

# Meaning Correlates of Mental Pain in Pediatric Cancer Survivors

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## Abstract

**Objective:** The objective was to examine cognitive correlates of Mental Pain (MP) experiences in adult survivors of pediatric cancer in terms of meaning assignment tendencies. The hypotheses were that MP in the present and in the past would correspond to a pattern of meaning variables reflecting the subjects approach to MP.

**Method:** The sample included 61 adult childhood cancer survivors (mean age was 25.03 years (SD=5.56) ranging from 18 to 41 years), who had been diagnosed and treated, mostly (n=27) for lymphoma, M=12.84 years ago, at the age of M=12.2 years. The tools were: A background information questionnaire; The MP questionnaire (Orbach) and the Test of Meanings (Kreitler).

**Results:** A two-step factor analysis of the meaning variables yielded eight meaning-based factors shared by MP in the present and in the past. Regression analyses with age, gender and marital status in the first step and the eight meaning-based predictors in the second step provided significant results showing that MP in the past was related to more predictors than MP in the present and focused mainly on shifting away through avoidance and negation from the painful themes this preventing coping with them productively. The results provide guidelines for coping interventions.

**Key words:** Pediatric cancer; Meaning system; mental pain; cancer survivors

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The medical problems of pediatric cancer survivors are common and have been the theme of many studies [7]. The psychological problems of pediatric cancer survivors are likely to be no less frequent in view of the duration, the difficulties, the pain and the anxiety often involved in undergoing the procedures of diagnosis, testing and treatments for pediatric cancer [8,9]. Studies show that in comparison to healthy subjects pediatric cancer survivors have a lower QOL [10], poor self-esteem and academic difficulties [11], lower self-concept [12], more depression, anxiety, pain, and insomnia [13], fatigue, emotional symptoms [14], posttraumatic stress [15], difficulties at work and marriage [16,17], and to some extent even suicide ideation [18-21].

## Mental Pain

Findings about the mental state of pediatric cancer survivors inspired a study about their Mental Pain (MP). The results showed that in the survivors MP scores were higher than in regular subjects and were related negatively to quality of life [22].

MP is a negative emotional experience, different from anxiety and depression with which it may share some features [23], reflecting mainly existential dissatisfaction, loss of meaning, and low self-esteem [24] suicidal tendencies [25,26].

The assumption underlying the present study was that MP is a kind of experience shaped at least to some extent by the meanings assigned by the individuals to oneself and one's situation. This assumption was grounded in the frequent references to loss of meaning in general and of meaningfulness of life in particular made in association with MP [27-29,8,23].

## Meaning

In order to assess the meanings characteristic of individuals suffering from MP we focused on assessing characteristic meaning assignment

## Introduction

The objective was to examine cognitive correlates of mental pain experiences in adult survivors of pediatric cancer. The specific correlates on which the study focuses are meaning assignment tendencies, such as tendencies to focus on functions of objects or emotional manifestations or temporal and locational characteristics that mediate the manner in which an individual perceives and conceptualizes the world around or within him or her. Previous studies were devoted to identifying the sets of meaning assignment tendencies corresponding to constructs such as personality traits or specific emotions [1-5]. Sets of meaning assignment tendencies provide insights into the nature and functioning of the studied construct and enable planning guidelines for improved coping.

The number of patients who survive pediatric cancer is about 80% and is increasing [6]. This situation has prompted an expanding effort to examine the late effects of pediatric cancer and its treatments so as to devise improved methods for helping the patients and their families.

tendencies of these individuals. The rationale was that these tendencies would manifest more characteristic tendencies than meanings of specific constructs, even those that are close to the investigated domain. The meaning assignment tendencies were assessed in terms of the Kreitler Meaning System, which is a comprehensive, empirically-based and broadly tested theoretical framework for conceptualizing and assessing meaning.

According to the Kreitler Meaning System meaning is defined as a referent-centered pattern of meaning values. In this definition, referent is the input, the carrier of meaning, which can be anything, such as a word, an object, or a situation, whereas meaning values are cognitive contents assigned to the referent in order to express or communicate its meaning. For example, when the referent is 'Table', responses such as 'made of wood' or 'stands in a room' are two different meaning values. The referent and the meaning value together form a meaning unit (e.g., Table - made of wood) [3]. Most descriptions of meaning include more than one meaning unit. Meaning is assessed by means of six sets of variables, defined on the basis of analyzing thousands of meaning responses provided by individuals differing in culture, gender and age. These variables characterize the contents, structure and modes of expression of the meaning units. Table 1 presents a full list of meaning variables and Table 2 provides their definitions accompanied by examples.

A body of studies shows that each of the meaning variables represents a domain of contents and the processes involved in its activation. For example, the meaning variable of Function represents the set of contents related to function e.g., it enables X, it serves Y) and the cognitive processes involved in thinking about function. Accordingly, each meaning variable is actually a meaning assignment tendency which the individual applies for comprehending external and internal stimuli and situations. Thus, the meaning variable of emotions for example is used by the individual for identifying emotional stimuli and perceiving situations in terms of their emotional connotations.

However, most psychological acts, like planning or recalling or experiencing an emotion are complex events in which more than one meaning variable is involved. Thus, each of these acts was found to correspond to a set of meaning variables. Such profiles of meaning variables were identified, for example, for spatial navigation, art evaluation, curiosity, creativity, cognitive conservation, problem solving, planning, learning of reading, interest, and reading comprehension [31-45,4,5]. Moreover, patterns of meaning variables have been identified also for personality traits (e.g., extroversion, openness) [18], personality tendencies (e.g., resilience) [33], defense mechanisms (e.g. projection, denial) [32], or value orientation [47], as well as for emotions, like fear, anger, anxiety, and depression [19,26].

There are two important benefits to identifying the patterns of meaning variables corresponding to a psychological construct. First, the meaning variables in the pattern provide insights into the nature and functioning of the psychological construct, for example, in regard to anxiety they show that it consists in focusing on metaphors and one's sensations and disregarding action and reality. Secondly, the strength of the construct may be changed by changing the salience and strength of the meaning variables constituting the pattern.

Both the insight into the functioning of the construct and the possibility of changing the meaning variables constituting the pattern indicate that the pattern of meaning variables corresponding to the construct may be considered as a strategy of coping with the situation underlying the construct or to which the construct refers [1].

The three main results of the previous studies that contributed directly to the theoretical and methodological foundation of the present study were first, the recurrent finding that psychological constructs correspond to patterns of meaning variables; that meaningfulness of

life was one of the constructs for which a pattern of meaning variables was identified; and that various emotions were found to correspond to patterns of meaning variables. Accordingly, we expected that a pattern of meaning variables would be found to correspond to an experience such as MP that includes both the component of loss of meaningfulness of life and an emotion.

**Hypotheses.** The hypotheses were first, that a pattern of meaning variables would be found to correspond to MP in the present and to MP in the past; second, that the pattern of meaning variables corresponding to MP in the present and to MP in the past would enable predicting the levels of MP in the present and MP in the past.

## Method

**Participants.** The sample included 61 subjects, 28 women and 33 men. Their mean age was 25.03 years (SD=5.56) ranging from 18 to 41 years. The majority (n=48) were unmarried, 10 married and 3 divorced. Most of the subjects were born in Israel (n=56), the rest in other countries. According to self-reports 48 described themselves as Jewish non-religious, and 13 as Jewish observant. They have been diagnosed and treated M=12.84 (SD=7.15) years earlier, when their mean age at that time was 12.2 (SD=5.13) years, for pediatric cancer, mostly lymphoma [27] and leukemia [14] or other diagnoses (brain tumors and sarcoma).

**Tools.** All subjects were administered the following questionnaires:

(a) A background information questionnaire designed to provide demographic and medical data about the subjects (e.g., gender, date of birth, cancer diagnosis in the past);

(b) The MP questionnaire [23] which provides scores about MP at present, and MP in the past (during diagnosis and treatments). The parts referring to MP at present and in the past were identical except for the instructions which referred either to the present or the past. The MP questionnaire includes 45 items, each with 5 response alternatives ('strongly disagree' to 'strongly agree', scored as 1 to 5, respectively), referring to the following themes: loss of control; irreversibility of pain; emotional flooding; narcissistic wounds (i.e. sense of being abandoned); estrangement from oneself; confusion; need for social support; emptiness; freezing (i.e., sense of being paralyzed). The overall MP score was taken as the mean across all items. The questionnaire was validated in different samples [34,26]. The reliability scores were Cronbach's  $\alpha = .97$  for MP at present and Cronbach's  $\alpha = .97$  for MP in the past.

(c) The questionnaire of meanings. It was constructed similarly to the Test of Meanings [28] and required the subjects to communicate to someone else of their choice the interpersonal common meaning and the personal subjective meaning, using any adequate means of expression, of the following 8 words: cancer, hospital, physician, oncology, chemotherapy, examinations, treatments, leukemia/ non-Hodgkins lymphoma/ Hodgkins lymphoma/sarcoma/ Ewing (selecting as stimulus the specific disease they personally had). The responses were coded in terms of the meaning system: first they were analyzed into meaning units, and then each meaning unit was characterized by one meaning dimension, one type of relation, one form of relation, one shift of referent and one form of expression. The codings across all responses to the 8 word stimuli were summed, for each set of meaning variables separately. The coding was done on a computer system [35] and yielded five sets of scores, one for each of the five sets of meaning variables. Since all responses were verbal the meaning variables of mode of expression were not considered further in the study due to absence of variability. The inter-coder reliability was satisfactory: The correlations between the summative scores for the five sets of meaning variables based on the codings of two independent coders ranged from .89 to .92.

**Table 1:** Major Variables of the Meaning System: The Meaning Variables [30].

MEANING DIMENSIONS <sup>d</sup>		FORMS OF RELATION	
Dim. 1	Contextual Allocation	FR 1	Propositional (1a: Positive; 1b: Negative)
Dim. 2	Range of Inclusion (2a: Sub-classes; 2b: Parts)	FR 2	Partial (2a: Positive; 2b: Negative)
Dim. 3	Function, Purpose & Role	FR 3	Universal (3a: Positive; 3b: Negative)
Dim. 4	Actions & Potentialities for Actions (4a: by referent; 4b: to referent)	FR 4	Conjunctive (4a: Positive; 4b: Negative)
Dim. 5	Manner of Occurrence & Operation	FR 5	Disjunctive (5a: Positive; 5b: Negative)
Dim. 6	Antecedents & Causes	FR 6	Normative (6a: Positive; 6b: Negative)
Dim. 7	Consequences & Results	FR 7	Questioning (7a: Positive; 7b: Negative)
Dim. 8	Domain of Application (8a: as subject; 8b: as object)	FR 8	Desired, wished (8a: Positive; 8b: Negative)
Dim. 9	Material	SHIFTS IN REFERENT <sup>b</sup>	
Dim. 10	Structure	SR 1	Identical
Dim. 11	State & Possible change in it	SR 2	Opposite
Dim. 12	Weight & Mass	SR 3	Partial
Dim. 13	Size & Dimensionality	SR 4	Modified by addition
Dim. 14	Quantity & Mass	SR 5	Previous meaning value
Dim. 15	Locational Qualities	SR 6	Association
Dim. 16	Temporal Qualities	SR 7	Unrelated
Dim. 17	Possessions (17a) & Belongingness (17b)	SR 8	Verbal label
Dim. 18	Development	SR 9	Grammatical variation
Dim. 19	Sensory Qualities <sup>c</sup> (19a: of referent; 19b: by referent)	SR 10	Previous meaning values combined
Dim. 20	Feelings & Emotions (20a: evoked by referent; 20b: felt by referent)	SR 11	Superordinate
Dim. 21	Judgments & Evaluations (21a: about referent; 21b: by referent)	SR 12	Synonym (12a: in original language; 12b: translated in another language; 12c: label in another medium; 12d a different formulation for the same referent on the same level)
Dim. 22	Cognitive Qualities (22a: evoked by referent; 22b: of referent)	SR 13	Replacement by implicit meaning value
TYPES OF RELATION <sup>a</sup>		FORMS OF EXPRESSION	
TR 1	Attributive (1a: Qualities to substance; 1b: Actions to agent)	FE 1	Verbal (1a: Actual enactment; 1b: Verbally described; 1c: Using available materials)
TR 2	Comparative (2a: Similarity; 2b: Difference; 2c: Complementariness; 2d: Relationality)	FE 2	Graphic (2a: Actual enactment; 2b: Verbally described; 2c: Using available materials)
TR 3	Exemplifying-Illustrative (3a: Exemplifying instance; 3b: Exemplifying situation; 3c: Exemplifying scene)	FE 3	Motoric (3a: Actual enactment; 3b: Verbally described; 3c: Using available materials)
TR 4	Metaphoric-Symbolic (4a: Interpretation; 4b: Conventional metaphor; 4c: Original metaphor; 4d: Symbol)	FE4	Sounds & Tones (4a: Actual enactment; 4b: Verbally described; 4c: Using available materials)
		FE5	Denotative (5a: Actual enactment; 5b: Verbally described; 5c: Using available materials)

Note. The table does not include the meta-meaning variables.

<sup>a</sup>Modes of meaning: Lexical mode: TR1+TR2; Personal mode: TR3+TR4

<sup>b</sup>Close SR: 1+3+9+12 Medium SR: 2+4+5+10+11 Distant SR: 6+7+8+13

<sup>c</sup>This meaning dimension includes a listing of subcategories of the different senses/sensations: [for special purposes they may also be grouped into "external sensations" and "internal sensations"] e.g., color, form, taste, sound, smell, pain, humidity and various internal sensations.

**Table 2:** The meaning variables: The types, definitions, examples of categories and the categories and examples of coded responses [14].

Type of meaning variables	Definition	Examples of categories	Examples of coded responses
Meaning dimensions	Characterize the contents of the meaning values from the viewpoint of the specific communicated information	Sensory qualities, Emotions, Function, Consequences and results	Street: long Meaning dimension: Size and dimensions
Types of relation	Characterize the immediacy of the relation between the referent and the cognitive contents	Attributive (of a quality or action), Comparative (similar, different), illustrative exemplifying, metaphoric	Summer: warmer than spring Type of relation: comparative
Forms of relation	Characterize the formal regulation of the relation between the referent and the cognitive contents: its validity, quantification and status	Validity: Positive or negative; Quantification: Absolute, partial; Status: factual, desired, desirable	Yoga: It is not a religion Form of relation: negative Law: should be obeyed. Form of relation: Desired
Referent Shifts	Characterize the relation between the referent and the original input or the former referent	A referent may be identical to the input or the former referent; it may be its opposite; a part of it; unrelated to it	The input was "car" and the response was: a Ford rides fast. Referent shift: the referent is a part of the input
Forms of expression	Characterize the forms of expression of the meaning units	Verbal, Denotation, Drawing, Description of a gesture	The input was Street and the response - drawing of a street. Form of expression: graphic

Note. Meta-meaning, a sixth type of meaning variables, which characterize the attitude of the individual to the meaning communication is not presented in the table because of its marginal significance in the present context.

**Procedure.** During the data collection period which lasted 6 months, all pediatric cancer survivors who met the inclusion criteria were addressed at their routine follow-up visit to the outpatient clinic in a major tertiary medical center in Israel. After presenting the study to the subjects they were asked to sign the consent form and to participate in the study by completing the questionnaires while waiting for their routine check-up at the survivors' hematology-oncology clinic. The questionnaires were presented unanimously in random order. An experimenter was available for help if the patients asked for it. The study protocol was approved by the institutional ethics committee of "Rabin Medical Center" (212RMC).

### The statistical analyses

- (1) The means and SD's of the variables.
- (2) Factor analysis of the dimensions of meaning variables. (Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.
- (3) Relations between MP present and MP past with the factors of meaning variables.
- (4) Regression analysis of MP at present and MP past with control variables and factors of meaning variables as predictors.

### Results

The means and SD's for MP at present and MP in the past were 1.719 [.529], 2.530 [.862], respectively. MP at present and MP in the past were correlated positively ( $r=.588$ ,  $p<.001$ ). Accordingly, the study focused on identifying the meaning variables corresponding to both MP at present and to MP in the past rather than only to one or the other.

**Factor analyses of the sets of meaning variables:** Analysis of the meaning variables proceeded in two phases. First, each of the four sets of meaning variables was factor analyzed separately. Table 3 presents the results of the factor analysis of the meaning dimensions. The results showed four factors accounting together for 34.798% of the variance. The first and most salient factor represents focusing on the objective dynamic-functional aspects of external reality (Meaning dimensions 8a, 8b, 3, 4a, 4b) while suppressing one's personal approach (Meaning dimensions minus loadings of 20b, 21b, 19b, 6, and 7). The second

factor is focused on contextual aspects of external reality (Meaning Dimensions 17b, 15, 19a, 9, 21b) and may be labelled contextual-perceptual aspects of reality. The third factor is focused on cognitions, and external characteristics of objects that are not immediately evident perceptually (Meaning dimensions 22a, 22b, 12, 13, 18, 17b minus), and may be labelled as representing cognitive and formal aspects of objects. The fourth factor focuses on structural aspects, categorical and analytical, suppressing time and state of objects (Meaning dimensions 5, 2b, 1, 10, and 11 minus, 16 minus) and may be labelled structural-categorical aspects of objects and situations.

Table 4 presents the results of the factor analysis of the second set of meaning variables which deals with types of relation. There were four factors, accounting together for 54.056% of the variance. In this set the first factor represents the comparative types of relation (TR2c, TR2b), emphasized by excluding the attributive type of relation (1a minus). Hence, it may be labelled comparison. The second factor represents the interpersonal types of relation emphasizing the more unique contributions of examples (TR3a) and personal interpretations (TR4a) but excluding the metaphor (4d minus). Hence, it represents interpersonal meaning (with example and interpretation), and may be labelled interpersonal meaning. The third factor is defined by the following meaning variables: TR4c, TR4b, and TR2d. It represents two kinds of metaphoric relations (both the standard TR4b and the personal TR4c) and the interactional relations (TR2d). Hence it may be labelled metaphoric meaning. The fourth factor is defined by the following variables: TR2a, TR3b, and TR3c. It represents analogies of similarity (TR2b), and exemplifying-illustrative relations by means of images of situations (TR3b) and dynamic scenes (TR3c). Hence, it may be labelled label: concrete demonstration/illustration). . Hence it may be labelled concrete demonstrations.

Table 5 presents the results of the factor analysis of the third set of meaning variables that deal with forms of relation. The analysis yielded three factors which accounted together for 54.428% of the variance. The first factor is defined by the meaning variables FR1b, FR1a minus, FR 5b, FR4b. It clearly represents the negative forms of relation in regard to propositional (FR1b), conjunctive (FR 4b) and disjunctive (FR5b) statements, excluding the positive declarative relation (FR1a). It may be labelled the negative relations. The second factor is defined by

**Table 3:** Results of factor analysis of the dimensions of meaning variables.

Meaning variables	Factor I	Factor II	Factor III	Factor IV
dim21a	-.774			
dim20a	-.689			
dim8a	.635			
dim4a	.556			
dim14	-.493			
dim20b	-.486			
dim8b	.477			
dim3	.447			
dim7	-.424			
dim2a	.415			
dim19b	-.367			
dim4b	.366			
dim6	-.200			
dim9		.701		
dim17a		.695		
dim15		.682		
dim19a		.641		
dim21b		.162		
dim17b		-.133		
dim22a			.704	
dim18			.676	
dim13			.621	
dim12			.613	
dim22b			-.142	
dim5				.717
dim2b				.613
dim1				.420
dim16				-.406
dim10				.383
dim11				-.212
Eigenvalue	3.897	2.350	2.180	2.012
Per cent of variance	12.991	7.832	7.268	6.707
Suggested label	Objective dynamic-functional aspects	Contextual-perceptual aspects	Cognitive and formal aspects	Structural-categorical aspects

Note. Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

**Table 4:** Results of the factor analysis of the types of relation meaning variables.

Meaning variables	Factor 1	Factor 2	Factor 3	Factor 4
TR2c	.872			
TR2b	.804			
TR1a	-.731			
TR1b		-.889		
TR3a		.756		
TR4a		.521		
TR4d		-.263		
TR4c			.739	
TR4b			.677	
TR2d			.636	
TR2a				.748
TR3b				.633
TR3c				.392
Eigenvalue	2.302	1.910	1.539	1.277
Per Cent of variance	17.710	14.691	11.836	9.820
Suggested label	Comparison	Interpersonal meaning	Metaphoric meaning	Concrete demonstrations

Note. Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. The presented factor loadings are those that in each column are higher than those in the adjoining one.

**Table 5:** The results of the factor analysis of the forms of relation meaning variables.

Meaning variables	Factor I	Factor II	Factor III
FR1b	.954		
FR1a	-.944		
FR5b	.482		
FR4b	.352		
FR6a		.811	
FR4a		.757	
FR3a		.467	
FR2a			.851
FR2b			.756
FR5a			-.185
Eigenvalue	2.334	1.586	1.524
Per Cent of variance	23.336	15.856	15.235
Suggested label	Negative relations	Positive relations	Restrictive-Disjunctive relations

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

The presented factor loadings are those that in each column are higher than those in the adjoining one.

the meaning variables FR4a, FR6a, FR3a which represent the positive relations in regard to the conjunctive (FR4a), universal (FR3a) and normative (FR6a) statements. Hence, it may be labelled the positive relations. The third factor is defined by FR2a, FR2b and FR5a, which represent the partial (FR2a, FR2b) and disjunctive relations. Hence it may be labelled restrictive-disjunctive relations.

Table 6 presents the results of the factor analysis of the fourth set of meaning variables that deal with shifts of referent. The analysis yielded four factors which accounted together for 57.999% of the variance. The first factor is defined by the variables associations (SR6minus), elaborating previous referent (SR5), modifying previous referent (SR4) or combining several previous referents (SR10). It may be labelled elaborating former referents. The second factor is defined by denying the presented referent (SR1 minus) and focusing on parts of it (SR3). It may be labelled as focus on parts of the original referent. The third factor is defined by the variables denying the verbal label (SR8 minus) and focusing on the opposite (SR2) or unrelated referents (SR7). It may be labelled as shifting to an opposite or unrelated referent. Factor 4 is defined by the variables SR9 (grammatical variation of the original referent) with a very low loading on SR11 (shifting to a superordinate referent). Hence, it may be labelled focus on grammatical features as the referent.

**Relations between MP present and MP past with the factors of meaning variables:** For the purpose of analyzing the relations between MP in the present and MP in the past with the sets of meaning variables, the MP at present and MP in the past were correlated with the factors representing the four sets of meaning variables. Only those factors of the meaning variables that were found to be correlated significantly with both MP present and MP past were selected as components for the meaning profile corresponding to MP.

The original list of factors representing the meaning variables (Tables 3-6) included 15 factors. But only eight factors were correlated with both MP at present and MP in the past. The list included the following factors: Third factor of the meaning dimensional factors (DIMI): cognitions and formal characteristics of objects; fourth factor of the type of relations factors (TRIV): concrete demonstrations; first factor of the forms of relations factors (FRI): negative forms of relation;

second factor of the forms of relations factor (FRII): positive forms of relation; first factor of the referent shift factors (SRI): elaborating previous referents; second factor of the referent shift factors (SRII): focusing on partial referents; third factor of the referent shift factors (SRIII): focusing on opposite or unrelated referents; fourth factor of the referent shift factors (SRIV): focus on grammatical features as referent. These eight factors will be used in the next analyses as meaning-based predictor variables. There were intercorrelations between them only in two cases (the first and the second referent shift factors were correlated with the first factor of forms of relation,  $r=.292, p<.05$ ).

In order to examine the hypothesis that the set of the meaning factors would enable predicting the level of MP in the present and in the past regression analyses were performed with the eight meaning-based predictor variables and the MP at present and the MP in the past as dependent variables. The regression analyses were in two steps. In the first step the control factors of age, gender and marital status were introduced. In the second step all the eight meaning-based predictor variables were entered in the analyses. Table 7 presents the results of the regression analysis in regard to MP at present. It shows that the whole model yielded significant results both for the control variables as well as when the meaning-based predictor variables were added. For the whole model, the amount of variance accounted for is 34.1%. There are only two coefficients with significant contributions. It is gender (i.e., being female) and the first factor of forms of relation (FRI) which represents the tendency for negation.

Table 8 presents the results of the regression analysis for MP in the past. It shows that the control variables alone did not yield a significant result but adding the meaning-based predictor variables yielded an addition to the prediction that was significant and turned the whole model into significant. The amount of variance accounted for was 38.5%. There were three meaning-based predictor variables with significant contributions: the third meaning dimensional factor (DIMIII) which represents cognitive and formal characteristics of objects; the first referent shift factor (SRI) which represents focusing on the elaboration of previous responses; and the fourth referent shift factor (SRIV) which represents focusing on grammatical features of the referent. The last mentioned variable is the meaning-based predictor with the highest loading and highest level of significance.

## Discussion

The study deals with the correlates of MP at present and MP in the past in terms of sets of meaning variables. The findings confirm the general expectation that MP in the present and MP in the past are related to meaning variables. The findings show that there is a set of meaning-based factors related to MP in the present and to MP in the past which can be considered as the meaning profile of MP. This conclusion provides support for the first hypothesis.

The meaning profile of MP can be analyzed in terms of its formal characteristics and in terms of its contents. In terms of formal characteristics this meaning profile turns out to be comparable to the profiles of personality traits only in the number of components but not in terms of the other criteria (i.e., the proportion of meaning variables from the four sets of factors, and the number of negative correlations).

The meaning profile of MP is characterized by the salience of factors representing shifts of referent. It includes all four factors representing Shift of Referent (SR) meaning variables. The factors of the SR meaning variables describe the variety of processes enabling shifting away from a presented referent or focusing on it. Notably, the shift of referent factors in the present study are characterized by limiting oneself to elaborating the same components of the presented referent (Factor SRI), or focusing on parts of the original referent (Factor SRII), shifting to opposite or unrelated referents (Factor SRIII), or focusing on the grammatical features of the original referent (Factor SRIV. Factors SRI, SRII and

**Table 6:** Results of factor analysis of the referent shift meaning variables.

Meaning variables	Factor I	Factor II	Factor III	Factor IV
SR6: Association	-.948			
SR5: Previous meaning value	.805			
SR4: Former referent modified by addition	.617			
SR10: Former meaning values combined	.527			
SR1: Identical to presented referent		-.935		
SR3: Part of presented referent		.813		
SR8: Verbal label			-.656	
SR2: Opposite			.601	
SR7: Unrelated			.596	
SR9: Grammatical variation				.853
SR11: Superordinate referent				.191
Eigenvalue	2.267	1.745	1.234	1.523
Per cent of variance	20.608	15.864	11.215	19.213
Suggested label	Elaborating former referents	Focus on parts of the original referent	Shifting to an opposite or unrelated referent	Focus on grammatical features

Note. Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.

**Table 7:** Two-step regression analysis of MP at present with control variables and factors of meaning variables as predictors.

Predictors	Unstandardized coefficients		Standardized coefficients	t-test
	B	Std error	Beta	
Constant	1.682	.371		4.530***
Gender	.342	.131	.324	2.613*
Marital status	.300	.202	.234	1.486
Age at present	-.007	.015	-.077	-.488
Constant	1.610	.378		4.258***
Gender	.210	.136	.200	1.553
Marital status	.352	.211	.275	1.670
Age at present	-.002	.016	-.025	-.153
Factor DIMIII	.063	.063	.122	.993
Factor SRIV	.109	.088	.162	1.240
Factor FRI	.250	.081	.474	3.086**
Factor TRIV	.089	.073	.148	1.220
Factor SRII	-.094	.067	-.182	-1.401
Factor SRI	.088	.073	.167	1.206
Factor SRIII	-.045	.063	-.086	-.708
FRII	.052	.062	.101	.840

Step 1:  $R^2 = .161$  F change=3.634,  $df=5/57$ ,  $p < .05$  overall  $F=3.634$ ,  $df=3/60$ ,  $p < .05$

Step 2:  $R^2 = .341$  F change=2.683,  $df=8/49$ ,  $p < .05$  overall  $F=2.310$ ,  $df=11/60$ ,  $p < .05$

For interpreting the meaning variable factors in column 1, please see tables 3-6

SRIV represent processes manifesting different maneuvers of focusing specifically on the presented referent. Factor SRIII represents some kind of shifting away from the presented referent but to the opposite (which is not too far) or to unrelated referents (which express evasion). Factor SRIV is characterized by focusing on the grammatical features of the referent, which clearly suggests overlooking completely the referent's meaning. That which is clearly missing in these SR processes is evidence for an effort to elaborating the original referent, expanding its meaning, exploring its associations in order to comprehend its underlying meaning and thus overcome its emotional control over oneself.

In addition to the described SR meaning factors the meaning profile of MP includes two FR factors: one representing the negative relation (FRI) and one representing the positive relations (FR2). Both

factors are of interest in the present context. The positive relations have a declarative definitive sense about them. But the negative relations express a negation, a denial, the absence or non-being of something [46]. Studies showed that the use of negation expresses an effort to avoid a theme, to approach it at best indirectly, to overlook its unique characteristics [47]. It is also related to a certain degree of difficulty in comprehending, in increased number of errors and delayed reaction time [48]. Notably, negation also plays a role in emotional regulation, increasing the attempt to reevaluate a theme while inhibiting the response evoked by that theme [49]. In sum, the factor of negation (FRI) implies a tendency to cover up cognitively some theme, avoid it emotionally, and inhibit a behavioral reaction to it.

The two additional meaning factors fit in well with the above described meaning factors, enhancing the tendencies expressed by

**Table 8:** Two-step regression analysis of MP in the past with control variables and factors of meaning variables as predictors.

Predictors	Unstandardized coefficients		Standardized coefficients	t-test
	B	Std error	Beta	
Constant	2.722	.636		4.277***
Gender	.304	.224	.177	1.356
Marital status	.431	.346	.208	1.243
Age at present	-.017	.026	-.109	-.657
Constant	2.420	.594		4.074 ***
Gender	.050	.231	.029	.236
Marital status	.343	.332	.164	1.033
Age at present	.001	.025	.009	.056
Factor DIMIII	.246	.099	.292	2.470*
Factor SRIV	.475	.138	.435	3.449***
Factor FRI	.167	.127	.194	1.311
Factor TRIV	.046	.115	.047	.399
Factor SRII	.052	.105	.062	.492
Factor SRI	.223	.114	.262	1.954*
Factor SRIII	-.105	.099	-.124	-1.064
FRII	.146	.097	.174	1.497

Step 1:  $R^2 = .068$  F change=1.378,  $df=3/57$ , ns overall  $F=1.378$ ,  $df=3/60$ , ns

Step 2:  $R^2 = .385$  F change=3.161,  $df=8/49$ ,  $p < .01$  overall  $F=2.789$ ,  $df=11/60$ ,  $p < .01$

For interpreting the meaning variable factors in column 1, please see tables 3-6.

the other factors in the meaning profile. Thus, the dimensional factor (DIMIII) adds the emphasis on cognitive and formal characteristics of objects and the Factor TRIV adds the tendency for concrete demonstrations. Both factors enhance the above described tendencies of avoiding dealing with the core meanings of a presented theme. In the present context this theme is most likely to be the suffering and pain caused by the cancer disease and the treatments in one's childhood.

The findings provide support also for the second hypothesis which was that the meaning profile of MP would enable predicting the level of the scores of MP in the present and MP in the past. The two regression analyses show that as expected the predictions are significant in regard to both MP at present and MP in the past. There are however two findings relating to these regressions that were unexpected. One finding related to the meaning-based factors that played a prominent role in each of these predictions and the second findings was the difference in the number of meaning-based factors that had significant contributions to predicting MP at present and MP in the past (1 vs 3).

In regard to MP at present it was the factor FRI that represents the tendency for negation. In regard to MP in the past there were three meaning-based factors with significant contributions: dimensional factor III: cognitive and formal characteristics, Factor SRIV representing shifting to the actually irrelevant grammatical features of the input, and SRI which represents focusing on former responses. The difference between the factors playing a prominent role in regard to MP in the present and MP in the past suggests a possible difference in handling these two aspects of MP. While MP in the present is a kind of open experience which may be accessed personally and related to present experiences, MP in the past is a kind of closed experience that tends to be dissociated from the present. Hence its score is higher and its meaning potentially broader; it does not have to be closed up and blocked by negation tendencies to the same extent as MP at present.

The findings have theoretical and practical implications. The major theoretical implication is that the study is the first example of exploring the meaning correlates of a construct by using a Meaning Test with stimuli that differ completely from those in the standard Test of Meanings in number (8 vs 11), and content (referring to the context of the study vs neutral/standard). Nevertheless the findings are

encouraging and support the methodological innovation of applying contextually relevant tests of meaning.

The practical implications of the study refer to the guidelines it provides for helping survivors in coping with the MP experiences. The findings indicate which meaning variables need to constitute the targets for an intervention. If the goal is to reduce MP then the memories and past experiences need to be elaborated more widely, in terms of a rich variety of meaning variables including temporal and locational aspects, and other new features that would allow the evocation of new emotional responses. These could provide the context for integrating the past experiences into one's overall functioning at present. This kind of broad meaning-based systematic elaboration of the past experiences may help the survivors overcome the pain and reabsorb the past experiences into their present life and functioning in a productive manner. In this way, the past experiences may lose their painful restrictive connotations and turn instead into a positive contribution to one's quality of life.

The limitations of the study refer mainly to the small size of the sample and the reliance only on single measures of MP and of the cognitive correlates. In view of the encouraging results of the present study, it would be necessary and advisable to repeat the study in a larger sample in which more measures of MP and cognitive correlates would be applied as well as exploration of the relations of MP with the current state of the survivors and their diagnoses and treatments in the past.

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