

Positive–Negative Evaluation (PNE) scale: A new dimension of the subjective domains of quality of life measure

M. Amir,* D. Bar-On and R. Penso

Department of Behavioural Sciences, Ben-Gurion University of the Negev,
Beer-Sheva, Israel

A new subjective measure of Quality of Life (QOL), the Subjective Domains of Quality of Life Measure (SDQLM), developed by Bar-On and Amir,¹ is a qualitative and quantitative self-structured method shown to have internal reliability and construct validity compared with quantitative pre-structured measures and evaluations by spouses and physicians. To earlier analyses on a sample of male hypertensives and normotensives, we added a content analysis which is reported here, in which the elicited QOL domains were assessed according to whether the respondent evaluated his QOL domains as positive, negative or neutral/mixed. The content analysis showed that respondents may be classified on a continuous scale from stable positive to stable negative evaluations of their QOL domains (before–after measurement). The scale was assembled by ordinal ranging of the answers at two points in time (one year apart). A respondent who evaluated his domain as positive at both such points was ranked highest on the scale, negative at both points the lowest and the two remaining possibilities constituted the middle range. Analysis of the data showed that the SDQLM with this additional content analysis correlated significantly with depression scale scores, sexual functioning, physical fitness, work satisfaction, quality of sleep, hardiness, education and age, as well as individual self-rating of QOL. The subjective measure based on self-elicited domains with PNE was shown to be an important construct compared with pre-structured measures of QOL.

Key words: Hypertension; positive-negative evaluation (PNE); quality of life; subjective domains of QOL.

We wish to express our gratitude to Dr. A. Loidl and Sandoz-Pharma, Basel, for their support that enabled this study to take place.

* To whom correspondence should be addressed at Department of Behavioural Sciences, Ben-Gurion University of the Negev, PO Box 653, 84105 Beer-Sheva, Israel; Fax: +972-747-2930; Tel: +972-746-9382.

Introduction

Despite its problematic aspects, QOL is gaining popularity as an outcome measure in clinical trials.² In many areas of medicine, the patient's point of view, as measured by QOL, has become an important source of information for the medical staff. A health outcome has come to mean the extent to which a change in a patient's behavioural functioning or well-being meets that patient's needs or expectations.³ However, most measures of QOL, such as the Nottingham Health Profile⁴ or the Sickness Impact Profile,⁵ are pre-structured and as such do not allow for the individual patient to express his/her idiosyncratic preferences regarding what is most important in his/her life.^{6,7} Such measures imply that QOL means the same to everyone and may be defined in general terms accordingly. Furthermore, the questionnaires are often distributed among populations different from the one on which the instrument was developed.⁸

The phenomenological approach to assessment of QOL⁹ stresses the importance of the individuals subjective evaluation of his/her QOL and allows individuals to define their respective important domains and functioning therein. Respondents are free to answer as they choose, allowing expression of specific preferences without pre-structured suggestions that might be completely irrelevant to the individual or social context. Moreover, the pre-structured questionnaires did not emphasize family issues that were found to be of major importance in open-ended questionnaires, especially among older persons.¹⁰ These observations, together with data showing that a patient's self-assessment of QOL is very different from evaluations by third parties, such as spouse and physician,^{11,12} suggest a need for development of measures that allow individuals to select their own priorities. The Schedule for the Evaluation of Individual Quality of Life (SEIQOL)^{6,13}

is a method developed to obtain subjective QOL data, based on Judgment Analysis, in which respondents elicit the domains of life to which they accord prominence, and domains are subsequently weighted relative to one another. The Repertory Grid, based on Kelley's Personal Construct Psychology and developed by Thunedborg *et al.*,⁸ is another example of a method for eliciting free choice of individual priorities. The Subjective Domains Quality of Life Measure—SDQLM—is a combined qualitative and quantitative self-structured method shown to have both internal reliability and construct validity¹ compared with quantitative pre-structured measures and evaluations by patients, spouses and physicians. We proceed to examine a product of the content analysis in which the elicited QOL domain was assessed according to whether the respondent expressed positive, negative or neutral/mixed evaluations of his/her subjective QOL domains. The primary purpose of the present analyses was to determine the value of this additional qualitative dimension to the open-ended QOL measure and assess its validity against other pre-structured conventional QOL measures. The data reported here constitute part of the results of a multicentre, double-blind study to compare qualitative and quantitative QOL measures taken before and after a one-year regimen of various anti-hypertensive medications (including placebos) and with results obtained from a sample of normotensives.

Methods

Subjects

Three hundred and sixty-eight mild hypertensive male outpatients and 257 male normotensives matched for age and level of education, aged 40–65 [average age=52.14 (sd=7.70) for hypertensives and 51.66 (sd=4.92) for normotensives] with a median educational level of 10–12 years of formal schooling.

Instruments

SDQLM

In a semi-structured interview, each subject was asked to define three domains and rank them in order of importance, indicating which he believed was the most significant aspect of his QOL. For each domain, the subject was asked to indicate his subjective assess-

ment of qualitative optimal and dysfunctional levels, in his own words. For example, if a respondent listed family as one domain, the optimal level could be higher education for all his children and the dysfunctional level might be a drug problem with one or more of his children. The subject was then asked to indicate his current functioning level and rank it relative to the optimal and dysfunctional extremes on a scale of 1–6, respectively. We then conducted a content analysis on the subjects definitions of current functioning level in all three domains, ascertaining whether said domains were described positively (I have a wonderful family that I'm proud of), negatively (I am terribly worried about my younger daughter) or in a neutral or mixed manner (my children are grown up and my wife works part-time) way. Content analysis was accomplished by two graduate psychology students, with an interjudge reliability of 0.84. The current functioning level of the SDQLM as assessed by the subject was found to demonstrate systematic reliability and construct validity (see Bar-On and Amir¹ for an extensive description of psychometric properties) and shown to have significant negative correlations with physical, sexual and sleep dysfunctions ($r = -0.22$, $r = -0.22$ and $r = -0.25$, respectively) and with depression scores ($r = -0.51$), as well as positive correlations with measures such as hardiness ($r = 0.20$). In other words, patients ranking end-of-year functioning level closer to the optimal level displayed fewer physical problems, less depression and more hardiness.

Pre-structured QOL Measures

Israeli PERI life event scale: This scale is an adaptation of Holmes and Rahe's Social Readjustment Rating Scale,¹⁴ translated into Hebrew and adapted for Israel by Carmel.¹⁵ Two additional facets were included in the present study, desirability and controllability, following Rhodewalt and Agustdottir.¹⁶ Subjects reported both recent (RLE) and past (PLE) critical life events.

Physical, sleep and sexual dysfunctioning: An eleven-item questionnaire was developed, following Jenkins,¹⁷ in which the subject was required to rate each item according to the number of days in the previous month on which the dysfunction was observed. Subjects were also asked to indicate how many hours they sleep at night, the frequency of their sexual relations and the intensity of their physical activity. Earlier factor analyses displayed the expected three factors (physical, sleep and sexual). Their internal

reliability, measured by Cronbach's α , was found to be significant in both measurements (0.70, 0.62 and 0.77, respectively, in the first and 0.64, 0.51 and 0.77 in the second). All factorial scores were standardized.

Depression: Lubins mood scale¹⁸ was used as a measure of depression. Subjects were presented with 34 adjectives relating to mood and overall feelings and were asked to indicate those most appropriate at the time of completing the questionnaire. The questionnaire was translated and validated in Hebrew by Lomeranz *et al.*^{19,20}

Hardiness: Kobasas original 50-item questionnaire²¹ was used, translated and validated in Hebrew by Lev.²²

Stress at workplace: A questionnaire based on Frankenhauser and Gardell²³ was developed, in which subjects were asked to assess various stressful aspects at the workplace on a 13-item scale. This questionnaire was translated for the present study and earlier analyses demonstrated its reliability and validity.¹

Semantic memory: Following Weingartner *et al.*,²⁴ an experimental laboratory method was used to measure this higher mental function. Subjects were asked to name as many vegetables as they could within a time limit of sixty seconds and as many musical instruments they could recall within an additional sixty second period.

Design

Hypertensives were selected from nine clinics selected to represent the major geographical regions of Israel and were randomized into three treatment groups (Methyldopa, Isradipine, and placebo), while normotensives were recruited from various major factories and other workplaces in the south of Israel, according to various criteria (for a detailed description of the study's medical design, see Yodfat and Cristal).²⁵ QOL assessment was conducted at baseline and after twelve months by trained interviewers.

Data analysis

Differences between groups were analyzed with analysis of variance, using Schaeffe's comparisons and χ^2 when appropriate. Pearson's correlation coefficient was used between the PNE Scale and the QOL measures. Regression analysis was performed with the

PNE Scale, demographic variables and pre-structured QOL measures.

Results

Domains chosen by hypertensives and normotensives

Our first inquiry sought to determine whether there were any differences in the respective domains chosen by hypertensives and normotensives. Table 1 indicates the percentages of the two groups selecting the various domains as their first and subjectively most important choice.

The family category relates to family issues, such as relationship with spouse or family life in general, children refers specifically to the children in the family (sometimes even one specific child) and miscellaneous covers such diverse topics as finances, the political situation, leisure activity etc., all placed into one category because no single topic was represented by more than 2%. Table 1 shows that the domain most frequently chosen by both groups relates to family issues (about half of each group if the children category is considered family-related as well). The groups differ in their selection of health, an issue of substantially greater significance to the hypertensives. Miscellaneous, in contrast, is more frequently selected by normotensives.

We divided the entire sample into two age groups, 40–52 and 53–65, to assess distribution of first-choice QOL domain. The difference between the two groups was significant ($\chi^2=18.22$, $df=4$, $p < 0.001$): the family category was chosen more often among the younger group, whereas children and health were more prominent among the older one.

Table 1. Frequency of domains chosen as most important by the groups at the first evaluation

Domain	Hypertensives (n=367)	Normotensives (n=257)
Family	157 (43%)	114 (44%)
Children	37 (10%)	17 (7%)
Work	48 (13%)	38 (15%)
Health	88 (24%)	40 (16%)
Miscellaneous	37 (10%)	48 (19%)

Difference between hypertensives and normotensives significant at $p < 0.01$ ($\chi^2=16.06$, $df=4$)

Table 2. Frequency of the four evaluation groups among hypertensives and normotensives

First Evaluation—Second Evaluation	Hypertensives (n=216)		Normotensives (n=165)	
	n	%	n	%
1. Positive—positive (PP)	105	48.6	119	72.1
2. Negative—positive (NP)	28	13.0	22	13.3
3. Positive—negative (PN)	42	19.4	15	9.1
4. Negative—negative (NN)	41	19.0	9	5.5

Table 3. ANOVA of the four PNE categories with education and certain QOL variables

	PP (n=105) x (sd)	NP(n=28) x (sd)	PN(n=42) x (sd)	NN(n=41) x (sd)	f	Significance* (p<0.05)
Depression†	6.85 (4.06)	7.82 (5.74)	8.09 (4.51)	12.97 (6.99)	13.45	NN # PP, NP, PN
Sexual dysfunction†	-0.05 (0.80)	0.06 (0.76)	0.12 (0.86)	0.69 (1.11)	6.64	NN # PP, NP, PN
Physical fitness	0.13 (0.76)	0.02 (0.78)	-0.44 (0.91)	-0.43 (0.96)	6.77	PP # NN, PN
Current functioning‡	1.84 (0.89)	3.40 (1.32)	2.67 (1.42)	3.93 (1.35)	37.17	PP # NN, PN, NP
Education	12.20 (3.18)	12.70 (3.29)	11.58 (3.29)	9.92 (2.53)	6.00	NN # NP, PP

*Schaeffe's comparisons

†Lower value indicates better QOL

‡Measured according to self-evaluation of current functioning level on the SDQOL

PNE

Besides the domain selected as constituting QOL, we analyzed the positive, negative and neutral/mixed evaluations of the current level of the specific domain (see *Methods*, above). As a mixed/neutral evaluation was selected infrequently (7% among hypertensives and 4% among normotensives), we proceeded to analyze only evaluations that were clearly positive or negative. Each individual was assessed according to evaluation of the first QOL domain as positive or negative at both assessment points (12 months apart), yielding four groups: positive–positive, negative–positive, positive–negative and negative–negative. Table 2 displays the frequency of the four evaluation categories for the hypertensives and the normotensives.

The difference between the hypertensives and the normotensives was significant ($\chi^2=28.34$, $p<0.001$, $df=3$). As most normotensives were concentrated in one category (positive–positive), we continued the analysis with the hypertensives only.

Table 3 indicates the means and standard deviations for a selection of QOL variables and education for the four categories among hypertensives only.

Table 3 reveals that respondents who expressed a stable positive evaluation at both times differ significantly from those recording stable negative evaluations regarding depression scores, sexual

dysfunction, physical fitness and current functioning in first QOL domain, as well as education. The former are less depressed, function better sexually, are more physically fit, perceive their current functioning more optimistically and are better educated. The intermediate levels do not all differ significantly from one another, but the rank order is almost the same in all the measures showed above. In other words, QOL values improve as one proceeds from negative–negative through positive–negative and negative–positive evaluations, with the highest values for positive–positive. Consequently, we decided to develop a scale, the PNE Scale, from the most positive evaluation, PP, to the most negative, NN, with two intermediary levels, PN and NP; the pair with the positive evaluation at the end (NP) is preferable to the negative one (PN). The scale expresses a range from stable positive to stable negative evaluations of ones QOL. Below, we analyze the internal and construct validity of the proposed PNE Scale.

Internal validity

In order to assess the internal validity of the PNE Scale we correlated independently evaluated PNE with each subjects own assessment of his current

Table 4. Pearson's correlation between the PNE Scale and the current functioning in the three QOL domains at the beginning and end of the year

Current functioning	Pearson's <i>r</i>	<i>n</i>
Domain I		
Time I	0.60	210
Time II	0.51	207
Domain II		
Time I	0.47	208
Time II	0.39	206
Domain III		
Time I	0.48	182
Time II	0.29	158

All correlations significant at $p < 0.001$

level of functioning relative to optimal and dysfunctional levels. The results are shown in Table 4, that displays the correlation between the PNE Scale and subjective ratings of current QOL levels, on a six-point scale, in the three domains at both assessment points.

The difference between the subject's rating of his current level at the two points in time was not significant in any of the domains (data not shown here), i.e., the pharmaceutical treatment given to most subjects during the year had no effect on the above evaluations. This observation was corroborated by

the lack of any significant differences among the three randomized groups (Isradipine, Methyldopa and placebo). Table 4 shows that a person's self-rating of his/her QOL closely conforms with the PNE Scale: all correlations were highly significant, i.e. the more positively a person assesses his QOL (as evaluated by independent judges), the better he will estimate his current functioning in that domain at the beginning and end of the year alike. The correlations are shown to be consistently lower at the end of the year than at the beginning—an observation that could be explained by a variety of factors which have not been examined or controlled in the present study.

Construct validity

To establish the construct validity of the positive-negative evaluation scale, we correlated scores on the scale with other pre-structured QOL measures and certain demographic measures. Furthermore, to ascertain the PNE Scales contribution beyond the subject's own evaluation of his current level of functioning, we performed a partial correlation of the PNE Scale and QOL measures, keeping current functioning level constant. Table 5 displays the significant Pearson's correlations between the PNE scale and the pre-structured QOL measures, as well as the partial

Table 5. Significant Pearson's correlation between the PNE Scale and prestructured QOL measures and partial correlation with current functioning level constant

	First domain		Second domain		Third domain		Partial correlation current level constant first domain	
	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>	<i>r</i>	<i>n</i>
Education	0.19	208	0.11*	206	0.12*	178	0.12*	200
Age	-0.14*	208	—	—	—	—	—	—
Depression I	-0.30**	202	-0.30**	192	-0.17*	165	-0.19*	186
Depression II	-0.30**	202	-0.35**	202	-0.19*	176	-0.23**	194
Semantic memory	0.17*	102	—	—	—	—	—	—
Sexual dysfunction I†	-0.28**	194	-0.27**	193	—	—	-0.16*	187
Sexual dysfunction II†	-0.21*	180	-0.30**	183	-0.14*	159	-0.13*	174
Sleep dysfunction I†	-0.20*	205	-0.17*	203	-0.12*	176	-0.11*	200
Sleep dysfunction II†	—	—	-0.15*	195	—	—	-0.22**	188
Physical fitness I†	0.24**	204	0.18*	202	—	—	0.12*	196
Physical fitness II†	0.23**	196	0.19*	195	—	—	0.13*	189
Control at work I‡	0.17**	190	0.18*	188	—	—	0.11*	187
Satisfaction at work I‡	0.19*	190	0.25**	188	0.22*	162	0.22**	183
Satisfaction at work II‡	—	—	0.22*	169	0.13*	147	0.16*	183
RLE—desirability	0.17*	135	—	—	—	—	—	—
Hardiness	—	—	0.23**	178	0.20*	158	0.16*	171

† From Jenkins questionnaire¹⁷ (Croog *et al.*, 1986; ‡ From Frankenheuser and Gardel²³ (1976); * $p < 0.05$; ** $p < 0.001$; — = Non-significant; RLE = Recent Life Events

Table 6. Regression analysis of the PNE scale with age, education and QOL measures for all three domains

	Multiple <i>r</i>	<i>r</i> ²	<i>r</i> ² change	Significance
Education/age	0.34	0.12	0.12	0.026
Depression scores	0.57	0.32	0.20	0.000

correlation with current level of functioning held constant. The table shows the full correlation for the three domains and partial correlation for the first domain only (partial correlations for the other two domains were very similar and are not shown).

Table 5 shows that the PNE Scale of the three QOL domains correlates significantly with several pre-structured QOL measures. The partial correlation indicates that the PNE Scale significantly accounts for most of these measures, with a contribution extending beyond the current level of the specific QOL domain evaluated by the subject.

As both age and education also correlated with the scale, we performed a stepwise regression analysis with age and education (see Table 6) as a forced entry and the QOL measures as free entries.

The table shows that the PNE scale is accounted for by education and age (11%) and by depression scores (20%). None of the other QOL measures reached significance in the regression analysis, i.e., higher PNE Scale scores are accounted for by younger age, more education and lower depression scores.

Discussion

Our results show that an additional content analysis of the SDQLM, assessing the subject's positive-negative evaluation of his/her QOL, has both content and construct validity and correlates with education, age and pre-structured QOL measures. This content analysis showed that we may obtain additional important information about the subject's own perception of his (all our subjects were males) QOL, besides the self-elicited domains. This shows that a person's QOL comprises several levels, the selected domain and perceived functioning therein. However, without the respondent's own personal evaluation of whether he/she is pleased or displeased with the specific QOL domain and views it positively or negatively, we lack sufficient information concerning the subjective QOL. Measures of QOL, whether self-reported (in which the subject freely elicits his preferences) or pre-structured (in which the investigator determines the QOL items), do not take this new dimension of PNE into account. If our QOL

measures are to have any validity, we must account for the subject's emotional and cognitive idiosyncratic evaluation of his/her QOL. It is of major significance if a subject who chooses his/her family as the most important QOL domain is proud of and happy with this family (or a particular member or members thereof), or unhappy and concerned about the family (or any of its members). As shown, such assessment correlates with depression, sexual functioning, physical fitness, hardiness, a sense of control and satisfaction at work, semantic memory and desirability of life events. The PNE Scale accounts for measures beyond those addressed by a subject's own evaluation of his/her functioning. We suggest that this new dimension is an internal construct through which a person evaluates his/her situation in areas he/she considers important. As we have demonstrated, it appears to constitute an influential dimension of one's QOL. The disadvantage of this scale is its demand for a content analysis by trained judges, a procedure which might be cumbersome if standard and therefore ought to be kept in mind for salient measures only.

The above observations were found to be valid for the hypertensive patients only. The data analysis showed that the PNE Scale also differentiated between hypertensives and normotensives, with the latter significantly more frequent in their positive-positive evaluations than the former. Our sample had too few normotensives in the other categories (NP, PN and NN) to enable PNE Scale testing. The fact that normotensive individuals enjoy a better QOL than hypertensives has already been established.²⁶ The present analysis shows that some hypertensives can also enjoy a good QOL, depending on how positive or negative they view their current functioning in self-perceived QOL domains. Taylor²⁷ has suggested that one's level of optimism or pessimism may determine health status, citing evidence suggesting that optimistic people may be somewhat healthier than pessimistic ones. We suggest that the basic definition of health and disease ought to include a subjective QOL evaluation, i.e., optimism, pessimism or PNE as applied in this study. As Taylor noted, research on the correlation between optimism and physical health is still in its infancy, with few studies

showing any clear causal directions. Further research is required to ascertain whether evaluation of one's QOL as positive or negative may be a causal factor affecting health status.

The influence of education in QOL assessment has been demonstrated repeatedly.^{28,29} So far, research has explored the effect of education on subjective level of well-being (a concept similar to subjective QOL)^{30,31} and the structure of self-evaluations.³² The present study shows that education is also an influential factor in one's PNE. Having more education leads one to maintain a somewhat more positive attitude towards one's QOL, reflected not only in higher QOL levels but also in increased optimism.

Age and subjective QOL is another well-researched topic.³³ In a meta-analysis of 119 studies, Stock *et al.*³⁴ found a weak but positive relationship between subjective well-being and age. However, studies from Israel display an opposite trend.³⁵ In our study, the PNE reflected a trend similar to those noted by other Israeli researchers, QOL decreasing slightly with age. This decline in QOL or subjective well-being may be accounted for by the many stressors with which the population of Israel has inevitably had to cope in recent generations. The situation may not be similar to those of other Western cultures, in which the post-World War II years have been less stressful. Older persons have most likely experienced either the Holocaust, wars in Israel or migration to a new country, which is considered a stressful life event.³⁶

We have pointed out a further dimension of the SDQLM, namely a content analysis of positive-negative evaluation of current QOL functioning, demonstrating that it possesses both internal and construct validity and is correlated with education, age and depression.

References

1. Bar-On D, Amir M. Re-examining quality of life of hypertensives: a new self-structured measure. *Am J Hypertension* 1993; 6: 62S-66S.
2. Hollandsworth JG. Evaluating the impact of medical treatment on the quality of life: a five year update. *Soc Sc Med* 1988; 26: 425-434
3. Ware JE, Gandek B and the IQOLA project group. *Int J Ment Health* 1994; 23: 49-73.
4. Hunt SM, McEwen J, McKenna SP. Measuring health status: a new tool for clinicians and epidemiologists. *J Roy Coll Pract* 1985; 35: 185-188.
5. Bergner M, Bobbit RA, Carter WB, Gilson BS. The Sickness Impact Profile: development and final revision of a health status measure. *Med Care* 1981; 19: 787-805.
6. O'Boyle CA, McGee H, Hickey A, O'Mally K, Joyce CRB. Individual quality of life in patients undergoing hip replacement. *Lancet* 1992; 339: 1088-1091.
7. Browne JP, O'Boyle CA, McGee HM, Joyce CRB, McDonald NJ, O'Malley K, Hiltbrunner. Individual quality of life in the healthy elderly. *Qual Life Res* 1994; 3: 235-244.
8. Thunedborg K, Allerup P, Beck P, Joyce CRB. Development of the repertory grid for measurement of individual quality of life in clinical trials. *Internatl J Meth in Psychiat Res* 1993; 3: 45-56.
9. Kuyken W, Orley J, Hudelson P, Sartorius N. Quality of life assessment across cultures. *Int J Ment Health* 1994; 23: 5-27.
10. Long JD, Anderson J, Williams RL. Life reflections by older kinsmen about critical life issues. *Educ Gerontol* 1990; 16: 61-71.
11. Pearlmann RA, Uhlmann RF. Quality of life in chronic diseases: perceptions of elderly patients. *J Gerontol* 1988; 43: 25-30.
12. Slevin ML, Plant H, Lurch D, Drinkwater J, Gregory WM. Who should measure quality of life, the doctor or the patient. *Br J Cancer* 1988; 57: 109-122.
13. McGee HM, O'Boyle CA, Hickey A, O'Malley KM, Joyce CRB. Assessing the QoL in the individual: the SEIQoL with a healthy and a gastroenterology unit population. *Psychol Med* 1991; 21: 749-759.
14. Holmes T, Rahe R. The Social Readjustment rating scale. *J Psychosom Res* 1967; 11: 213-218.
15. Carmel, S. An investigation of the applicability of the Holmes and Rahe 'Social Readjustment Rating Scale' to a population of Israeli industrial workers. Unpublished Dissertation for the degree of Master in Public Health, The Hebrew University of Jerusalem, 1976.
16. Rhodewalt F, Agustdottir S. On the relationship of hardiness to the Type A behaviour: Perception of life events versus coping with life events. *J Res Pers* 1984; 18: 211-223.
17. Croog SH, Levine S, Testa MA, Brown B, Bulpitt CJ, Jenkins CD, Klerman GL, Williams GH. The effect of antihypertensive therapy on the quality of life. *New Eng J Med* 1986; 314: 1657-1664.
18. Lubin B, Himelstein P. Reliability of the Depression Adjective Checklist. *Percept Motor Skill* 1976; 43: 1037-1038.
19. Lomeranz J, Lubin B, Eyal N, Medini G. Hebrew version of the depression adjective checklist, reliability and validity. *J Pers Assess* 1981a; 45: 380-384.
20. Lomeranz J, Lubin B, Eyal N, Medini G. Norms for the revised Hebrew version of the Depression Adjective Check List. *J Clin Psychol* 1981b; 37: 378-379.
21. Kobasa SC. Stressful life events, personality and health: An inquiry into hardiness. *J Pers Soc Psychol* 1979; 37: 1-11.
22. Lev S. The relationship between Hardiness, Cognitive evaluation, and Coping mechanisms and between the results of the coping in a structured stress situation in a pilot training course. Unpublished M.A. Thesis, Ben-Gurion University of the Negev, 1991.
23. Frankenhaeuser M, Gardell B. Underload and overload in working life: outline of a multidisciplinary approach. *J Hum Stress* 1976; 2: 35-46.
24. Weingartner H, Gratman J, Boutelle W, Kaye W, Martin PR. Forms of memory failure. *Science* 1983; 221: 380-382.
25. Yodfat Y, Cristal N. A multicentre, double blind, randomized, placebo controlled study of Isradipine and Methyl dopa as monotherapy or in combination with Captopril in the treatment of hypertension. The LOMIR-MCT-IL research group. *Am J Hypertension* 1993; 6: 57S-61S.
26. Amir M, Bar-On D. Hypertension and quality of life: The

- disease, the treatment or a combination of both. *Psychol Health* 1995; In press.
27. Taylor, S. E., *Positive Illusions: Creative Self-deception and the Healthy Mind*. Basic Books, Inc., Publishers, New York, 1989: 111.
 28. Andrews FM. Research on the Quality of Life. University of Michigan, Institute for social research, Ann Arbor 1986.
 29. Glenn ND, Weaver CN. Education's effects on Psychological Well-Being. *Public Opin Quart* 1981; 45: 22-39.
 30. Campbell A. Subjective measures of well-being. *Am Psychol* 1976; 31: 117-124.
 31. Diener, E. Subjective Well-being. *Psychol Bull* 1984; 95: 542-575.
 32. Bryant FB, Marquez JT. Educational status and the structure of Subjective Well-Being in men and women. *Soc Psychol Quart* 1986; 49: 142-153.
 33. Shmotkin D. Subjective well-being as a function of age and gender: a multivariate look for differentiated trends. *Soc Indic Res* 1990; 23: 201-230.
 34. Stock WA, Okun MA, Haring MJ, Witter RA. Age differences in subjective well-being: A meta-analysis. In: Light RJ, ed, *Evaluation Studies: Review Annual* Vol. 8, Beverly Hills, CA: Sage. 1983: 79-302.
 35. Lomeranz J, Eyal N, Shmotkin D, Zemach M. Subjective well-being and its domains across different age groups: An Israeli sample. *Aging* 1990; 2: 181-190.
 36. Shuval JT. Migration and stress. In Goldberger L, Breznitz S, eds. *Handbook of Stress: Theoretical and Clinical Aspects*. New York: Free Press, 1993: 641-657.

(Received 21 July 1995;
accepted 25 August 1995)