

# The Big Five Personality Factors among Lebanese Chronic Disease Patients

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**Abstract:-** Personality traits have long been known to contribute to disease states and disease progression. Several studies have been conducted on the links between personality traits and health outcomes. However, there is less focus on chronic illness. The aim of the present study was to explore the Big-Five (BF) personality traits in three groups of out-patients suffering from hypertension, diabetes, and receiving kidney dialysis (N = 157). They responded to the Arabic Big Five Personality Inventory. Results indicated that the only significant difference was in extraversion, in which the kidney dialysis patients obtained the high mean score. Compared with a Lebanese non-patient sample, studied previously, it was found that hypertension patients obtained a low extraversion mean score, whereas kidney dialysis patients had a high mean score on extraversion and agreeableness. The kidney patients, on the other hand, obtained the lowest mean score on conscientiousness. The most important result in this comparison was the high mean score on neuroticism among the three patient groups. Which probably means that their quality of life was impaired compared to healthy people because they had more negative emotions. Specific significant Pearson correlations were found between the BF traits. Principal components analysis extracted one component in the three groups of patients, which was labeled “General factor of personality”. It was concluded that chronic disease patients with high scores on neuroticism are in need of counseling or brief psychotherapy.

**Keywords:-** Personality, Extraversion, Neuroticism, Openness, Agreeableness, Conscientiousness, Chronic Patients, Lebanon.

## I. INTRODUCTION

The present study was designed to explore the differences in the Big Five (henceforth BF) personality traits among three samples of outpatients with chronic disease: hypertensives, Type II diabetics, and patients receiving kidney dialysis. The introduction presents the following items: the Big Five personality traits, the importance of the BF model, chronic

disease, the links between personality traits and chronic disease, the aims of the current study, and its hypotheses.

### ➤ *The Big Five Personality Traits*

The term "personality" encompasses at least three key aspects: affect, behavior, and cognition, or emotion, behavior, and thought. Personality is defined as "a complex, relatively stable and enduring behavioral pattern that includes a unique organization of a set of mental functions, psychological traits, emotional states, and physiological factors that determine an individual's behavior and thought" [1].

Several theories have been proposed within the framework of personality psychology, including psychoanalysis, phenomenology, learning, self-cognitive components, social cognition and trait theories, among other theories [2]. One of the trait theories, the Five-Factor Model (FFM) of Personality, has become particularly significant in personality psychology and other branches of psychology. It encompasses the full range of individual differences in human personality classification [3] and has gained the status of a reference model [4]. Reference [5] notes that the BF model reflects a consensus among researchers regarding the general framework for classifying personality traits. Many personality psychologists agree that the BF factors encompass the most important individual differences in personality traits [6]. This model has been developed empirically by factor analysis of many personality items or trait descriptors, therefore the claim that its five dimensions are not entirely arbitrary but actually “carve Nature at her joints”.

Over the past twenty years, the BF model has become a key framework for understanding individual differences in personality [7,8]. It is recognized as a comprehensive map of universal personality traits, explaining phenotypic personality variations among people [9]. The Five Factor Model (FFM) is hierarchical, organizing specific traits into five broad factors: Extraversion (E), Neuroticism (N), Agreeableness (A), Openness to Experience (O), and Conscientiousness (C) [10]. It is important to briefly elucidate the meaning and contents of the FFM or the BF.

- **Extraversion:** The main characteristic of the extraversion factor is the inclination towards social interaction and positive affect, including gregariousness, assertiveness, activity, excitement-seeking, and positive emotions [11]. Extraversion is associated with processes that generally lead to more positive emotional states and life events [12].
- **Neuroticism:** a propensity towards negative emotional states such as anxiety, depression, hostility, and vulnerability to stress [10]. It is the opposite of adjustment or emotional stability, predisposing individuals to negative emotions and stressful life events [13].
- **Agreeableness:** characterized by pleasantness and a desire to maintain interpersonal harmony, including traits like trust, straightforwardness, altruism, compliance, modesty, and tender-mindedness [14].
- **Openness to Experience:** marked by curiosity, independent thought, and adaptability, associated with spiritual maturity and lower levels of fundamentalism [15].
- **Conscientiousness:** marked by high levels of competence, order, dutifulness, achievement striving, self-discipline, deliberation [14], impulse control, rule-conforming, and consistency [3].

#### ➤ *The Importance of the BF Model*

The BF model is necessary and sufficient to describe the basic dimensions of personality, providing a unified framework for trait research [14]. It has gained the status of a reference model due to several reasons as follows:

(a) Longitudinal and cross-sectional studies have shown that the BF are stable behavioral tendencies; (b) traits associated with the BF appear in different personality models and various studies conducted on natural language; (c) the BF are found in groups of different age, gender, race, language, and culture; (d) genetic studies demonstrate a biological basis for each of these BF personality traits [8]. Perhaps you can cite here more recent studies: genome-wide association studies, and predictive polygenic scores for the different personality traits.; Dear Gerhard: would you please help for this? (e) the BF can be extracted from self-assessment scales, ratings, natural languages, theory-based intelligences, and samples of adults from several countries [16]; that is, across cultures [17]; (f) the BF are distributed based on geographical differences [18]. However, the results have been very inconsistent. This is often attributed to the reference group effect, when respondents in self-report studies compare themselves with others in their country, culture or social group. and (g) the BF are were found to be highly stable and consistent in a study conducted over six years [7].

#### ➤ *Chronic Disease*

The main health problems and causes of death in developed countries today are chronic diseases that develop or persist over a long period of time. A main reason for the increasing rates of chronic diseases is that more people are living to the age when they are at high risk for contracting chronic diseases [19]. Also, industrialization increased people's stress and exposure to harmful chemicals, as well as causing them to adopt habits and lifestyles to which they are not genetically adapted ("diseases of civilization").

Chronic diseases impact on the patient and the family. Adapting to the chronic disease includes dealing with the symptoms of the disease, managing the stresses of treatment, living as normal a life as possible, and facing the possibility of death. However, the quality of life may be less affected than healthy people imagine. For some chronic diseases, such as hypertension and diabetes, people reported levels of functioning similar to those with no chronic disease [20]. The hedonic treadmill model, which says that people adapt to their circumstances such that a change for the worse, for example through disability or chronic illness, does not much affect subjective well-being long-term. There is a rather substantial literature about this, with mixed results.

On the other hand, a chronic illness can produce drastic changes in both self-concept and self-esteem. Many of these changes will be temporary, but some may be permanent. Self-concept is a composite of self-evaluations regarding many aspects of life, which include body image, achievement, social functioning, and the private self [21].

#### ➤ *Personality and Chronic Disease*

Personality – an individual's biopsychosocial patterns of behavior – is a construct that connects well with biopsychosocial approaches to health. Personality is important because it is the individual person who lives a unique life path, becomes ill or stays well, and lives long or dies prematurely [22].

The relationship among individual differences, disease and health have been investigated scientifically for more than 100 years. More recently, reference [22] developed the constructs termed disease-prone personality and self-healing personality to elucidate the associations between health and disease away from relations of single predictors and a single outcome, focusing instead on multiple predictors and multiple-outcome development over long periods of time. This approach uses concepts of biopsychosocial homeostasis, overall well-being, and mortality risk in a sociocultural context. There is a question of cause and effect. Chronic disease can certainly have effects on personality, but personality also has an effect on coping with the disease and perhaps even on the natural course of the disease, although it is a bit mysterious how neuroticism can cause physical illness.

The development of chronic disease is often life-changing, with significant physiological, social, and psychological consequences. Severe illness and the burden of disease can lead to long-term changes in self-perception. While psychological factors, such as personality traits, are linked to disease development [23], the impact of chronic illness on personality change is notably understudied in the personality development literature [24]. A longitudinal rather than cross-sectional design would be required. A very large cohort study, where some people develop a chronic illness and others don't, would be needed to study this. Personality traits have long been known to contribute to disease states and disease progression. For instance, early Type A literature linked a hostile aggressive personality to cardiovascular outcomes such as heart attack and stroke [25].

Recent work has demonstrated that other BF traits, in addition to low agreeableness, are associated with illness. For example, higher neuroticism and lower conscientiousness have been found to predict aggregate morbidity and self-rated health [26, 27]. Researchers have to define, whether this prediction is longitudinal studies, or were these studies where personality was measured only in people who were ill already? Personality traits are also associated with disease progression. Among those living with HIV, for example, disease progression is slower for more open, extraverted and conscientious individuals [28].

Studies using the BF personality traits have found that the higher scores on extraversion and neuroticism scales are linked with higher risks of cardiovascular disease [29, 30]. In contrast, openness to experience and conscientiousness are cardio-protective traits [29, 31]. Existing literature suggests that low scores on conscientiousness and agreeableness, high scores on neuroticism [32], affective temperaments [33], and type D personality are associated with hypertension. Reference [34] observed that high conscientiousness was linked to better adherence to antihypertensive medication, while high neuroticism was associated with poorer management outcomes. Reference [35] examined the relationship between the BF personality traits and hypertension, finding that low conscientiousness and high neuroticism are significantly associated with a higher risk of hypertension. However, other studies did not find any significant relationship between personality factors and hypertension [36, 37, 38]

Reference [39] concluded that among patients with Type 2 diabetes, those with higher levels of conscientiousness were more likely to adhere to their diabetes self-management practices. In contrast, patients with higher levels of neuroticism had poorer adherence to these practices due to higher stress and emotional instability. These researchers emphasize the need for tailored interventions that consider individual personality traits to improve diabetes management outcomes. Reference [40] highlighted that patients with Type 2 diabetes exhibiting high neuroticism tend to have higher levels of stress and anxiety, negatively impacting their self-management behaviors. Conversely, high conscientiousness was associated with better glycemic control and adherence to treatment regimens. They suggested that psychological support and stress management interventions could benefit patients with high neuroticism. They found that low conscientiousness was a significant risk factor for developing Type 2 diabetes. Additionally, personality traits such as high neuroticism were linked to poorer disease management and higher rates of complications.

The relationship between the BF personality traits and adherence to medical regimens among renal dialysis patients has been investigated by Reference [41]. The findings indicate that conscientiousness and agreeableness are significant predictors of better adherence to treatment protocols, which enhances clinical outcomes and quality of life. They underscore the importance of considering personality traits in developing adherence interventions. Reference [42] found that

conscientiousness is significantly correlated with higher adherence to treatment protocols among renal dialysis patients. Additionally, agreeableness was found to positively influence adherence, suggesting that more cooperative and trusting patients are more likely to follow medical advice.

By and large, personality traits are stable over time and significantly influence health outcomes, especially in chronic disease patients. High neuroticism and low conscientiousness are associated with poorer health outcomes and faster disease progression. In contrast, traits such as conscientiousness and openness are linked to better health management and more adherence to medical regimens.

#### ➤ *The Current Study*

Reference [43] highlight that, while extensive research exists on the general links between personality traits and health outcomes, there is comparatively less focus on personality of patients with chronic illnesses. They underscore the need for more targeted research to understand how personality traits affect the management and progression of chronic illnesses, adherence to treatment, and overall well-being of these patients. They suggest that understanding these dynamics could lead to more effective interventions and support strategies for individuals with chronic health conditions. Furthermore, reference [44] noted that while the BF have been widely studied in general populations, fewer studies have specifically examined these traits in individuals with chronic illnesses. This gap in research suggests a need for further studies to explore how personality traits influence the experiences and outcomes of chronic disease.

The present study aims, generally, to identify the BF personality traits in samples of patients with chronic disease: hypertension, diabetes, and chronic renal failure requiring dialysis. The detailed aims of the present study were: (a) to explore the differences in BF among patients with chronic diseases; (b) to investigate the associations between BF considering the type of chronic disease; and (c) to conduct a factorial analysis of BF considering the type of chronic disease.

#### ➤ *Hypothesis*

The general expectation in the present study is that distressing chronic disease increases negative emotions and reduces positive emotions. Therefore, the expectation is that Neuroticism goes up, and the other BF factors goes down. This is expected to be most severe in those conditions that impair normal life a lot, but not in those that don't cause serious symptoms and don't interfere with daily life. Especially, we can expect that kidney patients (dialysis three times a week, restrictive diet) are more distressed than hypertensives (daily blood pressure pills but no other restrictions).

The current study was designed to test the following three hypotheses: (1) the mean scores of the BF factors will differ based on the type of disease, (2) all the factors are positively correlated except neuroticism which correlates negatively with the others, and (3) the PCA will extract a general factor of personality.

## II. MATERIAL AND METHODS

### ➤ *Participants*

The sample consisted of (157) Lebanese individuals with chronic illnesses, aged between 25 and 50 years, distributed as shown in Table 1.

Table 1 The Study Sample (N=157)

| Patients        | Men | Women | Total |
|-----------------|-----|-------|-------|
| Hypertension    | 10  | 42    | 52    |
| Diabetes        | 19  | 39    | 58    |
| Kidney dialysis | 27  | 20    | 47    |
| Total           | 56  | 101   | 157   |

The study sample was recruited from the out-patient clinics in the following hospitals in Beirut, Lebanon: Sahel, Al-Rasoul Al-Azam, Al-Hayat, and Al-Zahraa.

### ➤ *The Arabic Big-Five Personality Inventory (ABFPI)*

The ABFPI was developed by Abdel-Khalek [45, 46, 6] based on a pool of 455 items from previous studies and online sources to measure the five factors: Neuroticism, Extraversion, Agreeableness, Openness, and Conscientiousness. Each set of items, assessing one of the five factors, was administered to a separate sample of college students (total N = 1,161). Item-remainder correlations were computed for each factor, and the 20 items with the highest correlations were retained.

Using another sample (N = 450), the correlations between these 20 items and the total score on the same factor of the NEO-FFI-R [14] were computed. The six items with the highest correlations with the NEO-FFI-R were retained for each of the five factors, assuring good criterion-related validity. In the final step of scale development, five items were eliminated based on item response theory [47].

Thus, the final ABFPI consisted of 25 short statements to be answered on a four-point Likert scale: 1 (No), 2 (Some), 3 (Much), and 4 (Always). The total score for each factor could range from 5 to 20, with higher scores indicating higher levels of the trait. The scale demonstrated acceptable to high alpha reliability as reported in Table 2 below.

Many psychometric textbooks advise balancing positively and negatively worded items to avoid response bias, particularly the acquiescent response set, and to minimize monotonous responding (Yeasayers vs. Naysayers). However, based on extensive personal experience administering thousands of scales and questionnaires, the author of the ABFPI found that many participants struggle with answering the negatively-worded items when yielding to double negatives. Reference [48] stated that “negatively-worded

items often turn out to be harder to understand or more complicated to answer than positively-worded items.” Similarly, reference [49] concluded that negatively-worded items impair response accuracy.

As a remedy to the problem of understanding double negatives, some researchers use negatively-worded items (e.g., “I feel blue”) in happiness scales and then recode the responses. However, according to reference [50] in their paper “Bad is Stronger than Good”, this procedure is problematic because items describing negative emotions tend to evoke much stronger responses than items describing positive ones. People tend to underestimate the frequency of positive but not negative affect. The authors concluded that “bad emotions generally produce more cognitive processing and have other effects on behavior that are stronger than positive emotions” (p. 334). For these reasons, the ABFPI developer used positively-worded items, apart from one item (No. 5).

### ➤ *Procedures*

The ABFPI was administered individually to patients with chronic diseases. The third researcher visited hospitals and outpatient clinics to meet with patients after obtaining verbal consent from both the hospitals and the patients. The purpose and importance of the study and its aims were briefly explained to the patients. The study samples were generally cooperative, except for the kidney dialysis patients, with whom the third researcher faced difficulties due to their difficult health conditions. The administration of the scales took approximately three months.

### ➤ *Data Analysis*

Data were analyzed using SPSS (2009) for Windows. Descriptive statistics, ANOVA, and Scheffe’s method were used for testing hypothesis 1, Pearson correlations for testing hypothesis 2, and principal components analysis to test hypothesis 3.

**III. RESULTS**

Table 2 presents the reliability and the validity of the ABFPI

Table 2 The Psychometric Properties of the ABFPI

| Scale             | Reliability |        | Criterion validity |     |
|-------------------|-------------|--------|--------------------|-----|
|                   | Alpha       | Retest | A                  | B   |
| Extraversion      | .78         | .81    | .82                | .74 |
| Neuroticism       | .79         | .90    | .85                | .63 |
| Agreeableness     | .75         | .89    | .49                | .50 |
| Openness          | .72         | .91    | .53                | .61 |
| Conscientiousness | .80         | .87    | .68                | .73 |

➤ Note: The Interval between the Test and Retest was 7-14 Days.

- The criterion was the NEO-FFI [14].
- The criterion was reference [51] FFM.

Inspection of Table 2 indicates that Cronbach’s alpha and test-retest reliabilities as well as the criterion-related validity of the ABFPI were acceptable to good.

To test Hypothesis 1, table 3 sets out the descriptive statistics for the ABFPI by type of chronic disease.

Table 3 Mean (M), Standard Deviation (SD), for the ABFPI by type of Chronic Disease (N=157).

| ABFPI             | Hypertension (N=52) |      | Diabetes (N=58) |      | Kidney dialysis (N=47) |      |
|-------------------|---------------------|------|-----------------|------|------------------------|------|
|                   | M                   | SD   | M               | SD   | M                      | SD   |
| Extraversion      | 12.42               | 3.13 | 13.79           | 3.53 | 14.51                  | 3.86 |
| Neuroticism       | 12.01               | 3.30 | 12.29           | 3.07 | 12.12                  | 3.28 |
| Agreeableness     | 16.09               | 2.99 | 15.87           | 3.44 | 17.10                  | 2.78 |
| Openness          | 11.90               | 3.90 | 12.94           | 3.91 | 11.53                  | 4.04 |
| Conscientiousness | 14.44               | 4.24 | 14.53           | 3.93 | 13.21                  | 3.38 |

Table 3 indicates that the kidney dialysis patients obtained a higher mean total score on extraversion than did the hypertension and diabetic patients. Table 4 presents the

ANOVA results for the ABFPI, comparing the mean differences between three groups of patients with different chronic disease. Table 4 sets out the ANOVA.

Table 4 Analysis of Variance (ANOVA) for the ABFPI by type of Chronic Disease (N=157).

| ABFPI             | Source of variation | Sum of squares | df  | Mean square | F     | P     |
|-------------------|---------------------|----------------|-----|-------------|-------|-------|
| Extraversion      | Between Groups      | 112.836        | 2   | 56.418      | 4.568 | .012* |
|                   | Within Groups       | 1901.954       | 154 | 12.350      |       |       |
|                   | Total               | 2014.790       | 156 |             |       |       |
| Neuroticism       | Between Groups      | 2.099          | 2   | 1.050       | 0.102 | .904  |
|                   | Within Groups       | 1592.232       | 154 | 10.339      |       |       |
|                   | Total               | 1594.331       | 156 |             |       |       |
| Agreeableness     | Between Groups      | 42.934         | 2   | 21.467      | 2.220 | .112  |
|                   | Within Groups       | 1489.142       | 154 | 9.670       |       |       |
|                   | Total               | 1532.076       | 156 |             |       |       |
| Openness          | Between Groups      | 57.940         | 2   | 28.970      | 1.855 | .160  |
|                   | Within Groups       | 2405.066       | 154 | 15.617      |       |       |
|                   | Total               | 2463.006       | 156 |             |       |       |
| Conscientiousness | Between Groups      | 54.029         | 2   | 27.014      | 1.786 | .171  |
|                   | Within Groups       | 2329.130       | 154 | 15.124      |       |       |
|                   | Total               | 2383.159       | 156 |             |       |       |

\* p < 0.01

Inspection of Table 4 indicates that there is a statistically significant difference in extraversion mean total scores between the chronic disease groups. However, there are no statistically significant differences in neuroticism, agreeableness, openness, and conscientiousness mean scores

among the different chronic disease patients. This suggests that these personality traits are not significantly different by the type of chronic disease. To identify the direction of the differences in extraversion, Scheffe’s test was applied (see Table 5).

Table 5 Scheffe value for mean Differences in Extraversion among Patients with Chronic Disease (N=157).

| Chronic disease (A) | Chronic disease (B) | Mean difference (A-B) | Std. Error | p     |
|---------------------|---------------------|-----------------------|------------|-------|
| Hypertension        | Diabetes            | -1.370                | 0.671      | 0.128 |
| Hypertension        | Kidney dialysis     | 2.087*                | 0.707      | 0.014 |
| Diabetes            | Kidney dialysis     | -0.717                | 0.689      | 0.583 |

Table 5 indicates that there is a statistically significant difference in extraversion between the hypertension and kidney dialysis patients, in favor of the latter sample.

To test Hypothesis 2, Tables 6 and 7 set out the Pearson correlation coefficients between the scores on the BF separately for the three samples.

Table 6 Pearson Correlations between the BF for Hypertension Patients (N = 52; the Lower Matrix) and Diabetes Patients (N = 58; the Upper Matrix)

| ABFPI                 | E     | N      | A    | O       | C      |
|-----------------------|-------|--------|------|---------|--------|
| Extraversion (E)      | -     | -0.26* | 0.12 | 0.63**  | 0.38** |
| Neuroticism (N)       | -0.22 | -      | 0.03 | -0.33** | -0.22  |
| Agreeableness (A)     | 0.33* | 0.03   | -    | 0.13    | 0.41** |
| Openness (O)          | 0.03  | -0.32* | 0.14 | -       | 0.50** |
| Conscientiousness (C) | -0.10 | -0.19  | 0.19 | 0.74**  | -      |

\*  $p < .05$

\*\*  $p < .01$

Table 6 indicates that, for the hypertension sample, there is a significant correlation at the 0.05 level between extraversion and agreeableness. Neuroticism is negatively correlated with openness ( $p < 0.05$  level), and openness is positively correlated with conscientiousness ( $p < 0.01$  level). As for the diabetes sample, a significant negative correlation was found between extraversion and neuroticism ( $p < 0.05$

level), between extraversion and both openness and conscientiousness ( $p < 0.01$  level), as well as between neuroticism and openness (negative). Additionally, there is a significant positive correlation between conscientiousness and both agreeableness and openness ( $p < 0.01$  level). By and large, all three patient groups show the usual pattern of correlations to some extent.

Table 7 Pearson Correlations among the BF for kidney Dialysis Patients (N = 47)

| ABFPI                | E      | N       | A      | O      | C |
|----------------------|--------|---------|--------|--------|---|
| Extraversion(E)      | -      |         |        |        |   |
| Neuroticism(N)       | -0.34* | -       |        |        |   |
| Agreeableness(A)     | 0.41** | -0.26   | -      |        |   |
| Openness(O)          | 0.49** | -0.18   | 0.36*  |        |   |
| Conscientiousness(C) | 0.53** | -0.40** | 0.41** | 0.62** | - |

\*  $p < .05$

\*\*  $p < .01$

As seen in Table 7, related to the correlation coefficients of the ABFPI in the kidney dialysis sample, there is a negative correlation between extraversion and neuroticism ( $p < 0.05$  level) and a positive correlation between extraversion and the following factors: agreeableness, openness, and conscientiousness. Additionally, there is a negative correlation between neuroticism and conscientiousness, and a positive correlation between agreeableness and both openness and

conscientiousness, as well as between openness and conscientiousness.

To test Hypothesis 3, a principal components analysis was conducted to examine the factorial structure of the ABFPI scores for the hypertension, diabetes, and kidney total dialysis patients, separately. According to Table 8, one component was extracted for each sample, accounting for 57%, 61%, and 60% of the total variance in the three samples, respectively.

Table 8 Principal Components analysis for the ABFPI among the Three Samples

| ABFPI             | Hypertension | Diabetes | Kidney |
|-------------------|--------------|----------|--------|
| Extraversion      | 0.881        | 0.899    | 0.871  |
| Neuroticism       | -0.815       | -0.886   | -0.839 |
| Agreeableness     | 0.763        | 0.872    | 0.822  |
| Openness          | 0.723        | 0.776    | 0.798  |
| Conscientiousness | 0.584        | 0.446    | 0.520  |
| Eigen value       | 15.796       | 19.583   | 16.390 |
| % variance        | 57.745       | 61.515   | 60.889 |

With reference to Table 8, the three components of the three patient groups could be labeled: “A general factor of personality” (GFP). Actually, the GFP can be interpreted meaningfully. It means socially desirable responding, self-presentation, mental health, social skills, well-being, etc.

#### IV. DISCUSSION

The objectives of this study have been successfully fulfilled and its hypotheses have been adequately tested. Before discussing the findings of the current investigation, it is important to refer to the psychometric scale used in it. The ABFPI was developed in the Arabic language and then translated into English on the basis of the standard technique of back translation [52, 53, 54]. Furthermore, reliability of the scale is acceptable to good (test-retest and internal consistency). The ABFPI shows also strong convergent correlations with the gold-standard, i.e., the NEO-PI-R scales [14]. It is well-known that the trustworthiness of any results depends on the psychometric characteristics of the psychological tool, among other elements.

As to the first hypothesis, the only statistically significant difference in the BF was in extraversion. That is, kidney dialysis patients obtained a higher mean total score than did the hypertensive patients. The high mean score on extraversion among patients of kidney dialysis may be due to their frequent attendance of the dialysis sessions in the hospital, during which they practice social contact with the hospital’s staff more than the other two groups of hypertension and diabetes. On the other hand, there were no statistically significant differences between the three groups of patients in the BF personality traits of neuroticism, agreeableness, openness, and conscientiousness. This result may be related to the general factor of pathology affecting all these patients (see Tables 3, 4, & 5). Therefore, hypothesis 1 was partially supported. Also worth mentioning is perhaps that neuroticism, as a measure of distress and negative emotions, is the same in all three groups although we would expect that the most seriously impaired (dialysis patients) are more distressed and neurotic than the least impaired (hypertensives). This suggests that a kind of hedonic treadmill model, where people adapt to their circumstances, may apply to the negative emotions tested with the neuroticism scale as it does to positive emotions and subjective well-being.

It is particularly noteworthy to compare the current results on the ABFPI among chronic patients with another sample in the same country (i.e., Lebanon) the members of which do not suffer from any chronic disease [55]. Compared with the latter sample, hypertensive patients obtained a low extraversion mean score, whereas kidney patients got a high mean extraversion score, as well as a high mean score on agreeableness. However, the kidney patients obtained the lowest mean score on conscientiousness in comparison with the non-patient group. The most important result in this comparison with non-patients was the high mean score on neuroticism among all three samples of chronic disease patients, which is highly expected [35, 56, 30].

Regarding hypothesis 2, results indicated that the pattern of correlations between the BF personality traits was different

among the three groups of patients. Many aspects may explain these differences, e.g., the severity of symptoms during the administration of the scale, the length of the session, and the test-taking attitude, as well as the psychological and social variables in the patient. However, the only agreement among the three groups of patients was the statistically significant and positive association between openness and conscientiousness. Therefore, hypothesis 2 was partially verified.

To test the third hypothesis, principal components analysis (PCA) was conducted for the three groups of patients, separately. To more concisely summarize the information in Tables 6 and 7, PCA was conducted to determine the percent of variance explained by the unrotated first principal component (the “general factor of personality”, GFP). Perhaps personality structure becomes less differentiated when people suffer from distressing conditions like kidney dialysis. The interpretation of the GFP is uncertain, but it seems to come close to concepts like subjective well-being and mental health, which both are known to be of a rather general nature. In psychology all the good things go together, and all the bad things go together. In addition, considering that we have almost only direct-scored items, the mainly negative rather than positive correlations of neuroticism with the other dimensions suggest that in these three samples, substantive responding is more important than acquiescent responding.

#### V. LIMITATIONS

Notwithstanding the positive aspects of the current study, namely the suitable number of each chronic group sample as a clinical investigation and the good psychometric characteristics of the psychological tool (the ABFPI), some limitations have to be acknowledged. Foremost among these is as follows: this study did not take measures of the severity of the patients’ condition. In diabetes, for example, the condition can be asymptomatic but other patients have serious complications such as blindness or amputations. Another limitation is the convenience and non-probability sampling method used in this study. Furthermore, the patients were recruited from the city of Beirut. However, Lebanon has many cities and hospitals. Lastly, this study was conducted only on three samples of chronic patients. Therefore, a next step would be a replication of the present study using different diagnoses of chronic illness from different areas in Lebanon. This is a project for the future.

#### VI. CONCLUSION

The interaction between personality and chronic disease has been long investigated. Three groups of Lebanese chronic patients (hypertension, diabetes, and kidney dialysis) responded to the ABFPI. Kidney dialysis patients obtained a higher mean score on extraversion than did the other two groups. The pattern of correlations between the BF personality traits was different among the three groups of patients. The only agreement between these groups was the statistically significant and positive correlations between openness and conscientiousness. The PCA extracted one component, which could be labeled. “The general factor of personality”. Similar to the general factor of intelligence, Spearman’s  $g$ , some

personality psychologists propose that the GFP occupies the apex of the hierarchy [57, 58, 59]. Based on the high mean total score on neuroticism among the three chronic patients, it was suggested that these patients are in need of counseling or brief psychotherapy.

The present study raised important question: is there a trend for higher between-scale correlations among those with more severe disease (hypertension < diabetes < dialysis)? This would be an interesting observation although it may be difficult to demonstrate its statistical significance. Still, it suggests future research into severe chronic disease as a factor causing “de-differentiation” of personality structure.

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