

Predictability of levels of physical and mental health: a 6 months longitudinal study

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Abstract

Purpose: Identify the social, family, personality traits and health locus of control factors which influence physical and mental health, consumption of medications, and frequency of medical consultations.

Method twenty participants were included in a two years long longitudinal study. At baseline, participants' age, gender, family composition, net income, chronic treatments, family dynamics (Family Adaptation and Cohesion Scale), Multi-dimensional Health Locus of Control, and personality (NEO Personality Inventory) were recorded. Every six months their state of mental and physical health (12 Survey Factors and Hamilton Depression Scale), consumption of medications and number of medical consultations were reassessed.

Results: For the period T_0 to $T_{6\text{ months}}$, the level of physical health presented the highest level of predictability. At time T_0 , a four factors model of linear regression including cohesion of family of origin, and of the current couple, open personality, and adaptability of the ideal family explained 82.4% of the variance. At time $T_{6\text{ months}}$, nuclear family cohesion, and neuroticism accounted for 30.3% of the variance.

Conclusion: In contrast to what one could expect, the level of physical health appears to be a more predictable variable than the level of mental health. The variables that determine health evolve with time. Further results must confirm these first observations.

Key words: Family, Health, Personality, Locus of controle, Depression

Introduction

In previous studies Zdanowicz (1-4) compared the links between family dynamic, conception of health, and certain indicators of health between a group of healthy adolescent, and a group of adolescents presenting various mental disorders. They used the Olson's model (Family Adaptation and Cohesion Scale FACES III (5)) to investigate family dynamics. This model evaluates two dimensions of the functioning of a relational system: cohesion and adaptability. Cohesion is defined as "the emotional ties that every member develops with regard to the others". Adaptability is "the ability of the system to change its power structure, its roles and rules in response to stressful situations". A review about the use of this scale was published in 2008 (3). In this researches the health conception was investigated with Wallston's MHLC (Multidimensional Health Locus of Control) (6). This model explores how people relate to their own health in terms of the role they play in it. While certain individuals think they have a personal role to play to avoid or fight diseases (internal perception of "health locus of control"), others attribute the causes of their health to destiny or "others' influence" (members of the family or health professional). The MHLC distinguishes between three sub-scales: "Internality" (IHLC - Internal Health Locus of Control), "Others' Power" (PHLC - Powerful others Health Locus of Control), and "Chance" (CHLC - Chance Health Locus of Control).

In this previous study, adolescents' family cohesion and adaptability were both differentiating variables between the two groups but also showed to be influential in:

- Participants' conceptions of health.
- Changes of these conception at different ages

On the whole the family of origin of healthy adolescents was more adaptable and especially more cohesive. Those results correlate with a higher feeling of control over one's health (internality-IHLC) and with a declining propensity to attribute responsibility over one's health to others over time (Power of Others-PHLC). In 2006 in another study (7) attempted to determine if these variables could equally predict 2 years of different indicators of health as, for example medication consumption. This hypothesis was confirmed only for healthy adolescents. In order to complete, better objectify and extent these results, we conduct a 2 years longitudinal study that also include adults, and personality factors in our criteria of health. Twenty healthy participants – ten adolescent and ten adults – were evaluated every six months in terms of their mental and physical health, consumption of medications, and frequency of medical consultations.

Materials and Methods

Participants

Twenty Caucasian participants (ten between 12 and 18, and ten between 19 and 63) were enlisted after agreement and signature of a written consent. Participants' written consent was agreed by the Ethics Committee of the Catholic University of Louvain Mount Godinne clinics. The above agreement covers the national territory (Belgium B03920072846). The participants were to be free from any psychiatric disorder on axis I of the DSM IV nor of any physical pathology unless it was chronic and stable. The sample mean age was 29.14 year (std: 14.62). The youngest subject was 13, and the oldest, 56. The gender ratio was nine females for eleven males. On average, four people (min 1, max 6) lived together (std: 1.5). The average net family income was 2.300€/month (std 830€), the Belgian income average being of 1140€/months/person.

Measures and procedure

The French version 5.0.0 of the MINI (8) (International Mini Neuropsychiatric Interview) was employed in order to exclude all psychiatric disorders.

The socio-demographic data collected included age, gender, number of persons living in the same habitation (family composition), net monthly income (in the case of an adolescent, the cumulated income of his/her parents is divided by 2), and eventual chronic treatment.

The following basic data (independent variables) were also collected at time T_0 :

1. The cohesion and adaptability of the - nuclear and ideal - family of origin, as well as of the current and ideal couple using Olson's FACES III (5)
2. Wallston's Multidimensional Health Locus of Control (MHLC) (6)
3. Personality - according to Neo-FFi typology (9). This instrument explores five dimensions of personality: neuroticism, extraversion, openness, agreeableness, and conscientiousness. The dimension neuroticism refers to one's emotional stability and adaptability. The more present this dimension, the more the subject feels negative affects such as fear, sadness, anger, guilt, disgust, and embarrassment. Extrovert participants are sociable, although gregariousness is only one facet extraversion. Extrovert people prefer large groups, are active, energetic, verbose and optimistic. Open participants are curious of everything that originates in their internal and external universe, and their life is rich in experiences. They typically conceive new ideas, adopt unconventional values, and experience intense positive and negative emotions. Participants who obtain a low grade on the openness dimension tend to be conservative and conventional in their opinions and their behaviours. People who score high on agreeableness are altruistic, likable, helpful, and think they are likely to get help in return. People who score low on agreeableness are egocentric, suspicious of others' intention and are more likely to compete rather than cooperate. The

dimension of consciousness (C) refers to the capacity to manage one's desires. This self-control can lead one to active planning, organizing, and realizing tasks. A positive high C score is associated with academic and professional success. A negative C score is correlated with exaggerated and painful requirements, with a compulsive need for order and cleanliness and with work overload.

The following data (dependent variables) were collected at time T_0 , and then every six months:

1. The level of physical health (physical functioning, physical daily life functioning, physical pain and general health), and mental functioning (vitality, social functioning, daily mental life functioning and mental health) with SF-12 (10).
2. The level of depressive symptoms with Hamilton's 17 items scale (11)
3. Prescribed drug consumption (number of drugs and their classification).
4. Medical consumption (number and types of medical consultations (general or specialized medicine, as well as the specialty type))

Statistics

Parametric statistical methods were used and checked for types 1 and 2 errors. No post-hoc test was realized. Correlations between continuous variables were studied with Pearson's test, controlled for eventual demographic co-variables, and eventually completed with a linear regression. Means were compared using t-Student test, and Pearson χ^2 as a test of independence.

Results

Independent variables:

FACES III, MHLC, Neo-FFI

The scores at the FACES III are detailed in table I.

It is worth noting that in this sample, the participants describe ideal couples and ideal families as more cohesive than theirs. Except for the comparisons of means between present family cohesion versus ideal family, the observed differences were statistically significant (Table II).

The MHLC results (min 6 – max 36) show that on average, participants were more “internal” (23.71, std: 4.18), then “others' power” (19.14, std: 4.1), and finally, are lower for the level of “chance” (17.43, std: 4.0).

Table I. FACES III scores

	Cohesion (std) (average on Osion : 40 ; min 10 – max 50)	Adaptability (std) (average on Osion : 24 ; min 10 – max 50)
Family of origin	35 (6.1)	25 (5.2)
Nuclear family (adults only)	39.1 (4.7)	25.3 (5.1)
Current couple (adults only)	39 (6.5)	32.5 (6.1)
Ideal family	41.8 (3.4)	28.5 (7.1)
Ideal Couple	44.7 (3.8)	35.1 (7.8)

Table II. 2 X 2 comparisons of FACES III categories

	Δ (Std)	t	p	Effect Size
Current couple / ideal: Cohesion	6,00 (5.90)	-3.212	0.011	0.152
Current couple / ideal: Adaptability	5.40 (4.99)	-3.420	0.008	0.162
Nuclear family / ideal: Cohesion	0.30 (2.32)	-0.410	0.691	0.015
Nuclear family / ideal: Adaptability	3.90 (2.92)	-4.219	0.002	0.200

As for personality, (min 0 - max 60), the dimension "extraversion" was predominant (42.38 std : 4.87), followed by the dimension of "consciousness", (42.48 std : 8.34), "agreeableness", (41.05 std : 5.84), "openness" (37.62 std : 6.53), and finally, "neuroticism" (32.9 std 8.76).

Dependent variables: physical health, depression, drugs consumption, medical consultation.

The average scores on SF12 were of 51.15 (std: 4.72) for physical health (whereas the Belgian average was 52.44 according to the ESEMED study (12)), and 51.51 (std: 10.49) for mental health (the Belgian average being 57.13).

On the Hamilton scale, our sample average of 3.90 (std:3.23) was quite inferior to the limit of 7, which indicates a risk of depression close to nil. Two participants scored respectively 9 and 13.

Two participants take two medications on a chronic basis, and one subject takes only one medication regularly. Medical consultation was defined as nil in the beginning of the research.

Correlations between demographic and dependent variables

Although we could not exclude (non significant) influences of the demographic data on the dependent variables, participants' scores on the Hamilton scale were nevertheless statistically in-

dependent from age and from the number of persons living together. Similarly, while the number of persons living together did not directly influence the Hamilton scale, it had an unfavourable influence on mental health ($p = 0.007$; $r = 0.573$). One can notice that women scored significantly higher than men on the Hamilton scale (average of women: 5.78; average of men: 2.50; $p = 0.033$, t-Student = 2.410).

The quantity of drugs intake was correlated with the participants' age ($p = 0.042$; $r = 0.447$) and with income level ($p = 0.001$; $r = 0.683$).

Correlations between independent and dependent variables at time T_0

The correlations analysis suggests that a number of factors positively or negatively influence health indicators as shown in table III

Physical health was the parameter that presents the highest quantity of intersections (4) with the independent variables. When we introduced these parameters in a decreasing order of importance of coefficient in a linear regression we obtained a total of 82,4% of accounted variances.

The same operation realized for the number of medications yields a total percentage of accounted variances of 40,8% and of 10,1% on Hamilton' scale. These data are summarized in Table IV.

Table III. Variables influencing health at time T_0

Favourable to health				Unfavourable to health			
V independent	V dependent	p	r	V independent	V dependent	P	r
FO co	Phys health	0.006	0.581	Ccu ada	Hamilton	0.038	0.659
Ccu co	Phys health	0.045	0.642	FI ada	Phys health	0.054	-0.426
FI co	Nbr med	0.025	-0.487	CHLC	Nbr med	0.039	0.453
IHLC	Hamilton	0.019	-0.507	Neuroticism	Ment health	0.002	-0.637
Openness	Phys health	0.016	0.517	Neuroticism	Nbr med	0.011	-0.545
				Consciousness	Nbr med	0.052	0.429

Abbreviations : F: family ; C: couple ; O : Origin ; N : Nuclear ; cu : current ; I : ideal ; co : cohesion ; ada : adaptability ; Phys health : physical health ; Ment health : mental health ; nbr med : number of medications

Table IV. Linear regression of three health indicators at time T_0 and Time $T_{6\text{ months}}$

	R	r adjusted	Std error	f	p
Physical health T_0	0.974	0.908	1.489	23.098	0.002
Number of medications T_0	0.842	0.639	0.387	9.863	< 0.000
Hamilton T_0	0.685	0.318	2.077	3.094	0.010
Physical health $T_{6\text{ months}}$	0.807	0.551	5.580	6.519	0.025

Evolution of the dependent variables after 6 months, and influence of the independent variables.

Except for the score on the depression scale on which only one participant's score was higher than 7, all the parameters worsened in the 6 months period (Table VI), but except for the number of medical consultation, this evolution was not statistically significant.

The analysis of the controlled correlations for the co-variables at 6 months show that other factors influence health indicators (Table VI).

Physical health was the parameter that presents the highest quantity of intersections (2) with the independent variables. When we introduced these parameters in a decreasing order of degree of correlation coefficients in a linear regression, we obtained a total accounted for variance of 30.3%. These data are summarized in Table IV.

Discussion

First, it is necessary to notice certain truisms such as "the older one is the more drugs one consumes", or the higher score of women on Hamilton's scale. Some correlations are more surprising such as the one between income and drugs consumption. We evidently still need to know if "rich" people take more drugs or if "poor" people

save money on their medical expenses. To take other examples, high income correlates positively with the belief in chance as a determining factor of health; women seek more medical consultations than men, and the fact that living in a large family correlates negatively with mental health (whereas current data rather stress the protective role of support groups). We are surprised by negative (although statistically not significant) evolution of all the indicators of health at 6 months interval, with the exception of the score on the depression scale. This result remains to be confirmed in the forthcoming months. What seems most interesting to us is to discover that factors that were correlated in the beginning of the study no longer correlate six months later, and that factors which were not correlated six months ago became so. This seems to indicate how much health is a sequential process where short term determining factors cease to be determining after a while. We also find interesting to discover that although we thought that mental health was an easier "correlate" than physical health, such was not the case. How one perceives one's physical health is the variable with the most predictive power, not only in terms of variables allowing to predict future physical health (T_0 : 4; $T_{6 \text{ months}}$: 2), but also in terms of explained variance. Familial's factors seem to be important to affect health indicators: cohesion of the ideal family and of the family of origin as well as cohesion of the current couple have positive effects on

Table V. Variables influencing health at time $T_{6 \text{ months}}$

	Time T_0 mean (std)	Time $T_{6 \text{ months}}$ mean (std)	p (t-student)	Effect size
Physical health	51.14 (4.72)	50.81 (7.71)	0.847 (0.195)	0.009
Mental health	51.51 (10.4)	50.74 (8.33)	0.699 (0.392)	0.018
Hamilton	3.90 (3.32)	3.62 (2.61)	0.649 (0.462)	0.021
Nbr of medications	0.29 (0.64)	0.71 (1.38)	0.186 (-1.369)	0.065
Nbr of consultations	0	0.43 (0.7)	0.009 (-2.905)	0.138

Table VI. Variables influencing health at time $T_{6 \text{ months}}$

Favourable to health				Unfavourable to health			
V independent	V dependent	p	r	V independent	V dependent	p	r
FN co	Phys health	0.030	0.682	FO ada	Nbr consults	0.044	0.443
FN ada	Hamilton	0.003	-0.854	Neuroticism	Phys health	0.012	-0.537

health indicators whereas levels of adaptability of the ideal family and the current couple have negative effects on health indicators.

In Conclusion, in contrast to what one could expect, the level of physical health proves to be a more predictable parameter than the level of mental health. The parameters that determine physical health evolve over time. Further results must confirm these first observations.

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