the review of Leserman J., 2003, the issue of depression is like the "chicken-or-the-egg" problem for the researchers. It is not very clearly examined in many studies, whether

[70] Table 2, cited in Leserman J., (2003)

depression precedes the change of the disease status, or whether is followed as part of the acute disorder. Leserman tried to answer this question, providing evidence of systematic measures of depression, prior to the onset of the AIDS, onwards. This approach helps establish whether the depressive symptoms occurred before the changes in disease status, or after[71]. Time varying techniques on depression scales every six months (as in the studies of Leserman et al. 2002, 2003) provides research with the opportunity understanding the core symptomatology of depression, which appears to be controlled due to and independent to HIV. Using a Cox Regression Model of risk for depression, they[72] concluded that 61% of those who developed a major depression during 9 years of the study had been depressed at least once before baseline. In other words, those who had a major depression before the study had almost a fivefold increased risk of depression during the 9 years of the study. Moreover, those with more social conflict (e.g., argued and irritated with people, frequent unpleasant social interactions) also had increased risk of depression. CD4 + cell count and developing an AIDS clinical symptom did not predict major depression; however, as reported above, depressive symptoms did predict increased risk of developing AIDS, which can be explained to as that depression may be more likely to lead to clinical disease change than vice versa. Developing depression in HIV may be more a function of having been depressed previously and having conflicting social relationships.

Depressive symptoms and higher baseline viral load were significantly related to greater risk of AIDS-related mortality[73]. In their study, Leserman et al., (2007) tested 490 HIV-infected participants, both men and women, as far as stressful events, depressive symptoms, and effects of lifetime trauma, are concerned, as indicators for AIDS related mortality (while being under antiretroviral therapy) where they found increased incidences of mortality across depressed infected people.

In contrast, positive thinking and optimism were found as indicators on the slower progression of HIV. In their study[74], dispositional optimism was measured on a Life Orientation Test[75], while progression of HIV included, CD4 Cell count and viral load measures for a follow up period of 2 years. Those who found low in optimism (25%) lost CD4 cells at a rate 1.55 times faster than those

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[71] Leserman J., (2003)

[72] Leserman J., (2003)

[73] Leserman et al., (2007)

[74] Ironson et al., (2005)

[75] (LOT; Scheier & Carver, 1985)

high in optimism (75%). Those who see things from a positive perspective, also seem with a higher proactive behavior, less avoidant coping, and less depression. It is very interesting the way thinking and coping with problematic circumstances, how can finally affect the physiology of the body. There seems once again, that the interconnection of physiology and thinking as interconnected entities, including the immune's functional responses.

In longitudinal measures (Ickovics and colleagues, cited in Leserman et al., 2008) depressed women over a period of 7 years were about two times likely to die from AIDS, than those never experienced depression. In their study, low CD4+ counts were associated with depression. Low CD4+ Counts was the case measured by Zen˜a-Castillo et al., (2009), with higher depressive symptomatology and anxiety rates, in a sample of 250 hospitalized Peru HIV+ patients. For the demands of a Masters Thesis, they created a linear predictive model of CD4+ Counts, controlling anxiety and depression related with adherence to hospitalization. However, a South African study of 456 seropositive individuals did not manage to reveal any correlations between neither CD4 Counts & anxiety, nor between CD4+ Counts & depression.

From the previous research inspired, the current study is attempting to establish associations between immunological and psychosocial variations, as well as to create a linear predictive model of immunity in terms of psychopathological Tendencies. In order to establish a good understanding of the variability of such a multi-factorial component as HIV, research should encounter cross-cultural measures. Cross cultural, approaches provide science not only with diversities, but also with potential key answers. Several of these questions we tried to answer here. In order to do that, we used 70 Cretan HIV+ individuals who went through our experimental procedure.

CHAPTER 2

Methods

In our study, we tried to establish two sets of correlations supported by the international research, concerning the HIV from a psychoimmunological point of view. Our psychological measures concerned the issue of depression as well as anxiety to HIV+ Cretan individuals in correlation with their viral load and CD4+ Counts of their last blood check ups, to now. We tested the following hypotheses:

- The CD4_Count and Tendencies for Anxiety (using STAI-Scores, including *state & trait* anxiety) will correlate negatively
- The CD4_Count and Tendencies for Depression (using BDI-Scores) will correlate negatively
- The relation between the Viral Load & STAI &/or BDI – Scores will correlate positively

Finally, secondary estimations were considered, between:

- *Gender, Duration of Infection, HAART, Age, Marital Status, Psychiatric Medication of the patients*

2.1.1 *Ethics Committee*

The current experiment acquired the signed agreement and approval of the ethics committee of the University of Crete, Department of psychology (for further referral, look at the Appendixes: **A**). The ethics committee, after a third trial of acceptance, all agreed that the experiment, met the ethics criteria of the committee, as for the maintenance and protection of the secrecy of the participants names of a such vulnerable population to stigmatization. All the participants agreed to be informed for the real purpose of the study orally and in written, individually, prior to their contribution. A consent form was signed, thereafter. Furthermore, *ethics approval* was asked and approved by the Medical Service of the Hospital (for the signed agreement of PAGNH Hospital, look at the Appendices: **B**) no debriefing was organized after the completion of the study with the participants, due to the absence of any kind of misconception.

2.1.2 *Consent Form*

The patients who agreed to participate, signed up a Consent Form (See Appendix: **D)**, after being told and in written explained for the purpose of the study. Moreover they explained in writing (SEE APPEDIX **C**) and orally, as is appropriate, that their potential participation or not to the study, will not in any way affect their pharmaceutical scheme, with their doctor or medical stuff of the department, and that moreover, their data will remain secret and anonymous and will only be used for the purpose of the present experiment.

2.1.3 *Demographic Information*

All the participants contributed in our experiment had to complete an A4 paper-form concerning information about their:

- time of questionnaire administration
- sex
- marital status
- age
- year of infection
- If they are under any kind of psychiatric medication (i.e. if someone is under antipsychotic medication, that is good to know, so as to avoid getting extreme scores or values in your analysis,

Finally participants were asked to answer one open question, concerning:

- Practical difficulties in their everyday schedule concerning the infection of HIV

(FOR FURTHER DETAILS LOOK AT THE APPENDIX: **E**)

2.2 *Questionnaires*

The questionnaires used for the current research were the BDI-scores for *Depression* (for the full Greek Version of the Questionnaire, See Appendix: **F**) & STAI for the anxiety (and Appendix: **G**).
As for the BDI instrument, participants were advised to put one tick out of the 4 potential responds that best describes their emotional state for a total of 21 questions leaflet. So, for the first question the participant is called to choose between is i.e.:

_I don't feel sad

_I feel sad

_I feel always sad and cannot do anything about it

_I am so sad or despaired that I cannot stand it

,and so on.

The BDI questions address issues, such as: "*How sad I Feel", "I find no interest in the near future", "how often I feel guilty", "if I think of killing myself", etc*. The answers of these 21 questions are thereafter *grouped* into 4 categories (coded from 1=NOT AT ALL, 2=SOME, 3=ENOUGH, 4= A LOT) and scored, accordingly. The *sum* of their potential answers expresses the *tendency* of a subject, towards depression. The minimum score that can theoretically be achieved is 21 (as the number of the questions all scored as: 1=NOT AT ALL X 21) and the maximum score value can be 84 (4= A LOT X 21). For our study, participants scored with a sum of a minimum value for depression 21 and a maximum of 67 (Mean Value: 27.8, S.D.=9.35). The internal validity of this particular instrument in our sample was calculated with Cronbach's Alpha = .94[76]. This particular marker indicates a strong level of connection, between the consistency the answers achieved, in our sample.
From the other hand, STAI is an instrument that has been very well approved by scientists, as a tool that quickly and accurately measures anxiety levels or tendencies both on a trait and a state manner. STAI questionnaire moreover, provides the advantage by splitting up the first 20 questions when scored (20+20= 40 questions in total) to dichotomize into two extra variables the anxiety itself: *state* and *trait* anxiety. In this way, it can be tested if under the administration phase of the questionnaires subject experience state-stress, or if they generally appear stressed at a personality-trait level. In simple words, it can be seen that if some of their answers can potentially be influenced by the stress they feel at the moment of administration. The STAI instrument, sums the answers of the respondents on a 4-point scale (from 1=NOT AT ALL, 2=SOME, 3=ENOUGH, 4= A LOT),

[76] Ρούσσος Π.Α., & Τσαούσης Γ., (2002)

indicated in the beginning of the questionnaire. In order to avoid someone providing the same answer over the entire questionnaire, some of the questions are reversed and recoded after the completion of the task. For the questions 1, 2, 5, 8, 10, 11, 15, 16, 19, 20, 21, 26, 27, 33, 36, & 39 the scoring system is reversed from: 1= A LOT, 2=ENOUGH, 3=SOME, 4=NOT AT ALL.

The selection criteria to use these questionnaires vary according to the relevant bibliography[77]. They are mini, quick, each containing a battery of questions concerning either *stress* or *depression* (see Appendix **F**&**G**). Both questionnaires are translated and statistically established and standardized into Greek populations in different domains of interest[78,79]. Brief questionnaires are important to use in such target groups, due to fatigue and suspiciousness these minority populations may express. Both questionnaires measure tendencies for pathologies, either towards *stress* or towards *depression*.

2.2.1 *Participants*

All the participants used for this study, were outpatients of the Pathology unit of the National PAGNH Hospital of Heraklion of Crete. Out of *N*=170 HIV+ participants who went through their annual blood tests, only *N*=70 HIV+ individuals agreed to participate in our experiment. Those who didn't contribute were not obliged in any way to explain reasons, for the lack of their participation. Out of seventy individuals, 48 (68%) of them were *Males* and 21 (30%) *Females,* married at a 43% and single at 57%. They all had an average period of infection: 9 years (S.D.= 4.4 yrs). Among them, only a small portion (7%) was under psychiatric medication. Finally, 92% of the sample used, was under the era of HAART (for further details check the: Demographic Descriptives & Frequencies in Appendix: **H** & **I,** respectively).

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[77] Gianousi et al., (2010)

[78] McPherson et al., (2010)

[79] Fountoulakis et al., (2006)

2.2.2 *Procedure of the Study*

All the participants went though their annual blood tests for HIV progression between December 2011 and February 2012. Soon after ethics approvals from both committees, the Psychology Department of the University of Crete and the Medical Service of PAGNH hospital, was achieved, the procedure followed the phase of administration. At this particular phase of the experimental procedure, it was agreed with one of the scientific co-workers of the pathology unit of PAGNH hospital, to administer and collect the data, as well as to explain briefly the experiment and its procedure. The agreement with the Pathology-Unit included no face-to-face interactions with the patients apart from the co-worker herself (who knows the patients individually and already has a secure interaction with most of them, already established) due to uncertainties and suspiciousness they may express. This was fully understood and accepted, due to that Greek minority groups, such as HIV+ people are faced with social stigmatization, and potential adversities, concerning this matter. It was fully explained in writing (see Appendix: **C**. Informational Layout) and orally that their contribution to the study is absolutely irrelevant to their therapeutic schemas and medication. Finally, participants were explained that the contribution to the study, will allow the examiner to access their medical record and data, for:

- CD4+ Counts,
- Viral loads &
- Medication Profile

Seventy individuals out of 170, agreed to participate in our study. Those who entered the experimental procedure, had initially to sigh up and complete, accordingly:

- a Consent Form,
- a leaflet of their Demographic Variables,

and two sets of questionnaires about

- Tendencies for Depression &
- Tendencies for State and Trait Anxiety.

No debriefing was organised due to the absence of any way of misconception trials towards the participants.

Soon after the completion of the task, questionnaires were all gathered and an appointment arranged with the scientific co-worker of the unit, so as to gather the medical information about the further blood tests of the subjects. The data was all coded by a number represented for the examiner, so as to keep the participants' data, safe. No participants' exclusion criteria were operated on this experiment.

For the SPSS data entry, we used a coding system for each question of both the BDI and the STAI questionnaires. The data-questions were coded using a 4-point scale, for both the questionnaires exposed on a different manner (for further details, check out the questionnaires in APPENDIX: **F** & **G**, respectively). A few of the questions were recoded and finally entered the SPSS statistical instrument for further analysis.

2.2.3 *Design*

SPSS statistical package was used to cover the needs of our study, and precisely the version 18.0.0. We used descriptives, frequencies, correlations, and multiple regression analyses in order to check out the hypotheses of our variables.

CHAPTER 3

Results

For the present experiment the initial optimistic aim was to create a linear model of predicting the disease outcome, according to the variance of psycho-immunal profiles of the patients. Particularly, we searched for strong correlations between *psychosocial variables* like depression and anxiety, and CD4 count, viral load measures.

3.1.1 *Descriptive statistics*

Descriptives (for further details, look at the Appendixes: **H**, for Descriptive Statistics) showed: Temporal Distance with HIV in our sample with a maximum of 19 years and a minimum of 1 year of infection (M.A.: 9.09 years (S.D.=4.42). Accordingly, the minimum participants' age was 23 yrs and maximum the 75 yrs (with M.A.: 45 years (S.D.= 10.25). The minimum CD4+ Count was estimated 17 and the maximum 1242 (M.A.: 487.1 (S.D.=251.6)).

Viral Load measures came out with a minimum value of 0 (representing the 68% of our sample) and a maximum 257191(representing the 32% of our sample), and M.A.: 7738.96 (S.D.= 34733.6).

CD4+ Counts were estimated with 17 minimums and 1242 maximum scores (M. A.: 487.1 (S.D.= 251.6)).

The mean average for BDI total was calculated M.A.: 27.8 (S.D.= 9.35), whereas for STAI-Total M.A.: 71.8 (S.D.= 29.2) with STAI-State M.A.: 36.4 (S.D.= 13.6) and STAI-Trait M.A.: 35.5 (S.D.= 15.8), respectively.

3.1.2 *Frequencies & Cross-tabulations*

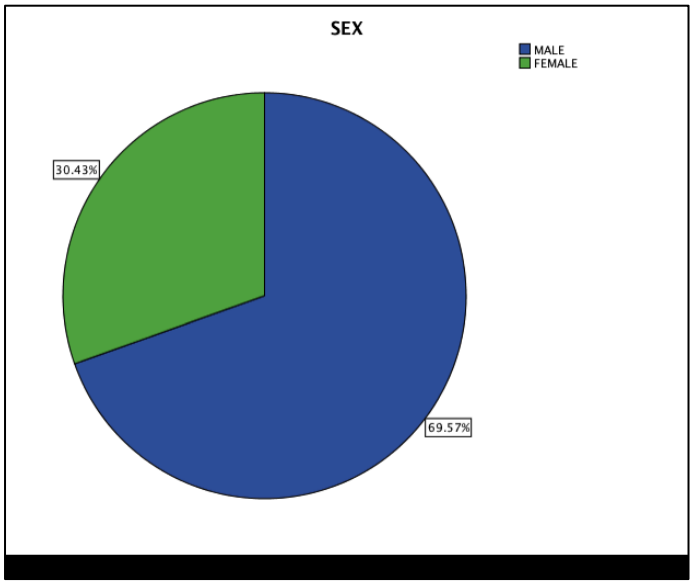
We looked at the frequencies in terms of percentages (%) for the following data:

Table 3: **Statistics**

		SEX	HAART	MARITAL STATUS	PSYCHIATRIC MEDICATION
N	Valid	69	69	66	70
	Missing	1	1	4	0
Mean		.30	.09	.42	.93
Std. Deviation		.464	.284	.498	.259
Percentiles	25	.00	.00	.00	1.00
	50	.00	.00	.00	1.00
	75	1.00	.00	1.00	1.00

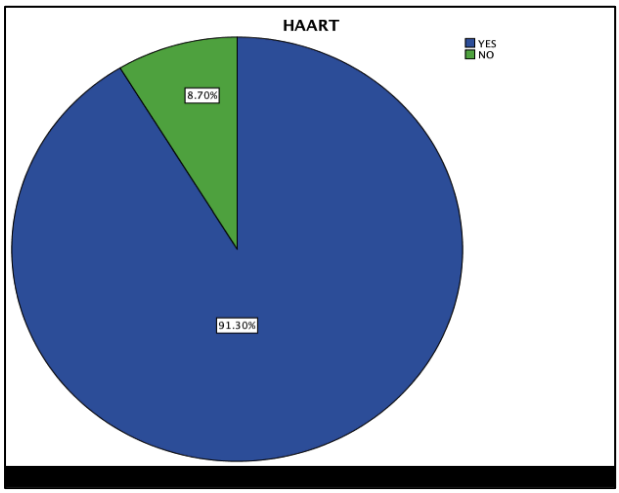
The following pie charts show the demographic variable percentages of: sex, HAART-Condition, Marital Status, Psychiatric Medication & Viral Loads:

Pie Chart 1:



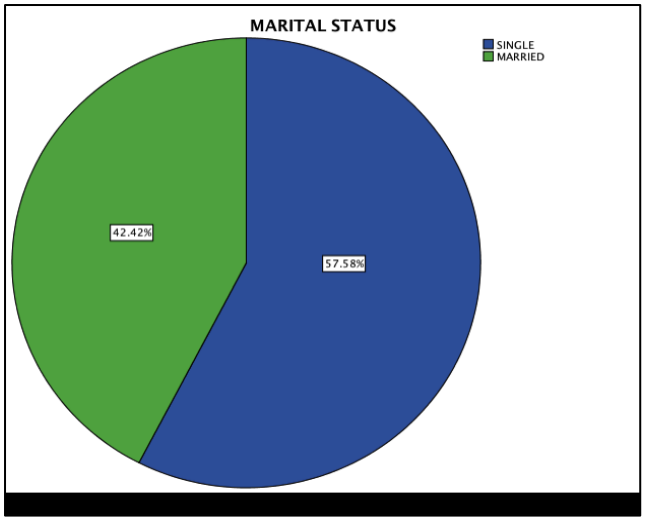
Pie Chart 1: shows the percentages of *Sex* in our population; 30% (n=21) were females, whereas 70% (n=48) were males.

Pie Chart 2:



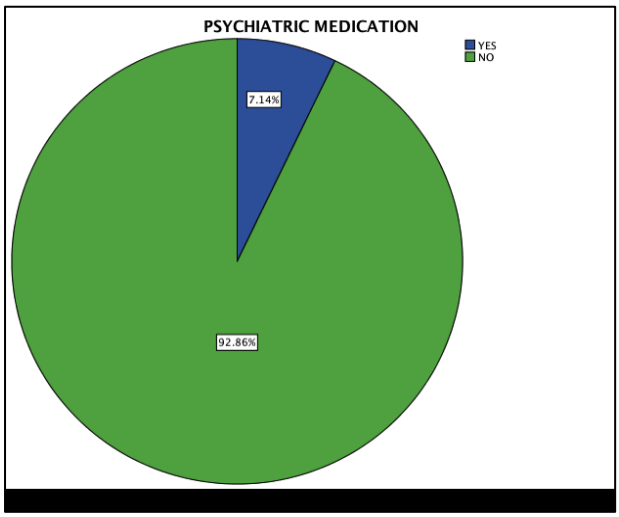
Pie Chart 2: shows the percentages of *HAART-Condition* of our sample; only 8% (n=6) of our sample was not under HAART, the rest 92% (n=63) was under HAART.

Pie Chart 3:



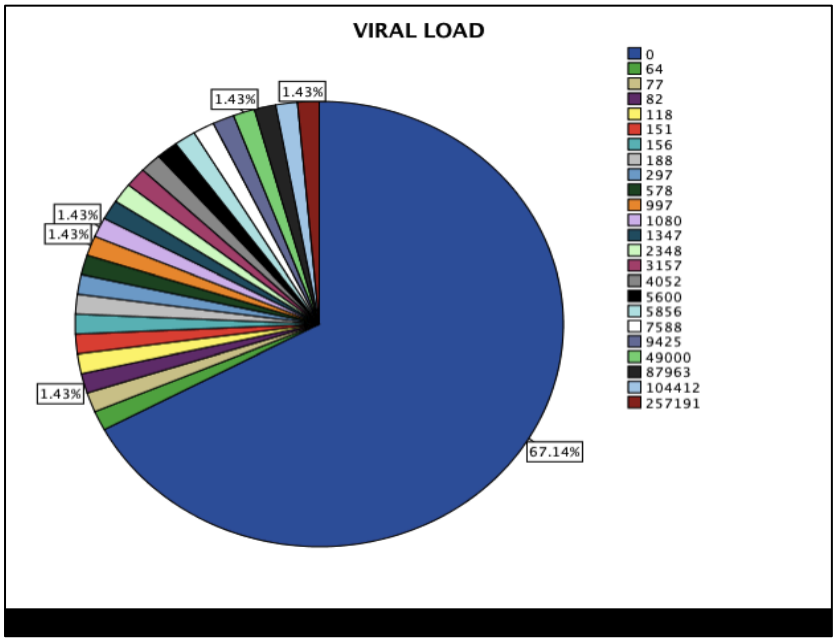
Pie Chart 3: shows in percentages the Marital Status of our sample; 57% (n=38) were single whereas 43% (n=28) were married.

Pie Chart 4:



Pie-Chart 4: shows the percentages of participants' Psychiatric Medication; only 7% (n=5) was under medication for psychiatric reasons.

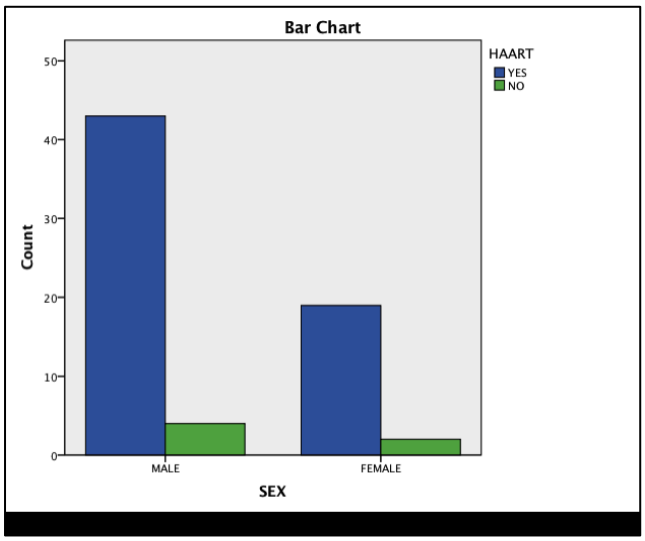
Pie Chart 5:



Pie Chart 5: an approximate of 68% (n= 47) of the Viral Loads was 0. The rest apprx. 32% (n= 23) shows variability in terms of individual V.Load estimations.

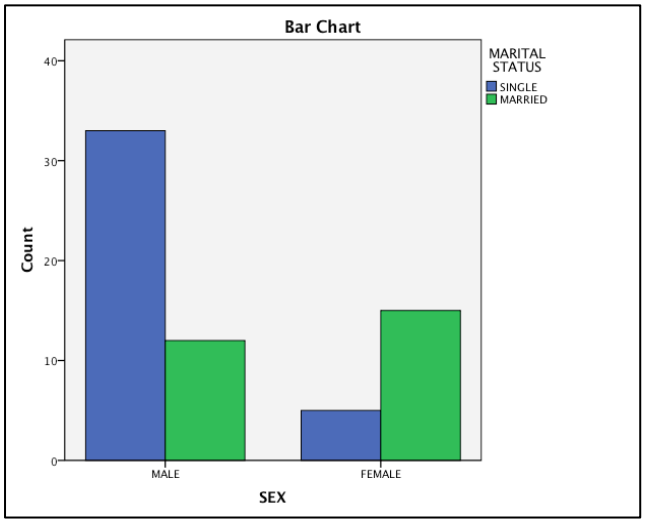
Using the **Cross Tabs Analyses** we acquired a better insight within our variables (analytic crosstab analyses with be found in Appendices:

Graph 1:



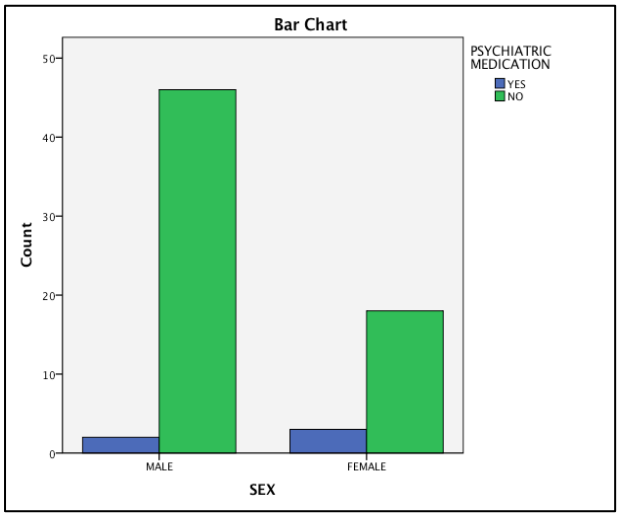
Graph 1: the Crosstabs analyses, revealed that 63.2% (n= 43) of the male population is under HAART, compared with the 5.9% (n= 4) who are not, and a 27.9% (n= 19) of the females under HAART, compared with only 2.9% (n= 2) who are not under HAART.

Graph 2:



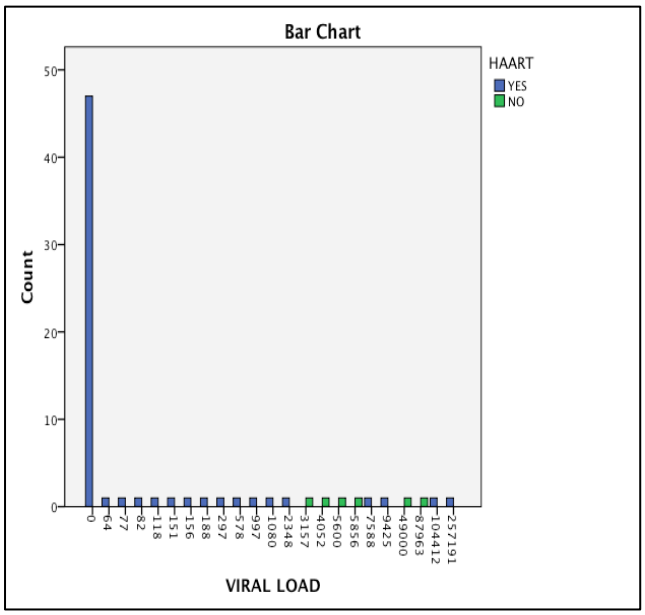
Graph 2: 50.8% (n= 33) males are single compared with the 7.7% (n= 5) of the females, whereas, 18.5% (n= 12) males are married compared with the 23.1% (n= 15) of the females.

Graph 3:



Graph 3: 2.9% (n= 2) of the male participants were under psychiatric medication (P.M.) compared with the 4.3% (n= 3) of the females, whereas, 66.7% (n= 46) males were not under P.M. compared with 26.1% (n= 18) of the females.

Graph 4:



Graph 4: of those in the era of HAART (n= 63), a 68.1% (n= 47) had a minimum of 0 Viral Load measures

3.1.3 *Reliability of the Questionnaires*

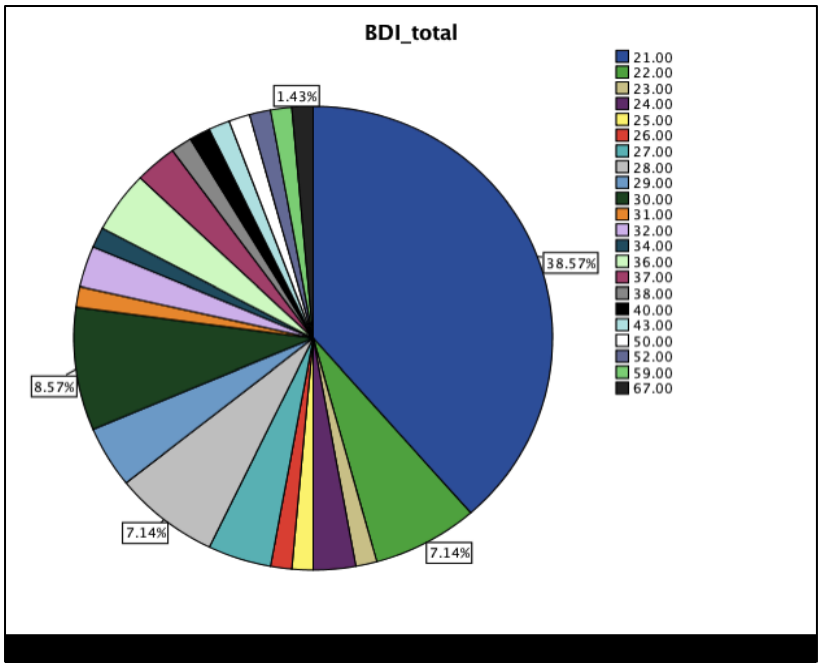
The first measure to attain concerned the *Reliability* of the questionnaires we used. To start with, we had to reassure that BDI and STAI measuring were reliable and finally well adopted by this particular Greek HIV sample, as to what they are constructed to measure: Tendencies for Depression and Anxiety, accordingly.

Cronbach's Alpha was estimated: 0.94 for the BDI - instrument, and 0.98 for the STAI-Scores, respectively (for further details, check out APPENDIX: **J**). Internal consistency indicated a strong and reliable variance for both the questionnaires we used.

3.2 *Questionnaire outcomes*

A 38.5% of our participants scored the minimum for BDI values (that is the sum of 21), whereas a very little approximation of 5% scored the higher values for this particular instrument (from the sum of 40 up to 67) [M.A.: 27.8 (S.D.= 9.35]. The following pie chart is an indicator of the answers in percentages of the participants on BDI:

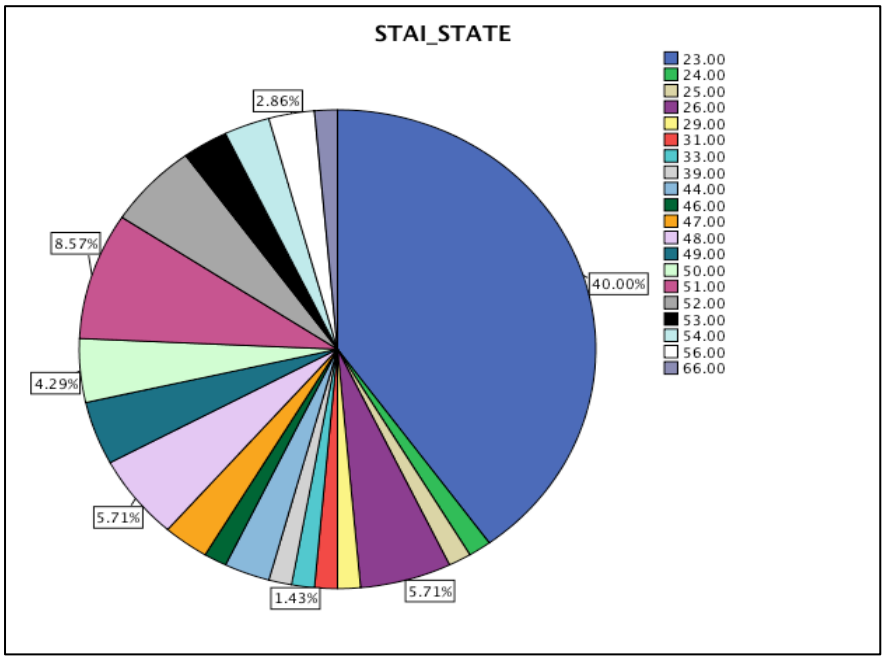
Pie Chart 6:



Pie Chart 6: shows the percentages of the scoring patterns in our sample. Interestingly, 38.5% of the individuals, appear with no depressive tendencies.

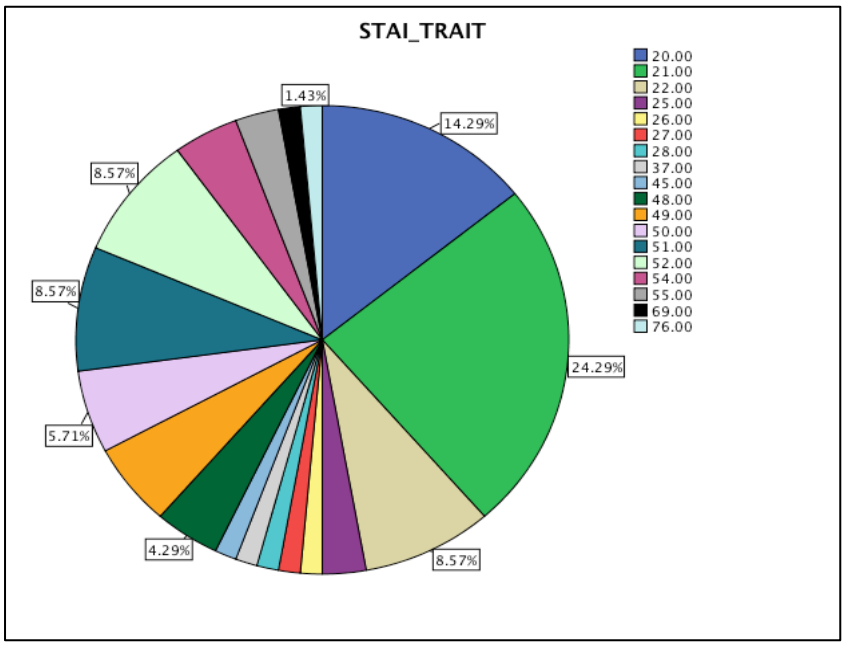
Accordingly, for the STAI instrument, State Anxiety came out with a minimum sum of 23 and a maximum of 66 [M.A.= 36.4 (S.D.= 13.6)], Trait Anxiety with a minimum sum of 20 and a maximum of 76 [M.A.= 35.3 (S.D.= 15.8)], and a Total Anxiety with a minimum score of 43 and a maximum of 142 [M.A.= 71.8 (S.D.= 29.2)] (for further details look at the Appendix: **H** & **I**). The following charts represent the percentages of the answers of all the above Anxiety levels; State – Trait - Total:

Pie Chart 7:



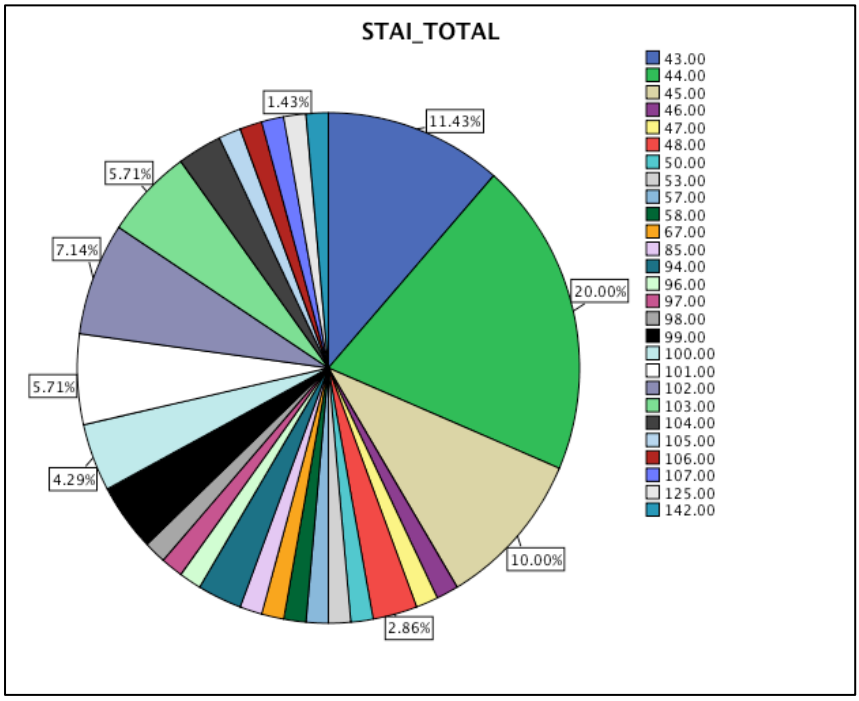
Pie Chart 7: shows the different scores of participants in terms of percentages; 40% of them are estimated not to experience any State Anxiety, with a 2.8% experiencing increased anxiety within the experimental procedure.

Pie Chart 8:



Pie Chart 8: shows a different and more spread pattern of so far estimated Anxiety; 14.2% of participants scored not to experience any Trait Anxiety, and very little Trait at a 24% and 8.5%. as it can be seen, another 8.5% score to experience increased Trait Anxiety levels, with an 1.4% experiencing the maximum scores of Trait Anxiety.

Pie Chart 9:



Pie Chart 9: shows the pattern of scores in Total Anxiety Tendencies in our sample. The lowest scores of anxiety include 11.4%, 20% and 10% respectively, whereas those who scored the highest sums include the 1.4% of the population.

3.2.1 *Normality of the Data*

Secondary, our concern was based on the normality of the data tested, so as to be able to run parametric analyses and regression models. The normality of the data, was not acquired for some of the variables (Appendix **J** & **K**), so, log transformations were performed in order to normalize the data, something common in social - medical - sciences[80]. For our main variables such as the BDI & STAI Scores, data did not revealed any normality even on a logarithmic approach, which apparently, was not good. Normality of the data explored, using the Kolmogorov-Smirnov tool[81] (see Appendix **K**) which apparently should not be statistically significant for normally distributed variables. Apart from this indicator, histograms Q-Q Plots & scatter plots were taken into account. As it can clearly be seen from the tests of normality (see Appendixes **K**: test of normality), neither BDI-Total, nor STAI-Trait, STAI- State, & STAI-Total, met the criteria for normality before and after the log-transformations (Kolmogorov-Smirnov, was estimated in all the variables highly significant). Kolmogorov-Smirnov did not appear statistically significant for the following variables: log_viral load, log_age, age, CD4 count, Temporal Distance HIV+, meaning that these variables were normally distributed across our sample.

[80] Coolican H., (2009)

[81] Γναρδέλλης Χ., (2003) & Γναρδέλλης Χ., (2009)

3.2.2 *Correlations*

Unfortunately, **no** main correlations recorded between our *main* variables neither before nor after the analysis with exclusion criteria included:
log_CD4 Count & log_BDI Total [*Pearson's r* (70)= -.01 , *n.s.*], log_CD4 Count & log_STAI State [*r* (70)=.10, *n.s.*] log_CD4 Count & log_STAI Trait [*r* (70)= -. 11, *n.s.*], log_CD4 Count & log_STAI Total [*r* (70)= -.11, *n.s.*], did not manage to come out with, any significances. Accordingly, no significant correlations were found between the: log_viral load & log_BDI Total [*r* (70)= .10, *n.s.*], log_viral load & log_STAI State [*r* (70)= -.21, *n.s.*], log_viral load & log_STAI Trait [*r* (70)= -.23, *n.s.*], log_viral load & log_STAI Total [*r* (70)= -.23, *n.s.*] (for further details of analytical correlation outcomes visit the Appendix: **L**).
To further test our hypotheses, we decided to make use of the exclusion criteria of the sample, so as to secure that psychiatric medication, do not in any particular way affect the outcomes of their answers and thereafter the variable associations. A 7% (n=5) under mood medications was excluded, in order to retest the associations between the psychoimmune variables. Even with the usage of sample exclusion criteria, the sample did not find any significant associates of the main purpose estimations (further research look at the Appendix L(i)). Thereafter, and since the data did not dramatically differ, before and after the exclusions, we kept and analysed the initial data association outcomes.

However, we revealed secondary correlations as the following **Table 4** demonstrates:

	log_Age & Temporal Distance HIV+	log_BDI Total & log_STAI State	log_BDI Total & log_STAI Trait	log_BDI Total & log_STAI Total	log_CD4 Count & log_viral load
Pearson r	.31	.55	.56	.56	- .47
Significance level	p< .01	p< .01	p< .01	p< .01	p< .01

Particularly, we found a low positive correlation between log_Age & Temporal Distance HIV+ [r (70)= .31, $p< .01$] quite convenient due to that for instance: when age increases the temporal distance carrying the various, also increases.

We, moreover estimated a medium positive correlation for the log_BDI Total & log_STAI State [r (70)= .55, $p< .01$] suggesting that increased Tendencies for Depression accompany increased State – Anxiety levels in our sample. Similar was the case for Depression and Trait Anxiety [log_BDI Total & log_STAI Trait revealed an association: r (70) = .56, $p< .01$], as well as for Depression and Total Anxiety [log_BDI Total & log_STAI Total: r (70) = .56, $p< .01$]. From the above we can debate on that: those who scored higher to Depression Scales, scored higher at the same time to State, Trait and Total anxiety levels, accordingly, whereas, those with increased CD4 Counts appear with lower viral load measures, and vice versa [Log_CD4+ and Log_Viral-Loads (r (70) = - .47, $p< .01$)].

The aim of the present study was to find potential correlations between the CD4 Count, Viral load, and tendencies for pathologies of 70 HIV+ Cretan individuals. The basic purpose, concerned the correlation of different sets of variables composing what is known recently in science as psycho-neuro-immunology domain of interest for HIV. If strong correlations were about to come out of the study, the final goal was to create a linear correlation model, between these variables, so as to use it as a prognostic tool for further research and medical purposes. For the sake of the current masters thesis, analysis went further, no matter the lack of basic and strong correlations, confirming the international research. We estimated the variances of individual psycho-related variables predicting the CD4 + Count of the patients using multiple regression analyses.

3.2.3 *Multiple Regressions*

Four different models (SEE APPENDIX: **M**) we run through SPSS in order to establish potential variance prognostic tools of CD4+ rapid declines parallel with significant viral load incensement for HIV+ patients, in respect to their psychological – emotional state. We controlled the variables *CD4 Count* & Viral Load as predictors in our study to see how much of their total variance may predict potential anxiety they experience (now, or everyday) and depression, respectively. None our models appeared significant, consistent with the absence of basic correlations among the variables (for further details, check out Appendix: M: i, ii, iii, iV). Neither Depression, nor Anxiety (State-Trait-Total) can predict in any degree CD4+ and Viral Loads, together.

The following Tables are an example of one out of 4 linear models we run (SEE APPENDIX: **M**), when their anxiety level was predicted by CD4+ and Viral Load measures:

Table 5: **Variables Entered/Removed**[b]

Model	Variables Entered	Variables Removed	Method
1	log_viral_load, CD4 COUNT[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: STAI_TRAIT

Table 6**: Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,231[a]	,053	-,041	17,11028

a. Predictors: (Constant), log_viral_load, CD4 COUNT

Table 7: **ANOVA**[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	330,504	2	165,252	,564	,577[a]
	Residual	5855,235	20	292,762		
	Total	6185,739	22			

a. Predictors: (Constant), log_viral_load, CD4 COUNT
b. Dependent Variable: STAI_TRAIT

Table 8: **Coefficients**[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47,465	14,801		3,207	,004
	CD4 COUNT	,001	,020	,016	,072	,943
	log_viral_load	-3,541	3,416	-,228	-1,037	,312

a. Dependent Variable: STAI_TRAIT

Accordingly, we run 3 more regression models using CD4+ & Viral Loads as predictors, and dependent: STAI_State, STAI_Total, BDI, respectively.

None of the predictive models revealed any statistical significances of Anxiety (State-Trait-Total) & Depression by CD4+ & Viral Loads, together (SEE APPENDIXES: **M**: i, ii, iii, iV). It was quite expected, since the basic correlations of our variables were neither strong nor significant. The sample size we used may be rather narrow, for such an analysis.

CHAPTER 4

Discussion

HIV/AIDS and depression are projected to be the world's two leading causes of disability by 2030[82]. In accordance with this view, the aim of the present study was to find potential associations between psychosocial indicators, as well as indicators of immunity, in order to further expand the research into predictive models of HIV disease outcome, in a Greek sample. Research has been focused recently into predictive disease outcome models, from various theoretical and empirical perspectives, in order to complete the puzzle of bio-immunity and psychosocial correlates of HIV[83]. The importance of such studies may cover basic scientific questions as well as empirical fields. The outcomes may get adopted in health care systems, so as to help HIV patients around the world to acquire a better access in quality of life providers, or to decrease the incidence of frequent hospitalizations. From the other hand, it may support the science by increasing, the basic understanding about such "multi-framed" occasions, as HIV. Psycho-neuro-immunology is a rather broaden perspective to watch the variety of HIV disorder. A lot of research is needed thought, in order to acquire the privilege to combine sets of knowledge into specific forms of HIV disease morbidity and mortality outcomes. In order to be able to do that, one should take into account among others, the HIV diversion among cultural contexts. Further insight into the cultural, differences, such as quality of life, insurance profile, dietary varieties and other, may help to better understand, the profile of a disease adopted in a specific cultural context. HIV is pandemic, and there is enough evidence to support the cross-cultural variations in terms of disease understanding in *research or filed,* outcomes.

Our study did not verity the international research concerning the matter of psychosocial variations on immunity[84]. Precisely, with this experimental example, we tried to see the connections of depression and anxiety with the immune system of 70 Cretan individuals. As very well stated by similar to depression and anxiety research[85], individuals suffering from depression may be more likely to engage in risky sexual behaviours, and therefore at greater risk of contracting HIV. As they

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[82] Mathers et al., (2006), cited in: Pappin et al., (2012)

[83] Bottonari et al., (2012)

[84] Cole, S.W. (2008)

[85] Pappin et al., (2012)

state, *a HIV + diagnosis may trigger symptoms of anxiety and depression, which may in turn result in risky sexual behaviours and the spread of HIV*. In our example we tried to find potential psychosocial adversities, such as anxiety and depression, and to count them on HIV immune related indicators, such as CD4 and Viral Loads. Influenced by other inspirations[86], with a more bio-behavioural oriented insight, supporting the notion, that the existence of psychosocial variations, through specific biological ways, negatively affects the HIV progression and the disease outcome in a more *hormonal-directed* pattern[87], we tried to establish such variations in this particular sample. It has been argued that in HIV - progression and disease outcome, two different pathways are implicated: the *Neuroendocrine* pathway, and the *Sympathetic Nervous System* pathway. Both activated or preserved by psychosocial correlates that intrigue or support the activation of these pathways. Our sample did not reveal such associations between psychosocial indicators and markers of immunity. Even though, the outcomes of the present trial do not significantly prove the existence of basic associations of the depression and anxiety variables with biomarkers of immunity, it is a good effort, not to underestimate a forgotten topic in Crete, the HIV Virus.

Specifically, our study did not manage to demonstrate significant correlations neither between CD4+ Count and: a)State [r (70)= .10, $n.s.$] – b)Trait [r (70)= -. 11, $n.s.$] – c)Overall [r (70)= -.11, $n.s.$] anxieties, nor between CD4+ Count and Depression [r (70)= -.01, $n.s.$]. This suggests that potentially, the individuals do not experience anxiety levels or simply they just answered the questions with no real emotional accuracy.

Additionally, Viral Load Measures neither revealed associations with a) State [r (70)= -.21, $n.s$] – b) Trait [r (70)= -.23, $n.s.$] – c) Total [r (70)= -.23, $n.s.$] anxieties, nor between Viral Load Measures and Depression [r (70)= .10, $n.s$]. Again, this says a little, since the variety of viral load measures represents the 32% (n= 23) of the population whereas the 68% (n= 47) estimated with zero viral load counts. Future research could potentially treat viral loads as dichotomous variables. The problem is where to dichotomize viral loads since there is a great variance of the virus estimations. This is exactly the reason; the present study treated all numeric variables, as continuous. Future research is important to create a quantified profile of immunity for each individual looking immunity from various perspectives.

In addition, no significances recorded in the predictive models we ran. This came out coherent with the fact that since the main variables used did not statistically correlate, they would come out with no statistical significances of the variance theses predictors would account on the anxiety levels.

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[86] Leserman, J. & Temoshok, L.R. (2008)

[87] similarly in, Cole, S.W. (2008)

The predictive models ran, absolutely for the sake of the present thesis, given the idea of how the study was initially designed. Supporting the idea that HIV is a multifactor disease[88] research suggests that psychosocial factors play an important role for the predictive outcome of the HIV disease, even though not apparent in this particular case.

From the other hand, secondary associations should not be underestimated, such as the negative association between the CD4+ Count level and the Viral Load estimations [r (70)= -0.47, $p<0.01$], suggesting the notion that indeed, the CD4+ increase is associated with a parallel decrease in Viral Loads, and vice versa. This is exactly the idea the biological model suggests[89]. Increased amount of the HIV virus into the body fights against these leukocyte CD4 helper cells and that causes CD4 degenerations and necrotic cell death. The CD4 decrease the Cytokine production and secretion, decreasing the immunity of the body. As Loftis et al., 2009 suggests, there is direct evidence of induced Cytokine Depression via the suppression of cytokines through the HPA axis hyperactivity. This may be a potential direct way of immunosupression affected by depression. Apart from Depression and Anxiety parameters, in our study, we were particularly interested in participants' demographics in order to understand the whole picture of what we possibly didn't at first take into account. Demographic correlations, show that when Age increases, the Temporal Distance with HIV+ increases as well [r (70)= 0.31, $p<0.01$)], and the other way around. This is an obvious outcome, simply because potential raise ups to the longevity of the Virus in a "host", increases with the Age, and vice versa. To obtain a better idea, we included the Depression Scores. BDI- Scores were found to be highly (at a $p<0.01$ level of significance) associated with Anxiety – Scores, at a State [r (70)= 0.55, $p<0.01$)], Trait [r (70)= 0.56, $p<0.01$)], & Overall [r (70)= 0.56, $p<0.01$)], levels. Interestingly, the psychosocial variables we used for the current study (BDI & STAI) were inter-related together in all levels, as well as the biological markers (CD4 & Viral Loads) too, but no association was recorded between the together associations. Potentially, for this particular sample, a subtler instrument (unfortunately, there aren't many *self-report* instruments standardized in Greek populations) should be used by further research. Further research should not underestimate to account on biological indicators of anxiety and "hypertension" of the HPA axis, such as cortisol[90]. Working self-reports in parallel with cortisol levels would provide the researcher with an

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[88] Chen et al., (2012)

[89] Cole S.W., (2008)

[90] Turner-Cobb J.M. (2005)

idea of the consistency between the State anxiety or HPA Hyperactivity on a biological and a self-report manner.

The inadequacy to reveal associations between the *immune-related* variables and the *mood-related* ones may be due to various reasons. The CD4+ Counts which is a strong marker of immunity came out with a mean average of 487.1 (S.D.=251.6) and normally distributed (as Appendix: **K.** *Sample Normality Tests & Graphs,* Histogram of CD4counts Frequency, shows) suggesting that the entire sample used for this particular experiment, had good average immune profiles. From the other hand, mean average for Viral Load measures was estimated quite high [Mean Average Viral Load: 7738.96 (S.D.= 34733.6], when calculated *only* for those who had a detectable Viral Load Measure [that was the 32% (n= 23) of our sample] (see: Graph 4, in the Results Section). The rest 68% (n= 47) viral estimations came out with the non-detectable Viral Loads. The rest 32% was either under No-HAART, 8% (n= 6), or Under HAART 24% (n= 17) with a variance of Viral Load Estimations, possibly due to absence of regularity to their medication intake, or not good adaptation to their HAART prescriptions. From the above, it can be concluded that since increased viral estimations represent the 32% of the populations with a Mean Average of CD4 + Counts M.A. 487.1 (S.D.=251.6), their general average immune profile is good[91].

In our study, we treated Viral Loads and CD4+ as *continuous* variables. Similarly, we did the same with Anxiety and Depression outcomes. For BDI & STAI, we estimated a total for every individual, which was the sum of the 4-point scale, key-scoring system. Since we acquired the negative association between CD4 and Viral loads, we therefore were interested mostly between the associations of CD4+s (as a strong biomarker of immunity) and the scores of the self-reports. A basic restriction at this point concerned the distribution of the self-reports and immunity, variables. In this case, we did not manage to have normally distributed outcomes of the psychosocial, Depression and Anxiety Scores. This may be due to that questionnaires did not manage for some reasons to measure finally the tendencies for pathologies (even with the strong (*Cronbach's Alpha*-indicator of internal consistency of the scores in relation to the pathologies measured), or simply due to the absence of tendencies for *Depression* and *Anxiety* pathologies for this particular group.

[91] www.hivbook.com

BDI-Instrument

The Depression Scale (BDI), came out with a *high* internal consistency of 0.94 (*Cronbach's Alpha)*. The distribution of BDI-Scores came out with a few extreme values (check out Appendices: **K**; *Histograms*, *Q-plots* and *Scatter Plots* for BDI). The Histogram of the BDI normality shows the scores loading in the left edge mostly, suggesting that there are no tendencies for Depression (38.5% of the population, indicated apparently the sum of the lowest for pathologies: 21 BDI-scores). The BDI Sum of 21 is the lowest score that can be achieved by the BDI-instrument and represented the 38.5% of the population. In contrast, the maximum scores for BDI (that is the sum of: 67 BDI Scores), represented the 1.4% of the population. In order to normalize our outcomes, we performed log transformations to our data, however, it did not make much of difference neither before, nor after the transformations (see Appendix **K**).

STAI-instrument

Cronbach's Alpha demonstrated a strong *internal consistency* for the STAI-Instrument (0.98). However, the distribution of STAI-Scores came out with extreme values (check out Appendices: **K**; *Histograms*, *Q-plots* and *Scatter Plots* for STAI). The State - Anxiety Histogram shows increased loadings to both the edges of the graph and not in the middle. Similar was the case with the Trait – Anxiety Histogram, as well as with the Total – Anxiety Scores. Again, from the tables of Frequencies, as well as the Pie Charts (see Appendix: **I)**, we estimate that the lower scores in State – Trait and Total Anxieties represented approximately the 50% of the total scores. In particular, 40% of the population scored the lowest State-Anxiety values (that was a minimum of 23). For the Trait-Anxiety, 14.2% scored the minimum value (that is 20), following the 24.2% (for the 21 value) and an 8.5% (for the value 22). A similar pattern followed the overall Anxiety levels with 11.4%, 20% & 10 % scored for the lowest levels of Anxiety (43, 44, 45 values, respectively). The Highest values (value 142) for the Total Anxiety levels represented only a 1.4% of the population (see Appendices **I**, *for frequencies & Pie Charts* & **K**, *for sample normality tests*). As it has been indicated by relevant research, STAI is very well translated and adopted into Greek samples instrument in certain populations[92]. The relevant research with HIV Greek populations, however, has not up to now used any published findings, including the STAI or BDI estimations. HIV populations in particular, may be rather suspicious due to stigmatization. This particular HIV+ group included many heteroclite patients with a variety of economic and social status diversities that future research should account for. It is important to better define the characteristics of the sample, in order to mislead into

[92] Mystakidou et al., (2009)

confounding results. Nearly the absence of detectable pathologies may be explained partially by various reasons. The health-care system in Greece is public, up to now, providing patients with a welfare support monthly income as well as with free active antiretroviral therapies no matter their economic or social background. This support is a good that should not be underestimated, since it is partially an indicator suggesting a system with a social-centred quality of life, affecting individuals in a positive way, creating a level of security. Depression or anxiety is partially indicators of lack of security or point of reference, or could be seen this way. Extra variations for the lack of pathologies of our sample, were also considered. Partnership is partially a potential reason of lack of both depression and anxiety. Out of 65 males and females (sex data missing: 5), approximately the 50% was married and did not mention any adversities in the open related questions, suggesting that the 50% of them had good and supportive network environments. Copying mechanisms are important in many aspects, related to illness. The supportive networks through customs such as marriage may apart from a folklore view, be seen as an extra indicator of psychosocial stability. Supportive environments provide better communication, understanding as well as providing HIVs with a feeling of security. Societies with a better welfare, social and personal support, may appear with less tendencies for pathologies which seems to be the case in this particular sample.

Since, levels of anxiety and depression were limited in this group, this may be due to methodological reasons, or simply due to the absence of Depression and/or Anxiety.

Further suggestions

A good way to improve further studies would be to account into extra psycho-immune variations and biological correlates to measure hyperactivity of HPA, such as through the cortisol[93] levels. Using peripheral indicators of emotional states such as the cortisol[94] paradigm could provide research with a better understanding of individual emotional states, especially when experimental indicators do not absolutely concern self reported techniques. A plethora of HIV-related variables would make the consistency of the research outcomes more rigid and safe to generalizations. Quality of life profiles would be an interesting approach to include in HIV studies, on a cross-cultural level. The HIV virus may affect the across cultures hosts in many potential ways. Further research needed to be able to better understand HIV outcome in such contexts.

Our research faced a basic difficulty. When participants approach the Unit for their annually scheduled blood tests, they appear rather suspicious or in a hurry to end up with the whole blood-

[93] Turner-Cobb J.M. (2005)

[94] Glover D.A, et al., (2010)

test process, potentially due to the absence of any kind of psychosocial special trained support of the Unit, itself. Psychosocial support by specially educated members as well as knowledge debriefings towards HIV+ populations would certainly increase their level of security and confidence, as well as their disease outcome. Even though they self-score lower for pathologies, they may not experience emotions the same way. Unfortunately, the Pathology Unit in PAGNH hospital does not include and specially trained psychosocial support team, and as it has been discussed with the scientific co-worker; that they normally feel exposed and stigmatized to the process when faced with unknown to them people, even with new stuff-members of the Unit, itself. This may potentially give a credit to reasons of scoring with similar tendencies. At this particular point, the administration process, or even the sequence of the instruments, should be referred to as a suggestion of further improvement. The completion of the BDI questions' format, does not necessarily involve, any particular change to the tendency the answers are given. So one may follow, adopt the same or similar pattern of answering throughout the entire questionnaire. The STAI questionnaire from the other hand, uses a slightly different pattern; mixing up the questions actually requires the subject to think for the potential answer, which might not be the same direction as the previous. For the present experiment the administration of the STAI questionnaire first, might have had a different impact on the scoring tendencies. Personality Traits such as the trait anxiety should be better framed in further research. Personality characteristics may heavily account for potential pathologies or absence of them. Personality characteristics as well as copying mechanisms are necessary to be better understood and researched in relation to HIV, by further research.

Finally, a repetitive study, with a similar more or less design, would be an interesting approach. Precisely, at least a 6 months follow up, could provide research with more clear outcomes. Greece is in the middle (hopefully) of an economic crisis, and the scores may dramatically change, in little periods of time. Maybe to re-test whether there are any future changes in their self-recorded, at the time, data, as well as indicators of immunity, including extra indicators like CD8 counts, cortisol levels, quality of life indexes, as well as access to full medication profile of the patient, would provide a more coherent view of how HIV is adopted in Greek populations. Finally, the homogeneity of the sample used could potentially be further limited or categorised accordingly. for prospect research, it should be taken into account samples with either a more rigid CD4 cell count (i.e. all individuals with CD4s between 500 up to 1000), or with extra categorical splittings of CD4s.

The current experiment came out with apparent scientific estimations, as well as with limitations, mainly in two different foci of attention: the physiological factors and the psycho-social factors

concerning the issue of HIV. International research up to now, includes various psyco-bio-medical domains of interest to frame HIV, including: stress, stress related behaviors, PTSD, traumas, depression, chronic fatigue syndrome to name a few.

The view that stress can cause illness has been part of common folklore for a long time. Patients often cite stress as an important cause of their illness, yet some argued that the link between stress and illness is unproved and theoretical (Jones & Bright, 2001). Although the association between reported stress, illness, and even mortality is well established, conceptual and methodological problems mean it difficult to establish whether stress is causal, and the precise mechanisms or processes through which stress impacts on health are not well understood.

When multi-factor disorders come into play, like HIV - AIDS, many parameters should be taken into account. As indicated in cross-cultural research, AIDS related symptomatology, appears diverged among samples all over the world[95]. This is rather important parameter, since the virus of HIV doesn't seem to follow the same pattern around the world, and moreover, it can be concluded that the virus together with other variables and especially environment related ones, swifts the pattern of the HIV progression across earth. It is also very interesting, that many individuals with HIV + infection, and without any treatment, continue to leave with increased CD4 cell count and decreased viral loads[96]. No matter what, the HIV progression displays an interconnection with the immunity of body, and further research should be focused on psychosocial adversities, as well as, coping strategies for the better outcomes of the virus. Since, optimism[97] and good mood, as well as lack of depression or anxiety behaviors all correlate (even though controversial) with a better well being (increased CD4 cell count and decreased in viral load, among HIV infected populations) extra care should be focused not just in antiretroviral elements, but moreover on active cognitive therapeutic techniques, and other like behavioral based interventions, so as to improve concern but not panic, information (through psycho-education), as well as to support and reinforce communication and potential loss in intimate connections.

The truth beyond HIV, still remains elicit, and further studies should be carried, in order to integrate the puzzle of viral disease, progression, and outcome.

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[95] www.unaids.org

[96] Leserman, J. & Temoshok, L.T. (2008)

[97] Ironson et al, (2005)

Conclusions

The current study attempted to relate psychosocial elements with aspects of immunity of 70 HIV – infected Cretan individuals. The associations examined did not reveal significant correlations, due to extreme values, or potential lack of tendencies for pathologies like Anxiety and Depression. The BDI & STAI Scores of the recent estimation do not associate with markers of immunity like CD4+ cells or Viral Load Counts, in this particular population. Secondary associations reveal in a good extend the international bibliography. Interestingly, increased Anxieties, are associated with increased levels of Depression, and vice versa. In contrast, increased levels of CD4s accompany decreased levels of Viral Loads, and vice versa. However, indicators of immunity were not significantly correlated with the psychosocial indicators. Further research needed to support the psycho-immune interrelations among Greek sample groups.

References:

Anagnostopoulos, F. & Karademas, E. (2007). Special Issues in Health Psychology: A Greek Perspective. *Athens: Livani Publishing.*

Ayers, S. Baum, A. McManus, C. Newman, S. Wallston, K. Weinman, J. West, R. (2007). Cambridge Handbook of Psychology, Health and Medicine (pp. 719–20) *Cambridge University Press.*

Bachen, E.A. Manuck, S.B. Cohen, S. Muldoon, M.F. Raible, R. Herbert, T.B. Rabin, B. (1995). Adrenergic blockade ameliorates cellular immune responses to mental stress in humans. *Psychosomatic Medicine, 57*: 366–372.

Balbin, E.G. Ironson, G.H. Solomon, G.F. (1999). Stress and coping: the psychoneuroimmunology of HIV/AIDS. *Clinical Endocrinology and Metabolism, 13 (4)*: 615 - 633.

Blaxhult, A. & Lidman, K. (1998). Current treatment of HIV infection. *Nordic Medicine, 113*: 290 - 292, 296.

Bottonari, K.A. Tripathi, S.P. Fortney, J.C. Curran, G. Rimland, D. Rodriguez-Barradas, M. Gifford, A.L. Pyne, J.M. (2012). Correlates of Antiretroviral and Antidepressant Adherence Among Depressed HIV-Infected Patients. *Behavioural and Psychosocial Research, 26(5*): 265-273.

Bremner, J.D. Cheema, F.A. Ashraf, A. Afzal, N. Fani, N. Reed, L. Musselman, D.L. Ritchie, J.C. Faber, T. Votaw, J.R. Nemeroff, C.B. Vaccarino, V. (2008). Effects of a cognitive stress challenge on myocardial perfusion and plasma cortisol in coronary heart disease patients with depression. *Stress and Health, 25*: 267–278.

Breslau, N. Davis, G.C. Peterson, E.L. Schultz, L.R. (2000). A Second Look at Comorbidity in Victims of Trauma: The Posttraumatic Stress Disorder–Major Depression Connection. *Society of Biological Psychiatry, 48*: 902–909.

Carrico, A.W. Antoni, M.H. Durán, R.E. Ironson, G. M.D. Penedo, F. Fletcher, M.A. Klimas, N. Schneiderman, N. (2006). Reductions in Depressed Mood and Denial Coping During Cognitive

Behavioral Stress Management With HIV-Positive Gay Men Treated With HAART. *The Society of Behavioral Medicine, 31(2)*:155-64.

Γναρδέλλης, Χ. (2003). Εφαρμοσμένη Στατιστική. Αθήνα: *ΕΚΔΟΣΕΙΣ ΠΑΠΑΖΗΣΗ*.

Γναρδέλλης, Χ. (2009). ανάλυση δεδομένων με το PASW Statistics 17.0. Αθήνα: *ΕΚΔΟΣΕΙΣ ΠΑΠΑΖΗΣΗ*.

Castillo, D.Z. Holguin, E.M. Garcıa, G.V. Alban, A.L.C. Morales, A.J.R. Gonzalez, S.D. (2009). Impact of hospital-associated anxiety and depression on the CD4 counts of naive HIV/AIDS patients from locations in Northern Peru. *International Journal of Infectious Diseases, 13*: 75 – 76.

Chaisson, R.E. (1998). The changing natural history of HIV/AIDS in the `HAART' era: clinical implications. *Medscape HIV/AIDS, 4*: 2.

Chida, Y. Vedhara, K. (2009). Adverse psychosocial factors predict poorer prognosis in HIV disease: A meta-analytic review of prospective investigations. *Brain Behaviour and Immunity, 23*: 434–445.

Chen, M.H. Su, T.P. Chen, T.J. Cheng, J.Y. Han-Ting Wei, H.T. Bai, Y.M. (2012). Identification of psychiatric disorders among human immunodeficiency virus-infected individuals in Taiwan, a nine-year nationwide population-based study. *AIDS Care,* 1-7.

Cohen, J. (1994) The Duesberg Phenomenon. *Science*, *266:*1642-1649.

Cole, S.W. (2008). Psychosocial Influences on HIV-1 Disease Progression: Neural, Endocrine, and Virologic Mechanisms. *Psychosomatic Medicine, 70*: 562–568.

Cole, S.W. Naliboff, B.D. Kemeny, M.E. Griswold, M.P. Fahey, J.L. Zack, J.A. (2001). Impaired response to HAART in HIV-infected individuals with high autonomic nervous system activity. *National Academy of Science (USA), 98*: 12695–700.

Coolican, H. (2009). Research Methods and Statistics in Psychology. Hodder Education.

Deenick, E.K. Ma, C.S. (2011). The regulation and role of T follicular helper cells in immunity. *Immunology, 134*: 361–367.

Donias, S. Demertzis, I. (1983). Validation of Depressive symptoms of the Beck Depression Inventory. *Proceedings of the 10th Panhellenic Conference of Neurology and Psychiatry Thessaloniki , (1):* 486–492.

Durant, J. Clevenbergh, P. Halfon, P. (1999). Drug-resistance genotyping in HIV-1 therapy: the VIRADAPT randomized controlled trial. *Lancet, 353*: 2195-2199.

Evans, D.L. Leserman, J. Perkins, D.O. Stern, R.A. Murphy, C. Zheng, R.N.B. Gettes, M.S.D. Longmate, J.A. Silva, S.G. Van Der Horst, C.M. Hall, C.D.M.D., Folds, J.D. Golden, R.N. Petitto, J.M. (1997). Severe Life Stress as a Predictor of Early Disease Progression in HIV Infection. *American Journal of Psychiatry, 154(5):* 630-634.

Fauci, A.S. (1988). The scientific agenda for AIDS. *Issues in Science and Technology, 4*: 33-42.

Fountoulakis, K.N. Papadopoulou, M. Kleanthous, S. Papadopoulou, A. Bizeli, V. Nimatoudis, I. (2006). Reliability and psychometric properties of the Greek translation of the State-Trait Anxiety Inventory form Y: Preliminary data. *Annals of General Psychiatry, 5:* 2. Retrieved from http://www.annals-general-psychiatry.com/content/5/1/2

Giannousi, Z. Manaras, I. Georgoulias, V. Samonis, G. (2010). Illness perceptions in Greek patients with cancer: a validation of the Revised-Illness Perception Questionnaire. *Psycho-Oncology, 19*: 85–92.

Goodkin, K. Feaster, D.J. Tuttle, R. Blaney, N.T. Kumar, M. Baum, M.K. Shapshak, P. Fletcher, M.A. (1996). Bereavement is associated with timedependent decrements in cellular immune function in asymptomatic human immunodeficiency virus type 1-seropositive homosexual men. *Clinical Diagnostic Laboratory of Immunity, 3*: 109 –18.

Glaser, K.J. Glaser, R. (1988). Methodological issues in behavioural immunology research with humans. *Brain Behavioral Immunity, 2*: 67-78.

Glover, D.A. Garcia-Aracena, E.F. Lester, P. Rice, E. Rothram-Borus, M.J. (2010). Stress Biomarkers as Outcomes for HIV+ Prevention: Participation, Feasibility and Findings Among HIV + Latina and African American Mothers. *AIDS & Behavior, 14*: 339 –350.

Gwandure, C. (2007). Sexual assault in childhood: Risk HIV and AIDS behaviours in adulthood. *AIDS Care, 19(10):* 1313-1315.

Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology and Neurosurgery Psychiatry, 23:* 56–62.

Hammoud, D.A. Endres, C.J. Hammond, E. Uzuner, O. Brown, A. Nath, A. Kaplin, A.I. Pomper, M.G. (2010). Imaging Serotonergic Transmission with [11C]DASB-PET in Depressed and Non-Depressed Patients Infected with HIV. *Neuroimage, 49(3*): 2588-95.

Ironson, G. Balbin, E. Stuetzle, R. Fletcher, M.A. O'Cleirigh, C. Laurenceau, J.P. Schneiderman, N. Solomon, G. (2005). Dispositional Optimism and the Mechanisms by Which It Predicts Slower Disease Progression in HIV: Proactive Behavior, Avoidant Coping, and Depression. *International Journal of Behavioral Medicine, 12(2):* 86–97.

Ironson, G. O'Cleirigh, C. Fletcher, M.A. Laurenceau, J.P. Balbin, E. Klimas, N. Schneiderman, N. Solomon, G. (2005). **P**sychosocial Factors Predict CD4 and Viral Load Change in Men and Women With Human Immunodeficiency Virus in the Era of Highly Active Antiretroviral Treatment. *Psychosomatic Medicine 67:* 1013–1021.

Jia, H. Uphold, C.R. Zheng, Y. Wu, S. Chen, G.J. Findley, K. Duncan, P.W. (2007). A further investigation of health-related quality of life over time among men with HIV infection in the HAART era. *Quality of Life Research, 16:* 961–968.

Kelly, B. Raphael, B. Judd, F. Perdices, M. Kernutt, G. Burnett, P. Dunne, M. Burrows, G. (1998). Suicidal Ideation, Suicide Attempts, and HIV Infection. *Psychosomatics, 39*(5): 405-15.

Kemeny, M.E. Dean, L. (1995). Effects of AIDS-related bereavement on HIV progression among New York City gay men. *AIDS Education Previews, 7(5)*: 36–47.

Kentikelenis, A. Karanikolos, M. Papanicolas, I. Basu, S. McKee, M. Stuckler, D. (2012). Health and the financial crisis in Greece – Authors' reply. *The Lancet*, *379(9820)*: 1002 - www.thelancet.com.

Kessler, R.C. Foster, C. Joseph, J. Ostrow, D. Wortman, C. Phair, J. Chmiel, J. (1991). Stressful life events and symptom onset in HIV infection. *American Journal of Psychiatry 148*: 733– 8.

Kimura, K. Isowa, T. Ohira, H. Murashima S. (2005). Temporal variation of acute stress responses in sympathetic nervous and immune systems. *Biological Psychology 70*: 131–139.

Klimas, N.G. Caralis, P. LaPerriere, A. Antony, M.H. Ironson, G. Simoneau, J. Schneiderman, N. Fletcher, M.A. (1991). Immunologic function in a cohort of human immunodeficiency virus type 1-seropositive and - negative healthy homosexual men. *Journal of Clinical Microbiology, 29(7):* 1413–1421.

Kopnisky, K.L. Stoff, D.M. Rausch, D.M. (2004). Workshop report: the effects of psychological variables on the progression of HIV-1 disease. *Brain Behavior and Immunity, 18*: 246–261.

Leserman, J. (2003). HIV disease progression: depression, stress, and possible mechanisms. *Biological Psychiatry, 54*: 295–306.

Leserman, J. Barroso, J. Pence, B.W. Salahuddin, N. Harmon, J.L. (2008). Trauma, stressful life events, and depression predict HIV-related fatigue [E-pub ahead of print]. *AIDS Care, 17*: 1-8.

Leserman, J. Jackson, E.D. Petitto, J.M. Golden, R.N. Silva, S.G. Perkins, D.O. (1999). Progression to AIDS: The effects of stress, depressive symptoms, and social support. *Psychosomatic Medicine, 61*: 397-406.

Leserman, J. Pence, B.W. Whetten, K. Mugavero, M.J. Thielman, N.M. Swartz, M.S. Stangl, D. (2007). Relation of lifetime trauma and depressive symptoms to mortality in HIV. *American Journal of Psychiatry, 164:* 1707–1713.

Leserman, J. Petitto, J.M. Golden, R.N. Gaynes, B.N. Gu, H. Perkins, D.O. Silva, S.G. Folds, J.D. Evans, D.L. (2000). The impact of stressful life events, depression, social support, coping and cortisol on progression to AIDS. *American Journal of Psychiatry, 157:* 1221– 8.

Leserman J. Petitto, J.M. Gu, H. Gaynes, B.N. Barroso, J. Golden, R.N. Perkins, D.O. Folds, J.D. Evans, D.L. (2002). Progression to AIDS, a clinical AID condition, and mortality: psychosocial and physiological predictors. *Psychosomatic Medicine, 32*: 1059 –73.

Leserman, J. Temoshok, L.R. (2008). A Road Well Traveled (Although Not Yet a Super Highway). *Psychosomatic Medicine, 70:* 521–522.

Leserman, J. Whetten, K. Lowe, K. Stangl, D. Swartz, M.S. Thielman, N.M. (2005). How Trauma, Recent Stressful Events, and PTSD Affect Functional Health Status and Health Utilization in HIV-Infected Patients in the South. *Psychosomatic Medicine, 67:* 500–507.

Liebschutz, J. Feinman, G. Sullivan, L. Stein, M. Samet, J. (2000). Physical and sexual abuse in women infected with human Immunodefiency virus. *Archives of International Medicine, 160*: 1659–1664.

Loftis, J.M. Huckans, M. Morasco, B.J. (2010). Neuroimmune mechanisms of cytokine-induced depression: Current theories and novel treatment strategies. *Neurobiology of Disease, 37(3*): 519–533.

McPherson, A. Martin, C.R. (2010). A narrative review of the Beck Depression Inventory (BDI) and implications for its use in an alcohol-dependent population. *Journal of Psychiatric and Mental Health Nursing, 17*: 19–30.

Miller, G.E. Blackwell, E. (2006). Turning up the heat: Inflammation as a mechanism linking chronic stress, depression and heart disease. *Current Directions in Psychological Science*, *15*: 269–272.

Mystakidou, M. Tsilika, E. Parpa, E. Sakkas, P. Vlahos, L. (2009). The psychometric properties of the Greek version of the State-Trait Anxiety Inventory in cancer patients receiving palliative care. *Psychology and Health, 24(10*): 1215–1228.

Nott, K.H. Vedhara, K. Spickett, G.P. (1995). PSYCHOLOGY, IMMUNOLOGY, AND HIV. *Psychoneuroendocrinology, 20(5):* 451-474.

Pappin, M. Wouters, E. Booysen, F. (2012).Anxiety and depression amongst patients enrolled in a public sector antiretroviral treatment programme in South Africa: a cross-sectional study. *BMC Public Health, 12*: 244.

Perry, S. Fishman, B. Jacobsberg, L. Frances, A. (1992). Relationships over one year between lymphocyte subsets and psychosocial variables among adults with infection by human immunodeficiency virus. *Archives of General Psychiatry 49*: 396–401.

Ρούσσος, Π.Α. Τσαούσης, Γ. (2002). Στατιστική εφαρμοσμένη στις κοινωνικές επιστήμες. Ελληνικά Γράμματα.

Sendi, P.P. Bucher, H.C. Craig, B.A. (1999). Estimating AIDS-free survival in a severely immuno-suppressed asymptomatic HIV-Infected population in the era of antiretroviral triple combination therapy. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology, 20:* 376-381.

Sledjeski, E.M. Delahanty, D.L. Bogart, L.M. (2005). Incidence and Impact of Posttraumatic Stress Disorder and Comorbid Depression on Adherence to HAART and CD4_ Counts in People Living with HIV. *AIDS Patient's Care and STDs: 19 (11):* 728-736.

Spielberger, C.D. Gorsuch, R.L. Lushene, R.E. (1970). Manual for the State-Trait Anxiety Inventory. *Consulting Psychologists Press*, Polo Alto, CA.

Stine, G.J. (1996). AIDS Update (pp. 112-114) *Upper Saddle River, New Jersey:* Prentice-Hall.

Sutton, S. Baum, A. Johnston, M. Turner-Cobb, J.M. (2005). THE SAGE HANDBOOK Of HEALTH PSYCHOLOGY, *SAGE Publications Ltd*

Thompson, K.A. McArthur, J.C. Wesselingh, S.L. (2000). Correlation Between Neurological Progression and Astrocyte Apoptosis in HIV-Associated Dementia. *Annals of Neurology, Vol 49 (6): 745-52.*

Turner-Cobb, J.M. (2005). Psychological and stress hormone correlates in early life: A key to HPA-axis dysregulation and normalization. *Stress, 8(1*): 47–57.

www.unaids.org, Switcherland , 2007

http://en.wikipedia.org/wiki/HIV
www.hivbook.com

http://www.msf.org.hk/public/contents/news?ha=&wc=0&hb=&hc=&revision_id=28281&item_id=28280 : for further information, visit: *Medicine sans frontiers*

Appendices:

A. *University Of Crete, Department of Psychology Ethics Approval*

ΕΛΛΗΝΙΚΗ ΔΗΜΟΚΡΑΤΙΑ
ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΡΗΤΗΣ

ΣΧΟΛΗ ΚΟΙΝΩΝΙΚΩΝ ΕΠΙΣΤΗΜΩΝ
ΤΜΗΜΑ ΨΥΧΟΛΟΓΙΑΣ

Επιτροπή Ερευνητικής Δεοντολογίας

Αριθ. Πρωτ. 24/19-01-2012

Αγαπητέ κ. Δ. Γιαγκιόζη,

Η επιτροπή δεοντολογίας διερευνώντας το αίτημά σας για την εκπόνηση της έρευνας: «Συσχέτιση ψυχολογικών παραγόντων και CD4 επιπέδων σε ασθενείς με HIV»
και λαμβάνοντας υπόψη: α) τους σκοπούς της έρευνας, β) τα αναμενόμενα οφέλη, γ) τα χαρακτηριστικά του δείγματος, δ) τη μέθοδο της έρευνας, ε) την απουσία ταπεινών κινήτρων συμμετοχής, ζ) τη δέσμευση για τήρηση της ανωνυμίας τους, στ) τη μη σύγκρουση συμφερόντων και τέλος ζ) την έλλειψη πιθανών κινδύνων για τα υποκείμενα της έρευνας,

έκρινε ομόφωνα ότι τηρούνται στην πρότασή σας οι θεμελιώδεις αρχές και οι βασικοί κανόνες δεοντολογίας που οφείλουν να διέπουν κάθε ερευνητική δραστηριότητα που πρόκειται να διεξαχθεί στο πλαίσιο μιας ευνομούμενης Πολιτείας.

Σας ευχόμαστε καλή επιτυχία στη διεξαγωγή της έρευνά σας.

Ρέθυμνο, 19– 01 -2012

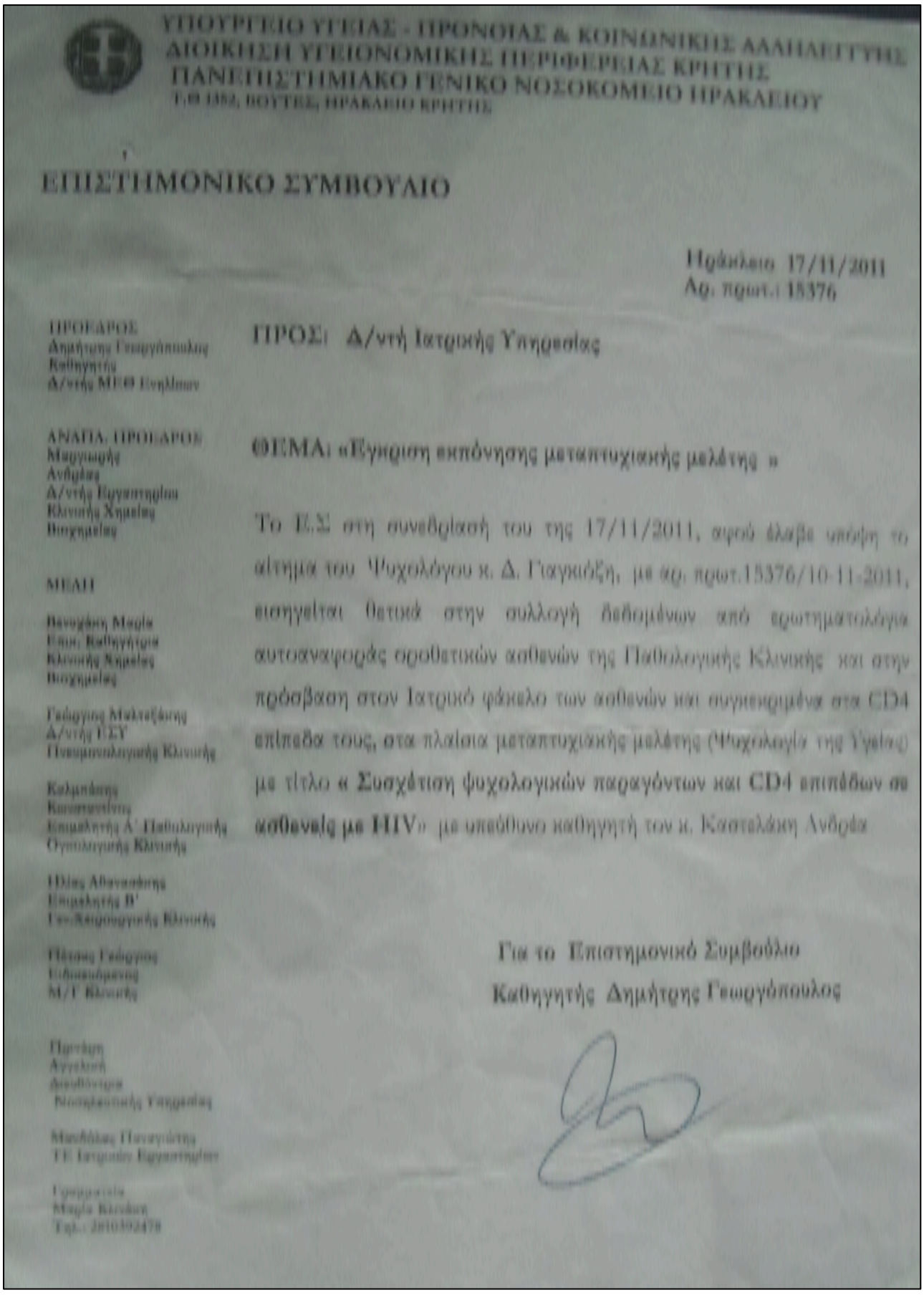
Με τιμή

Τα μέλη της Επιτροπής

Σοφία Τριλίβα
Στέλλα Γιακουμάκη
Όλγα Θεμελή
Δέσποινα Ξανθοπούλου

Πανεπιστημιούπολη Γάλλου, 74100 Ρέθυμνο, Τηλ. 2831-0-77577 & 77579 fax: 2831-0-7757

B. *PAGNH Hospital, Medical Service Ethics Approval*



ΥΠΟΥΡΓΕΙΟ ΥΓΕΙΑΣ - ΠΡΟΝΟΙΑΣ & ΚΟΙΝΩΝΙΚΗΣ ΑΛΛΗΛΕΓΓΥΗΣ
ΔΙΟΙΚΗΣΗ ΥΓΕΙΟΝΟΜΙΚΗΣ ΠΕΡΙΦΕΡΕΙΑΣ ΚΡΗΤΗΣ
ΠΑΝΕΠΙΣΤΗΜΙΑΚΟ ΓΕΝΙΚΟ ΝΟΣΟΚΟΜΕΙΟ ΗΡΑΚΛΕΙΟΥ
Τ.Θ 1352, ΒΟΥΤΕΣ, ΗΡΑΚΛΕΙΟ ΚΡΗΤΗΣ

ΕΠΙΣΤΗΜΟΝΙΚΟ ΣΥΜΒΟΥΛΙΟ

Ηράκλειο 17/11/2011
Αρ. πρωτ.: 15376

ΠΡΟΕΔΡΟΣ
Δημήτριος Γεωργόπουλος
Καθηγητής
Δ/ντής ΜΕΘ Ενηλίκων

ΑΝΑΠΛ. ΠΡΟΕΔΡΟΣ
Μαργιωρής
Ανδρέας
Δ/ντής Εργαστηρίου
Κλινικής Χημείας
Βιοχημείας

ΜΕΛΗ

Βανουδάκη Μαρία
Επικ. Καθηγήτρια
Κλινικής Χημείας
Βιοχημείας

Γεώργιος Μαλτεζάκης
Δ/ντής ΕΣΥ
Πνευμονολογικής Κλινικής

Καλμπάκης
Κωνσταντίνος
Επιμελητής Α' Παθολογικής
Ογκολογικής Κλινικής

Ηλίας Αθανασάκης
Επιμελητής Β'
Γεν.Χειρουργικής Κλινικής

Πέτσας Γεώργιος
Ειδικευόμενος
Μ/Γ Κλινικής

Παντάζη
Αγγελική
Διοικήτρια
Νοσηλευτικής Υπηρεσίας

Μανδάλας Παναγιώτης
ΤΕ Ιατρικών Εργαστηρίων

Γραμματεία
Μαρία Κανάκη
Τηλ.: 2810392478

ΠΡΟΣ: Δ/ντή Ιατρικής Υπηρεσίας

ΘΕΜΑ: «Έγκριση εκπόνησης μεταπτυχιακής μελέτης »

Το Ε.Σ στη συνεδρίασή του της 17/11/2011, αφού άκουσε υπόψη το αίτημα του Ψυχολόγου κ. Δ. Γιαγκιόζη, με αρ. πρωτ.15376/10-11-2011, εισηγείται θετικά στην συλλογή δεδομένων από ερωτηματολόγια αυτοαναφοράς ορθοπεδικών ασθενών της Παθολογικής Κλινικής και στην πρόσβαση στον Ιατρικό φάκελο των ασθενών και συγκεκριμένα στα CD4 επίπεδα τους, στα πλαίσια μεταπτυχιακής μελέτης (Ψυχολογία της Υγείας) με τίτλο « **Συσχέτιση ψυχολογικών παραγόντων και CD4 επιπέδων σε ασθενείς με HIV**» με υπεύθυνο καθηγητή τον κ. Καστελάκη Ανδρέα

Για το Επιστημονικό Συμβούλιο
Καθηγητής Δημήτρης Γεωργόπουλος

C. *Informational Layout*

ΕΝΗΜΕΡΩΤΙΚΉ ΕΠΙΣΤΟΛΉ ΠΡΟΣ ΤΟΥΣ ΣΥΜΜΕΤΈΧΟΝΤΕΣ (DEBRIEFING)

Τίτλος μελέτης:

«Συσχέτιση ψυχολογικών παραγόντων και CD4 επιπέδων σε ασθενείς με HIV»

Η παρούσα έρευνα γίνεται στα πλαίσια μεταπτυχιακής μελέτης (Ψυχολογία της Υγείας) για το Πανεπιστήμιο Κρήτης, τμήματος Ψυχολογίας.
Σκοπός της έρευνας είναι να βρει τυχόν συσχετίσεις ανάμεσα σε ψυχολογικούς παράγοντες όπως είναι το στρές και η κατάθλιψη και των CD4 επιπέδων του οργανισμού σε άτομα που φέρουν τον ιό του HIV. Με απλά λόγια, ο σκοπός μας είναι να δούμε και να κατανοήσουμε περισσότερο το πως η διάθεση μας μπορεί να σχετίζεται με ένα βιολογικό δείκτη όπως είναι τα CD4 τα οποία μας δηλώνουν την επάρκεια-ανεπάρκεια του ανοσοποιητικού μας συστήματος.

Για το σκοπό αυτό, οι συμμετέχοντες καλούνται να συμπληρώσουν:

- ένα ερωτηματολόγιο δημογραφικών στοιχείων, με την ηλικία το φύλο τους, κ.α.
- ένα ερωτηματολόγιο για την *κατάθλιψη*
- ένα ερωτηματολόγιο για το *στρές*
- καθώς θα ληφθούν υπόψη τα επίπεδα των τελευταίων CD4 κυτταρικών τους καλλιεργειών από το ιατρικό τους αρχείο

Η συμμετοχή στη συγκεκριμένη μελέτη, δεν είναι σε καμία περίπτωση αναγκαστική, ενώ οι συμμετέχοντες, έχουν το δικαίωμα να αποχωρήσουν σε οποιαδήποτε φάση συμπλήρωσης των ερωτηματολογίων, όπου τυχόν αισθανθούν άβολα, η δυσάρεστα. Τα ονόματα των συμμετεχόντων είναι απόρρητα και για το λόγο αυτό γίνεται μια ευθύς εξαρχής κωδικοποίηση του κάθε συμμετέχοντα ξεχωριστά.
Η βοήθεια σας στην εν λόγω μελέτη ειναι ουσιαστική γι᾽αυτὸ και παρακαλείστε να δώσετε όσο το δυνατό πιο ειλικρινείς απαντήσεις στα παρακάτω ερωτηματολόγια.

Με εκτίμηση

Γιαγκιόζης Δημήτριος

D. *Consent Form*

ΕΝΤΥΠΟ ΕΝΥΠΟΓΡΑΦΗΣ ΣΥΓΚΑΤΑΘΕΣΗΣ ΣΥΜΜΕΤΕΧΟΝΤΩΝ ΓΙΑ ΤΗ ΜΕΛΕΤΗ ΜΕ ΤΙΤΛΟ:

«Συσχέτιση ψυχολογικών παραγόντων και CD4 επιπέδων σε ασθενείς με HIV»

Με το παρόν, βεβαιώνω την ενυπόγραφη συγκατάθεση μου στην παραπάνω μελέτη που γίνεται από το Πανεπιστήμιο Κρήτης, στο πλαίσιο της μεταπτυχιακής διπλωματικής εργασίας του κ. Δ. Γιαγκιόζη.

Βεβαιώνω ότι έχω ενημερωθεί γραπτώς και προφορικώς για τους σκοπούς και τη μεθοδολογία της μελέτης και ότι τα έχω κατανοήσει.

Βεβαιώνω ότι αποδέχομαι την πρόσβαση στον ιατρικό φάκελό μου από την ερευνητική ομάδα με σκοπό τη συλλογή στοιχείων που θα χρησιμοποιηθούν για τη συγκεκριμένη μελέτη αποκλειστικά και ότι αποδέχομαι να λάβω μέρος με την συμπλήρωση των ερωτηματολογίων αυτο-αναφοράς που πρόκειται να μου δοθούν προς συμπλήρωση.

Βεβαιώνω ότι έχω κατανοήσει ότι θα μου αποδοθεί ένας προσωπικός κωδικός που δε θα προδίδει την ταυτότητά μου και ότι οποιαδήποτε αναφορά σε δεδομένα που με αφορούν θα γίνεται με βάση αυτόν τον κωδικό.

Βεβαιώνω ότι μου έγινε σαφές πως οποιαδήποτε στιγμή θελήσω, έχω το δικαίωμα να διακόψω τη συμμετοχή μου στη μελέτη, χωρίς να δώσω καμία απολύτως εξήγηση για τους λόγους που με οδηγούν σε αυτήν μου την απόφαση και χωρίς να επηρεαστεί η φροντίδα που λαμβάνω από τη θεραπευτική ομάδα μου.

Ημερομηνία …../…../……..

Υπογραφή ……..

E. *Demographic Information form*

ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ ΔΗΜΟΓΡΑΦΙΚΩΝ ΣΤΟΙΧΕΙΩΝ

Ημερομηνία: ……

Φυλο: άνδρας γυναίκα

Οικογενειακή κατάσταση: έγγαμος άγαμος

Ηλικια: ……

Χρονολογία διάγνωσης: ……..

Βρίσκεστε σε κάποια ψυχιατρική αγωγή; (αντικαταθλιπτικά, αγχολυτικά κ.α.)
Ναι Όχι

Αν ναι, παρακαλώ αναφέρετε την ονομασία του σκευάσματος.
……
……

Περιγράψτε εν συντομία πρακτικές δυσκολίες κατά τις καθημερινές σας δραστηριότητες.
……
……
……
……
……
……

F. *BDI-Questionnaire*

G. *STAI-Questionnaire*

Ερωτηματολόγιο Αυτοεκτίμησης

C. D Spilberger

(Στάθμιση στα Ελληνικά Α. Λιάκου)

STAI – X-1

Οδηγίες: Παρακάτω ακολουθεί ένας αριθμός προτάσεων που άνθρωποι συνηθίζουν να χρησιμοποιούν για να περιγράψουν τον εαυτό τους. Διαβάστε προσεκτικά κάθε πρόταση και στη συνέχεια επιλέξτε μια από τις επιλογές που ακολουθούν, σημειώνοντας ή μαυρίζοντας τον αντίστοιχο αριθμό, για να δείξετε πως αισθάνεστε τώρα, δηλαδή αυτή τη στιγμή. Δεν υπάρχουν σωστές ή λανθασμένες απαντήσεις. Μη ξοδεύετε πολλή ώρα για κάθε πρόταση, αλλά δώστε την απάντηση που φαίνεται να ταιριάζει πιο καλά σε αυτό **που αισθάνεστε τώρα**.

①	②	③	④
Καθόλου	Κάπως	Μέτρια	Πάρα Πολύ

1.	Αισθάνομαι ήρεμος/η.	①	②	③	④
2.	Αισθάνομαι ασφαλής.	①	②	③	④
3.	Νιώθω μια εσωτερική ένταση.	①	②	③	④
4.	Είμαι στεναχωρημένος/η.	①	②	③	④
5.	Αισθάνομαι άνετα.	①	②	③	④
6.	Αισθάνομαι αναστατωμένος/η.	①	②	③	④
7.	Ανησυχώ αυτή τη στιγμή για ενδεχόμενες ατυχίες.	①	②	③	④
8.	Αισθάνομαι αναπαυμένος/η.	①	②	③	④
9.	Αισθάνομαι άγχος.	①	②	③	④
10.	Αισθάνομαι βολικά.	①	②	③	④
11.	Αισθάνομαι αυτοπεποίθηση.	①	②	③	④
12.	Αισθάνομαι νευρικότητα.	①	②	③	④
13.	Έχω μια νευρική τρεμούλα.	①	②	③	④
14.	Βρίσκομαι σε διέγερση.	①	②	③	④
15.	Είμαι χαλαρωμένος/η.	①	②	③	④
16.	Αισθάνομαι ικανοποιημένος.	①	②	③	④
17.	Ανησυχώ.	①	②	③	④
18.	Αισθάνομαι έξαψη και ταραχή.	①	②	③	④
19.	Αισθάνομαι χαρούμενος/η.	①	②	③	④
20.	Αισθάνομαι ευχάριστα.	①	②	③	④

Ερωτηματολόγιο Αυτοεκτίμησης

C.D Spilberger

STAI – X-2

Οδηγίες: Παρακάτω ακολουθεί ένας αριθμός προτάσεων που άνθρωποι συνηθίζουν να χρησιμοποιούν για να περιγράψουν τον εαυτό τους. Διαβάστε προσεκτικά κάθε πρόταση και στη συνέχεια επιλέξτε μια από τις επιλογές που ακολουθούν, σημειώνοντας ή μαυρίζοντας τον αντίστοιχο αριθμό, για να δείξετε πως αισθάνεστε τώρα, δηλαδή αυτή τη στιγμή. Δεν υπάρχουν σωστές ή λανθασμένες απαντήσεις. Μη ξοδεύετε πολλή ώρα για κάθε πρόταση, αλλά δώστε την απάντηση που φαίνεται να περιγράφει πως **αισθάνεστε γενικά**.

①	②	③	④
Καθόλου	Κάπως	Μέτρια	Πάρα Πολύ

21.	Αισθάνομαι ευχάριστα.	①	②	③	④
22.	Κουράζομαι εύκολα.	①	②	③	④
23.	Βρίσκομαι σε συνεχή αγωνία.	①	②	③	④
24.	Εύχομαι να μπορούσα να είμαι τόσο ευτυχισμένος/η όσο φαίνονται να είναι οι άλλοι	①	②	③	④
25.	Μένω πίσω στις δουλειές μου γιατί δεν μπορώ να αποφασίσω αρκετά γρήγορα.	①	②	③	④
26.	Αισθάνομαι αναπαυμένος.	①	②	③	④
27.	Είμαι ήρεμος/η, ψύχραιμος/η, και συγκεντρωμένος/η.	①	②	③	④
28.	Αισθάνομαι πως οι δυσκολίες συσσωρεύονται ώστε να μην μπορώ να τις ξεπεράσω.	①	②	③	④
29.	Ανησυχώ πάρα πολύ για κάτι που στην πραγματικότητα δεν έχει σημασία.	①	②	③	④
30.	Βρίσκομαι σε συνεχή υπερένταση.	①	②	③	④
31.	Έχω την τάση να βλέπω να πράγματα δύσκολα.	①	②	③	④
32.	Μου λείπει η αυτοπεποίθηση.	①	②	③	④
33.	Αισθάνομαι ασφαλής.	①	②	③	④
34.	Προσπαθώ να αποφεύγω την αντιμετώπιση μιας κρίσης ή δυσκολίας.	①	②	③	④
35.	Βρίσκομαι σε υπερδιέγερση.	①	②	③	④
36.	Είμαι ικανοποιημένος/η.	①	②	③	④
37.	Κάποια ασήμαντη σκέψη μου περνά από το μυαλό και μ' ενοχλεί.	①	②	③	④
38.	Παίρνω τις απογοητεύσεις τόσο πολύ στα σοβαρά, ώστε δεν μπορώ να τις διώξω από τη σκέψη μου.	①	②	③	④
39.	Είμαι ένας σταθερός χαρακτήρας.	①	②	③	④
40.	Έρχομαι σε κατάσταση έντασης ή αναστάτωσης όταν σκέφτομαι τις τρέχουσες ασχολίες και τα ενδιαφέροντά μου.	①	②	③	④

H. *Descriptive Statistics*

Descriptives

	N	Minimum	Maximum	Mean	Std. Deviation
SEX	69	0	1	.30	.464
TEMPORAL DISTANCE HIV +	70	1	19	9.09	4.429
CD4 COUNT	70	17	1242	487.16	251.650
VIRAL LOAD	70	0	257191	7738.96	34733.694
HAART	69	0	1	.09	.284
MARITAL STATUS	66	0	1	.42	.498
AGE	70	23	75	45.00	10.258
PSYCHIATRIC MEDICATION	70	0	1	.93	.259
BDI_total	70	21.00	67.00	27.8143	9.35808
STAI_STATE	70	23.00	66.00	36.4571	13.68135
STAI_TRAIT	70	20.00	76.00	35.3857	15.81807
STAI_TOTAL	70	43.00	142.00	71.8429	29.25086
Valid N (listwise)	65				

I. *Frequencies – Cross-Tabulations*

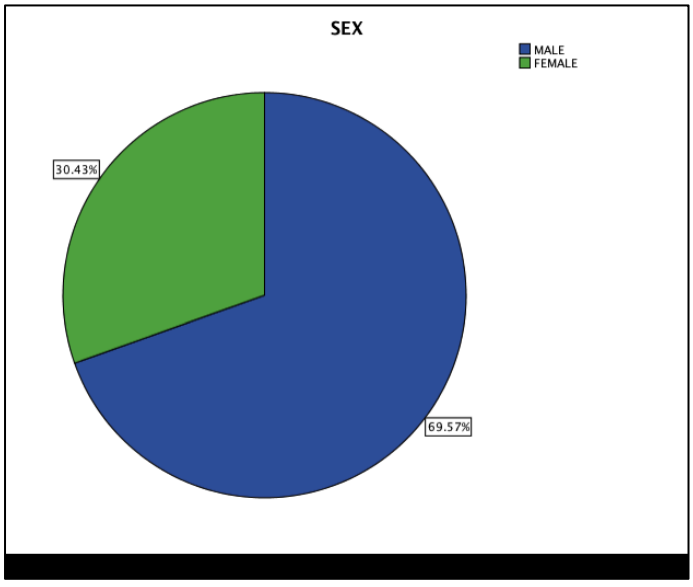
Statistics

		SEX	HAART	MARITAL STATUS	PSYCHIATRIC MEDICATION
N	Valid	69	69	66	70
	Missing	1	1	4	0
Mean		.30	.09	.42	.93
Std. Deviation		.464	.284	.498	.259
Percentiles	25	.00	.00	.00	1.00
	50	.00	.00	.00	1.00
	75	1.00	.00	1.00	1.00

SEX

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	48	68.6	69.6	69.6
	FEMALE	21	30.0	30.4	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

Pie Chart 1:

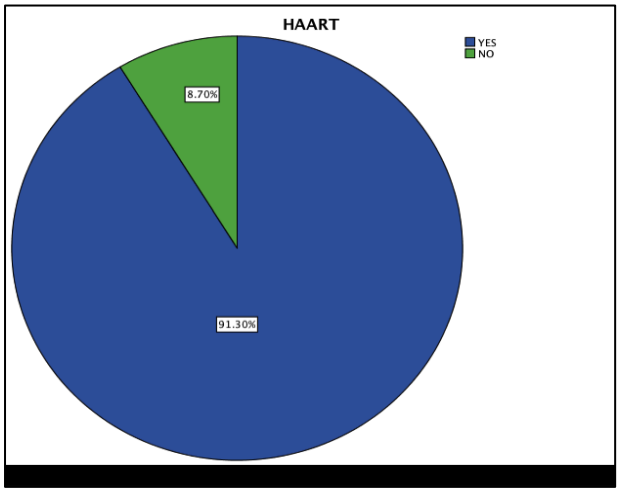


Pie Chart 1: shows the percentages of *Sex* in our population; 30% were female, whereas 70% were male

HAART

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	63	90.0	91.3	91.3
	NO	6	8.6	8.7	100.0
	Total	69	98.6	100.0	
Missing	System	1	1.4		
Total		70	100.0		

Pie Chart 2:

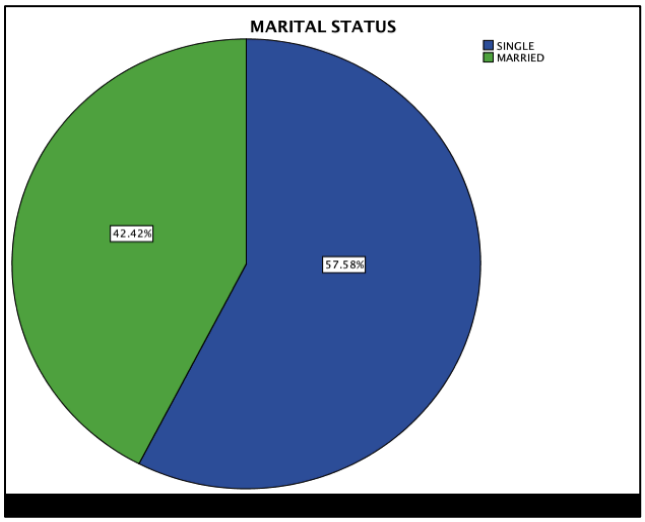


Pie Chart 2: shows the percentages of *HAART-Condition* of our sample; only 8% (n= 6) of our sample was not under HAART, the rest 92% (n= 63)was under HAART.

MARITAL STATUS

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SINGLE	38	54.3	57.6	57.6
	MARRIED	28	40.0	42.4	100.0
	Total	66	94.3	100.0	
Missing	System	4	5.7		
Total		70	100.0		

Pie Chart 3:

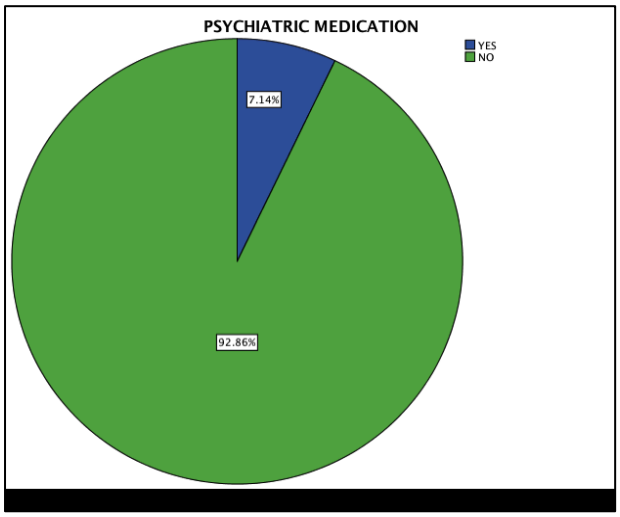


Pie Chart 3: shows in percentages the Marital Status of our sample; 57% were single whereas 43% were married.

PSYCHIATRIC MEDICATION

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	YES	5	7.1	7.1	7.1
	NO	65	92.9	92.9	100.0
	Total	70	100.0	100.0	

Pie Chart 4:

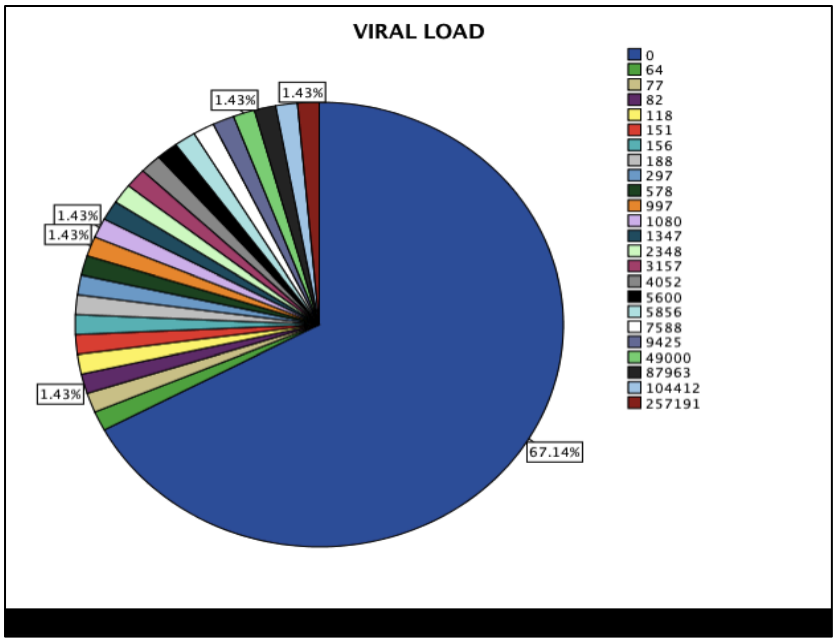


Pie-Chart 4: shows the percentages of participants' Psychiatric Medication; only 7% (n=5) was under medication for psychiatric reasons.

Statistics

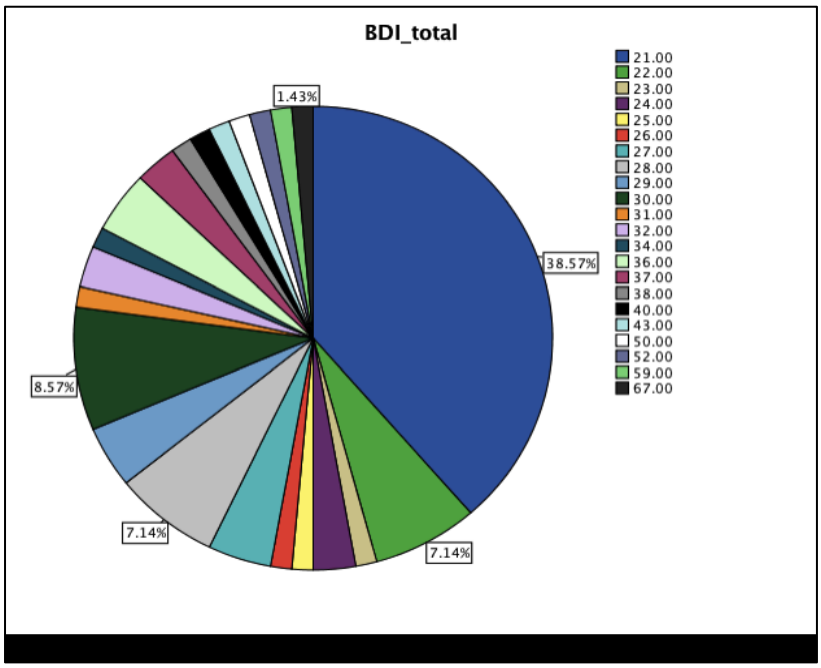
		VIRAL LOAD	BDI_total	STAI_STATE	STAI_TRAIT	STAI_TOTAL
N	Valid	70	70	70	70	70
	Missing	0	0	0	0	0
Mean		7738.96	27.8143	36.4571	35.3857	71.8429
Std. Deviation		34733.694	9.35808	13.68135	15.81807	29.25086
Minimum		0	21.00	23.00	20.00	43.00
Maximum		257191	67.00	66.00	76.00	142.00
Percentiles	25	.00	21.0000	23.0000	21.0000	44.0000
	50	.00	24.5000	30.0000	25.5000	55.0000
	75	164.00	30.0000	50.2500	51.0000	101.0000

Pie Chart 5:



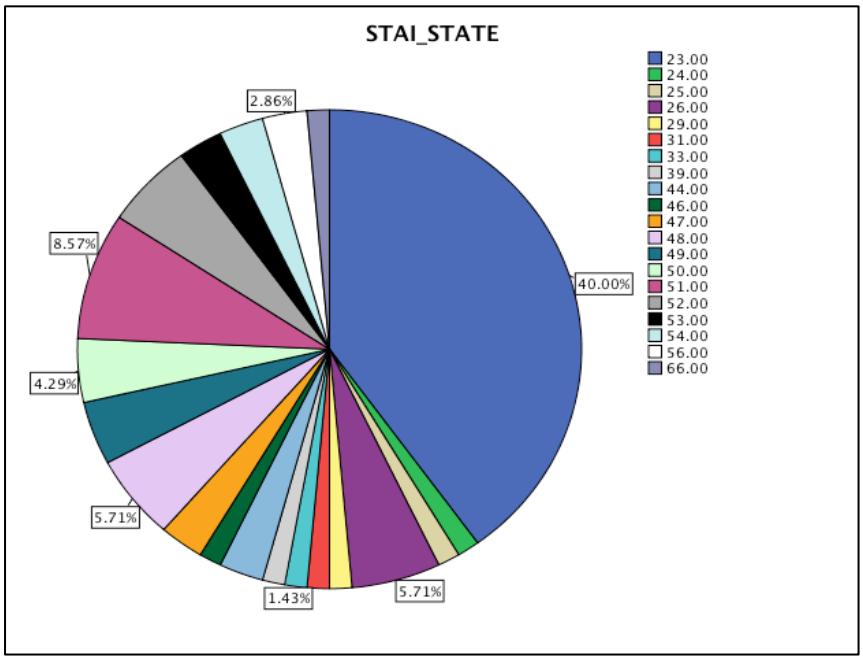
Pie Chart 5: an approximate of 68% (n= 47) of the Viral Loads was 0. The rest apprx. 32% (n= 23) shows variability in terms of individual V.Load estimations.

Pie Chart 6:



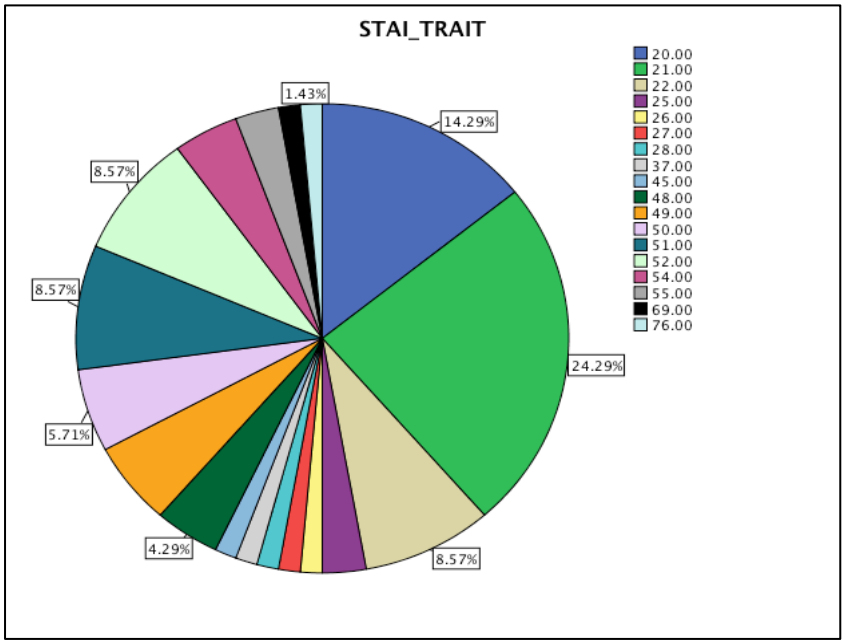
Pie Chart 6: shows the percentages of the scoring patterns in our sample. Interestingly, 38.5% of the individuals, appear with no depressive tendencies.

Pie Chart 7:



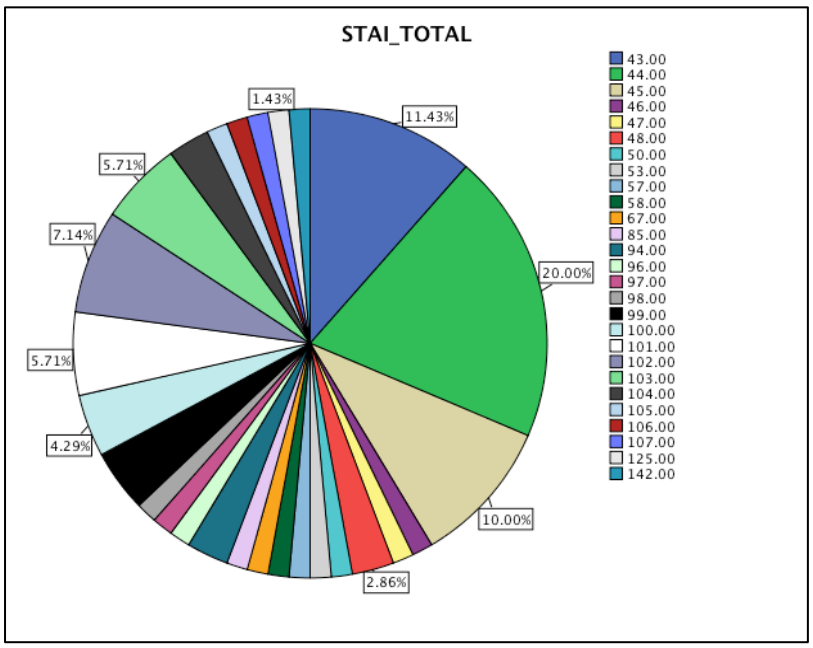
Pie Chart 7: shows the different scores of participants in terms of percentages; 40% of them are estimated not to experience any State Anxiety, with a 2.8% experiencing increased anxiety within the experimental procedure.

Pie Chart 8:



Pie Chart 8: shows a different and more spread pattern of so far estimated Anxiety; 14.2% of participants scored not to experience any Trait Anxiety, and very little Trait at a 24% and 8.5%. as it can be seen, another 8.5% score to experience increased Trait Anxiety levels, with an 1.4% experiencing the maximum scores of Trait Anxiety.

Pie Chart 9:



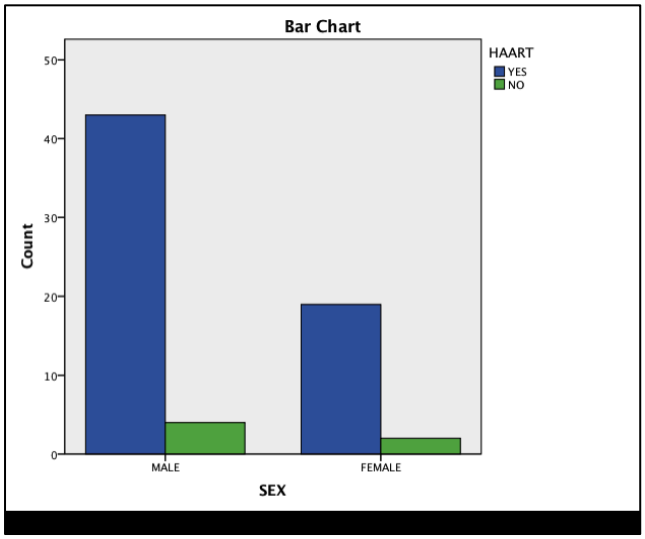
Pie Chart 9: shows the pattern of scores in Total Anxiety Tendencies in our sample. The lowest scores of anxiety include 11.4%, 20% and 10% respectively, whereas those who scored the highest sums, include the 1.4% of the population.

- Cross-Tabulation Outcomes:

SEX * HAART Crosstabulation

			HAART		
			YES	NO	Total
SEX	MALE	Count	43	4	47
		% within SEX	91.5%	8.5%	100.0%
		% within HAART	69.4%	66.7%	69.1%
		% of Total	63.2%	5.9%	69.1%
	FEMALE	Count	19	2	21
		% within SEX	90.5%	9.5%	100.0%
		% within HAART	30.6%	33.3%	30.9%
		% of Total	27.9%	2.9%	30.9%
Total		Count	62	6	68
		% within SEX	91.2%	8.8%	100.0%
		% within HAART	100.0%	100.0%	100.0%
		% of Total	91.2%	8.8%	100.0%

Graph 1:

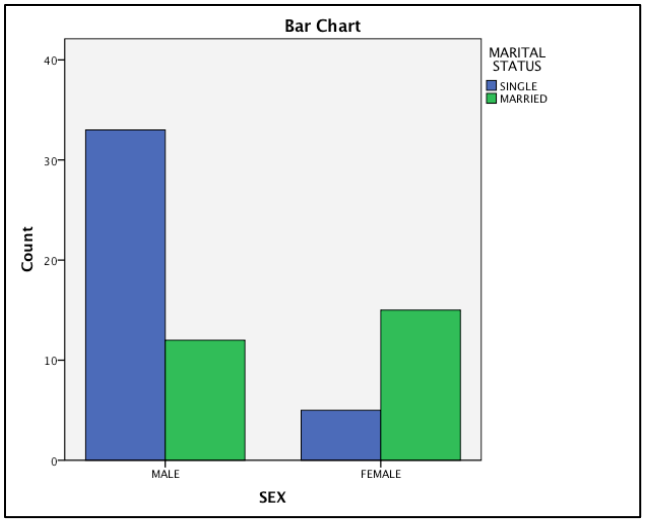


Graph 1: the Crosstabs analyses, revealed that 63.2% (n= 43) of the male population is under HAART, compared with the 5.9% (n= 4) who are not, and a 27.9% (n= 19) of the females under HAART, compared with only 2.9% (n= 2) who are not under HAART.

SEX * MARITAL STATUS Crosstabulation

			MARITAL STATUS		
			SINGLE	MARRIED	Total
SEX	MALE	Count	33	12	45
		% within SEX	73.3%	26.7%	100.0%
		% within MARITAL STATUS	86.8%	44.4%	69.2%
		% of Total	50.8%	18.5%	69.2%
	FEMALE	Count	5	15	20
		% within SEX	25.0%	75.0%	100.0%
		% within MARITAL STATUS	13.2%	55.6%	30.8%
		% of Total	7.7%	23.1%	30.8%
Total		Count	38	27	65
		% within SEX	58.5%	41.5%	100.0%
		% within MARITAL STATUS	100.0%	100.0%	100.0%
		% of Total	58.5%	41.5%	100.0%

Graph 2:

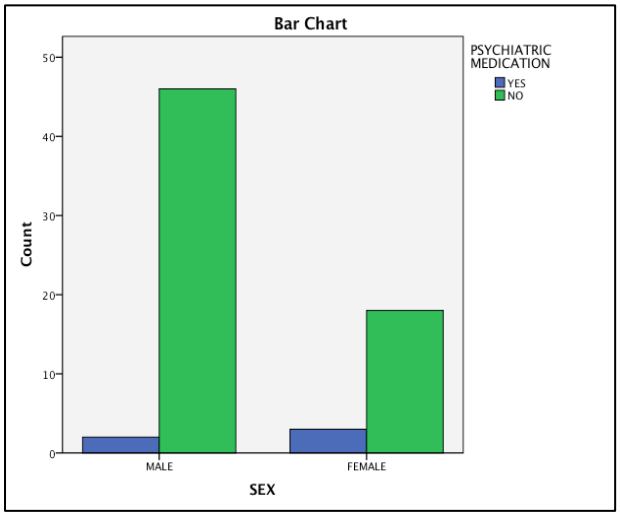


Graph 2: 50.8% (n= 33) males are single compared with the 7.7% (n= 5) of the females, whereas, 18.5% (n= 12) males are married compared with the 23.1% (n= 15) of the females.

SEX * PSYCHIATRIC MEDICATION Crosstabulation

			PSYCHIATRIC MEDICATION		
			YES	NO	Total
SEX	MALE	Count	2	46	48
		% within SEX	4.2%	95.8%	100.0%
		% within PSYCHIATRIC MEDICATION	40.0%	71.9%	69.6%
		% of Total	2.9%	66.7%	69.6%
	FEMALE	Count	3	18	21
		% within SEX	14.3%	85.7%	100.0%
		% within PSYCHIATRIC MEDICATION	60.0%	28.1%	30.4%
		% of Total	4.3%	26.1%	30.4%
Total		Count	5	64	69
		% within SEX	7.2%	92.8%	100.0%
		% within PSYCHIATRIC MEDICATION	100.0%	100.0%	100.0%
		% of Total	7.2%	92.8%	100.0%

Graph 3:



Graph 3: a 2.9% (n= 2) of the male participants were under psychiatric medication (P.M.) compared with the 4.3% (n= 3) of the females, whereas, 66.7% (n= 46) males were not under P.M. compared with 26.1% (n= 18) of the females.

VIRAL LOAD * HAART Crosstabulation

			HAART		
			YES	NO	Total
VIRAL LOAD	0	Count	47	0	47
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	74.6%	.0%	68.1%
		% of Total	68.1%	.0%	68.1%
	64	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	77	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	82	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	118	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	151	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	156	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	188	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	297	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	578	Count	1	0	1

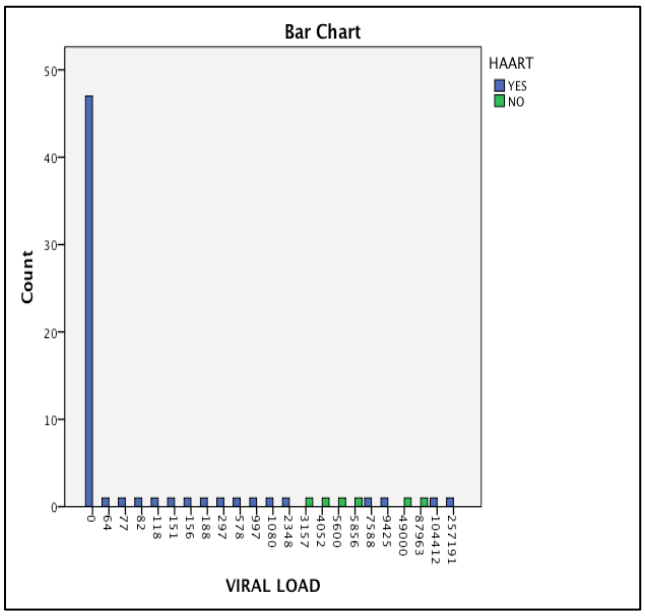
VIRAL LOAD * HAART Crosstabulation

			HAART		
			YES	NO	Total
VIRAL LOAD	0	Count	47	0	47
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	997	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	1080	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	2348	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	3157	Count	0	1	1
		% within VIRAL LOAD	.0%	100.0%	100.0%
		% within HAART	.0%	16.7%	1.4%
		% of Total	.0%	1.4%	1.4%
	4052	Count	0	1	1
		% within VIRAL LOAD	.0%	100.0%	100.0%
		% within HAART	.0%	16.7%	1.4%
		% of Total	.0%	1.4%	1.4%
	5600	Count	0	1	1
		% within VIRAL LOAD	.0%	100.0%	100.0%
		% within HAART	.0%	16.7%	1.4%
		% of Total	.0%	1.4%	1.4%
	5856	Count	0	1	1
		% within VIRAL LOAD	.0%	100.0%	100.0%
		% within HAART	.0%	16.7%	1.4%
		% of Total	.0%	1.4%	1.4%
	7588	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%

VIRAL LOAD * HAART Crosstabulation

			HAART		
			YES	NO	Total
VIRAL LOAD	0	Count	47	0	47
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% of Total	1.4%	.0%	1.4%
	9425	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	49000	Count	0	1	1
		% within VIRAL LOAD	.0%	100.0%	100.0%
		% within HAART	.0%	16.7%	1.4%
		% of Total	.0%	1.4%	1.4%
	87963	Count	0	1	1
		% within VIRAL LOAD	.0%	100.0%	100.0%
		% within HAART	.0%	16.7%	1.4%
		% of Total	.0%	1.4%	1.4%
	104412	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
	257191	Count	1	0	1
		% within VIRAL LOAD	100.0%	.0%	100.0%
		% within HAART	1.6%	.0%	1.4%
		% of Total	1.4%	.0%	1.4%
Total		Count	63	6	69
		% within VIRAL LOAD	91.3%	8.7%	100.0%
		% within HAART	100.0%	100.0%	100.0%
		% of Total	91.3%	8.7%	100.0%

Graph 4:



Graph 4: of those in the era of HAART (n= 63), a 68.1% (n= 47) had a minimum of 0 Viral Load measures

J. *Reliability Analyses of questionnaires*

The following two Reliability tables demonstrate the *Reliability Analyses* of the BDI & STAI questionnaires:

Reliability Statistics

Cronbach's Alpha for STAI	N of Items
,988	40

Reliability Statistics

Cronbach's Alpha for BDI	N of Items
,948	21

K. *Sample Normality Tests & Graphs*

Test of *Sample Normality*:

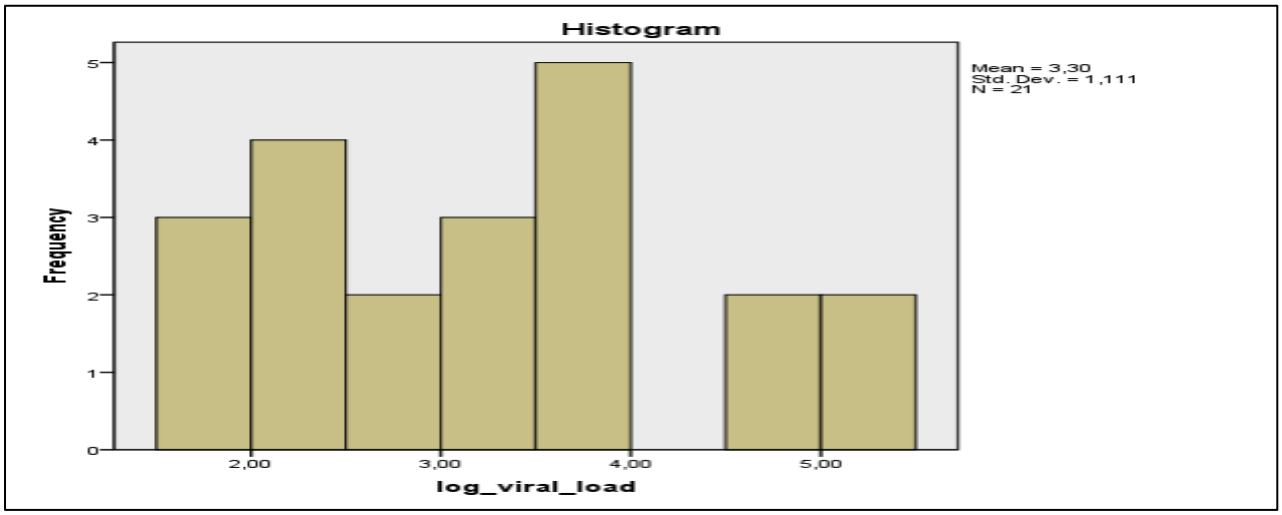
Tests of Normality

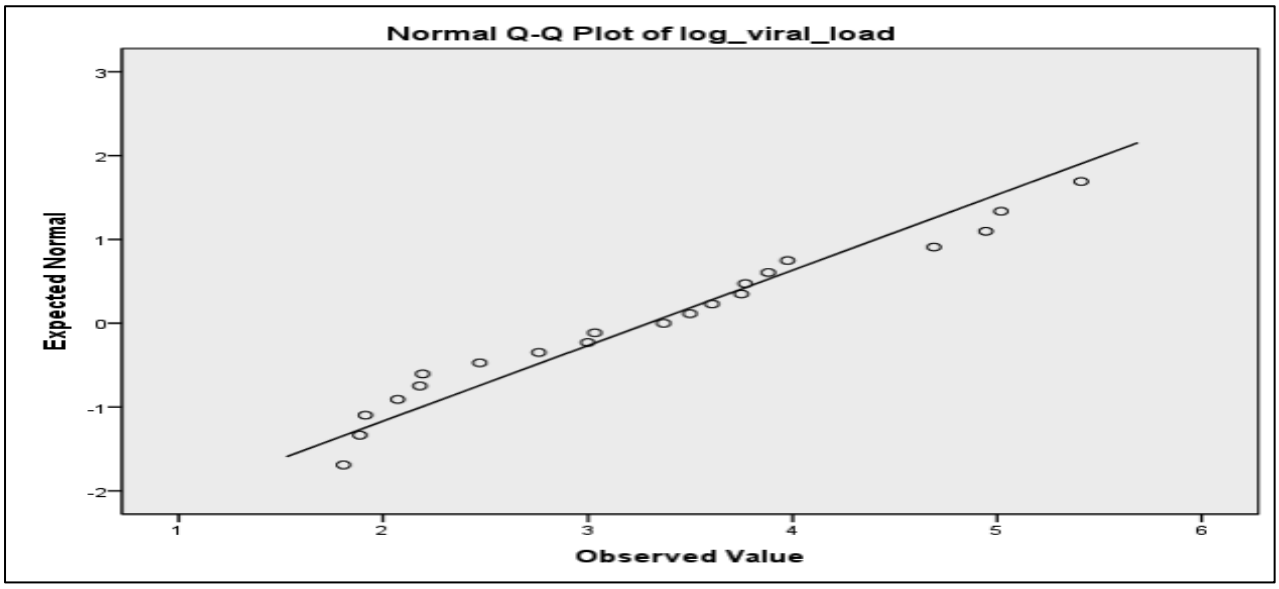
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
log_viral_load	,125	21	,200*	,940	21	,217
log_age	,086	21	,200*	,962	21	,558
CD4 COUNT	,127	21	,200*	,975	21	,847
TEMPORAL DISTANCE HIV +	,192	21	,043	,914	21	,065
log_BDI_total	,367	21	,000	,658	21	,000
log_STAI_STATE	,308	21	,000	,692	21	,000
log_STAI_TRAIT	,300	21	,000	,702	21	,000
log_STAI_TOTAL	,290	21	,000	,684	21	,000
SEX	,397	21	,000	,620	21	,000
VIRAL LOAD	,415	21	,000	,490	21	,000
HAART	,446	21	,000	,570	21	,000
MARITAL STATUS	,372	21	,000	,633	21	,000
AGE	,087	21	,200*	,983	21	,959
PSYCHIATRIC MEDICATION	,539	21	,000	,228	21	,000
BDI_total	,369	21	,000	,609	21	,000
STAI_STATE	,315	21	,000	,695	21	,000
STAI_TRAIT	,310	21	,000	,699	21	,000
STAI_TOTAL	,319	21	,000	,676	21	,000
log_CD4_count	,268	21	,000	,708	21	,000
log_temporal_distance	,246	21	,002	,879	21	,014

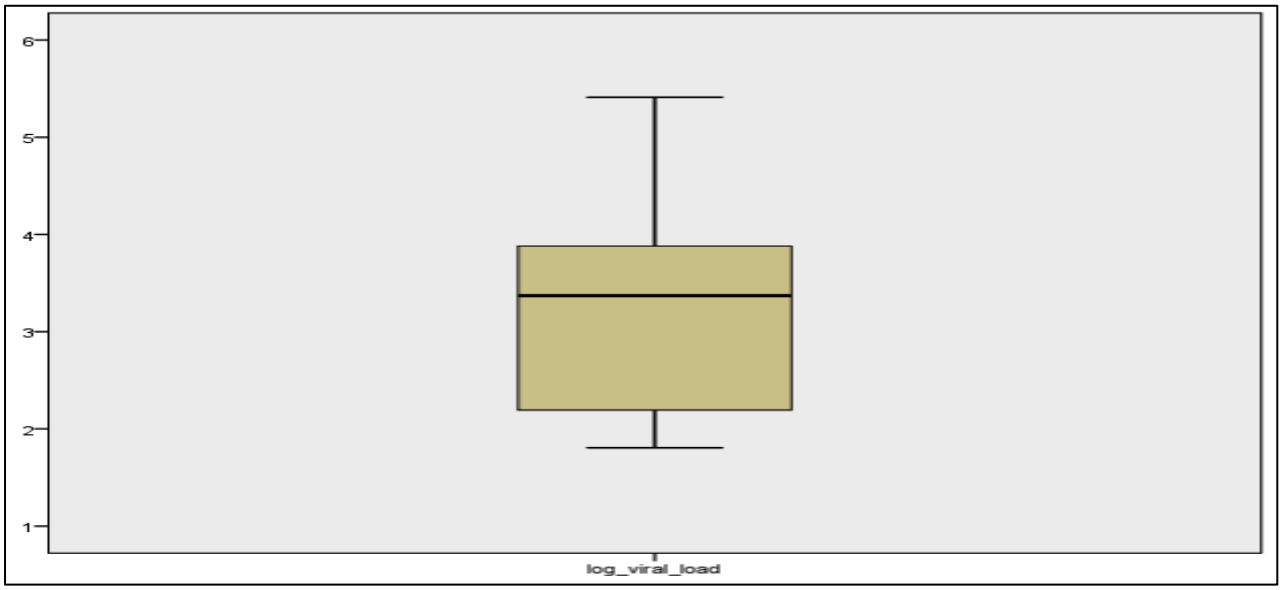
a. Lilliefors Significance Correction

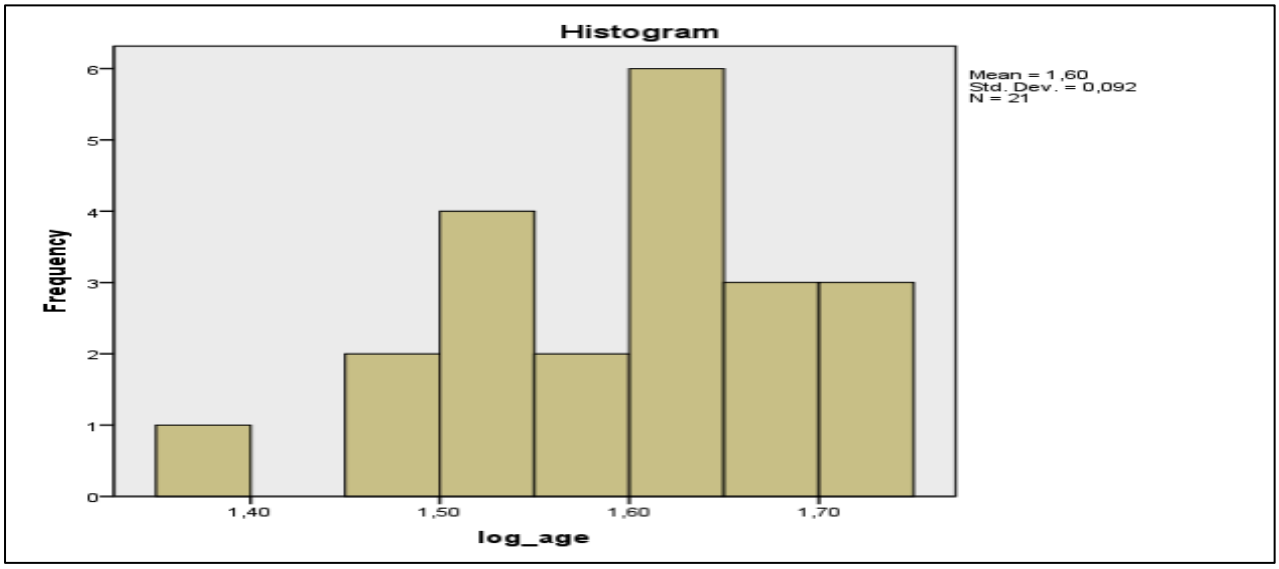
*. This is a lower bound of the true significance.

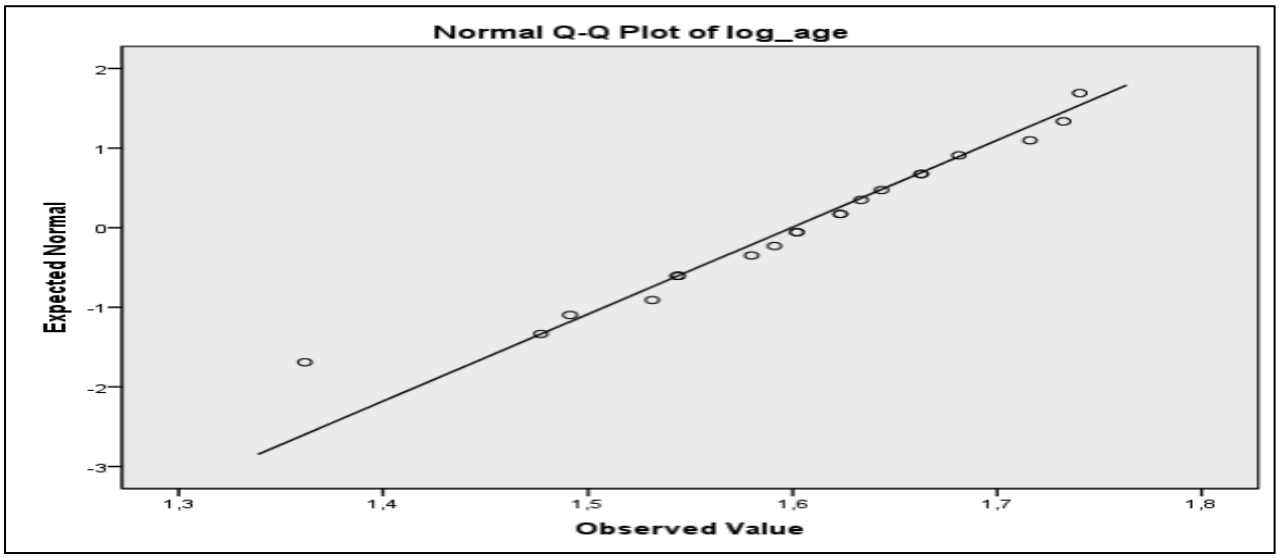
The following illustrations concern the sample normality of the variables in terms of *Histograms, Q-Plots, & Scatter Boxes*:

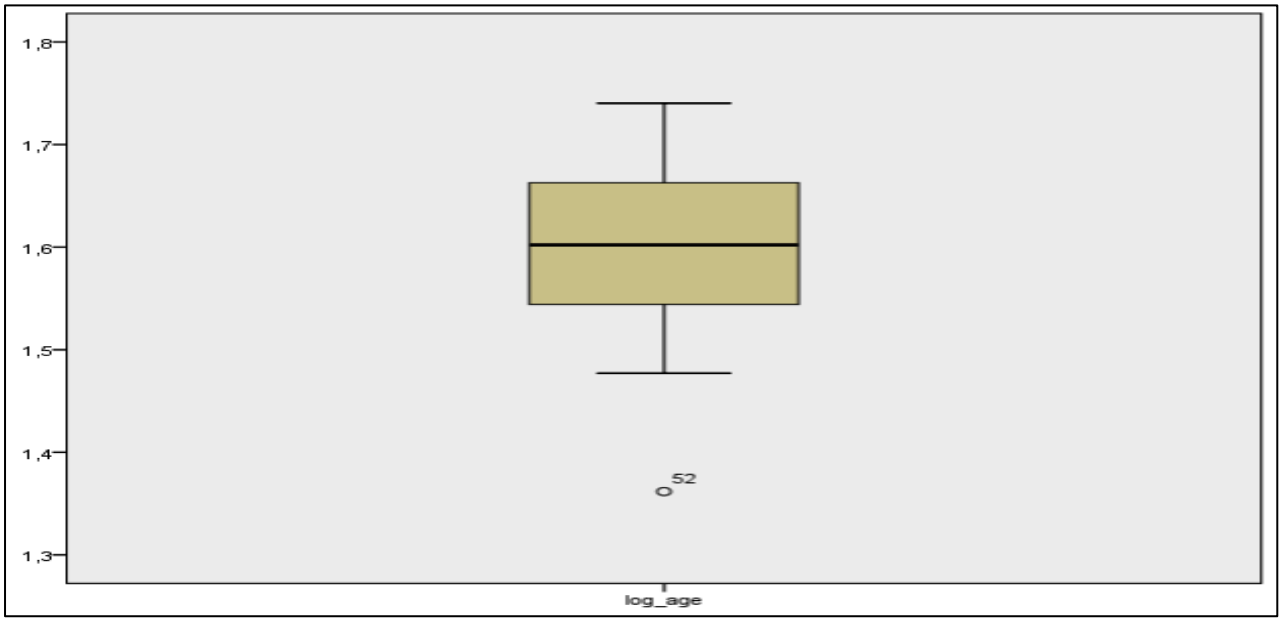


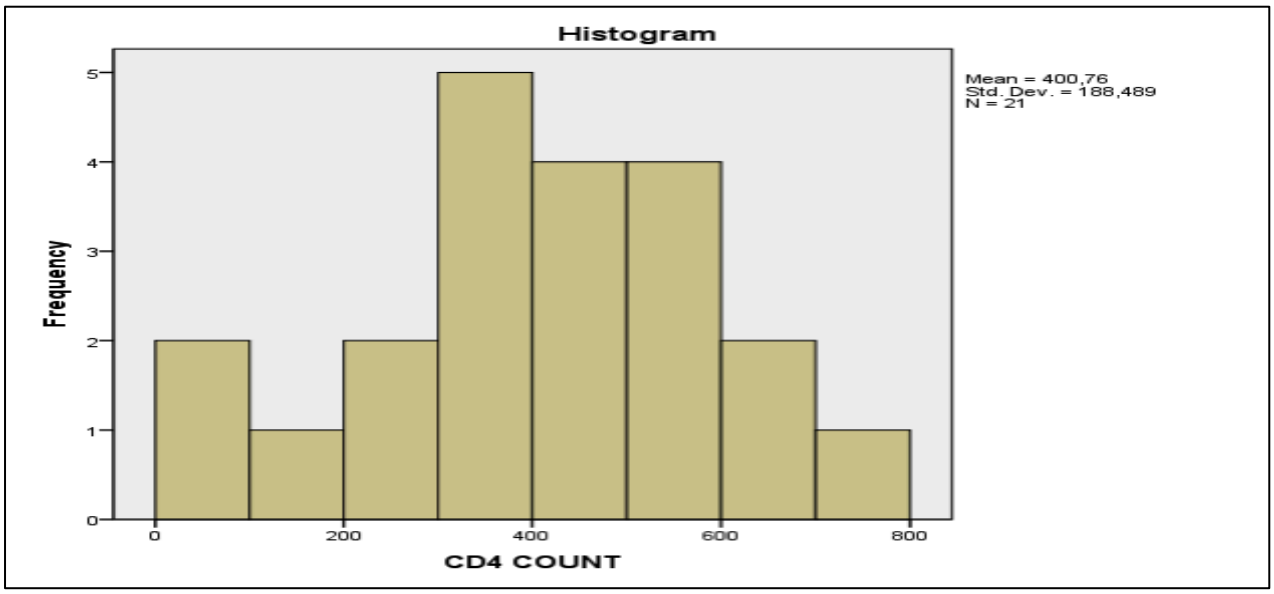


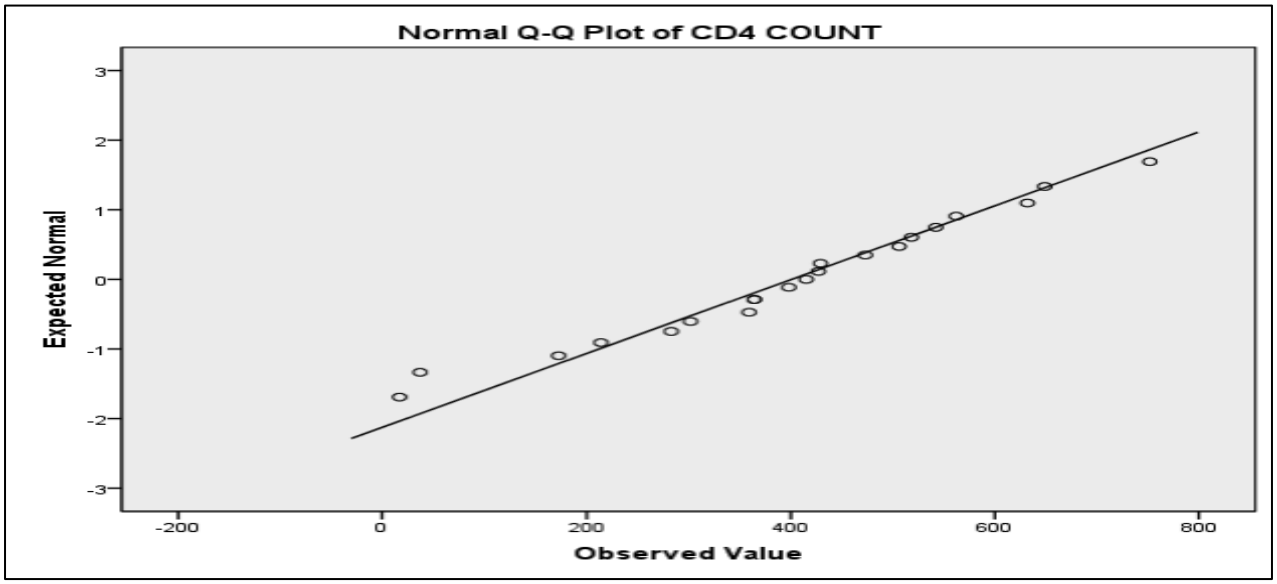


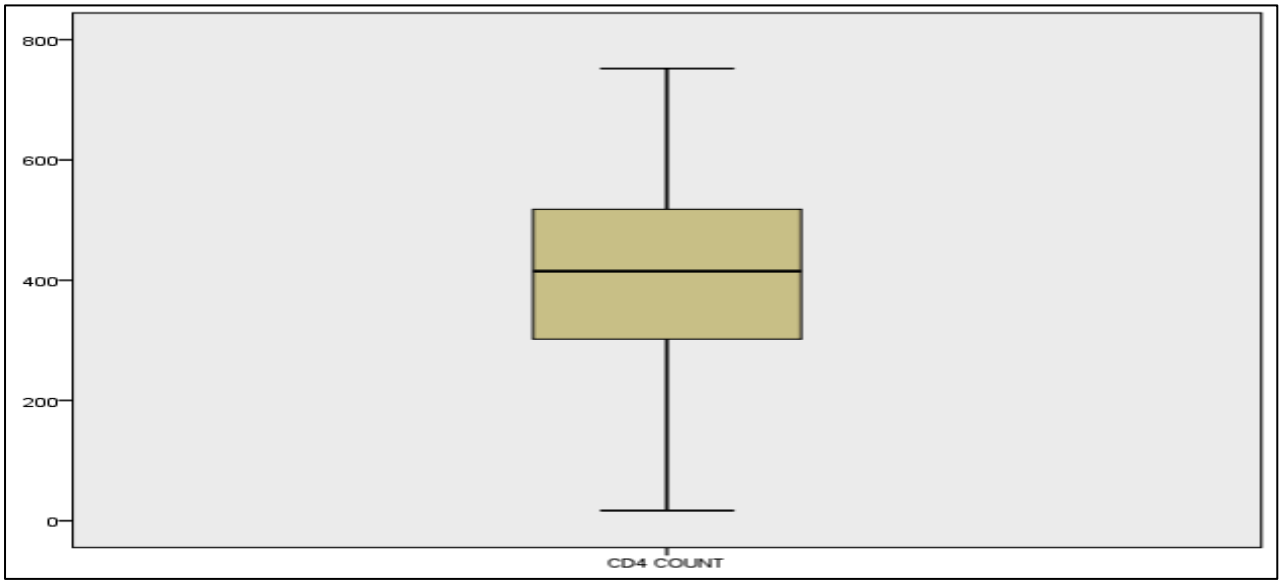

Histogram
Mean = 1,60
Std. Dev. = 0,092
N = 21
Frequency
log_age

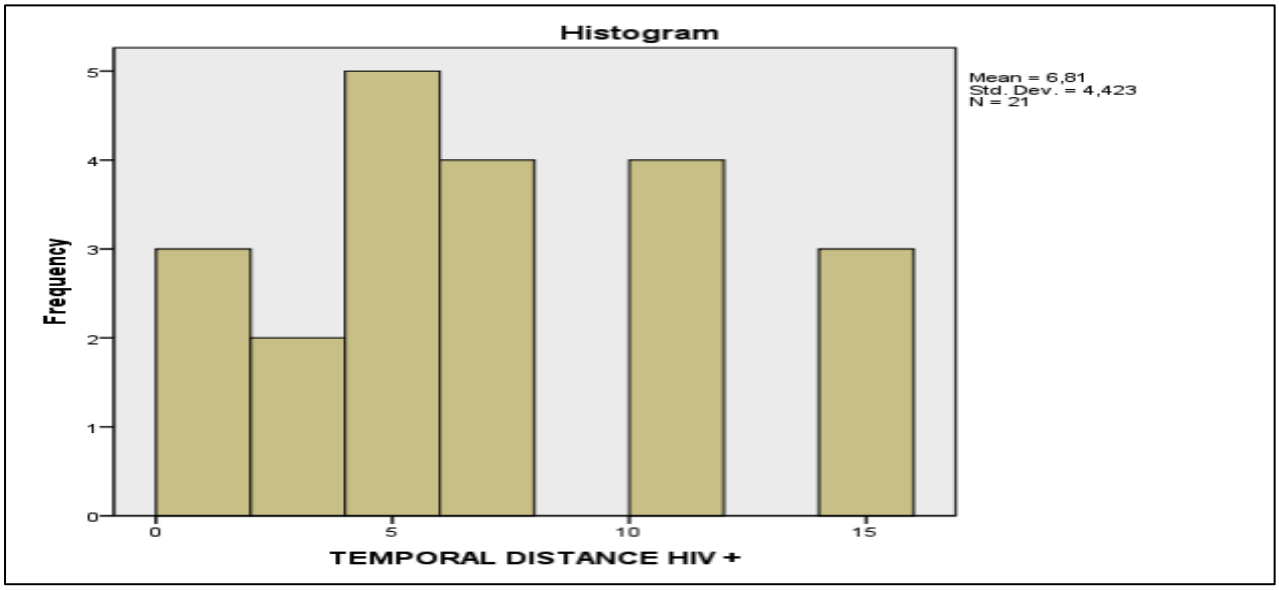

Normal Q-Q Plot of log_age
Expected Normal
Observed Value

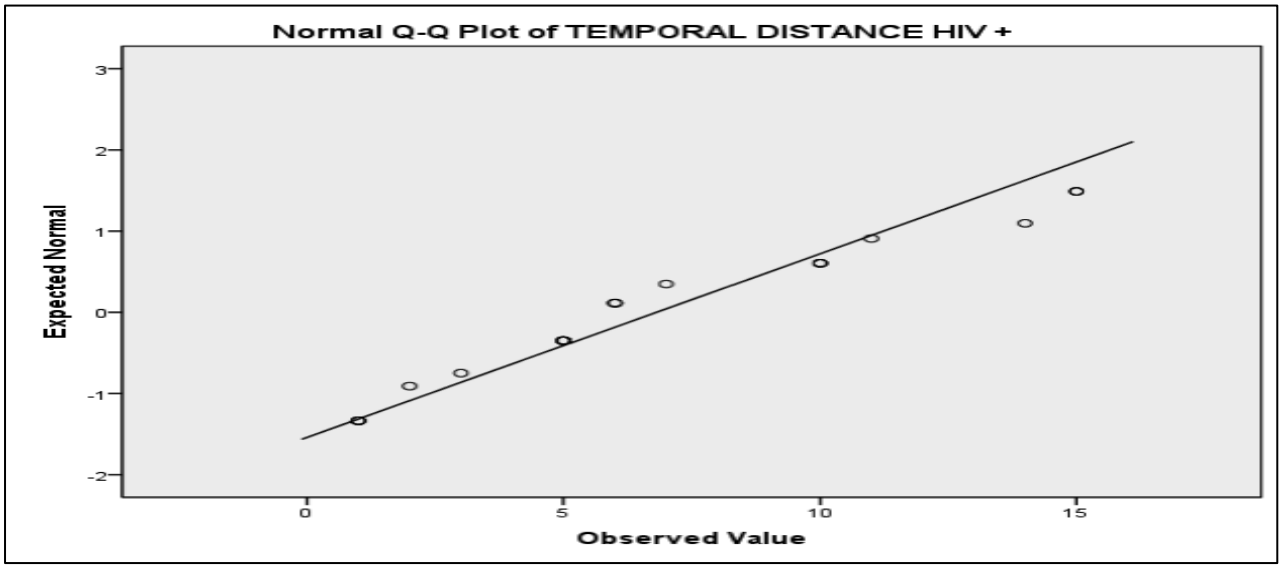

52
log_age

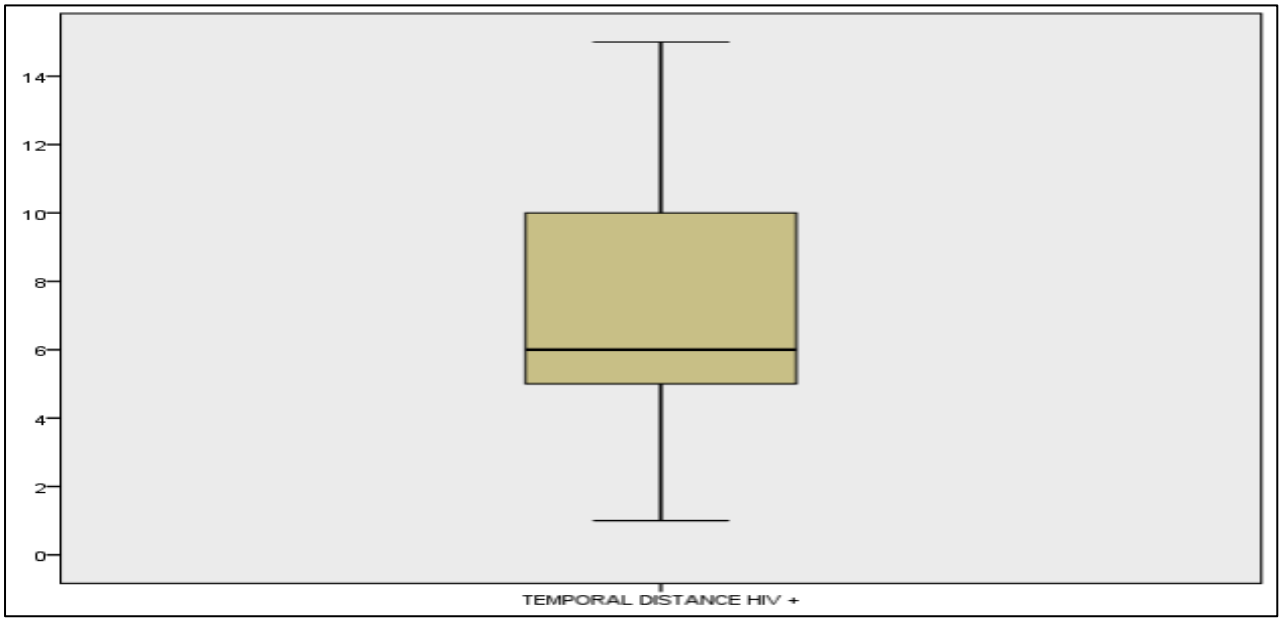

Histogram
Mean = 400,76
Std. Dev. = 188,489
N = 21
Frequency
CD4 COUNT

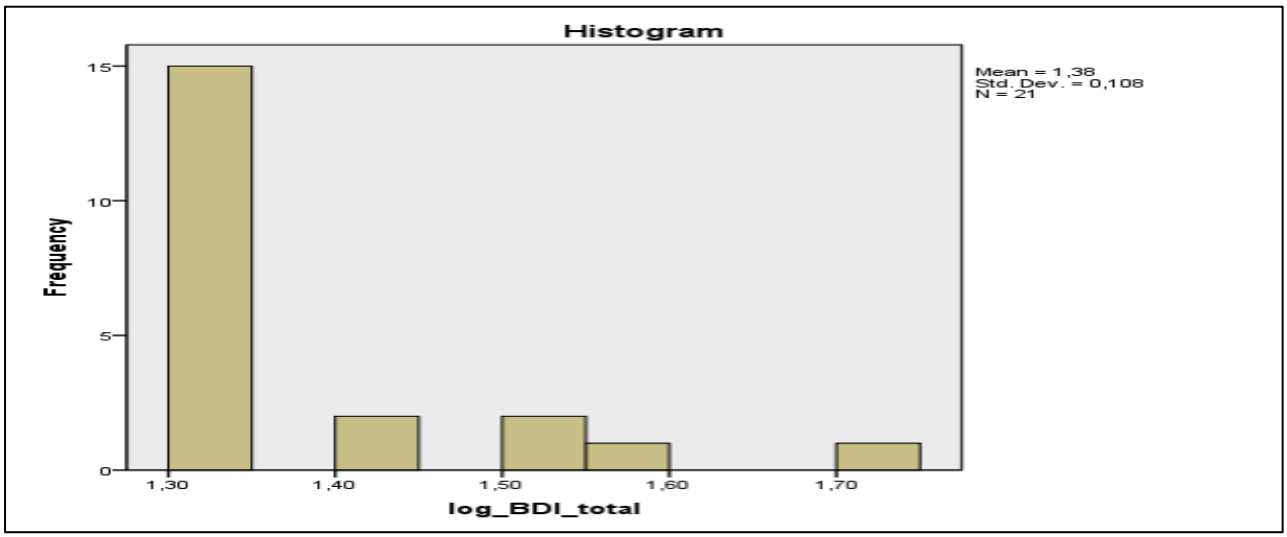

Normal Q-Q Plot of CD4 COUNT
Expected Normal
Observed Value

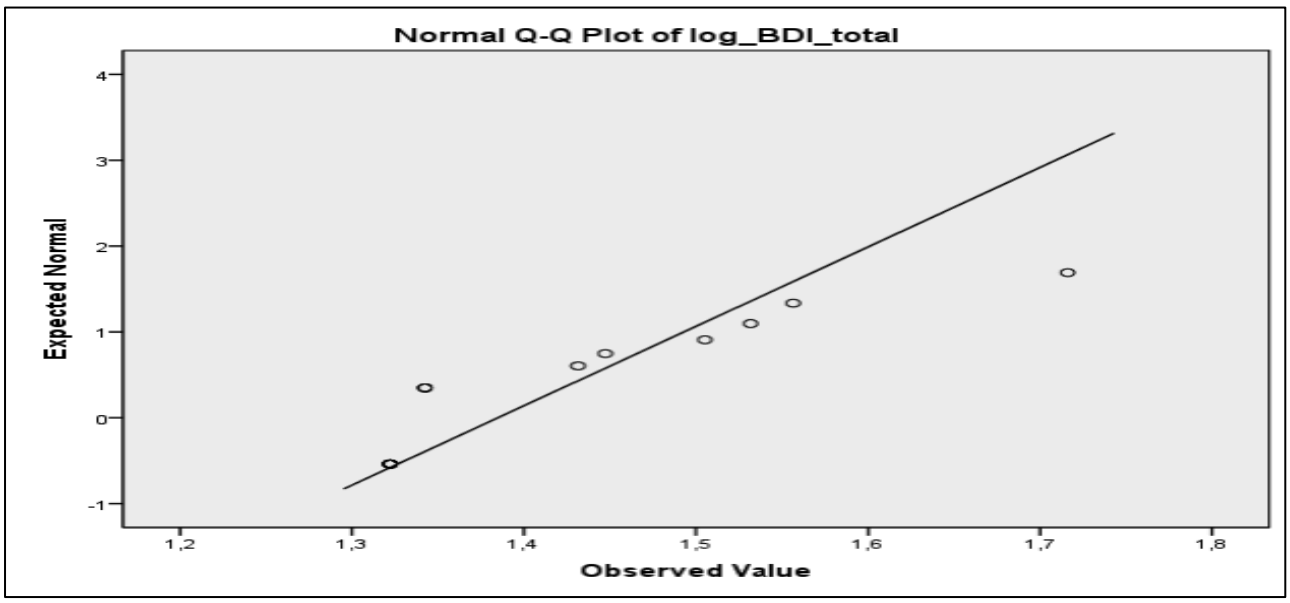

CD4 COUNT

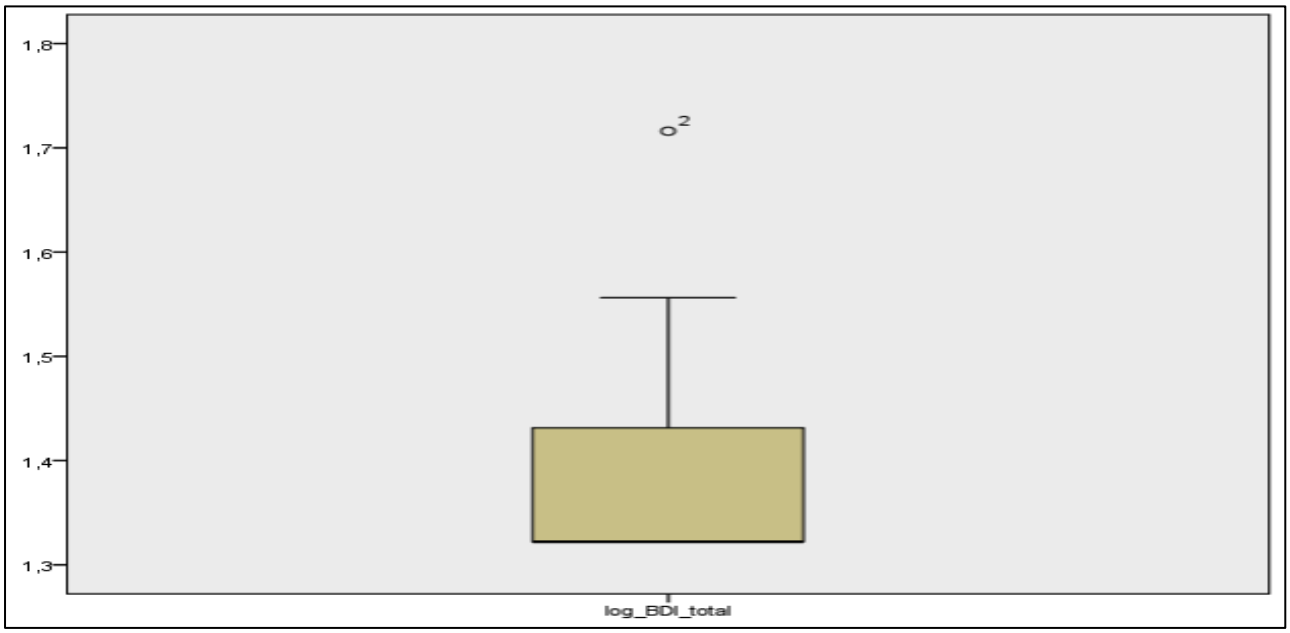

Histogram
Mean = 6,81
Std. Dev. = 4,423
N = 21
Frequency
TEMPORAL DISTANCE HIV +

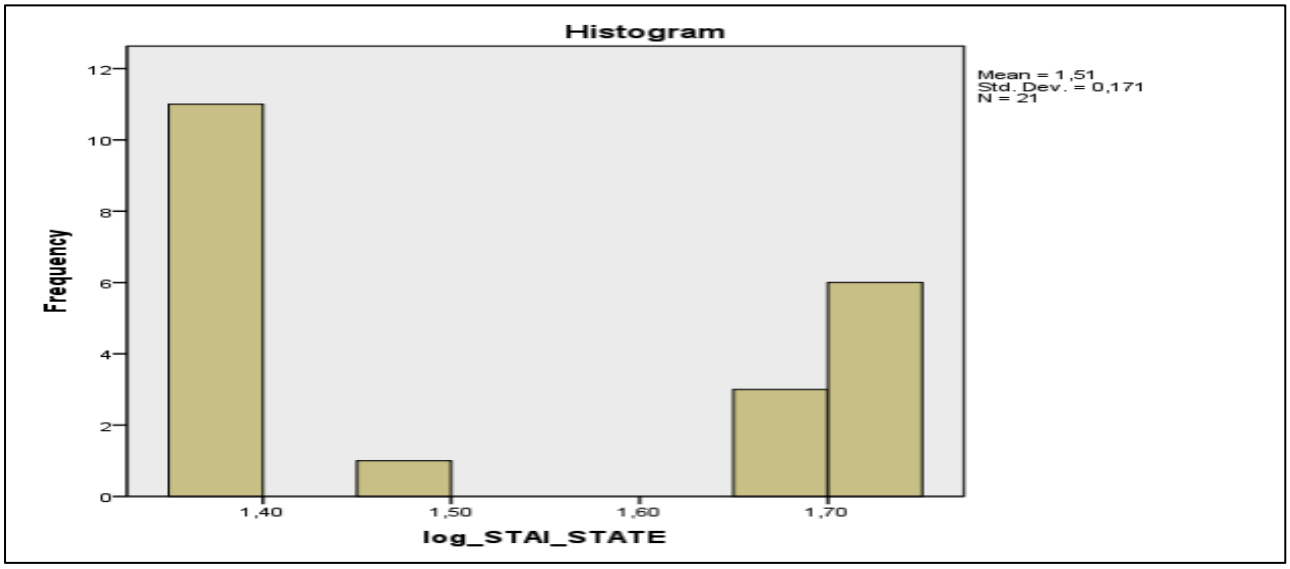

Normal Q-Q Plot of TEMPORAL DISTANCE HIV +
Expected Normal
Observed Value

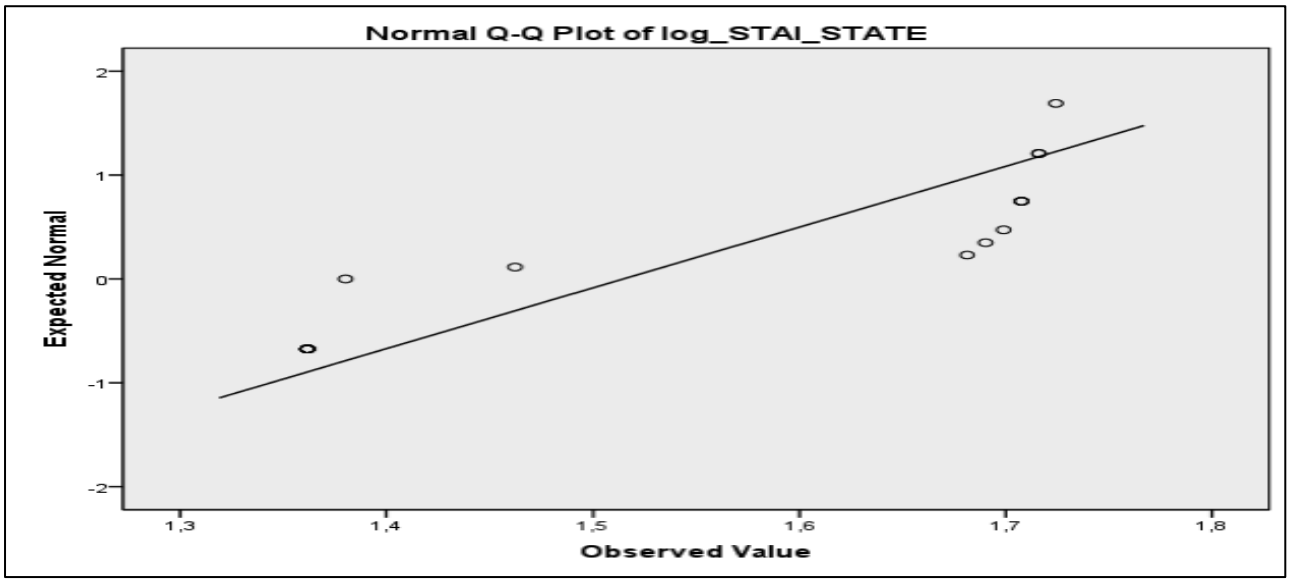

TEMPORAL DISTANCE HIV +

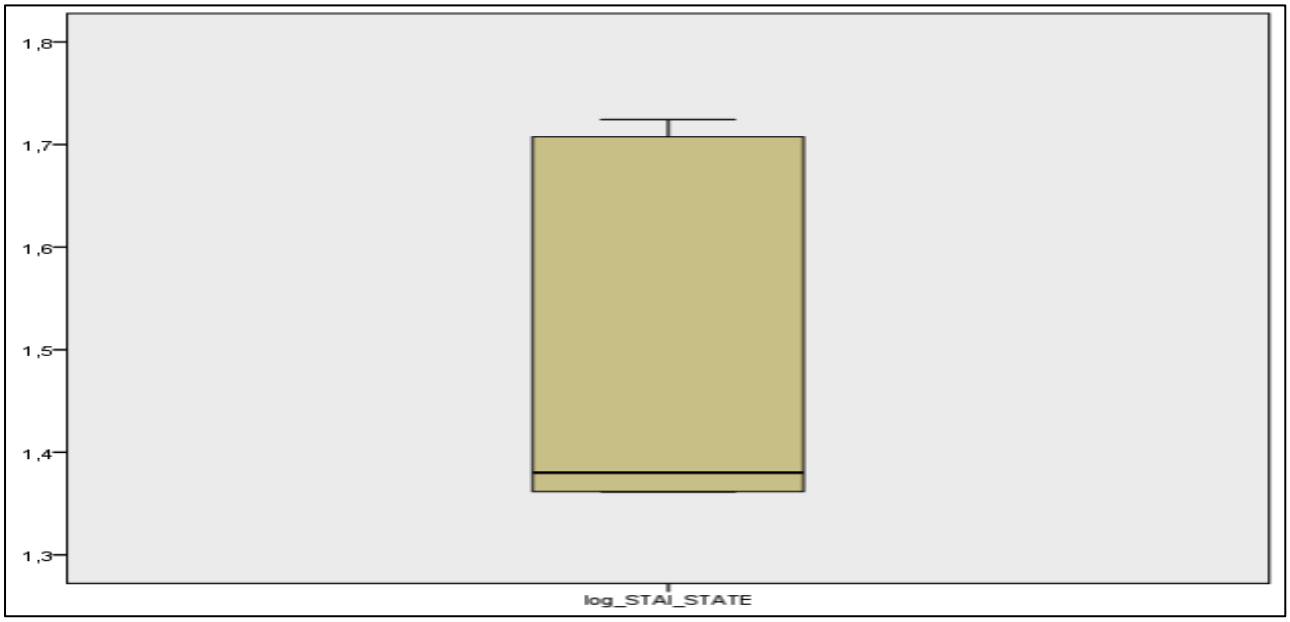

Histogram
Mean = 1,38
Std. Dev. = 0,108
N = 21
Frequency
15
10
5
0
1,30
1,40
1,50
1,60
1,70
log_BDI_total

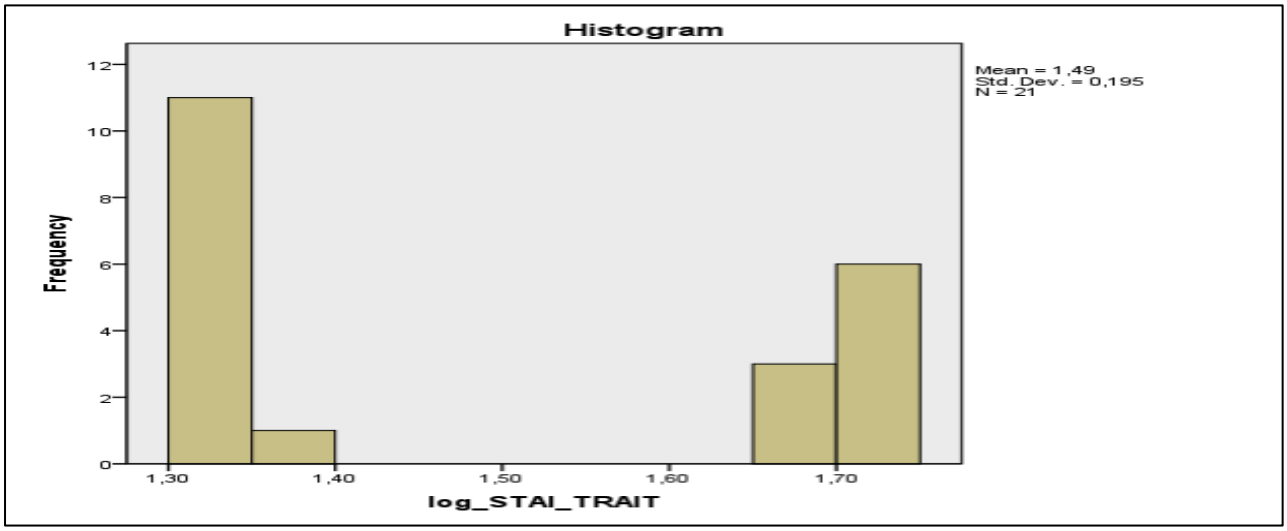

Normal Q-Q Plot of log_BDI_total
Expected Normal
4
3
2
1
0
-1
1,2
1,3
1,4
1,5
1,6
1,7
1,8
Observed Value

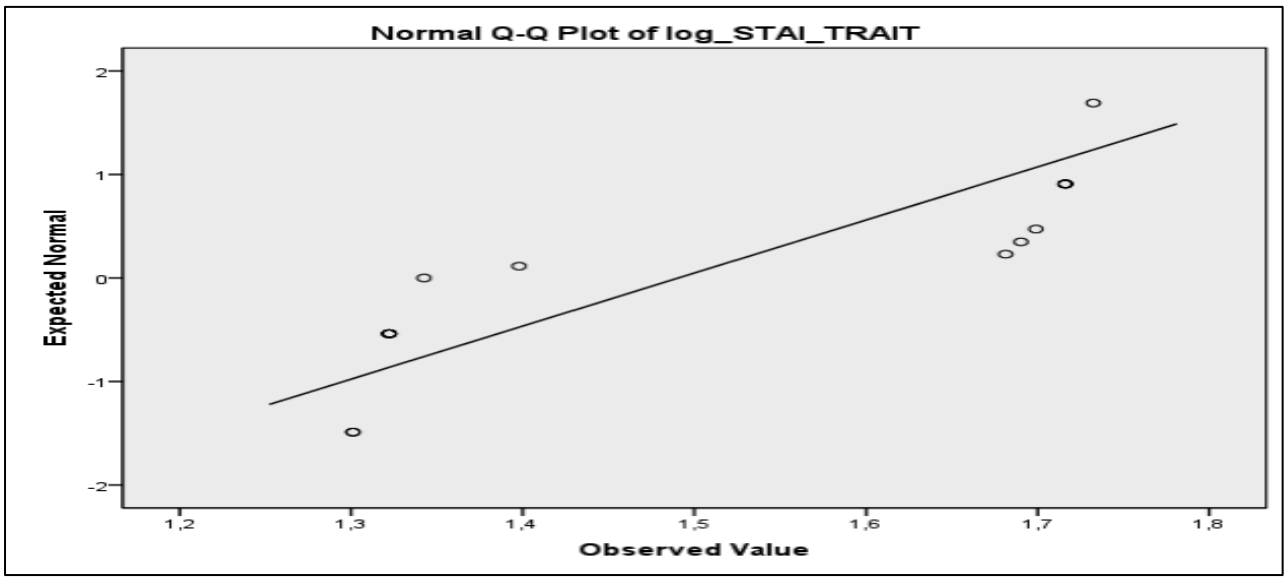

1,8
1,7
1,6
1,5
1,4
1,3
2
log_BDI_total

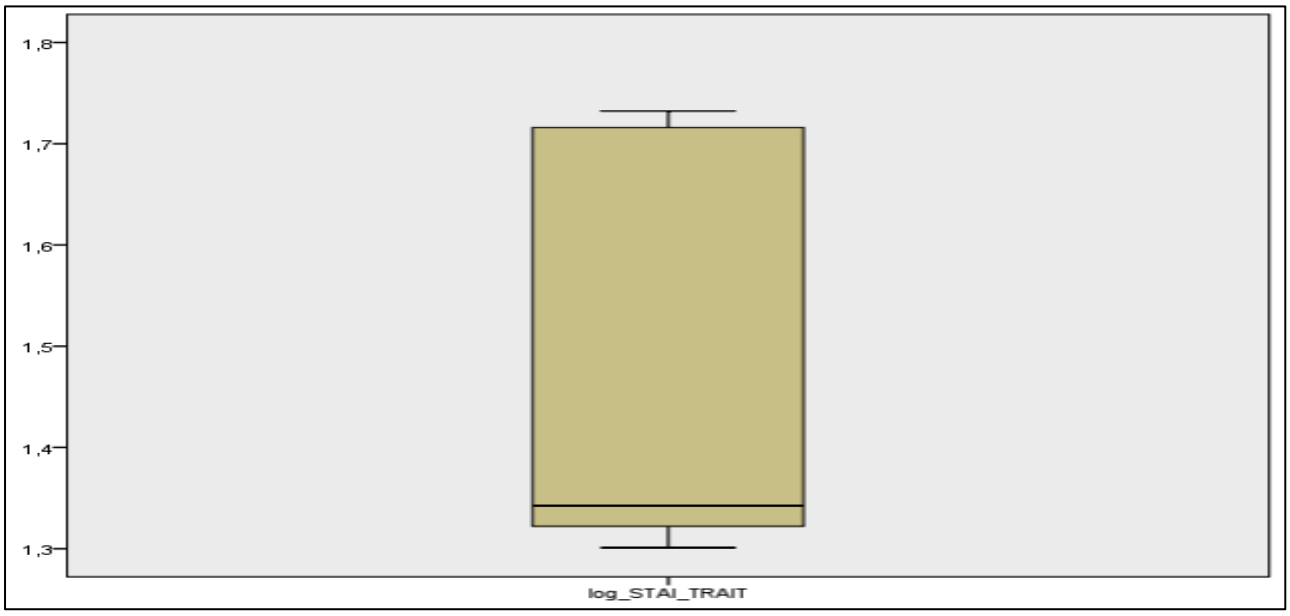

Histogram
Mean = 1,51
Std. Dev. = 0,171
N = 21
Frequency
12
10
8
6
4
2
0
1,40
1,50
1,60
1,70
log_STAI_STATE

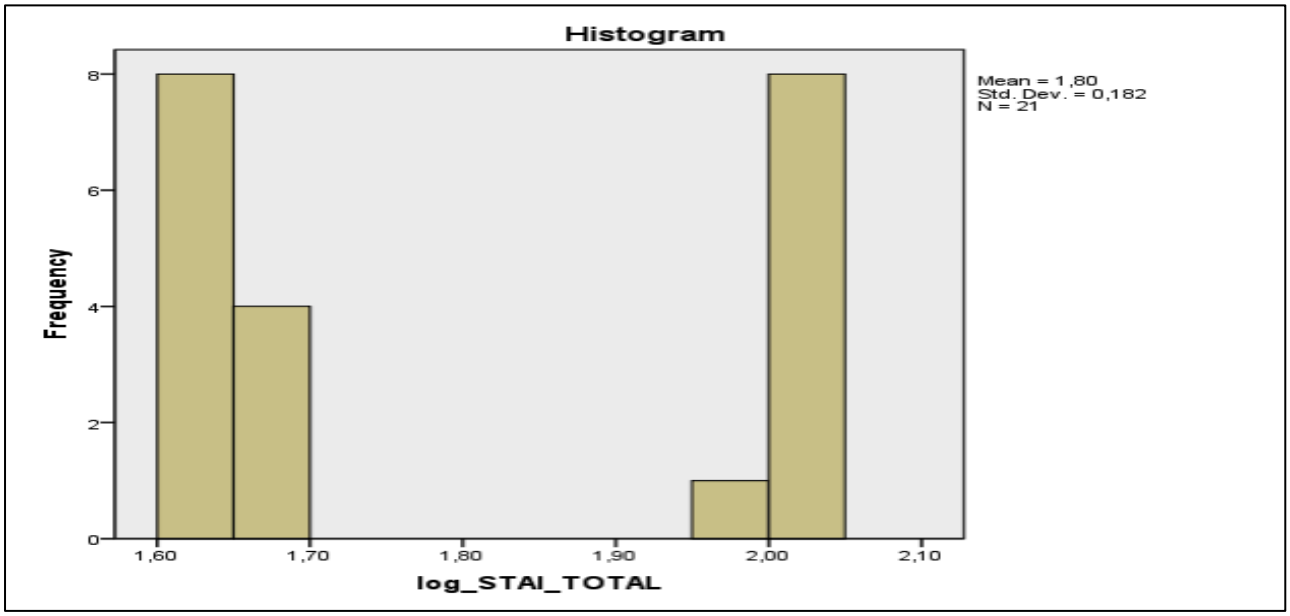

Normal Q-Q Plot of log_STAI_STATE
Expected Normal
2
1
0
-1
-2
1,3
1,4
1,5
1,6
1,7
1,8
Observed Value

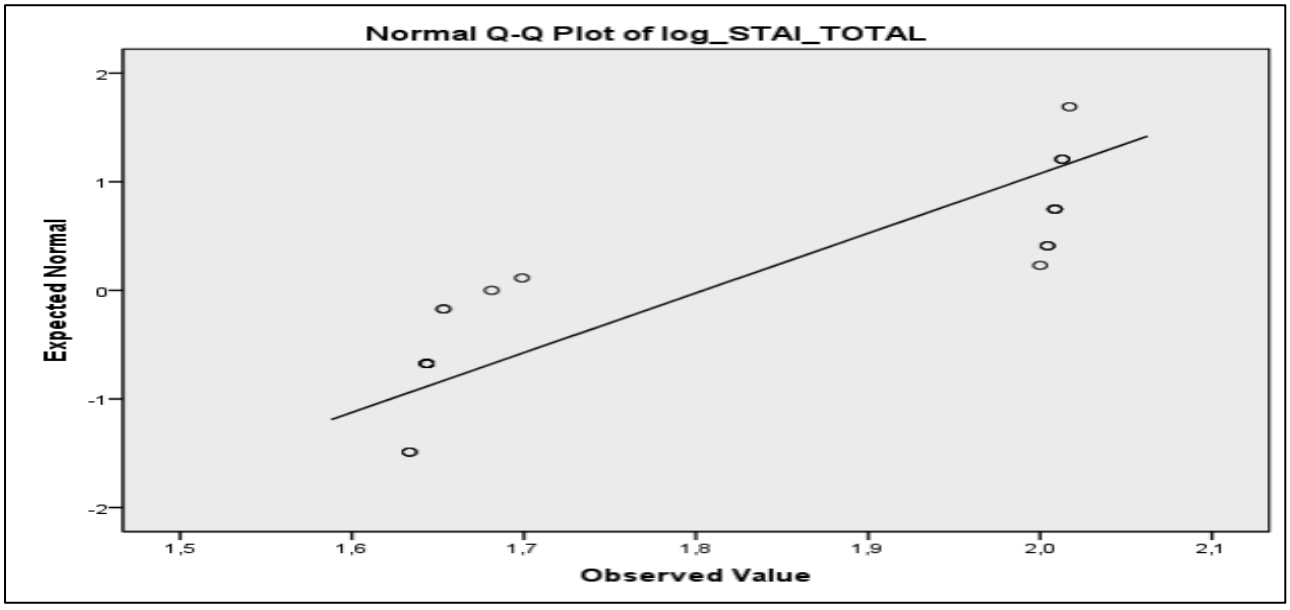

1,8
1,7
1,6
1,5
1,4
1,3
log_STAI_STATE

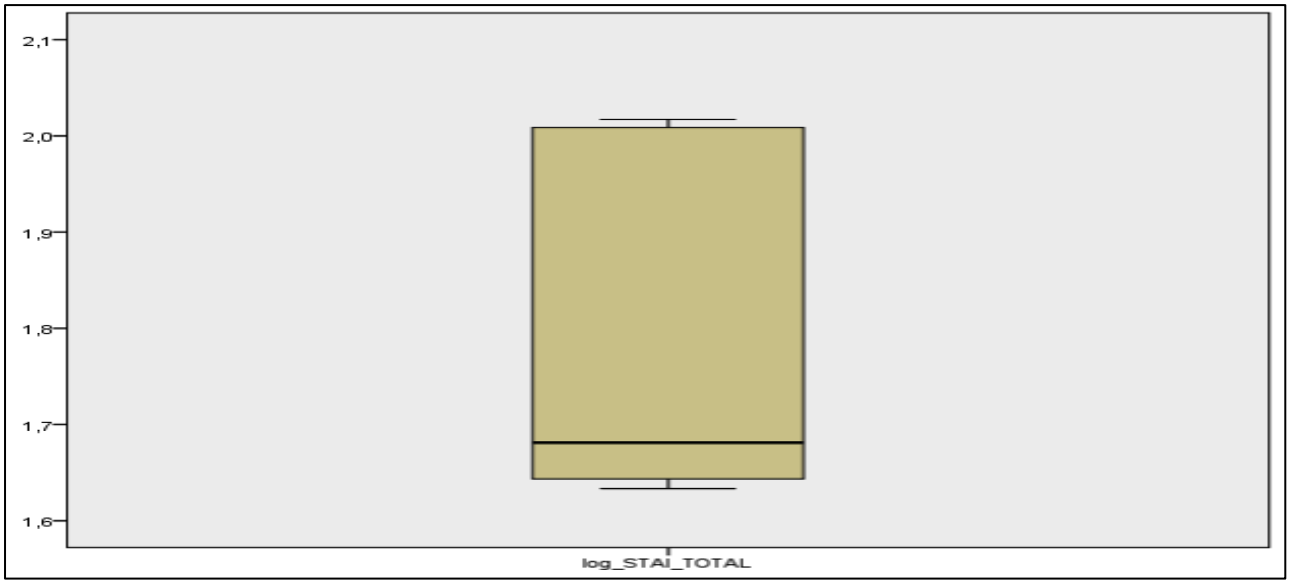

Histogram
Mean = 1,49
Std. Dev. = 0,195
N = 21
Frequency
log_STAI_TRAIT


Normal Q-Q Plot of log_STAI_TRAIT
Expected Normal
Observed Value


log_STAI_TRAIT


Histogram
Mean = 1,80
Std. Dev. = 0,182
N = 21
Frequency
log_STAI_TOTAL


Normal Q-Q Plot of log_STAI_TOTAL
Expected Normal
Observed Value


log_STAI_TOTAL

L. *Correlations*

		log_viral_load	log_age	CD4 COUNT	TEMPORAL DISTANCE HIV +	log_BDI_total	log_STAI_STATE	log_STAI_TRAIT	log_STAI_TOTAL
log_viral_load	Pearson Correlation	1	-,077	-,153	,082	,109	-,217	-,238	-,231
	Sig. (2-tailed)		,727	,486	,709	,621	,319	,274	,290
	N	23	23	23	23	23	23	23	23
log_age	Pearson Correlation	-,077	1	-,119	,318**	,196	-,053	-,053	-,052
	Sig. (2-tailed)	,727		,327	,007	,104	,663	,665	,669
	N	23	70	70	70	70	70	70	70
Log_CD4 Count	Pearson Correlation	-,473	-,119	1	,013	-,018	-,107	-,118	-,114
	Sig. (2-tailed)	,000	,327		,913	,880	,376	,330	,348
	N	70	70	70	70	70	70	70	70
TEMPORAL DISTANCE HIV +	Pearson Correlation	,082	,318**	,013	1	,071	-,229	-,211	-,220
	Sig. (2-tailed)	,709	,007	,913		,557	,056	,080	,067
	N	23	70	70	70	70	70	70	70
log_BDI_total	Pearson Correlation	,109	,196	-,018	,071	1	,554**	,566**	,565**
	Sig. (2-tailed)	,621	,104	,880	,557		,000	,000	,000
	N	23	70	70	70	70	70	70	70
log_STAI_STATE	Pearson Correlation	-,217	-,053	-,107	-,229	,554**	1	,974**	,993**
	Sig. (2-tailed)	,319	,663	,376	,056	,000		,000	,000
	N	23	70	70	70	70	70	70	70
log_STAI_TRAIT	Pearson Correlation	-,238	-,053	-,118	-,211	,566**	,974**	1	,994**
	Sig. (2-tailed)	,274	,665	,330	,080	,000	,000		,000
	N	23	70	70	70	70	70	70	70
log_STAI_TOTAL	Pearson Correlation	-,231	-,052	-,114	-,220	,565**	,993**	,994**	1
	Sig. (2-tailed)	,290	,669	,348	,067	,000	,000	,000	
	N	23	70	70	70	70	70	70	70

		log_viral_load	log_age	CD4 COUNT	TEMPORAL DISTANCE HIV +	log_BDI_total	log_STAI_STATE	log_STAI_TRAIT	log_STAI_TOTAL
log_viral_load	Pearson Correlation	1	-,077	-,153	,082	,109	-,217	-,238	-,231
	Sig. (2-tailed)		,727	,486	,709	,621	,319	,274	,290
	N	23	23	23	23	23	23	23	23

**. Correlation is significant at the 0.01 level (2-tailed).

L(i). *Correlations*

		Zscore: VIRAL LOAD	Zscore (BDI_ total)	Zscore (STAI_ STATE)	Zscore (STAI_ TRAIT)	Zscore: CD4 COUNT	Zscore (STAI_ TOTAL)
Zscore: VIRAL LOAD	Pearson Correlation	1	.014	-.098	-.092	-.203	-.095
	Sig. (2-tailed)		.913	.439	.468	.105	.450
	N	65	65	65	65	65	65
Zscore(BDI_total)	Pearson Correlation	.014	1	.514**	.562**	-.109	.544**
	Sig. (2-tailed)	.913		.000	.000	.386	.000
	N	65	65	65	65	65	65
Zscore(STAI_STATE)	Pearson Correlation	-.098	.514**	1	.966**	-.097	.990**
	Sig. (2-tailed)	.439	.000		.000	.444	.000
	N	65	65	65	65	65	65
Zscore(STAI_TRAIT)	Pearson Correlation	-.092	.562**	.966**	1	-.110	.993**
	Sig. (2-tailed)	.468	.000	.000		.384	.000
	N	65	65	65	65	65	65
Zscore: CD4 COUNT	Pearson Correlation	-.203	-.109	-.097	-.110	1	-.105
	Sig. (2-tailed)	.105	.386	.444	.384		.407
	N	65	65	65	65	65	65
Zscore(STAI_TOTAL)	Pearson Correlation	-.095	.544**	.990**	.993**	-.105	1
	Sig. (2-tailed)	.450	.000	.000	.000	.407	
	N	65	65	65	65	65	65

**. Correlation is significant at the 0.01 level (2-tailed).

M. *Multiple Regressions*

i. Model when controlling the Depression

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	log_viral_load, CD4 COUNT[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: log_BDI_total

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,154[a]	,024	-,074	,14984

a. Predictors: (Constant), log_viral_load, CD4 COUNT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,011	2	,005	,243	,787[a]
	Residual	,449	20	,022		
	Total	,460	22			

a. Predictors: (Constant), log_viral_load, CD4 COUNT
b. Dependent Variable: log_BDI_total

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,408	,130		10,863	,000
	CD4 COUNT	-8,504E-5	,000	-,110	-,492	,628
	log_viral_load	,012	,030	,092	,412	,685

a. Dependent Variable: log_BDI_total

ii. Model when controlling the State_Anxiety

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	log_viral_load, CD4 COUNT[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: log_STAI_STATE

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,236[a]	,056	-,039	,17570

a. Predictors: (Constant), log_viral_load, CD4 COUNT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,037	2	,018	,592	,563[a]
	Residual	,617	20	,031		
	Total	,654	22			

a. Predictors: (Constant), log_viral_load, CD4 COUNT
b. Dependent Variable: log_STAI_STATE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,603	,152		10,546	,000
	CD4 COUNT	8,691E-5	,000	,094	,429	,672
	log_viral_load	-,032	,035	-,203	-,923	,367

a. Dependent Variable: log_STAI_STATE

iii. Model when controlling the Trait_Anxiety

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	log_viral_load, CD4 COUNT[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: STAI_TRAIT

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,231[a]	,053	-,041	17,11028

a. Predictors: (Constant), log_viral_load, CD4 COUNT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	330,504	2	165,252	,564	,577[a]
	Residual	5855,235	20	292,762		
	Total	6185,739	22			

a. Predictors: (Constant), log_viral_load, CD4 COUNT
b. Dependent Variable: STAI_TRAIT

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47,465	14,801		3,207	,004
	CD4 COUNT	,001	,020	,016	,072	,943
	log_viral_load	-3,541	3,416	-,228	-1,037	,312

a. Dependent Variable: STAI_TRAIT

iv. Model when controlling the Overall_Anxiety

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	log_viral_load, CD4 COUNT[a]	.	Enter

a. All requested variables entered.
b. Dependent Variable: log_STAI_TOTAL

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,240[a]	,058	-,037	,19125

a. Predictors: (Constant), log_viral_load, CD4 COUNT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	,045	2	,022	,612	,552[a]
	Residual	,732	20	,037		
	Total	,776	22			

a. Predictors: (Constant), log_viral_load, CD4 COUNT
b. Dependent Variable: log_STAI_TOTAL

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,924	,165		11,628	,000
	CD4 COUNT	6,804E-5	,000	,068	,309	,761
	log_viral_load	-,038	,038	-,220	-1,003	,328

a. Dependent Variable: log_STAI_TOTAL

Abbreviations: CD4-count; HAART; BDI-Scores; STAI-Scores; Viral Load; Psyconeuroimmunology; Correlation; Multiple Regression Analysis.

WORD COUNT: 22.024