

ASSESSING NEGATIVE AND POSITIVE MOOD STATES: THE IDENTIFICATION OF A SHORT FORM OF THE POMS SCALE IN ITALIAN ONCOLOGY OUTPATIENTS

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In line with the interest in constructing brief questionnaires to be used in clinical settings, in this research a short form of the Italian version of the 65-item Profile of Mood States scale (POMS; McNair, Lorr, & Droppleman, 1971/1981; Italian version: Farnè, Sebellico, Gnugnoli, & Corallo, 1991) was developed for oncology patients, by analyzing the responses of 108 cancer suffers. In Study 1, by means of a Principal Component Factor Analysis, a 50-item two-factor structure was obtained, called Negative (40 items) and Positive (10 items) Mood States (NPMS) scale. Both factors showed internal consistency and correlation with external variables. In Study 2, in a latent trait perspective, an Item Response Theory analysis was applied. The previous factors were confirmed and reduced to seven and six items, respectively. The new 13 item-scale was named Negative and Positive Mood State Short Form (NPMS-SF).

Key words: Cancer patients; Mood States scale; Negative and Positive Mood State Short Form.

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INTRODUCTION

Oncology patients frequently experience psychological as well as somatic distress. However, they feel that their emotional needs are most frequently neglected in the medical care programs they undertake (e.g., Gattellari, Voigt, Butow, & Tattersall, 2002; Houts, Yasko, Benham, Schezel, & Marconi, 1986). Their most frequent cancer patients' psychological suffering relates to anxiety and depression, but anger, confusion, and guilt must also be taken into account (e.g., Andersen & Turnquist, 1989; Razavi et al., 2002). Research has long demonstrated the presence of psychiatric illness in cancer patients: Derogatis et al.'s (1983) study found that less than half of the patients presented a normal reaction in coping with critical situations, while the others manifested some kind of psychiatric disorder. With these premises, it is evident that a correct assessment of the status of oncology patients requires a complete knowledge of the person in view of a

correct healing process, which takes into account both medical and psychological aspects. In this perspective, very recently, several studies investigated variables such as anxiety, depression, mental adjustment and, more in general, quality of life of cancer patients (Braeken et al., 2009; Zenger, Brix, Borowski, Stolzenberg, & Hinz, 2009).

In this research, the psychological assessment of cancer patients' states was taken into consideration with the purpose of constructing a specific evaluation instrument, short and psychometrically valid. As is known, the clinical interview is most frequently the elective means of assessment in clinical settings (e.g., Kritsotakis, Koutis, Kotsori, Alexopoulos, & Philalithis, 2010), but important information can also be obtained by questionnaires, which can be used as appropriate means of screening as well. However, the administration of such instruments to a population of oncology patients might present some problems. Long questionnaires can be an additional burden for persons who are already tired and psychologically drained. Moreover, if the questionnaire, though in its short form, is conceived and validated to be used with a non medically-ill population (e.g., Aroian, Kulwicki, Kaskiri, Templin, & Wells, 2007) or with specific types of clinical populations other than oncology patients, it might be ill-suited. One reason is that it is not conceived to discriminate between those symptoms that are specifically consequent to the oncology illness and those that originate from a psychological distress. Thus it is advisable to use instruments that are not too long and are especially devised for oncology patients.

A number of instruments have been developed for the identification of psychological distress, such as the Hospital Anxiety and Depression Scale (HADS) (Costantini et al., 1999; Zigmond & Snaith, 1983), the Brief Symptom Inventory (BSI) (Derogatis, 2000), the Psychological Distress Inventory (PDI) (Morasso, Costantini, Baracco, Borreani, & Capelli, 1996), and the Profile of Mood States (POMS) (McNair, Lorr, & Droppleman, 1971/1981). Nevertheless, the time required to administer, score, and interpret these measures limit their use in clinical-oncological settings. With the purpose of developing brief and valid instruments for cancer patients, Guadagnoli and Mor (1989) derived from the POMS questionnaire a short form scale characterized by two dimensions called Positive Affect and Negative Affect. Curran, Andrykowski, and Studts (1995) studied the psychometric properties of the 37-item POMS short form developed by Shacham (1983). More recently, the National Comprehensive Cancer Network (NCCN, 2003) developed the Distress Thermometer (DT), a fast tool to screen for distress in cancer patients (Roth et al., 1998). Bulli, Miccinesi, Maruelli, Katz, and Paci (2009) in their study with Italian patients, demonstrated that the combination of the DT with the Problem List (PL) can be considered a satisfactory instrument for assessing the extent and kind of distress in a rehabilitative cancer patient.

In line with the main concern of Bulli et al. (2009) and of other researchers (e.g., Costantini et al., 1999), in this study the principal aim was to construct a brief measure based on the results obtained by Watson and Tellegen (1985) and Guadagnoli and Mor (1989). These authors suggested that the structure of mood, or affect, is less complex than that commonly reported, and demonstrated that the many factors described in the literature actually represent two dominant dimensions: positive and negative affects which represent psychological well-being and psychological distress, respectively.

Following the procedure adopted by Guadagnoli and Mor (1989), the POMS by McNair et al. (1971/1981; Italian adaptation by Farnè, Sebellico, Gnugnoli, & Corallo, 1991), was used as starting point.

MATERIAL AND METHODS

Material

The Profile of Mood States (POMS) by McNair et al. (1971/1981) is a 65-item, 5-point adjective rating scale. Its six-factor analytically derived scales are designed to measure Tension-Anxiety (T), Depression-Dejection (D), Anger-Hostility (A), Vigor-Activity (V), Fatigue-Inertia (F), and Confusion-Bewilderment (C). A total mood disturbance score can be computed by summing the six partial scores. The Italian adaptation of the POMS questionnaire, applied in Study 1 of the present research, was developed by Farnè et al. (1991) who administered the six original scales to 420 university students. The results of factorial analyses supported the existence of the six factors; the 5-point scale was maintained, whereas the number of items was reduced from 65 to 58 on the basis of factor loading weights.

With the purpose of measuring the independence of oncology patients in performing normal activities (Morasso et al., 1996), in Study 1 two further questionnaires were applied: the Activities of Daily Living (ADL; Katz, Ford, Moskowitz, Jackson, & Jaffe, 1969) and the Instrumental Activities of Daily Living (IADL; Lawton & Brody, 1969). The ADL is a scale evaluating a person's ability in accomplishing six simple physical functions of everyday life, such as eating, bathing, dressing, walking, toileting, and transferring and the independence in performing them without needing help from a caregiver. The IADL is a scale evaluating a person's ability in accomplishing, without external help, eight common everyday-life activities that are considered complex such as shopping, cooking, housekeeping, laundry, use of transportation, managing money, managing medication, and using the telephone.

In this study, a hypothesis of correlation between POMS and ADL and IADL was formulated.

In order to globally analyze the patients' physical and psychological status, a single question, "how have you been feeling during the last month?," rated on a scale from 1 *satisfactory* to 5 *unsatisfactory*, was also administered.

Participants

The questionnaires were submitted to 108 outpatients attending the Oncology Day Hospital at the Istituto Oncologico Veneto (IOV) in Padua, either to be examined or to receive chemotherapy. To be eligible for the study, patients were only required to have received a cancer diagnosis and to have adequate cognitive ability to complete the questionnaire. Table 1 presents the patients' attributes.

The participants were in the 32-74 age range ($M = 55.7$, $SD = 8.2$); 53.7% were males and 46.3% females. As for occupation, 46.7% were retired, 38.1% still employed, and 15.2% housewives. The majority of the patients (51%) had a diagnosis of a tumor located in the digestive tract (stomach, liver, intestine), 34.6% suffered from lung cancer, while the remaining 14.4% presented breast cancer and tumors in the female reproductive tract. A percentage of 61.8 was newly diagnosed. Only 14.3% of the participants lived alone. A percentage of 58.1 maintained

TABLE 1
 Patients' attributes

<i>Gender</i>	<i>N</i>	<i>%</i>	
Male	58	53.7	
Female	50	46.3	
<i>Age</i>	<i>Range</i>	<i>M</i>	<i>SD</i>
	32-74	55.7	8.2
<i>Education</i>	<i>N</i>	<i>%</i>	
nine years	53	52.0	
> eight years	49	48.0	
<i>Time since diagnosis</i>	<i>N</i>	<i>%</i>	
New diagnosis	55	61.8	
In therapy	34	38.2	
<i>Diagnosis</i>	<i>N</i>	<i>%</i>	
Digestive tract	53	51.0	
Lung	36	34.6	
Other	15	14.4	

they consumed alcohol regularly, and 22.8% of the patients were smokers. When asked to estimate their physical and psychological status, 68.6% claimed they felt well physically and 65.7% judged their psychological status positively.

Statistical Analyses

In Study 1 the scores collected with the POMS questionnaire (Farnè et al., 1991) were factor analyzed, using a principal-component procedure in order to define the factor structure of the items. A hypothesis was made about the existence of two main factors: a positive affect measure and a negative affect one. In order to test the solidity of the factor solution, the internal consistency of each factor was assessed by means of the Cronbach's alpha coefficient; the item-deleted Cronbach's alpha coefficient was also computed. With the purpose of verifying if the mood state scales might work differently in relation to different levels of specific patients' attributes (e.g., gender, age), the *t*-statistic was used. In the perspective of evaluating the concurrent validity of the questionnaire, correlation and regression analyses were performed between the mood states questionnaire, the ADL, and the IADL scores in order to verify the hypothesis of a positive relation between mood states and levels of independence in the patients' everyday life behaviors. Such correlation should prove that the mood state measures concur with the independence functioning measures to define the affect status of cancer patients.

In Study 2, the application of an Item Response Theory (IRT) analysis (Linacre, 2011) was planned in order to further test the internal structure of each factor obtained in Study 1 and to further reduce the number of items of both Negative and Positive Affect scales (PAS and NAS). Such analysis was preferred to confirmatory factor (CF) analysis due to the fact that the ratio between number of variables and number of participants did not allow a correct interpretation of the CF analysis results. The latent trait perspective was also privileged in order to analyze the location of the item constructs on the dimension characteristic of each scale. Further, the analysis of patients' responses, at a latent level, was considered particularly appropriate, as already demonstrated in other Italian clinical settings (e.g., Mannarini, 2009).

RESULTS

Study 1: The NPMS Identification

Factor Structure

As mentioned earlier, the data collected with the POMS questionnaire were factor analyzed, using a principal component procedure. Taking into consideration the hypothesis of a negative affect measure and a positive affect measure characteristic of the POMS data, two factors were considered for interpretation. Such factors accounted for 42.66% of the total variance. The examination of the eigenvalues scree-plot confirmed the two-dimensional structure. The items selected for the interpretation of each factor presented loadings higher than .35 in one factor and lower than .35 in the other. According to the literature, the interpretation highlighted the existence of two well-defined factors that were named Negative Affect scale – NAS (40 items) and Positive Affect scale – PAS (10 items). On the basis of factor analysis, the 58 items of the POMS Italian version (Farnè et al., 1991) were reduced to 50 items. The POMS measures obtained in this study were called Negative and Positive Mood States (NPMS) questionnaire. In Table 2 the negative affect adjective and the positive affect adjective measures are presented by means of the loadings on both factors.

Internal Consistency

As already stated, in order to define the internal consistency of the two factors, the Cronbach's alpha coefficient was calculated for each. The values for the two factors were .96 and .90, respectively, thus confirming the solidity of the NAS and PAS. The computation of the item-deleted alpha coefficients showed that the elimination of the items did not have any significant effects on the two factors' internal consistency.

Patients' Attributes Biases

Gender, age, and education levels did not show any effect on either negative or positive affects scores, showing that the affect scales are unaffected by those characteristics. The NAS

TABLE 2
Factor loadings: The Negative and Positive Mood States (NPMS)

Negative Affect				Positive Affect				
Item	Factors		Item	Factors		Item	Factors	
	1	2		1	2		1	2
1 Tense	.624	.063	29 Nervous	.730	.056	5 Full of life	.107	.809
2 Angry	.556	.147	30 Isolated	.496	.146	12 Active	.086	.707
3 Distressed	.723	.169	31 Humiliated	.714	.306	16 Energetic	.043	.757
4 Unhappy	.678	.300	32 Upset	.465	.304	19 Relaxed	.322	.513
6 Confused	.567	.265	34 Bitter	.733	.273	33 Good natured	.059	.696
7 Unsatisfied	.403	.283	36 Anxious	.669	.144	45 Alert	.059	.794
10 Irritated	.702	.035	38 Blue	.717	.214	48 Efficient	.156	.656
13 Irritable	.715	.020	39 Discouraged	.776	.299	49 Helpful	.056	.785
14 Sulky	.600	.067	40 Lazy	.423	.330	53 Carefree	.212	.419
15 Sad	.688	.246	42 Helpless	.574	.097	56 Strong	.145	.761
17 Panicky	.609	.081	43 Bored	.509	.322			
18 Hopeless	.621	.300	44 Uncertain	.633	.130			
20 Scornful	.489	.141	46 Disappointed	.732	.162			
21 Hostile	.526	.018	47 Furious	.683	.084			
22 Uneasy	.572	.207	50 Bad mood	.679	.203			
23 Jittery	.701	.187	51 Useless	.463	.137			
24 Distracted	.473	.278	52 Absent-minded	.393	.341			
25 Tired	.508	.282	54 Terrified	.613	.013			
26 Annoyed	.721	.137	57 Undecided	.430	.338			
28 Resentful	.627	.034	58 Bewildered	.602	.314			

presented the following significant results: patients assuming alcohol had a higher mean score ($p < .05$), just like smokers ($p < .05$) and newly diagnosed patients ($p < .05$).

The judgments that the patients gave of their physical and psychological statuses were coherent with their responses to the questionnaire. Those who perceived both their physical and psychological status as satisfactory scored higher in the PAS and lower in the NAS ($p < .001$). Likewise, those who perceived their status as unsatisfactory scored higher in the NAS ($p < .002$). The latter results are considered as a desirable bias since they confirm the capacity of both affect measures to discriminate the physical and psychological status perceived by patients.

Concurrent Validity

The two affect scales showed a significant negative correlation (-0.41 , $p < .01$), thus proving that higher negative affect scores correspond to lower positive affect scores. This result is in contrast with Watson and Tellegen's (1985) theory hypothesizing two orthogonal dimensions. Whereas it is in line with Watson and Clark's (1988) findings. The relation between negative and positive affects was also confirmed by regression analyses. Significant results were obtained ($p < .001$) when the negative affect measure was considered as the independent variable and the positive affect measure was the dependent one. The opposite situation was also demonstrated. Namely, positive mood states are good predictors of the absence of negative mood states, and vice versa.

As far as external variables are concerned, as expected, scores indicating independent functioning of the patients in basic activities, measured by the ADL scales, were negatively related ($p < .001$) to negative affect measures. This result was also supported by regression analysis findings: negative affect is a predictor of unsatisfactory independent functioning and the opposite is demonstrated as well.

Study 2: The Identification of the NPMS Short Form (NPMS-SF)

The IRT Analysis

Given the strong evidence of the existence of two affective measures named Negative and Positive Mood States (NPMS) scale, in order to further reduce the number of items of the two scales, for each factor the items with loadings higher than .35 in one factor and close to zero in the other factor were retained. In Table 3 the negative and positive affect measures are presented where the negative factor contains 11 items and the positive factor presents six items.

TABLE 3
 Factor loadings: The Negative and Positive Mood States (derived from Table 2)

Negative Affect				Positive Affect			
Item		Factors		Item		Factors	
		1	2			1	2
1	Tense	.624	.063	5	Full of life	.107	.809
10	Irritated	.702	.035	12	Active	.086	.707
13	Irritable	.715	.020	16	Energetic	.043	.757
14	Sulky	.600	.067	33	Good natured	.059	.696
17	Panicky	.609	.081	45	Alert	.059	.794
21	Hostile	.526	.018	49	Helpful	.056	.785
28	Resentful	.627	.034				
29	Nervous	.730	.056				
42	Helpless	.574	.097				
47	Furious	.683	.084				
54	Terrified	.613	.013				

In order to test the item structure of the two reduced factors and to examine the locations of the items on the two dimensions represented by the factors, an Item Response Theory (IRT) analysis was performed for each factor separately by applying the Rating Scale Model (Andrich, 1978), represented by the following equation

$$P(X_{vi} = x / \beta_v, \delta_i, \omega_k) = \beta_v - \delta_i - \omega_k$$

where $P(X_{vi} = x)$ is the probability of the response x of person v to item i as regards variable X , given the person, the item, and the scale category parameters; β_v is the parameter measure of

person v ; δ_i is the parameter measure of item i ; ω_k is the parameter measure up to category k of the rating scale.

In Table 4 the results of the IRT analysis are presented for the negative and the positive dimensions. In this study, fit statistic measures were considered satisfactory between .70 and 1.60 (Bond & Fox, 2001).

TABLE 4
 Item location measures, standard errors (SE), Cronbach's alpha coefficients if item deleted:
 the final version of the Negative and Positive Mood States Short Form (NPMD-SF)

Negative Affect						
	Item	Measure	SE	Infit	Outfit	Alpha
1	Tense	1.63	.16	.84	.81	.809
13	Irritable	-.15	.20	.91	.67	.791
14	Sulky	-.07	.19	1.00	.87	.811
17	Panicky	-1.09	.28	1.58	1.15	.824
21	Hostile	.11	.18	1.20	1.14	.821
28	Resentful	-1.17	.28	1.26	1.49	.814
29	Nervous	.74	.16	.77	.83	.787
Positive Affect						
	Item	Measure	SE	Infit	Outfit	Alpha
5	Full of life	.25	.19	1.17	1.12	.849
12	Active	.11	.19	.87	.88	.863
16	Energetic	-.46	.19	.83	.81	.853
33	Good-natured	-.06	.19	.76	.85	.865
45	Alert	.01	.19	.99	1.04	.854
49	Helpful	.15	.19	1.13	1.10	.850

Table 4 shows that the 6-item structure of the positive negative affect dimension was confirmed because both infit and outfit statistics were very good, in the .76-1.17 range. As far as the negative affect dimension is concerned, item 6 presented a satisfactory fit to the model (.70-1.30); item 17 was also retained for interpretation showing a clear tendency to validity; four items out of 11 could not be retained as far as latent structure was concerned, since their fit statistics were beyond the limits. These items are not included in Table 4.

The item locations on the negative dimension showed that feeling *tense* was the most representative aspect of oncology patients' state, followed in order by feeling *nervous*, feeling *hostile*, feeling *sulky*, *irritable*, *panicky*, and, lastly, feeling *resentful*. The item locations on the positive dimension, started with feeling *full of life*, the most representative aspect, followed by *helpful*, *active*, *alert*, *good natured*, and, last of all, *energetic*.

The results showed a correct functioning of the rating scale in terms of dimensions, in particular the step calibration parameters for the negative dimension are -1.37 (up to step 1), -

1.19 (up to step 2), .59 (up to step 3), 1.97 (up to step 4), whereas for the positive dimension, they are 2.39 (up to step 1), -1.21 (up to step 2), 1.03 (up to step 3), 2.56 (up to step 4).

In order to further examine the internal consistency and stability of the two dimensions, the Cronbach's alpha coefficient was calculated for each one. Moreover, the alpha coefficients if item deleted, were calculated for the items. The results showed satisfactory coefficients for both dimensions, .830 for the Negative and .877 for the Positive Mood State dimension. In Table 4 the alpha coefficients for the items are presented. They all confirm the contribution of each item to the internal consistency of the dimension.

The short version of the 7-item Negative and the 6-item Positive Mood States scale was called Negative and Positive Mood States Short Form (NPMS-SF).

CONCLUSION

In Study 1 the findings support the presence of a two-dimensional factor structure of mood states in oncology patients. On the basis of factor loadings such factors were interpreted as Negative Affect (40 items) and Positive Affect (10 items), respectively. The internal consistency of the two factors was also demonstrated. These results were obtained by applying the POMS questionnaire in its Italian version by Farnè et al. (1991) to 108 Italian oncology patients. The two factors were correlated and free from demographic biases, such as age, gender, and education, except for the NAS which presented biases in relation to alcoholics, smokers, and newly diagnosed patients.

The psychometric characteristics of the two factors resembled in most aspects the cancer patients' mood states measures obtained by Guadagnoli and Mor (1989), in particular for factor structure, consistency, and demographic biases.

As regards independence between the positive affect factor and the negative affect factor, the significant result achieved with Italian participants was not consistent with the independence between scales obtained by Guadagnoli and Mor (1989). Considering, though, that the correlation coefficient calculated with the Italian respondents was not too high (-.41), a hypothesis of independence might be formulated in future studies. The existence of independence between positive affect and negative affect could be of specific diagnostic values, in other words, the relative independence between negative and positive affectivity supports the need to include measures of positive well-being in the assessment of the psychological condition of patients, rather than concentrating on the presence or absence of psychiatric symptoms (Huppert & Whittington, 2003). A number of studies (Hall, 1977; Watson & Clark, 1988) with patients not suffering from cancer have demonstrated that these two mood state factors are effective in discriminating between anxiety and depression. The former is related to high scores in the negative affect factor but not in the positive affect one. Vice versa, depression is related to low scores in the positive affect factor, but not to the negative affect one.

In Study 2 a shorter form of the Negative and Positive Mood States measures was obtained by retaining the items with loadings higher than .35 in one factor and close to zero in the other. In this way, the negative affect factor was reduced to 11 items and the positive one to six items. In order to test the item structure of the two reduced factors and the location of the items on the dimensions represented by the factors, an IRT analysis was performed for each factor. The 6-item positive affect factor was confirmed, whereas the negative affect factor was further re-

duced to seven items. The alpha coefficient calculated for each dimension was quite satisfactory. The final version of the 11-item NPMS measure called NPMS Short Form (NPMS-SF), turned out to be sufficiently short and well structured in its constructs.

The NPMS and the NPMS-SF measures validated in this research can be considered useful tools for practitioners and researchers who deal with this kind of disease. In particular, the NPMS-SF can be easily applied to cancer patients in clinical settings. Future studies would be helpful in order to confirm the results here obtained and to further investigate the independence between positive and negative mood states. Cross-cultural validations of the measures here identified with Italian patients should also be taken into consideration.

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