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THE HEALTH MANAGEMENT AND AFFECT PROFILER: A SHORT QUESTIONNAIRE ASSESSING INSTRUMENTAL AND AFFECTIVE HEALTH-RELATED INDIVIDUAL DIFFERENCE FACTORS

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We examined reliability and validity of the Health Management and Affect Profiler (H-MAP), a short questionnaire assessing instrumental and affective components accounting for covariance of health-related person factors. Design. Study 1 tested the factorial structure of H-MAP items by Confirmatory Factor Analysis, and examined the association of H-MAP factors with general personality traits. Study 2 tested the association of H-MAP factors with well-established measures of health-related person factors. Methods. Study 1. Five hundred and sixteen participants (18 to 93 years old) completed the H-MAP with the Eysenck Personality Questionnaire Revised. Study 2. Two hundred and ninety-nine participants (21 to 92 years old) completed the H-MAP with measures of Generalized Self-Efficacy and Health-Locus of Control as markers of instrumental beliefs, and of Depression and Hypochondria as markers of affective beliefs. Results. Study 1. The H-MAP had a sound factorial structure as well as an acceptable internal consistency reliability. H-MAP factor scores were relatively independent from general personality traits as well as from participants' gender and education, and free from social desirability bias. Study 2. H-MAP ratings were properly associated with measures of instrumental and affective health-related person factors. Conclusions. The H-MAP is a valid and reliable instrument assessing health-related individual difference factors.

Key words: Health-related dispositions; Health psychology testing; Scale development; Confirmatory factor analysis.

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INTRODUCTION

During the past decades, health psychologists have produced an impressive amount of evidence suggesting that individual differences in health-related cognitions and emotions are associated with one's subjective and objective health status (Adler & Matthews, 1994; Van Heck, 1997). Within this framework, many narrow individual difference variables (e.g., self-efficacy, optimism, locus of control, hardiness, etc.), hereafter referred to as Health-Specific Person Fac-

tors (HSPF), have been considered as predictors of both clinical and patient-reported outcomes (Mancuso, Rincon, McCulloch, & Charlson, 2001; Marks & Allegrante 2005; Osterberg & Blaschke, 2005; Zrinyi et al., 2003).

Unlike general personality traits (e.g., the "Big Five" or the "Giant Three"), that were also regarded as predictors of health (Booth-Kewley & Vickers, 1994; Vollrath, Knoch, & Cassano, 1999; Vollrath & Torgersen 2002), the HPSF approach lacked a common structural theory to be used by health researchers to select a parsimonious set of predictors as well as to integrate evidence from different studies. Pragmatically, health researchers included increasingly larger sets of HSPF to improve the prediction of significant health outcomes, but in so doing they traded off an overall better predictive performance of their models with greater redundancy in the predictor set (Carifio & Rodhes, 2002; Hu, McAuley, & Elavsky, 2005; Majer, Jason, & Olson, 2004).

Although factor analyses might have provided health researchers with an empirical strategy to deal with such a redundancy of measures and concepts, factor analytic studies of HSPF have been relatively rare. Despite this, it looks as if a common "core" factor has emerged in most of the studies performed. For instance, Gould (1990) found a general factor that explained the covariance of health consciousness, health alertness, health self-monitoring, and health involvement. Similarly, Walker, Sechrist, and Pender (1987) extracted six first-order factors from a survey assessing both health-specific dispositions and health behaviors (i.e., self-actualization, health responsibility, exercise, nutrition, interpersonal support, and stress management) and uncovered a second-order general factor labeled "health-promoting lifestyle." Likewise, Bernard, Hutchison, Lavin, and Pennington (1996) provided evidence for a single "Health Proneness" factor accounting for the covariance in a set including ego-strength, hardiness, self-esteem, self-efficacy, optimism, and maladjustment. Recently, Erickson, Stapleton, Erickson, Giannokopoulos, and Wilson (2006) tested a hierarchical factor model yielding a higher-order Health-Proneness factor with Adaptability, Self-efficacy, and Subjective well-being as sub-factors.

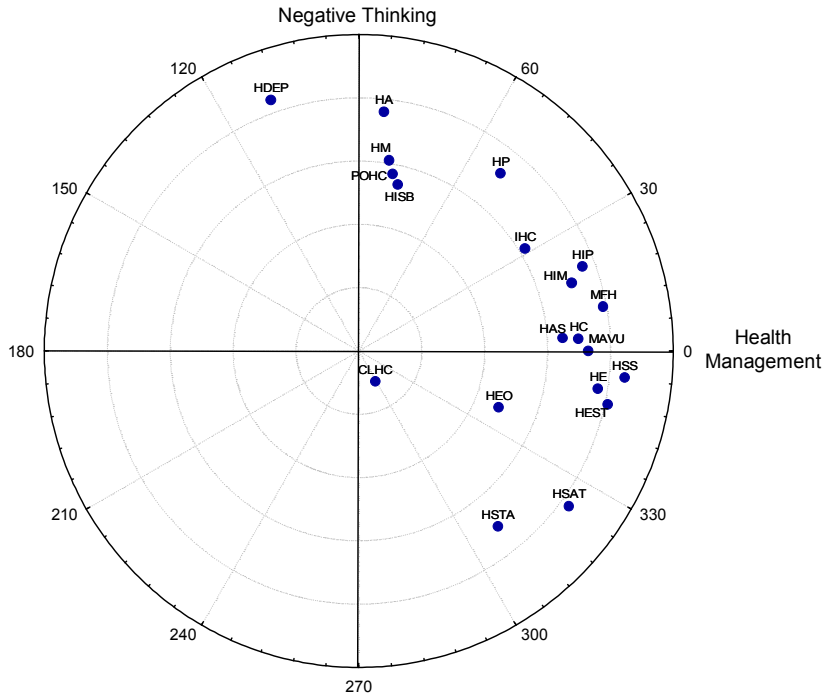
While factor analytic research has advanced our knowledge of HSPF by positing a hierarchical arrangement of specific individual difference variables arrayed below a single general "Health Proneness" factor, this structural model had limited generalizability, due to the lack of a common and representative set of HSPF included in each study. When more extensive sets have been analyzed, a more articulated picture of their factorial structure has emerged. For instance, Lauriola, Laicardi, Artistico, and Baldassarri (2000) showed that a considerable amount of common variance in a large set of HSPF (52%) could be summarized by two broad orthogonal factors.

The first factor, labeled *Health Management*, was mainly defined by health-motivations, health-efficacy, health-consciousness, health-self-schemata, and health-esteem subscales (in decreasing factor loading order), with internal-health control and health-expectations-optimism being less central but still important features of this factor. Consistent with all higher order factors retrieved in the reviewed factor analytic studies of HPSF (Bernard et al., 1996; Erickson et al., 2006; Gould, 1990; Walker et al., 1987), the Management factor represented a sort of *instrumental* component common to many HSPF that were positive predictors of health.

The second factor, labeled *Health Negative Thinking*, not only accounted for covariance among all HSPF tapping into negative affect (e.g., health-depression, health-anxiety, health-preoccupation, and illness-self-blame), but also its opposite pole was loaded by HSPF tapping

into positive affect, such as health-satisfaction, health-status, and health-optimism, but to a lesser extent than the negative affect HSPF did. Hence, the Negative Thinking factor represented an "affective" component that is novel in factor analytic studies of HPSF.

A re-analysis of the Lauriola et al. (2000) factor loading matrix revealed that the geometrical properties of a two-factor space defined by Management and Negative Thinking might be exploited to provide health researchers with a promising model for distinguishing common and distinct aspects of different HSPF (see Figure 1).



Note. CLHC = Chance-Luck Health Control; HA = Health Anxiety; HAS = Health Assertiveness; HC = Health Consciousness; HD = Health Depression; HE = Health Efficacy; HEO = Health Expectations-Optimism; HEST = Health Esteem; HIM = Health Illness Management; HIP = Health Illness Prevention; HISB = Health Illness Self-Blame; HM = Health Monitoring; HP = Health Preoccupation; HSAT = Health Satisfaction; HSS = Health Self-Schemata; HSTA = Health Status; IHC = Internal Health Control; MAVU = Motivation to Avoid Unhealthiness; MFH =. Motivation for Healthiness; POHC = Powerful-Other Health Control.

FIGURE 1
Geometrical representation of Lauriola et al. (2000) factor loading matrix.
Twenty Health-Specific Person Factors have been plotted onto the factor space defined by Health Management and Health Negative Thinking orthogonal dimensions.

For instance, the Health-Expectation-Optimism, Health-Status, and Health-Satisfaction measures share a common "functionally optimistic" view, as these variables are not only low in the Negative Thinking component, but also high in the Management component. Conversely, the Health-Depression measure is a marker of a "dysfunctional-pessimistic" view, as this variable is located in the space defined by low Management and high Negative Thinking. In a different way, the Health-Preoccupation, Health-Depression, and Health-Anxiety scales can be equated on the Negative Thinking dimension, while they cannot be equated on the Management one, with the

Health-Preoccupation, Anxiety, and Depression describing a decreasing trend of Management. Without loss of generality, such geometrical reasoning shows that Optimism, Health-efficacy, and Internal-Health-Control (all positive predictors of health) can be equated on the Management dimension, but not on the Negative Thinking one, with Efficacy being relatively neutral to affect and with Control and Optimism being high and low on the Negative Thinking dimension, respectively.

These are a few examples of the potential utility of using Health Management and Health Negative Thinking dimensions as a classification system for a large number of HSPF that are used as predictors of health in outcome research. However, the assessment of these Management and Negative Thinking components not only requires the extensive use of factor analysis to compute factor scores for each research participant, but also requires research participants to complete a 100-item survey (i.e., the Multidimensional Health Questionnaire, MHQ). As Gosling, Rentfrow, and Swann (2003) recently pointed out, "in an ideal world, personality researchers would have sufficient time and resources to exploit the superior content validity and reliability of well-established multi-item instruments. Unfortunately, circumstances are often not ideal and researchers may be faced with a stark choice of using an extremely brief instrument or using no instrument at all" (p. 505). This may be the case with outcome research conducted on unhealthy individuals or elderly people, where the administration of long surveys has not only been acknowledged as influencing the quality of the collected data, but also recognized as an issue of ethics (Koenig, George, Robins, Stangl, & Tweed, 1994; Ulrich, Wallen, Feister, & Grady, 2005).

To overcome respondent burden as well as effortful computation procedures, we have chosen to develop a new brief health survey comprised of the best factor markers of Health Management and Health Negative Thinking. The goal was not to merely abridge the Multidimensional Health Questionnaire; rather, we aimed to assess individuals' levels of Management and Negative Thinking by direct scoring of their most prototypical factor markers. This short instrument, hereafter referred to as the *Health Management and Affect Profiler (H-MAP)*, was devised to work as a reference "map" for HSPF in keeping with the geometrical approach depicted in Figure 1. Accordingly, we selected a few factor markers by the so-called "Lining-Up Technique" (Perugini & Leone, 1996). Then, we assessed the correlations of the 100 MHQ items with the reference structure depicted in Figure 1, thereby called item projections, in order to identify MHQ items with the highest projection on one of the two MHQ factors and the lowest projection on the other MHQ factor. We then computed a "prototypicality" index[1] (I_p) for each item and sorted them in descending order of I_p. Though a larger number of items could have been selected based on an $I_p > 1.50$, we decided to retain the six most prototypical Management items (average $I_p = 1.65 \pm .04$) and the six most prototypical Negative Thinking items (average $I_p = 1.64 \pm .05$) as a trade-off between optimal scale length and acceptable psychometric properties. Selected items are reported in the Appendix, as they form the current version of the H-MAP.

Based on the assumption that the most prototypical MHQ items may work as efficiently as the whole MHQ in reproducing the reference structure depicted in Figure 1, we expected the new questionnaire to show a sound factorial structure as well as to work as a reliable and valid tool for assessing affect and belief components retrieved in an earlier study of HSPF (Lauriola et al., 2000). The hypothesis about the factorial validity was tested in Study 1, while in Study 2 we aimed to provide additional evidence for concurrent validity with respect to existing personality scales and quality of life assessments.

STUDY 1

CONFIRMATORY FACTOR ANALYSIS OF H-MAP ITEMS

Aims

The main goal of this study was to test the factorial structure of H-MAP items using single- and multi-group Confirmatory Factor Analysis methods. A test of factorial validity is needed because H-MAP items were not selected through standard factor analytic methods, but according to a geometrical approach based on item projections onto a reference structure. A secondary goal of this study was to provide additional insights on the validity of H-MAP factors by examining the association of H-MAP scales with non-health-specific general personality traits, such as the "Giant Three" (Eysenck, 1994). The main research question to be answered was whether, and to what extent, "instrumental" and "affective" belief components measured by the H-MAP overlapped with general personality traits, which were also regarded as predictors of health in the literature (Vollrath et al., 1999; Vollrath & Torgersen, 2002).

Methods

Participants

A large convenience sample of 516 respondents, ranging in age from 21 to 92 years, voluntarily participated in this study. Twenty interviewers, who had received formal training on questionnaire administration, selected eligible participants from among their acquaintances. Inclusion criteria were: being in relatively good health (i.e., never having been admitted to the hospital during the past year nor having been diagnosed with a chronic/degenerative illness), living an independent life (i.e., needing no assistance by caregivers or special devices) and being able to complete paper-and-pencil tests/questionnaires without assistance. The sample comprised 253 men (mean age = 50.89, *SD* = 15.64) and 263 women (mean age = 52.79, *SD* = 16.32). One hundred participants (19%) had a primary school education, 116 (23%) had a middle-school education, 226 (44%) had a high-school degree, and 57 (11%) had a college degree. Seventeen participants (13%) did not disclose their educational level. Besides gender groups, two age groups (220 participants aged under 49 years vs. 296 participants aged over 50 years) and two groups with different educational levels (233 participants with under 8 years of schooling vs. 283 participants with over 8 years of schooling) were also created to perform multiple-group factor analyses by gender, age, and education.

Instruments

Research participants received the H-MAP item set (see Appendix) along with the Eysenck Personality Questionnaire Revised (Eysenck, Eysenck, & Barrett, 1985). As to the H-MAP, the participants' task was to read each item and to rate the extent to which each statement described them-

selves on a five-step Likert-type scale, ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). The Eysenck Personality Questionnaire-Revised (EPQ-R) is a 100-item personality inventory which measures the following three broad dimensions of personality: Extraversion (α = .87, 23 items), Neuroticism (α = .84, 24 items), Psychoticism (α = .72, 32 items). In addition, it presents a Lie Scale (α = .73, 21 items) assessing any tendency to provide socially desirable responses.

Statistical Analyses

The H-MAP two-factor model, with Health Management and Health Negative Thinking as either correlated or uncorrelated factors, was tested by EQS 6.1 (Bentler, 2004). Each latent variable loaded on six items (i.e., no items had path loadings on more than one factor). The Maximum Likelihood Robust Method was used to estimate each model's parameters as the data were not multivariate normally distributed (Mardia's normalized coefficient = 22.60). This method provided us with the Satorra-Bentler Scaled Statistic (S-Bχ^2), which is an adjusted measure of fit that is more accurate than the standard ML chi-square test statistic for non-normal data (Satorra & Bentler, 2001). Because virtually any factor model can be rejected if the sample size is large enough (based on the inspection of the model's chi square statistic), we evaluated the goodness of fit of each model considering both absolute (RMSEA) and comparative fit indices (CFI) in keeping with Hu and Bentler (1999).

The equality of the model's parameters across groups was tested in a logically ordered and increasingly restrictive way. According to Byrne (2006), the initial step required only the same number of factors and factor loadings across groups. This test of *configural* invariance was a multi-group representation of the best fitting model resulting from the whole sample and it postulated that participants belonging to different groups conceptualized the latent constructs in the same way. Results of configural invariance also provided a baseline onto which more constrained (nested) models were compared. More specifically, we carried out a test of *factor-loading* invariance which also assumed that the relations between specific H-MAP items and the underlying constructs were the same across groups. Subsequently, a test of *measurement error* invariance was carried out, in which the item error terms were also constrained to be equal across groups. In the present study, we performed this sequence of tests of invariance based on groups differing in gender, age, and education, which are important determinants of health.

In terms of assessing change in model fit when comparing nested models, $\Delta\chi^2$ is the most common measure. However, given that χ^2 is greatly affected by sample size, this criterion is not considered ideal. Based on simulation studies, Cheung and Rensvold (2002) recommended considering the ΔCFI in the process of comparing nested models, with a ΔCFI larger than .010 indicating rejection of the null hypothesis of invariance, regardless of the $\Delta\chi^2$ value.

Results

Single-group analyses. We started our CFA analysis by testing the less restrictive of two alternative factor models, which is the one with Health Management and Health Negative Thinking as correlated factors. Although this analysis yielded a statistically significant chi square value

(S-Bχ^2 = 170.39, *df* = 53, $p < .001$), the inspection of absolute and comparative fit indices revealed that this model met with the minimum standards for concluding that there was an acceptable fit between the hypothesized model and the data (CFI = .933; CFI/*df* ratio = 3.21; RMSEA = 0.066; RMSEA 90% C.I. = 0.055 to 0.077). The inspection of model parameters indicated that all the items significantly loaded on the appropriate factor (standardized solution reported in Figure 2, Panel A). The inspection of the factor correlation matrix also revealed that the Management factor was weakly but marginally significantly correlated with the Negative Thinking factor (r = .11, $p < .05$). We thus constrained the correlated factor model, setting to zero the covariance of Health Management with Health Negative Thinking, and then compared the constrained model's fit to that of the unconstrained model. Like earlier analysis, the constrained model yielded a statistically significant chi square value (S-Bχ^2 = 174.31, *df* = 54, $p < .001$) and met with standards for concluding that there was an acceptable fit between the hypothesized model and the data (CFI = .932; CFI/ *df* ratio = 3.23; RMSEA = 0.066; RMSEA 90% C.I. = 0.055 to 0.077). The difference between the two models was, however, not statistically significant, assuming α = .01 (ΔS-Bχ^2 = 3.96, *df* = 1, p = .046) and the ΔCFI = .001 was very much below the standard for rejecting the null hypothesis of invariance.

Based on the above evidence, we concluded that the two-factor model with uncorrelated factors provided a parsimonious account of the H-MAP factor structure, as well as an acceptable fit to the collected data. In addition, the inspection of model parameters indicated that the factor loadings for the uncorrelated factor model were virtually the same as for the correlated factor model (standardized solution reported in Figure 2, Panel B), thus making the two alternatives virtually indistinguishable from this point of view. Factor reliability assessed by the ω coefficient resulted in fairly high values for short scales, such as ω=.73 and ω =.81 for Health Management and Health Negative Thinking, respectively.

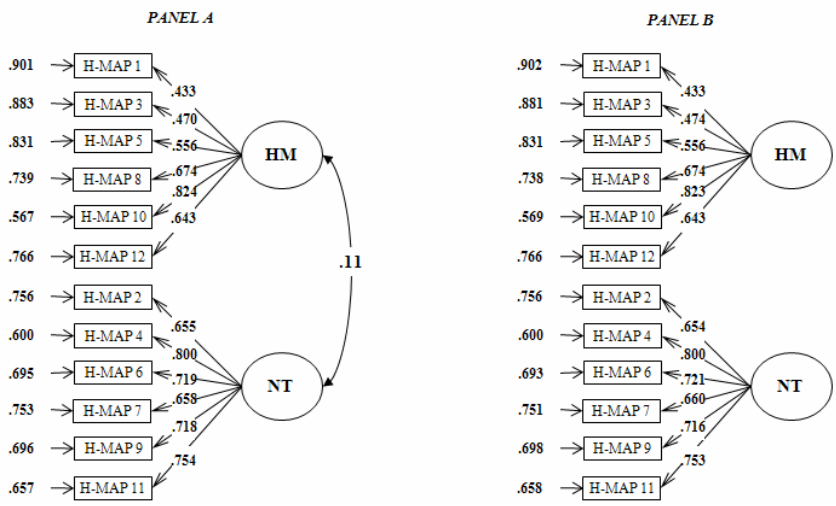


FIGURE 2
Panel A: two-factor model of H-MAP items with correlated factors
(HM = Health Management; NT = Health Negative Thinking).
Panel B: two-factor model of H-MAP items with uncorrelated factors.
Curved arrows represent relations between the latent factors, straight arrows from latent factors to H-MAP items represent factor loadings, straight arrows to H-MAP items represent error variance.

Multi-group analyses. Age, gender, and education are important determinants of one's health. Thus, it was reasonable to expect that representations of Health Management and Health Negative Thinking may change with these socio-demographic variables. This view was partly supported by a descriptive analysis of variance of the factor scores by gender, age (18-40; 41-60; and over 60 years old), and educational level (primary school; middle-school; high-school; and college degree), which uncovered a significant age group difference for Negative Thinking ratings — $F(2, 709) = 8.83$, $p < .01$, $\eta^2 = .08$ — with a monotonic increasing trend of health-related negative affect with age (summated ratings were 4.81, 6.69, and 9.04 respectively for 18-40, 41-60, and over 60 year old people).

TABLE 1
Multi-group factor analysis. Exact and close fit statistics/indices for the Health Management and Affect Profiler

Analysis	Equality assumed	S-Bχ^2	*df*	CFI	RMSEA	CI
Gender						
	Configural	176.65	108	.959	.035	.025-.044
	Configural, Λ	202.55	118	.949	.037	.028-.046
	Configural, Λ, Θ(δ)	217.41	126	.948	.038	.029-.046
Age						
	Configural	183.08	108	.953	.037	.027-.046
	Configural, Λ	202.20	118	.947	.037	.028-.046
	Configural, Λ, Θ(δ)	214.71	126	.948	.037	.028-.045
Education						
	Configural	201.19	108	.943	.041	.032-.050
	Configural, Λ	218.99	118	.938	.041	.032-.049
	Configural, Λ, Θ(δ)	247.98	126	.929	.043	.035-.051

Note. All chi-square measures were statistically significant at the .00001 level. S-Bχ^2 = chi-square with the correction by Satorra and Bentler; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; CI = Confidence Interval of RMSEA.

Because CFA allows for comparing factor models estimated from different groups, we extended our factor analytic study by examining the invariance of the two-factor model with uncorrelated factors by gender, age (under/over 50 years), and education (under/over 8 years). We first tested for the configural invariance of the factor model. The null hypothesis was that both groups associated the same subsets of items with the same psychological constructs. The model's fit was good for multi-group analyses carried out by gender and age, while it was only acceptable for multi-group analysis by education (see Table 1).

Next, we tested for factor loadings invariance, that is, a more restrictive form of invariance in which the null hypothesis is that the relationship between H-MAP items and their underlying constructs is the same for both groups. The model's fit was acceptable for all multi-group analyses (see Table 1). Because the model positing factor loadings equality was nested in the model positing configural equality, we tested whether each of the nested models resulted in a significantly worse fit than the configural invariance models. This test was statistically significant

for the comparison involving different gender groups (S-Bχ^2 = 39.06, *df* = 10, $p < .001$), while other comparisons were not statistically significant for both age (S-Bχ^2 = 22.30, *df* = 10, $p = .014$) and education (S-Bχ^2 = 16.65, *df* = 10, $p = .080$), assuming $\alpha = .01$ and $\alpha = .05$, respectively. In all cases, we obtained ΔCFI values less than or equal to .010, indicating that the null hypothesis of factor loading invariance could not be rejected (Cheung & Rensvold, 2002).

Finally, we added the constraint of measurement errors equality to that of factor loadings equality. The fit indices were again acceptable for gender, age, and education multi-group analyses (Table 1). The comparison of nested models yielded significant results for education (S-Bχ^2 = 30.39, *df* = 8, $p < .001$), while other comparisons were not statistically significant for age (S-Bχ^2 = 10.80, *df* = 8, $p = .211$) and gender (S-Bχ^2 = 16.18, *df* = 8, $p = .04$), assuming $\alpha = .05$ and $\alpha = .01$, respectively. Again the inspection of the ΔCFI value indicated that the null hypothesis of invariance could not be rejected in all analyses.

In summary, the H-MAP two-factor structure showed an acceptable degree of invariance across age, gender, and education, which are important determinants of one's health status. These results corroborated those obtained for single group analyses and strongly supported the factorial validity of the H-MAP questionnaire.

H-MAP factors and general personality traits. A secondary goal of this study was to explore possible associations of Health Management and Health Negative Thinking with the "Giant Three" personality factors that were also regarded as predictors of health in the literature. To attain this goal, each of the two H-MAP factors was set as the dependent variable in a standard regression analysis, with Psychoticism, Extraversion, Neuroticism, and Lie scores serving as independent variables. The "Giant Three" significantly predicted the Management factor ($F = 7.87$, *df* = 4, $p < .01$) but the effect size was quite limited ($R^2 = .04$; Adj $R^2 = .03$). Likewise, the inspection of standardized regression coefficients revealed that the Management factor was weakly and positively associated with Extraversion ($\beta = .19$, $t = 5.35$, $p < .01$) and Neuroticism ($\beta = .10$, $t = 2.65$, $p < .01$). These findings supported the view that Health Management, which represented the "instrumental" belief component of the H-MAP, shared very little common variances with general personality traits. The regression analysis of Negative Thinking on the "Giant Three" was also statistically significant ($F = 37.14$, *df* = 4, $p < .01$), but unlike earlier analysis, the effect was of a moderate size ($R^2 = .16$; Adj $R^2 = .16$). The inspection of standardized regression coefficients revealed that Neuroticism ($\beta = .35$, $t = 10.19$, $p < .01$) was the best predictor of Negative Thinking, with Extraversion providing a more limited contribution to the prediction ($\beta = -.13$, $t = -3.88$, $p < .01$). These findings supported the view that the Negative Thinking factor, which represented the "affective" belief component of the H-MAP, was related to a dispositional enduring tendency to experience negative emotional states. Interestingly, both regression analyses showed that H-MAP factors were not affected by any participants' tendency to provide socially desirable responses, as there was no statistically significant effect of Lie on both H-MAP factors.

In summary, Study 1 provided us with the following major findings: 1) the H-MAP had a sound factorial structure as well as an acceptable degree of invariance across gender, age, and education groups; 2) H-MAP factor scores were relatively independent from general personality traits and free from social desirability bias; 3) respondents' gender and education did not affect H-MAP ratings, while age group differences affected Negative Thinking ratings, but only to a limited extent.

STUDY 2

CONCURRENT VALIDITY OF H-MAP FACTORS

Aims

Concurrent validity is demonstrated if test scores are properly correlated with similar measures that have been already validated. Consistently, the main goal of this study was to complete the H-MAP validation process by testing the association of H-MAP factors with well-established external criteria that were not included in previous studies of the Multidimensional Health Questionnaire. To attain this goal, we designed a study in which the H-MAP was administered along with Generalized Self-Efficacy and Health-Locus of Control as markers of instrumental beliefs, and of Depression and Hypochondria as markers of affective beliefs. We expected Health Management and Health Negative Thinking to be properly correlated with each class of beliefs. Furthermore, we added the Life Orientation Test to a set of concurrent instruments, under the hypothesis that optimistic self-beliefs might be associated with both H-MAP factors, as was predicted by the model depicted in Figure 1. As a secondary goal of this study, we explored the association of H-MAP factors with the SF-36, which is a well-established measure of Health-Related Quality of Life widely used in health outcome research. We expected that individual difference in "instrumental" and "affective" belief components may account for a significant amount of variance in self-reported health outcomes.

Methods

Participants

A convenience sample of 299 Italians, ranging in age from 21 to 92 years, voluntarily participated in our study. Recruiting procedures and admission criteria were the same as in Study 1. The sample comprised 154 men (mean age = 53.5; *SD* = 15.4) and 145 women (mean age = 52.1; *SD* = 15.8). Seventy-two participants (24%) had a primary school education, 90 (30%) had a middle-school education, 101 (34%) had a high-school degree, and 36 (12%) had a college degree.

Instruments

All research participants completed the H-MAP (see Appendix). We assessed the internal consistency of Management and Negative Thinking composite scores that are more likely to be used by health researchers than factor scores to assess respondents' health profiles. Cronbach's alpha coefficients were .71 and .81, respectively, for Management and Negative Thinking. H-MAP composite scores not only met the required psychometric standard of internal consistency for short scales (cf., Carmines & Zeller, 1991), but also reproduced quite well the Omega reliability coefficients assessed in Study 1.

Participants were then randomly assigned to two experimental conditions, which did not differ statistically for the distribution of gender, age, and education. About half of the participants

(subsample A, n = 140) completed: a) the Beck Hopelessness Scale (Beck, Weissman, Lester, & Trexler, 1974), b) the Generalized Self-Efficacy Scale (Schwarzer, 1992), and c) the Life Orientation Test (Scheier, Carver, & Bridges, 1994). The Beck Hopelessness Scale (BHS) is a 20-item self-report inventory designed to measure one's overall level of hopelessness (α = .78) by obtaining scores on its three major aspects (feelings about the future, loss of motivation, and negative expectations). The Generalized Self-Efficacy Scale (GSE) is a 10-item psychometric scale that is designed to provide a single summated rating (α = .83) of optimistic self-beliefs to cope with a variety of difficult demands in life. In contrast to other similar scales assessing optimistic beliefs, this one explicitly refers to the sense of personal agency (i.e., the belief that one's actions are responsible for successful outcomes). The Life Orientation Test-Revised (LOT-R) is a six-item measure of dispositional optimism, comprising items which require either affirmation of optimism or disaffirmation of pessimism. Though it provides a single score, with higher values implying higher dispositional optimism, we computed separate subtotals for affirmation of optimism (α = .65, three items) and affirmation of pessimism (α = .68, three items).

The other half (subsample B, n = 159) completed: a) the Multidimensional Health Locus of Control Scales (Wallston, Wallston, & DeVellis, 1978), b) the Illness Attitude Scale (Ferguson & Daniel, 1995), and c) the SF-36 Health Survey (Ware, 1993). The Multidimensional Health Locus of Control (MHLC, Form A) is an 18-item scale which provides three composite scores of Internality (α = .69, six items), Powerful Others Externality (α = .74, six items), and Chance-Luck Externality (α = .66, six items). The Illness Attitude Scale (IAS) was devised to assess hypochondria and abnormal illness behavior. It has a four-factor structure and provides scores for General Hypochondria (α = .82, 12 items), Symptom Experience and Frequency of Treatments (α = .78, seven items), Thanatophobia (α = .70, four items), and Fear of Coronary Heart Disease and Associated Preventative Health Habits (α = .54, four items). Finally, the SF-36 is a multi-purpose health survey with only 36 questions. It yields eight composite scores, namely Physical Functioning (α =.79, 10 items), Role-Physical (α = .75, four items), Role-Emotional (α = .75, three items), Bodily Pain (α = .75, two items), General Health (α = .77, five items), Vitality (α = .69, four items), Social Functioning (α = .56, two items), and Mental Health (α = .76, five items). The SF-36 composite scores were coded so that higher scores corresponded to worse perceived health.

Statistical Analyses

Validity coefficients for H-MAP factors were calculated as Pearson's correlations of Health Management and Health Negative Thinking with the following concurrent measures: Beck Hopelessness scale — Total score; Life Orientation Test — Optimism and Pessimism scores; Generalized Self Efficacy — Total score; Multidimensional Health Locus of Control — Internal, External, and Chance-Luck Health Control; Illness Attitude Scale — General Hypochondria, Thanatophobia, Symptoms Perception, and CHD-related Habits.

Results

As expected (see Figure 3), the H-MAP Management scale was statistically associated with the Generalized Self-Efficacy scale (r = .31, p < .01) and with the Internal Health Control

scale (r = .52, p < .01), while the correlation of Management with the LOT-Optimism score was only marginally statistically significant (r = .13, $p \approx$ .12). People scoring high on Management were not only more likely than people scoring low on this dimension to believe that control of their future health outcomes resided primarily in oneself, but they also reported more optimistic self-belief that one's actions were responsible for successful outcomes, including health ones. This finding provided support for the validity of the H-MAP Management dimension as the "instrumental" component common to many HSPF that are positive predictors of Health.

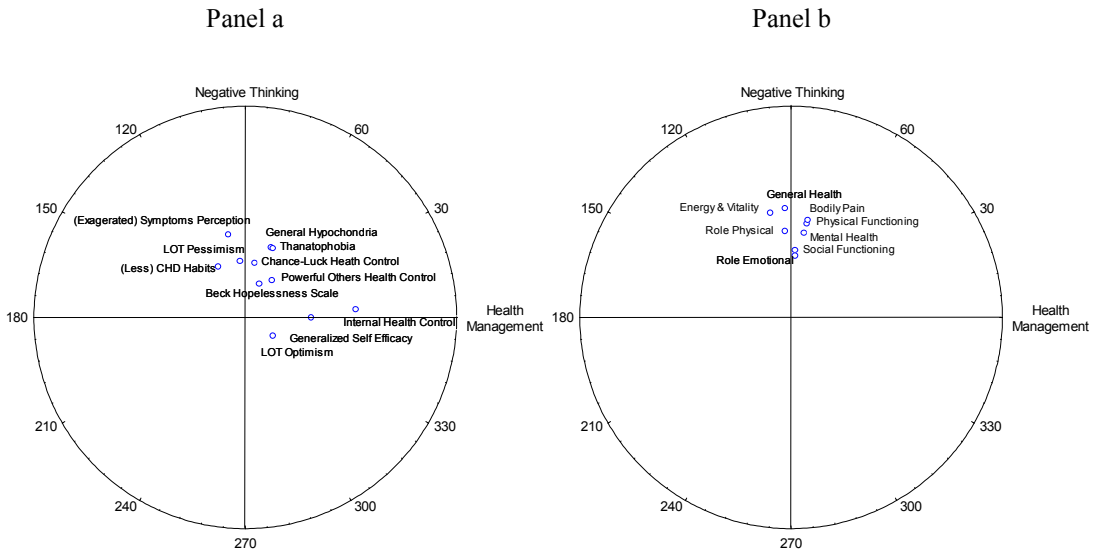


FIGURE 3
Geometrical representation of correlations.
Health-specific person factors (Panel a) and SF-36 health-related quality of life indicators (Panel b) have been plotted onto the factor space defined by Health Management and Health Negative Thinking orthogonal dimensions.

In keeping with our hypothesis (see Figure 3), the H-MAP Negative Thinking scale was properly associated with the Beck Hopelessness Scale (r = .16, $p \approx$ .06) and with the LOT-Pessimism score (r = .27, p < .01), as well as with the Illness Attitude Scale scores. In particular, people scoring higher on H-MAP Negative Thinking reported greater general Hypochondria (r = .33, p < .01), Thanatophobia (r = .33, p <. 01), and exaggerated symptoms perception (r = .39, p < .01), along with less CHD-related habits (r = .24, p < .01). In addition to these findings, which strongly supported the validity of Negative Thinking as the "affective" belief component, which is novel in factor analytic studies of HPSF, our analysis revealed significant correlations of Negative Thinking with the Multidimensional Health Locus of Control – Chance-Luck (r = .26, p < .01) and External-Powerful Others Control sub-scales (r = .18, p < .05). People scoring high in Negative Thinking were more likely than people scoring low in this dimension to believe that control of their future health outcomes depended primarily on powerful individuals (e.g., physicians or other health professionals) as well as on luck, fate, or chance. This finding was in keeping with the geometrical approach depicted in Figure 1, predicting that external types of perceived health control are independent from one's perceived management of health. Unlike in Figure 1, the Chance-

Luck health control was positively associated with Negative Thinking in this study, while this variable was not loaded by the Negative Thinking Factor in Lauriola et al. (2000).

Along with the main hypotheses concerning the concurrent validity of H-MAP dimensions, we explored the possible association of Management and Negative Thinking with the SF-36. The analysis showed that only the "affective" belief H-MAP scale was associated with both Physical and Mental Health SF-36 indicators. As to self-reported physical health, the coefficients were $r = .44$, $r = .41$, $r = .46$, and $r = .52$ with Physical Functioning, Role Limitations-Physical, Bodily Pain, and General Medical Health, respectively (all ps $< .01$). As to self-reported mental health, the coefficients were $r = .50$, $r = .32$, $r = .29$, and $r = .52$ with Energy and Vitality, Social Functioning, Role Limitations-Emotional and Mental Health, respectively (all ps $< .01$). Considering that the present study excluded people admitted to the hospital during the previous year or diagnosed with a chronic/degenerative illness, people not living an independent life and/or being unable to fill in questionnaires without special assistance, we can rule out the explanation that people with health problems also exhibit a health distress reaction, which is measurable in terms of increased health anxiety and depression (Stewart, Hays, & Ware, 1992). Alternatively, it seems more likely that negative affective states are more strongly associated with symptom-reporting than with objective health status (Costa & McCrae, 1985; Watson & Pennebaker, 1989).

Discussion

In this paper, we set a series of goals concerning the construction and validation of the *Health Management and Affect Profiler* (H-MAP), a short questionnaire assessing "instrumental" and "affective" belief components that are common to many Health-Specific Person Factors (HSPF). Our goals were to develop a short survey with sound factorial structure, reliability, and validity for use in health research. Based on the results of two independent studies, our objectives were met.

First of all, the H-MAP shows a remarkably sound factorial structure. A confirmatory factor analysis yields a clear two-factor structure in keeping with the hypothesized item-scale relations. Although the two-factor model with correlated factors result in a slightly better fit than the model with uncorrelated factors, the difference between the two models is not statistically significant. Furthermore, the H-MAP factor model with uncorrelated factors shows an acceptable degree of invariance by age, gender, and education when multiple-group analyses are performed.

Unlike general personality traits (e.g., the so-called "Giant Three"), which were also regarded as predictors of health, the HPSF approach has so far lacked a common structural theory. We have rejected the hypothesis that H-MAP factors can be equated to general personality traits. Despite our results showing that the Management component is weakly associated with some of the "Giant Three" such as Extraversion and Neuroticism, while Negative Thinking is moderately associated with Neuroticism and weakly associated with Introversion, a set of regression analyses reveal that the "Giant Three" only accounts for about 4% of individual differences in Management and approximately 16% of individual differences in Negative Thinking. In addition, H-MAP ratings are also relatively free from social desirability biases, and affected by participants' demographics and education only to a very limited extent. Hence, these results show that H-MAP factors are relatively independent from general personality traits and therefore provide an addi-

tional contribution to the prediction of health outcomes in studies of personality and health (Vollrath et al., 1999; Vollrath & Torgersen, 2002).

An additional feature of the H-MAP is that it is rather short compared to existing comprehensive health inventories (e.g., the Multidimensional Health Questionnaire) or to ad hoc collections of health-related scales routinely administered in health studies. This characteristic makes the H-MAP easy and quick to administer and to complete. Although reduced questionnaire length often results in poor reliability indices, the coefficients obtained for the H-MAP factors have met accepted conventions. In particular, reliability coefficients estimated with different methods (i.e., Omega and Alpha) on an independent sample of respondents result in fairly high values for short scales. These findings not only provide support for our general goal of developing a reliable instrument, but also reinforce the view that a short questionnaire like the H-MAP may work as efficiently as long health surveys in the assessment of "common" health-related variance. In addition, using the H-MAP as a part of health studies is likely to decrease respondent burden, which has been recently acknowledged as an issue of ethics in research conducted on special populations, such as unhealthy individuals (Ulrich, Wallen, Feister, & Grady, 2005).

Finally, the concurrent validity of H-MAP scales was tested with positive results by taking into account both general personality traits (i.e., the "Big Three") and well-established measures of Health-Specific Person Factors, such as the Multidimensional Health Locus of Control scales, the Generalized Self-Efficacy Scale, the Life Orientation Test, the Illness Attitude Scale, and the Beck Hopelessness Scales. Our results reveal that H-MAP ratings are not only relatively independent from general personality traits, thus providing additional person variance to the prediction of health outcomes, but are also properly associated with well-established and widely used measures of Health-Specific Person Factors that were not included in previous studies of the Multidimensional Health Questionnaire (Lauriola et al., 2000).

As expected, Health Management is positively correlated with Internal Health Control, Generalized Self-Efficacy, and Optimism, all positive predictors of health. These findings are not only consistent with earlier factor analytic studies revealing a general "Health Proneness" factor common to all HSPF associated to positive health outcomes (Bernard et al., 1996; Erickson et al., 2006; Gould, 1990; Walker et al., 1987), but they also support the hypothesis that the H-MAP Management factor besides tapping into internal health control beliefs, also encompasses more general positive beliefs about the self, similar to those retrieved by Judge, Erez, Bono, and Thoresen (2002) in the personality domain. Furthermore, these findings are in keeping with the view of Smith, Wallston, and Smith (1992), who combined outcome (i.e., efficacy) and behavioral (i.e., control) expectancies in a single "domain-specific measure of the degree to which an individual feels capable of effectively managing his or her health outcomes" (p. 51).

Based on our findings, we can also conclude that Negative Thinking exhibit a consistent set of positive correlations with all criteria instruments measuring negative affective states. There is extensive evidence that negative affective states are related to health outcomes; however, different explanations have been provided for this association. Some (Costa & McCrae, 1985; Watson & Pennebaker, 1989) regard negative affect as being more strongly associated with symptom reporting than with objective health status. Our studies with reasonably healthy individuals observe that the Negative Thinking scale is positively correlated with the exaggerated symptoms perception of the Illness Attitude Scale and bodily pain and with all composite scores from the SF-36 health profile. These findings support not only the validity of the scale, but also the "health

complaints" hypothesis, which views negative affect as a general nuisance factor in health research.

To conclude, although this is not a complete validation study, because all analyses were based on convenience samples, we believe that our construction and validation procedures provide evidence that the H-MAP is a valid and reliable assessment tool that yields scores on independent "instrumental" and "affective" health beliefs factors that explain variance in HSPF. These characteristics make the H-MAP useful for summarizing (in a single brief assessment) the individual differences usually measured by several correlated health scales. These features also make the H-MAP particularly promising for characterizing health profiles of individuals that are either functional (e.g., high Management and low Negative Thinking) or dysfunctional (e.g., low Management and high Negative Thinking). Indeed, investigating such profiles is a next step in our research program.

NOTE

1. According to Perugini and Leone (1996), the Index of Prototypicality is calculated as follows: $Ip = 1 - \left[\frac{\left(C - P_p^2\right)}{C}\right] + P_p$ $I_p = 1 - \left[\frac{C - P_p^2}{C}\right] + P_p$, where C is the sum of the squared projections of the MHQ items on the two MHQ factors, and P_p is the primary (i.e., the largest) projection of the item p.

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APPENDIX

The Health-Management and Affect Profiler Factor Markers

Italian version

			Fortemente in disaccordo	*In disaccordo*	*Né in accordo, né in disaccordo*	*D'accordo*	*Fortemente in accordo*
HM	1.	Sono io l'unico responsabile della mia salute	☐0	☐1	☐2	☐3	☐4
HNA	2.	Sento che potrei ammalarmi seriamente da un momento all'altro	☐0	☐1	☐2	☐3	☐4
HM	3.	Il mio stato di salute fisica dipende in gran parte da ciò che faccio (e non faccio)	☐0	☐1	☐2	☐3	☐4
HNA	4.	Sento che la mia salute fisica è in continuo peggioramento	☐0	☐1	☐2	☐3	☐4
HM	5.	Stare in buona forma fisica è frutto del mio impegno e delle mie capacità	☐0	☐1	☐2	☐3	☐4
HNA	6.	Sono scontento della qualità della mia salute.	☐0	☐1	☐2	☐3	☐4
HNA	7.	Sono scontento del mio stato di salute fisica	☐0	☐1	☐2	☐3	☐4
HM	8.	Durante una malattia, quello che faccio determina la mia guarigione	☐0	☐1	☐2	☐3	☐4
HNA	9.	Probabilmente in futuro avrò dei problemi di salute gravi	☐0	☐1	☐2	☐3	☐4
HM	10.	Guarire da una malattia dipende in gran parte da quello che faccio in prima persona	☐0	☐1	☐2	☐3	☐4
HNA	11.	Mi sento triste quando penso al mio stato attuale di salute	☐0	☐1	☐2	☐3	☐4
HM	12.	Se fossi malato la mia guarigione dipenderebbe dal modo in cui affronto il problema	☐0	☐1	☐2	☐3	☐4

English version

			Strongly disagree	*Disagree*	*Neither agree nor disagree*	*Agree*	*Strongly agree*
HM	1.	I am personally responsible for my health	☐0	☐1	☐2	☐3	☐4
HNA	2.	I feel that I could become seriously ill at any moment	☐0	☐1	☐2	☐3	☐4
HM	3.	My health status depends to a great extent on what I do (or do not do)	☐0	☐1	☐2	☐3	☐4
HNA	4.	I feel that my health is continuously getting worse	☐0	☐1	☐2	☐3	☐4
HM	5.	Staying healthy is the fruit of my labor	☐0	☐1	☐2	☐3	☐4
HNA	6.	I am disappointed in the quality of my health	☐0	☐1	☐2	☐3	☐4
HNA	7.	I am disappointed in my health status	☐0	☐1	☐2	☐3	☐4
HM	8.	When I am sick, what I do affects the outcome of my illness	☐0	☐1	☐2	☐3	☐4
HNA	9.	In the near future I will probably have serious health problems	☐0	☐1	☐2	☐3	☐4
HM	10.	Recovering from an illness depends to a great extent on what I do	☐0	☐1	☐2	☐3	☐4
HNA	11.	I feel sad when I think about my current health status	☐0	☐1	☐2	☐3	☐4
HM	12.	If I were ill the outcome would depend on how I cope with the illness	☐0	☐1	☐2	☐3	☐4

Note. HM = Health Management; HNA = Health Negative Affect.