

Happiness Behind the Scenes: Associations between Heuristic Happiness and Related Dimensions in Skin Diseases

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Positive health approaches, such as happiness, are largely unexplored in medicine, including dermatology. Taking into consideration the various happiness measures, the aims of this cross-sectional study were to assess this concept using a 1-item heuristic happiness question and its related dimensions (Satisfaction with Life, Positive and Negative Affect, Quality of Life, and Compound Psychological Capital) in outpatients with different skin diseases between December 2019 and June 2020, and to examine the link between these dimensions. Overall, 414 dermatological patients were included: 67 with psoriasis, 84 atopic eczema, 10 mastocytosis, 19 nummular eczema, 84 malignant melanoma and 150 keratinocyte carcinoma. Comparing the skin diseases, differences were observed for heuristic happiness, Positive Affect, and some domains of Quality of Life and Compound Psychological Capital. Analysing the relationship between heuristic happiness and other happiness measures, the data revealed moderate to strong correlations ($r=0.30-0.46$, $p<0.001$) and variations in the understanding of happiness between the skin diseases. Overall, the most important facet of happiness was Hope as a domain of Compound Psychological Capital. This study emphasizes the individual definition of heuristic happiness in patients with skin diseases. A 1-item heuristic approach may be a simple and practical method to assess the complexity and individuality of happiness.

Key words: happiness; quality of life; holistic health; skin diseases.

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Skin diseases are ranked as the 4th leading cause of disability worldwide (1). In Germany, skin diseases are among the most common reasons for seeking medical care (2), which is primarily provided by dermatologists and general practitioners in outpatient settings (3). Different skin diseases vary in their severity and can cause substantial physical, psychological, and social impairments (4–7). Traditionally, most empirical research in dermatology has taken a problem-oriented approach by

SIGNIFICANCE

Everyone has their own definition of happiness and associates different conditions with it. Consequently, there are multiple measures, including the 1-item heuristic happiness question (“Taking all things together, how happy would you say you are?”). The aims of this study were to assess 6 different happiness measures in patients with skin disease and to investigate the relationship between these measures. Differences in the happiness measures were observed, and the interpretation and associated conditions of happiness varied between different skin diseases. Hence, a 1-item happiness question may be a useful approach to reflect the individual understanding of happiness.

investigating how psychological stress and disease are related to poor health outcomes, such as wound healing (8) and depression (9). In contrast, positive health concepts, such as happiness, have remained largely unexplored in dermatology, but have been stated as essential to comprehensively understand skin diseases (7).

The health benefits of happiness and well-being have been increasingly emphasized in medical and sociopsychological research (10–12). There is growing evidence that happiness reduces pain in chronic diseases and has the potential to lower the incidence or moderate the severity of various diseases (13, 14). Happy people tend to have better health outcomes through better integrative thinking, creativity, and resilience (15).

In literature, happiness has different meanings (16) and is mainly used to describe positive subjective experiences (17). Subjective well-being (SWB) provides one of the most widely adopted definitions of happiness (18). This model is based on individual satisfaction with life (SWL) (19) and the predominance of positive affect (PA) over negative affect (NA) (18). In this taxonomy, happiness includes both cognitive and affective appraisals of life and is synonymously used with SWB (18). Happiness has also been conceptualized as an evaluation of individual’s quality of life (QoL) (12) and is often used interchangeable with other positive health dimensions, such as optimism (17). Depending on the context, happiness has different definitions (20) and thus highlights the relationship and a certain overlap between happiness and related dimensions (12, 16).

The increasing number of measuring tools for happiness has led to extensive debate about the most appropriate

methods among researchers, clinicians, and policymakers (15, 16, 20). Happiness is often included as single-item question in population-based surveys. The European Social Survey (ESS) asks: "Taking all things together, how happy would you say you are?" (21). As this question should be answered quickly and unconsciously, it follows a heuristic approach and is therefore defined as heuristic happiness (7). Additional scales attempt to measure further related dimensions, such as the Satisfaction with Life Scale (SWLS) (22), Scale of Positive and Negative Experience (SPANE) (23), Quality of Life Questionnaire (WHOQOL-BREF) (24), and the scale measuring Compound Psychological Capital (CPC-12) (25). The simplification to a 1-item question supports better comparisons and saves time in medical practice. However, to fully understand heuristic happiness as a concept, one should also study its associated dimensions.

The aim of this study was to assess heuristic happiness and its related dimensions in dermatological outpatients. The second aim was to investigate the relationship between heuristic happiness and other common and validated happiness-related measures for a better understanding of happiness in skin diseases.

MATERIALS AND METHODS

Study design

A cross-sectional study was conducted in a dermatological outpatient practice in Augsburg (Greater Munich area, Southern Germany). Patients affected by psoriasis, atopic eczema (AE), nummular eczema, mastocytosis, malignant melanoma, or keratinocyte carcinoma (KC) were recruited consecutively from December 2019 to June 2020. The inclusion criteria were at least 1 confirmed diagnosis of the aforementioned diseases, age ≥ 18 years, and being able to read and understand German. Patients meeting these criteria were asked to complete the paper-based questionnaire and provided written informed consent prior to study inclusion.

The study was reviewed and approved by the ethics committee of the Medical Faculty at Technical University of Munich (reference 424/17S) and conducted in accordance with the ethics standards of the Declaration of Helsinki.

Measures

Data were collected using structured questionnaires including age, sex, and happiness measures validated in the German language. The treating physician documented the diagnosis.

Heuristic happiness was assessed with the single-item Happiness Thermometer from the ESS (21), which uses an 11-point Likert scale (0–10: extremely unhappy to extremely happy).

SWL was evaluated with SWLS (22), consisting of 5 items rated on a 7-point Likert scale (1–7: strongly disagree to strongly agree). The items were summed to a total score ranging from 5 to 35, with higher scores indicating higher life satisfaction (19).

PA and NA were measured with SPANE (23), which consists of 12 items. Six items relate to the frequency of general and specific PA and 6 to general and specific NA. Each item is scored on a 5-point Likert scale (1–5: very rarely/never to very often/always). Two independent total scores ranging from 6 (=lowest) to 30 (=highest) were built by summing the corresponding 6 items for each PA and NA.

QoL was assessed with WHOQOL-BREF (24), consisting of 26 items with a 5-point Likert scale (1–5: very poor/very dis-

satisfied/not at all to very good/very satisfied/extremely). Scores were transformed into a continuous scale from 0 to 100, with higher values indicating higher QoL, and divided into 4 different domains: physical health (QoL-Physical), psychological health (QoL-Psychological), social relationships (QoL-Social), and environmental (QoL-Environmental). Scores were then summarized by a total score (QoL-Total).

CPC was evaluated with CPC-12 (25), consisting of 4 domains with each 3 items for hope (CPC-Hope), optimism (CPC-Optimism), resilience (CPC-Resilience), and self-efficacy (CPC-Self-efficacy). All 12 items were surveyed using a 6-point Likert scale (1–6: strongly/totally disagree to strongly agree). For each domain a mean score was calculated separately and all domains were summarized to a total score (CPC-Total).

The internal consistency of the scales was assessed with Cronbach's alpha. QoL (0.92), SWLS (0.91), and CPC (0.91) had excellent reliability and PA (0.89) and NA (0.87) had good reliability.

Missing values

Data were checked for unclear (e.g. multiple diagnoses, $n=4$) and implausible answers (e.g. multiple answers in 1 question, $n=1$) and excluded afterwards. Observations with more than 20% missing values in each happiness scale ($n=15$) were omitted. For linear regression, further 12 participants had to be excluded because they either did not report their sex ($n=2$) or belonged to the small patient group of mastocytosis ($n=10$).

Statistical analysis

Only QoL-Total was normally distributed. To test for differences between sexes, a Mann-Whitney U test, a χ^2 -test for categorical data, and a t -test for QoL-Total were used. To assess the differences between skin diseases, Kruskal-Wallis tests, χ^2 -tests for categorical variables, and analysis of variance (ANOVA) for QoL-Total were performed. For t -tests and ANOVA, the assumption of equal variances was checked with Levene's test.

Spearman's correlations (r) were calculated to examine the relationship between continuous variables. To investigate these associations in more detail, multiple linear regression with heuristic happiness as an outcome variable was conducted. SWL, PA, NA, QoL, CPC domains, skin diseases, sex, and age squared (Fig. S1) were included as predictor variables. To account for differences between sex and skin diseases in the happiness-related scales, interaction terms were included in the full model. A stepwise selection was performed using Akaike information criterion to identify only relevant variables. Model assumptions such as linearity, normality, and homoscedasticity were checked using residual plots. Since all scores tend to examine the same subject, multicollinearity had to be considered. Pearson correlation and variance inflation factor (VIF) were used to assess multicollinearity, with correlation $r > 0.7$ and/or $VIF \geq 10$ being commonly used cut-off values (26, 27). If at least 1 cut-off value was exceeded, 1 of the affected variables had to be removed.

Statistical analyses were performed using R version 4.0.4 (28). Graphical representations of the correlations were created by hand based on the R package "corrplot" (29). The significance level was set to $\alpha = 0.05$.

RESULTS

Descriptive data

In total, 434 dermatological patients were recruited. After checking for validity, data from 414 patients were analy-

Table I. Patient characteristics and rating of happiness scales

	Total	Sex (2 missing)		P-value
		Men	Women	
Sample size, n (%)	414	194 (46.9)	218 (52.7)	
Diagnosis, n (%)				0.017
Psoriasis	67 (16.2)	29 (14.9)	38 (17.4)	
Atopic eczema	84 (20.3)	33 (17.0)	51 (23.4)	
Mastocytosis	10 (2.4)	7 (3.6)	3 (1.4)	
Nummular eczema	19 (4.6)	8 (4.1)	11 (5.0)	
Malignant melanoma	84 (20.3)	32 (16.5)	52 (23.9)	
KC	150 (36.2)	85 (43.8)	63 (28.9)	
Age (median [IQR])	47.00 [35.00–60.00]	50.00 [40.00–61.00]	43.00 [34.00–53.00]	<0.001
Age categories, n (%)				<0.001
18–29 years	47 (11.4)	19 (9.8)	28 (12.8)	
30–39 years	84 (20.3)	20 (10.3)	64 (29.4)	
40–49 years	92 (22.2)	47 (24.2)	45 (20.6)	
50–59 years	81 (19.6)	46 (23.7)	35 (16.1)	
>60 years	110 (26.6)	62 (32.0)	46 (21.1)	
Happiness scales (median [IQR])				
Heuristic happiness	7.00 [7.00–8.00]	7.00 [7.00–8.00]	7.00 [7.00–8.00]	0.610
SWL	27.00 [25.00–30.00]	27.00 [25.00–29.00]	27.00 [25.00–30.00]	0.091
PA	24.00 [21.00–26.00]	23.00 [21.00–25.00]	24.00 [22.00–26.00]	0.012
NA	10.00 [8.00–12.00]	10.00 [8.00–13.00]	10.00 [8.00–12.00]	0.148
QoL-Physical	67.86 [57.14–78.57]	64.29 [57.14–75.00]	67.86 [60.71–78.57]	0.010
QoL-Psychological	75.00 [66.67–79.17]	70.83 [66.67–79.17]	75.00 [66.67–83.33]	0.032
QoL-Social	66.67 [58.33–75.00]	66.67 [58.33–75.00]	66.67 [58.33–83.33]	0.010
QoL-Environmental	71.88 [65.62–78.12]	71.88 [65.62–77.34]	75.00 [68.75–81.25]	0.006
QoL-Total (mean (SD))	71.02 (10.79)	69.27 (10.29)	72.61 (11.02)	0.002
CPC–Hope	4.67 [4.00–5.00]	4.33 [4.00–4.67]	4.67 [4.00–5.00]	0.056
CPC–Optimism	4.67 [4.00–5.33]	4.67 [4.00–5.00]	4.67 [4.33–5.33]	0.052
CPC–Resilience	4.33 [3.67–4.67]	4.33 [3.33–4.67]	4.33 [3.67–4.67]	0.109
CPC–Self-efficacy	4.50 [4.00–5.00]	4.33 [4.00–5.00]	4.67 [4.00–5.00]	0.028
CPC–Total	4.50 [4.08–4.83]	4.50 [4.00–4.81]	4.50 [4.17–4.92]	0.050

IQR: interquartile range; SD: standard deviation; KC: keratinocyte carcinoma; SWL: satisfaction with life; PA: positive affect; NA: negative affect; QoL: quality of life; CPC: Compound Psychological Capital.

sed: 67 (16.2%) with psoriasis, 84 (20.3%) AE, 10 (2.4%) mastocytosis, 19 (4.6%) nummular eczema, 84 (20.3%) malignant melanoma, and 150 KC (36.2%, **Table I**). Overall, 218 (52.9%) participants were women and the median age was 47.00 (interquartile range (IQR) 35.00–60.00) years.

Among all patients, low negative associations were found between age and the different happiness scores ($|r|=0.12–0.23$, $0.001 \leq p \leq 0.016$) with an exception for NA, which showed low positive association ($r=0.12$,

Differences in sex and skin diseases affecting happiness scores

Sex differences were observed between the skin diseases ($p=0.017$). Heuristic happiness, SWL, NA, CPC-Total, CPC-Hope, CPC-Optimism, and CPC-Resilience were similar for both sexes ($0.050 \leq p \leq 0.610$). Women reported better PA, QoL-Total, all QoL domains, and CPC-Self-efficacy ($0.002 \leq p \leq 0.032$, **Table I**).

Differences in median age were observed for the different skin diseases ($p < 0.001$, **Table II**). Comparing the happiness scales, greater differences were observed for heuristic happiness, PA, QoL-Physical, QoL-Social, CPC-Hope, CPC-Self-efficacy, and in both total scores ($0.002 \leq p \leq 0.028$). The remaining scales were rated more similarly in different dermatological conditions ($0.058 \leq p \leq 0.386$). In general, patients with nummular eczema, mastocytosis, and KC scored lower on most scales than other patients, with KC patients showing higher variability in nearly all happiness scores.

Correlation analysis in dermatological patients

Table II. Patient characteristics and ratings of happiness scales for each skin disease

	Psoriasis	AE	Mastocytosis	Nummular eczema	Malignant melanoma	KC	p-value
Sample size, n (%)	67 (16.2)	84 (20.3)	10 (2.4)	19 (4.6)	84 (20.3)	150 (36.2)	
Sex, n (%)						2 missing	0.017
Men	29 (43.3)	33 (39.3)	7 (70.0)	8 (42.1)	32 (38.1)	85 (57.4)	
Women	38 (56.7)	51 (60.7)	3 (30.0)	11 (57.9)	52 (61.9)	63 (42.6)	
Age, years (median [IQR])	43.00 [35.50–50.00]	35.00 [29.00–44.00]	39.00 [32.50–48.25]	54.00 [45.00–67.00]	41.00 [33.75–50.50]	60.00 [50.00–68.75]	<0.001
Age categories, n (%)							<0.001
18–29 years	7 (10.4)	23 (27.4)	1 (10.0)	1 (5.3)	12 (14.3)	3 (2.0)	
30–39 years	15 (22.4)	27 (32.1)	4 (40.0)	3 (15.8)	23 (27.4)	12 (8.0)	
40–49 years	27 (40.3)	21 (25.0)	2 (20.0)	3 (15.8)	22 (26.2)	17 (11.3)	
50–59 years	9 (13.4)	9 (10.7)	3 (30.0)	3 (15.8)	20 (23.8)	37 (24.7)	
>60 years	9 (13.4)	4 (4.8)	0 (0.0)	9 (47.4)	7 (8.3)	81 (54.0)	
Happiness scales (median [IQR])							
Heuristic happiness	7.00 [7.00–8.00]	7.00 [7.00–8.00]	8.00 [7.25–8.00]	7.00 [6.00–8.00]	8.00 [7.00–8.00]	7.00 [7.00–8.00]	0.016
SWL	26.00 [25.00–28.50]	28.00 [25.00–30.00]	28.00 [25.25–30.00]	27.00 [22.50–30.00]	28.00 [25.00–30.00]	27.00 [24.00–29.00]	0.113
PA	24.00 [21.50–26.00]	24.00 [22.00–26.00]	23.00 [22.00–24.75]	22.00 [19.00–25.50]	24.00 [22.75–26.00]	23.00 [20.25–25.00]	0.007
NA	11.00 [9.00–12.50]	10.00 [8.00–12.00]	12.00 [10.00–12.75]	12.00 [9.00–14.00]	9.00 [8.00–12.00]	10.00 [8.00–12.00]	0.137
QoL-Physical	67.86 [58.93–78.57]	67.86 [60.71–79.46]	67.56 [58.93–71.43]	64.29 [55.36–73.21]	71.43 [63.84–82.14]	64.29 [53.57–75.00]	0.002
QoL-Psychological	70.83 [66.67–79.17]	75.00 [66.67–83.33]	72.92 [67.71–78.12]	70.83 [60.42–79.17]	75.00 [70.83–83.33]	70.83 [66.67–79.17]	0.114
QoL-Social	66.67 [66.67–75.00]	75.00 [58.33–83.33]	54.17 [50.00–64.58]	75.00 [62.50–75.00]	66.67 [58.33–83.33]	66.67 [50.00–75.00]	0.010
QoL-Environmental	71.88 [65.62–78.12]	75.00 [68.75–79.24]	73.44 [64.06–79.69]	75.00 [68.75–85.94]	75.00 [68.75–81.25]	71.88 [65.62–78.12]	0.386
QoL-Total (mean (SD))	71.04 (9.43)	73.07 (11.09)	69.02 (8.76)	69.54 (12.32)	73.53 (9.88)	68.78 (11.22)	0.011
CPC–Hope	4.33 [4.17–4.67]	4.67 [4.00–5.00]	4.50 [4.00–4.67]	4.00 [3.67–4.50]	4.67 [4.33–5.00]	4.33 [4.00–4.67]	0.019
CPC–Optimism	4.67 [4.50–5.00]	5.00 [4.33–5.33]	4.50 [4.00–4.92]	4.67 [3.83–5.17]	4.83 [4.33–5.33]	4.67 [4.00–5.33]	0.074
CPC–Resilience	4.33 [3.67–4.67]	4.33 [3.92–4.67]	4.00 [3.67–4.00]	4.00 [3.67–4.83]	4.33 [3.92–4.67]	4.00 [3.33–4.67]	0.058
CPC–Self-efficacy	4.67 [4.00–5.00]	4.50 [4.00–5.00]	4.00 [3.75–4.33]	4.00 [3.50–4.83]	4.67 [4.25–5.00]	4.50 [4.00–5.00]	0.028
CPC–Total	4.50 [4.17–4.83]	4.58 [4.08–4.92]	4.25 [3.94–4.50]	4.17 [3.67–4.71]	4.58 [4.23–5.00]	4.42 [4.00–4.75]	0.020

IQR: interquartile range; SD: standard deviation; AE: atopic eczema; KC: keratinocyte carcinoma; SWL: satisfaction with life; PA: positive affect; NA: negative affect; QoL: quality of life; CPC: Compound Psychological Capital.

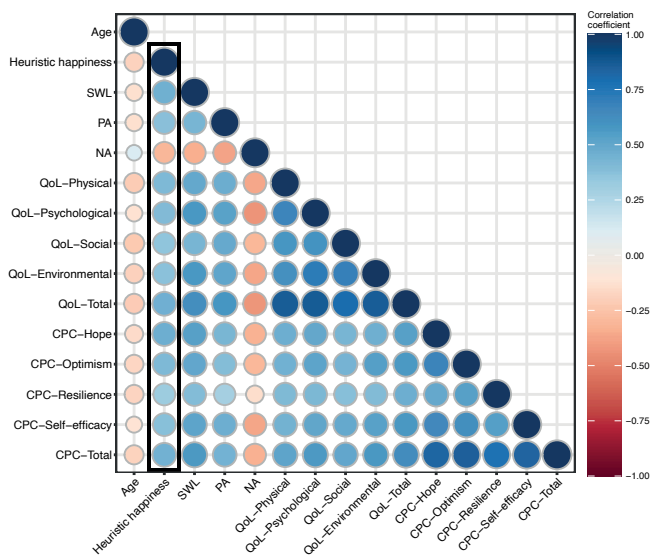


Fig. 1. Spearman's correlations between heuristic happiness and happiness-related scales in skin diseases. SWL: satisfaction with life; PA: positive affect; NA: negative affect; QoL: quality of life; CPC: Compound Psychological Capital.

$p=0.018$). Low to strong positive correlations were shown between the different happiness scores among all skin conditions, with exceptions for NA, which demonstrated negative associations ($r=0.14-0.87$, $0.001 \leq p \leq 0.003$). The domains of QoL and CPC correlated highly with their

total scores. In general, the data indicated moderate to strong correlations between heuristic happiness and other happiness-related scores ($|r|=0.30-0.46$, $p < 0.001$), with highest correlations with CPC-Hope ($r=0.46$) and SWL ($r=0.45$) (**Fig. 1**, Table SI).

Since differences were observed for the skin diseases, correlations between heuristic happiness and related dimensions were calculated separately for each skin disease (**Fig. 2**, Tables SII–SVII):

Psoriasis. Mild to moderate correlations were observed, with the highest correlation documented for QoL-Social ($r=0.35$, $p=0.004$) and the lowest for CPC-Resilience ($r=-0.10$, $p=0.399$).

Atopic eczema. Moderate to strong correlations were found. The highest correlations were identified for QoL-Physical ($r=0.57$, $p < 0.001$), CPC-Resilience ($r=0.52$, $p < 0.001$), and CPC-Hope ($r=0.52$, $p < 0.001$) and the lowest for NA ($r=-0.30$, $p=0.006$).

Mastocytosis. Heuristic happiness correlated slightly to strongly with the related dimensions ($|r|=0.04-0.56$, $0.096 \leq p \leq 0.921$), with partly reversed directions compared with other skin diseases.

Nummular eczema. Moderate to strong correlations were observed. The highest correlation was seen for CPC-Resilience ($r=0.70$, $p < 0.001$) and the lowest for QoL-Physical ($r=0.30$, $p=0.215$).

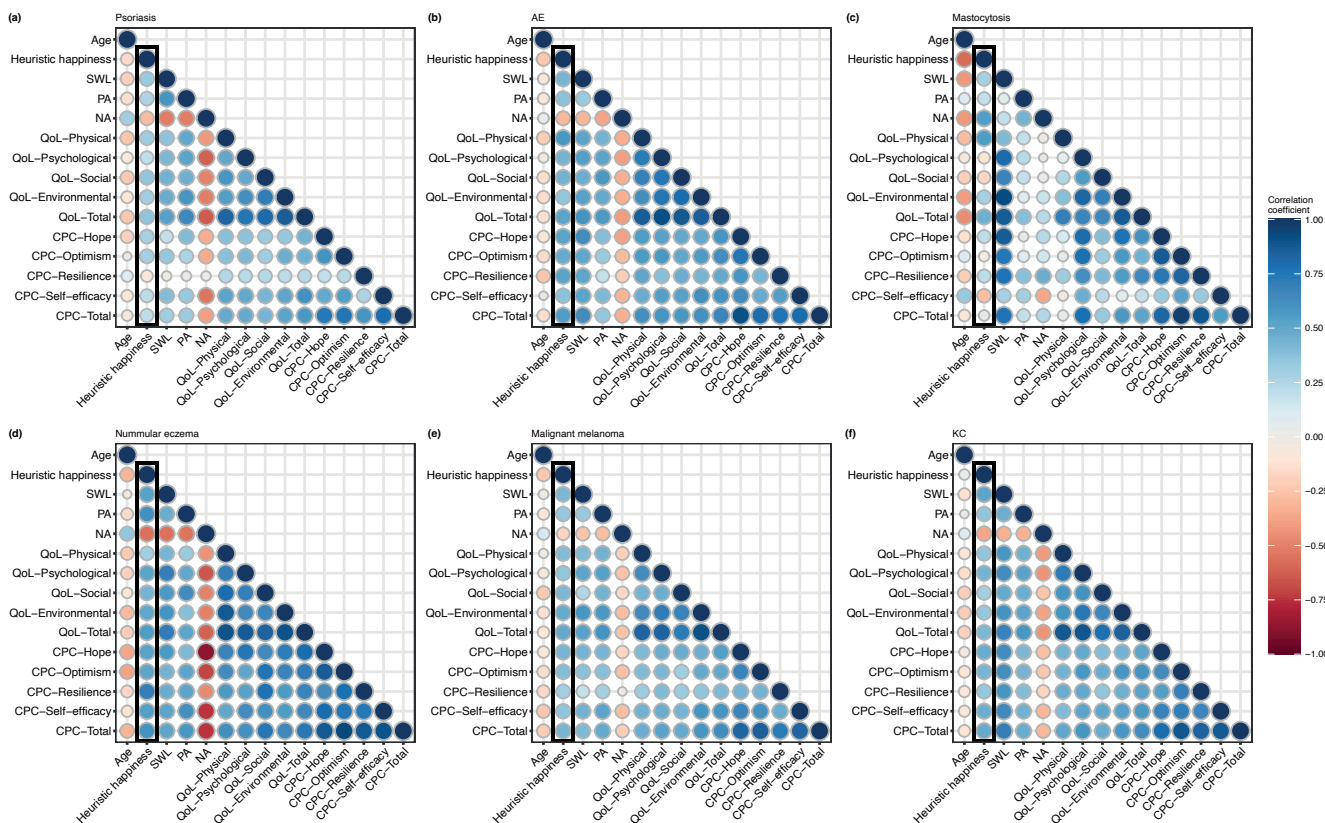


Fig. 2. Spearman's correlations between heuristic happiness and happiness-related scales in patients with (a) psoriasis, (b) atopic eczema (AE), (c) mastocytosis, (d) nummular eczema, (e) malignant melanoma, and (f) keratinocyte carcinoma (KC). SWL: satisfaction with life; PA: positive affect; NA: negative affect; QoL: quality of life; CPC: Compound Psychological Capital.

Malignant melanoma. Heuristic happiness showed low to moderate correlation with the related dimensions. Highest correlations were observed for QoL-Environmental ($r=0.48$, $p<0.001$) and CPC-Hope ($r=0.43$, $p<0.001$), while lowest for NA ($r=-0.18$, $p=0.109$) and CPC-Resilience ($r=0.29$, $p=0.008$).

Keratinocyte carcinoma. Moderate to strong correlations were observed. Highest correlations were shown for SWL ($r=0.51$, $p<0.001$) and CPC-Hope ($r=0.47$, $p<0.001$) and the lowest for QoL-Social ($r=0.30$, $p<0.001$).

Furthermore, this study investigated the correlation between heuristic happiness and happiness-related scores for different age categories. All age categories showed low to stronger correlations ($|r|=0.18-0.52$, $0.001 \leq p \leq 0.178$, Table SVIII).

Regression model of heuristic happiness

To examine the relationship between heuristic happiness and happiness-related scores in more detail, a linear regression model was generated ($n=402$). Two scores each had to be removed after stepwise selection (QoL-Social, CPC-Self-efficacy) and checking for multicollinearity (QoL-Environmental, CPC-Optimism). In the final model, CPC-Hope played an important role in heuristic happiness in all patients (Table III). The outcome variable was slightly associated with QoL-Psychological and negatively associated with NA. Differences in effects were found for SWL, PA, QoL-Physical, and CPC-Resilience in different skin diseases as seen in the interaction terms, while PA, QoL-Physical, and CPC-Resilience, showed either a positive or negative effect on heuristic happiness. In particular, CPC-Resilience showed a greater effect in nummular eczema and AE, whereas it was negatively associated with other skin diseases.

DISCUSSION

Studies on the role of happiness, particularly in dermatology, are limited. Comparing happiness scores, differences were observed in each dermatological disease. Overall, the associations between heuristic happiness and its related dimensions demonstrated moderate to strong correlations that differed between skin diseases. The regression indicated that CPC-Hope was important for heuristic happiness in all patients, while QoL-Social and CPC-Self-efficacy played no significant role for patients.

The current study observed sex and age differences between patients, as incidence rates and mortality differ depending on a patient's age and sex. For example, men are more frequently affected than women by KC (30), and its occurrence is closely associated with advanced age (2). Most happiness scores were approximately the same for both sexes as seen in previous research (31–33). However, some studies report contradictory results (6, 34). Analyses demonstrated negative correlations between age and nearly

Table III. Results of the regression model to assess factors associated with heuristic happiness after stepwise selection and checking for multicollinearity in dermatological patients

Coefficients	Estimate	SE	t value	p-value
Intercept	1.2677	0.7340	1.7271	0.085
Diagnosis (reference: KC)				
Psoriasis	1.0260	1.0801	0.9499	0.343
AE	0.3465	0.9500	0.3648	0.715
Nummular eczema	0.2574	1.4154	0.1819	0.856
Malignant melanoma	0.3109	1.0167	0.3058	0.760
Sex (reference: women)	2.4331	0.8192	2.9701	0.003
Age	-0.3560	0.9828	-0.3622	0.717
Age squared	2.3279	0.8217	2.8331	0.005
SWL	0.1397	0.0291	4.8086	<0.001
PA	0.0214	0.0231	0.9254	0.355
NA	-0.0085	0.0175	-0.4849	0.628
QoL-Physical	-0.0153	0.0076	-2.0023	0.046
QoL-Psychological	0.0103	0.0057	1.8232	0.069
CPC-Hope	0.4984	0.1057	4.7131	<0.001
CPC-Resilience	-0.0528	0.1067	-0.4953	0.621
Sex * SWL	-0.0472	0.0295	-1.5988	0.111
Sex * NA	-0.0270	0.0245	-1.1041	0.270
Sex * QoL-Physical	0.0148	0.0072	2.0736	0.039
Sex * CPC-Hope	-0.3904	0.1509	-2.5862	0.010
Psoriasis * SWL	0.0142	0.0401	0.3543	0.723
AE * SWL	-0.1202	0.0384	-3.1276	0.002
Nummular eczema * SWL	-0.1347	0.0549	-2.4545	0.015
Malignant melanoma * SWL	-0.0623	0.0384	-1.6241	0.105
Psoriasis * PA	-0.0575	0.0467	-1.2328	0.218
AE * PA	0.0366	0.0367	0.9955	0.320
Nummular eczema * PA	0.0437	0.0607	0.7206	0.472
Malignant melanoma * PA	-0.0004	0.0377	-0.0096	0.992
Psoriasis * QoL-Physical	0.0168	0.0105	1.5984	0.111
AE * QoL-Physical	0.0209	0.0107	1.9541	0.051
Nummular eczema * QoL-Physical	-0.0090	0.0189	-0.4767	0.634
Malignant melanoma * QoL-Physical	0.0187	0.0101	1.8506	0.065
Psoriasis * CPC-Resilience	-0.2645	0.1713	-1.5440	0.123
AE * CPC-Resilience	0.1714	0.1737	0.9868	0.324
Nummular eczema * CPC-Resilience	0.7199	0.3331	2.1613	0.031
Malignant melanoma * CPC-Resilience	0.0443	0.1655	0.2675	0.789

Residual standard error: 0.7784 on 367 degrees of freedom. Multiple R-squared: 0.4962, adjusted R-squared: 0.4495. F-statistic: 10.63 on 34 and 367 DF, p-value <2.2e-16.

SE: standard error; AE: atopic eczema; KC: keratinocyte carcinoma; SWL: satisfaction with life; PA: positive affect; NA: negative affect; QoL: quality of life; CPC: Compound Psychological Capital; *indicates an interaction term.

all happiness scores. These results align with those of other studies reporting lower Psychological Capital, SWL, and QoL among elderly people (31, 32). The relationship between age and happiness is still discussed in the literature (33). Further research is necessary for a more differentiated picture of happiness in relation to age and sex.

The ESS ($n=2,358$, mean (age): 49.7 ± 19.1 years, 48.6% women) showed that the happiness of the general German population, who stated being almost extremely happy (mean: 9.1) (21), exceeded that of dermatological patients (mean: 7.3) in the current study. In line with Schuster et al., this study also reported lower levels of heuristic happiness in dermatological patients compared with healthy controls (7).

The higher frequency of PA as opposed to NA in this study is consistent with the definition of SWB as a dimension related to happiness (10, 15). A previous study also identified stronger associations between SWL and optimism than pessimism (22). Different happiness dimensions are linked to several health-promoting behaviours and improved stress management (10, 11, 15). Studies in dermatology have found significant relationships between stress-related factors and the oc-

currence, severity, and progression of skin diseases (8). People with skin diseases reported lower PA compared with healthy controls (7), emphasizing the importance of positive psychological interventions (7, 9, 11). These methods potentially support both patients and physicians by motivating self-regulation, reducing time needed to understand health conditions, and expediting referrals to psychological specialists (32). Although interventions have been positively evaluated, they still need to be adapted for dermatological practice and integrated into interdisciplinary treatment approaches (11, 32).

Physical activity decreases with age and the presence of disease (13, 32), which may explain why physical health demonstrated the lowest scoring within the 4 domains of QoL in this study. Patients with KC and nummular eczema, the 2 oldest patient groups, showed the lowest scores and correlations with heuristic happiness for QoL-Physical and -Psychological. QoL-Social and -Environmental were not indicated as important in explaining heuristic happiness in most patients due to lower correlations and model exclusion. This finding appears consistent with that of a small sample of healthy university students (16).

Analyses indicated that especially CPC-Hope was important in explaining heuristic happiness in all patients, as CPC-Hope reflects a positive psychological state (25). The aforementioned association between stress and skin disease may be a reason for the lower rating of CPC-Resilience in all patients. Only for patients affected by nummular eczema and AE was resilience of higher importance in explaining heuristic happiness. A review demonstrated that children and adolescents affected by AE are severely impaired by problems such as embarrassment and bullying because of their visible skin lesions (5). Patients burdened in this manner may have formed coping strategies at an early age and consequently view resilience as an important factor for individual happiness. People with nummular eczema tend to have histories of AE (35), hence resilience may play a similar role in their happiness. Several studies have shown that patients with skin diseases have lower self-esteem than controls (36), which is probably attributed to the stigmatization of visible skin lesions (5). Since self-esteem and self-efficacy are closely related (37), this might be reflected in the low importance of self-efficacy in all patients.

Overall, the current study found that dermatological patients diagnosed with nummular eczema, mastocytosis, or KC scored lower in most happiness scores than other patient groups. One reason may be the small sample size for 2 of the 3 groups. In particular, the smallest group, comprising patients affected by mastocytosis, showed the highest intra- and inter-variations in ratings and correlations of happiness scales, e.g. the positive correlation between heuristic happiness and NA. These rather inconsistent ratings complicated comparisons. Some findings, such as the low scoring for QoL-Social, are consistent with previous studies (38). Larger study samples are

required for a more in-depth understanding of happiness and, particularly, of happiness in mastocytosis.

Moderate to strong correlations between heuristic happiness and happiness-related scores indicate the theoretical and conceptual intersection of the dimensions. This raises the question of whether an overlap leads to redundancy (12, 16, 17). Simplifying a universal heuristic happiness measurement requires more attention in health research and clinical practice for better comparisons and time-saving (9). One concern regarding 1-item measures is that they do not encompass the detail and breadth that can be achieved with multiple measures (39). Further studies are needed to compare single-item vs multiple-item happiness measures and to develop a measure consisting of only a few items, with international applicability.

Study limitations

Although happiness as a state of mind may be universal, asking about happiness in different cultures and languages may assess different dimensions, consequently leading to biased results (40). Germans frequently associate happiness with unexpected events, which may be attributed to the fact that the German word "Glück" can mean both "happiness" and "luck". Therefore, these conclusions are valid only in a German language setting. It should also be considered that a different order of happiness-related measures in the questionnaire could have led to different results (17). Another limitation is selection bias, as recruitment occurred in a single outpatient practice. The sample may therefore not be representative. Furthermore, the sample size was very small for skin diseases such as mastocytosis and nummular eczema, which may have led to biased results. Finally, the lack of a population-representative control group inhibits the evaluation of happiness measures in dermatological patients.

Conclusion

This study focused on positive health research to better understand its impact on skin diseases and the interaction between heuristic happiness and related happiness measures. The variations in skin diseases highlight the individual understanding of heuristic happiness, at least in a German context. Physicians should be trained to use positively framed questions to support patients to talk openly. This may lead to a better understanding of patients' holistic health, focus their attention on a positive perspective, and potentially have a therapeutic effect. Overall, analysing heuristic happiness may present a practical approach to approximating and simplifying a complex concept, such as happiness in both clinical practice and research.

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