Resilience in cancer patients and how it correlates with demographics, psychological factors and lifestyle

Lara Festerling (lara.festerling@uni-jena.de)
Universitätsklinikum Jena

J. Buentzel
Südharz Klinikum

L. Fischer von Weikersthal
Gesundheitszentrum St. Marien GmbH

C. Junghans
Paracelsus Klinik am Schillergarten Bad Elster

B. Zomorodbakhsch
üBAG/MVZ Onkologische Kooperation Harz GbR

C. Stoll
Bayreuth Klinik Herzoghöhe

F.-J. Prott
St. Josefs Hospital

S. Fuxius
Onkologische Schwerpunktpraxis Heidelberg

O. Micke
Francis Hospital

A. Richter
Inselberg Klinik Wicker GmbH & Co. OHG

D. Sallmann
REGIOMED REHA Klinik Masserberg GmbH

J. Huebner
Universitätsklinikum Jena

Catalina Hoppe
Universitätsklinikum Jena

Research Article

Keywords: resilience, cancer, multicentric cross-sectional study, self-efficacy, general life satisfaction, sense of coherence

Posted Date: May 5th, 2022

DOI: https://doi.org/10.21203/rs.3.rs-1610739/v1

Abstract

Purpose

Being diagnosed with cancer is challenging. Many patients wish to be actively involved in treatment and contribute to therapy, but the patients´ coping abilities and desire for involvement differ. The individual level of resilience seems to play a major role. Our study aims to learn more about the associations of resilience and factors as demographics and psychological factors.

Methods

This multicentric cross-sectional study was conducted in 10 oncological centers in Germany in summer 2021. The questionnaire collected information on demographics, resilience, self-efficacy, general satisfaction with life and sense of coherence. Considered lifestyle-aspects were diet and physical activity. 416 patients were included in the analyses.

Results

A moderate mean resilience score was achieved ($M = 69$). Significant correlations in demographics were found for resilience and education ($r = 0.146$, $p = 0.003$), income ($r = 0.205$, $p = 0.001$) and time since receiving diagnosis ($r = -0.115$, $p = 0.021$). Resilience and self-efficacy correlated on a high level ($r = 0.595$, $p < 0.001$), resilience and sense of coherence and, resilience and general satisfaction with life in a moderate way ($r = 0.339$, $p < 0.001$; $r = 0.461$, $p = 0.001$).

Conclusion

Resilience portrays an important aspect in cancer treatment. Detecting patients at risk, stabilizing, or improving resilience are important to focus on and strengthen them accordingly. Possible negatively influencing factors (e.g. low self-efficacy) need to be considered. Factors affecting resilience but difficult to influence, as educational background, should be screened for. Also, the combination of low resilience and low income seems to describe a vulnerable patient group.

Introduction

Receiving a diagnosis for cancer is a difficult situation to deal with for most people and affects many aspects of their and their next one´s life. Although it is undoubted that this diagnosis is challenging, some patients cope better than others. One factor that plays a crucial role in this coping ability is the patient´s level of resilience. In addition, the individually perceived self-efficacy is a concept that plays a role while dealing with illness and traumatic events. Both these terms are closely linked to each other since self-efficacy plays an important role in the concept of resilience [45].

A Seiler ,J Jenewein [40] showed that resilience performs as a protective factor against psychological distress and is closely related to a patient´s sense of coherence and optimism.

Resilience is brought into close relation with the individual being more optimistic, see more things as an opportunitiy to benefit from and also a greater emotional conciousness [2].

Along with self-efficacy, satisfaction with life spirituality and sense of coherence can be closely connected to resilience and are therefore interesting factors for examination.

There are a variety of definitions for resilience. To summarize resilience is defined as an individual´s ability to cope with distress and adapt to challenging events, such as the diagnosis of a life-threatening disease [12]. More important, resilience defines the ability to restore a stable mental and physiological status in or after burdensome events, such as the death of a close relative, loss of workplace and others. Resilient people seem to be able to reflect on their positive and negative emotions better than less resilient patients, which helps to restore resources and react more flexible.

According to different authors [11, 12] the extent of an individual´s resilience is to a certain extent, trainable and learnable, as well as to some degree determined by factors such as genetics

As resilience in the same individual is situational and depends on different protective and risk factors, not every situation in life is dealt with the same internal resistance. Above that not every person deals with similar situations the same way as resilience seen as an interindividual factor varies as well.

Different literature shows that resilience can be described as a dynamic process [1, 41] and is not a trait the individual is born with, but it develops throughout life based on experiences and learning [10]. It is also common that mental well-being and resilience in ill patients are strongly connected [17].

Due to the significance of this factor, identifying patients at risk of a lower level and strengthening resilience and self-efficacy should certainly be a priority. The intention is to find out what certain characteristics or criteria may be a target for cancer patients to improve or preserve their resilience in respect of coping with their disease and supporting patients in actively getting involved in treatment. Moreover, enhancing resilience may also affect quality of life. According to P Ludolph et al. [29], interventions based on therapies for positive psychology and supportive groups or behavioral therapies show the most beneficial results in respect of promoting resilience in cancer patients.

As mentioned above, actively including patients with cancer in the treatment is not only recommendable, but also often wished-for. Most of these patients are highly interested in diets and some in physical activity [7].

More than half of them also use complementary or alternative medicine [23].

In order to learn more about the associations of resilience, this study focuses on how resilience is connected to different demographics, other psychological factors and diverse aspects of lifestyle.

Patients And Methods

Study design

This prospective multicentric cross-sectional study was conducted in 10 oncological centers in Germany. Data acquisition was carried out from March 2021 until July 2021.

Study participants

The questionnaire was distributed in oncological centers (6 oncological departments of hospitals, one rehabilitation clinic and 3 oncological offices) in Germany to outpatient cancer patients. Inclusion criteria were a diagnosis of and active cancer treatment and a sufficient knowledge of the German language to answer the questions independently. Exclusion criteria were age below 18 years. As this study focuses on resilience, an additional criterium was that the patient needed to have a valid resilience score. The participants were asked to answer the questionnaire anonymously in a print version.

Questionnaire

The questionnaire consisted of two parts. The first part contained questions regarding the demographics such as gender, age, type of cancer and time since first diagnosis.

The second part consisted of different, established, and validated questionnaires:

1. We used the RS-13 short scale to file the patients´ resilience. The RS-13 questionnaire by K Leppert et al. [27] to file the participants resilience consists of 13 items with two subcategories acceptance and competence. This short version is based on the RS-25 by [38] and has a sufficient re-test reliability of 0.62. The RS-13 contains a 7-point Likert-scale (1= “I don’t agree at all”; 7= “I fully agree”) and exhibits an excellent internal reliability (Cronbach’s $a = 0.9$). It is an instrument that can be used to directly measure resilience. The resulting score is classified as “low”, “moderate” and “high”. For patients who skipped one item, we substituted the missing value by the stated values´ mean. All other questionnaires that missed more than one item were considered to be invalid and not included in further evaluation as no valid score could be calculated.
2. The general life satisfaction short scale L-1 is a 10-point Likert-Scale [4]. This short scale shows a re-test-reliability of 0.67. In comparison with the multi-item short scale [13], it also shows a high positive correlation ($r = 0.74$) [5].
3. To gather information about the patients´ perceived self-efficacy we used the “Allgemeine Selbstwirksamkeit-Kurzskala/general self-efficacy short scale” (ASKU), a short scale with a sufficient internal consistency between 0.81 and 0.86. Other studies showed a high positive correlation with the participants´ self-worth, their general life satisfaction and internal control conviction [4]. All items are collected with a 5-point Likert-scale, in case of one missing value, it was substituted by 3, the scales mean value.
4. The Sense Of Coherence SOC-L9 questionnaire files the patients´ sense of coherence with the three components of meaningfulness, manageability, and comprehensibility [39]. The employed short

scale shows an excellent correlation with longer versions such as the SOC-29 ($r = 0.94$), as well as an adequate internal consistency (Cronbach's $a = 0.87$).

5. To file the participants spirituality the questionnaire for Functional Assessment of Chronic Illness Therapy- Spiritual Well-Being 12 Item Scale (FACIT-Sp12) was used [8].
6. The so far and current use of complementary and alternative medicine was enquired by the PRiO (Preventive and Integrative Oncology) questionnaire [24], as well as daily and sporting activity. Daily activity was enquired by a Likert-scale with three options,0 standing for less than 10 minutes, 1 for a time between 11 and 30 minutes of activity, 2 for an activity level between 31–60 minutes a day and 3 signifying an activity level of more than 60 minutes.
7. For elaboration on the patients´ dietary habits and active investment the Adolescent Food Habits Checklist (AFHC) we used in this survey was shortened (12 items instead of 23 items) and translated. It collects information on the active investment in their diet and general dietary habits of the patients. The 23-item-Checklist´s internal consistency is high (Cronbach's $a = 0.82$) [25].
8. At the end the participants were asked to give information about their explanation approach for their personal cancer disease. For that they could choose from a variety of predefined answers and also state own approaches [44].

Employed questionnaires for spirituality, lay etiology, complementary and alternative medicine and their results will not be featured in this article but are part of separate analyses.

Statistical analysis

Statistical analyses were conducted using Statistical Package for Social Science (IBM SPSS) version 27.

Adapted to the scale of measurement in question Pearson´s correlation coefficient or Spearman´s rank correlation coefficient was used to assess relationships between demographic factors and resilience. For assessment of group differences in resilience analysis of variance t-tests have been carried out. For variables with more than two groups ANOVA with Bonferroni was performed, for samples that consisted of two groups only, independent sample t-tests were used. Group differences for age were assessed by the Mann-Whitney-U test.

$p < 0.05$ was considered to be significant.

Results

Demographics

A total of 451 patients out of 10 oncological centers and offices in Germany took part in this study.

284 (65.3%) were female and 151 (34.7%) were male. The participants mean age was 62.3, reaching from 33 to 85 years; 268 (66.0%) were female and 138 (34.0%) were male.

Further detailed information on demographical data can be found in Table 1

The RS-13 questionnaire was filled by 416 participants (92.2%) who were included in further evaluation.

Table 1
Demographic Data (N = 416)

Data		***N***	***(%)***
Marital status	Married	282	67,8
	Divorced	44	10,6
	Widowed	35	8,4
	Relationship	29	7,0
	Single	26	6,3
Financial coping without income	1–6 months	141	36,0
	6–12 months	94	24,0
	More than 12 months	157	40,1
Level of education	No degree	9	2,2
	8/10th grade	260	63,6
	Abitur	31	7,6
	University/College	109	26,7
Religion	Christian	233	57,0
	None	172	42,1
	Muslim	3	0,7
	Other	1	0,2
Type of cancer	Breast	146	37,1
	Colorectal	49	12,4
	Head-neck	45	11,4
	Gastrointestinal	31	7,9
	Leukaemia, lymphoma	29	7,4
	Prostate	21	5,3
	Lung	21	5,3
	Gynecological	21	5,3
	Other urogenital	6	1,5
	Others	25	6,3
Time since diagnosis	Less than 1 year	208	51,5

Data		*N*	*(%)*
	1–3 years	113	28,0
	3–6 years	41	10,1
	More than 6 years	42	10,4

Resilience

In the population, a mean resilience score of 69 was achieved, which lies in the moderate range

of the instrument. One-hundred-ninety-five patients (46.9%) scored a high resilience value, 16.3% ($N = 68$) had a moderate one, while 36.8% ($N = 153$) scored a low value.

Results of the correlation analyses are shown in Table 2 and are explained below.

Resilience and demographic data

There were no correlations between resilience and age, gender, marital status and none between resilience and religious affiliation Also, no significant difference could be observed for the type of cancer ($p > 0.05$).

Resilience was weakly correlated to a higher level of education ($r = 0.146$, $p = 0.003$) and a better income ($r = 0.205$, $p = 0.001$). In contrast, a long-standing diagnosis is correlated with lower resilience (r=-0.115, $p = 0.021$).

Resilience and lifestyle

Lifestyle in this context summarizes the factors dietary habits according to the AFHC and daily activity.

The Adolescents Food Habits Checklist Score showed a mean score of 7.8 out of 12 possible points, hence a moderately healthy score. The food habit checklist and resilience were positively and significantly correlated ($r = 0.117$, $p = 0.018$).

Results from the activity- questionnaire showed that the majority achieved an average current daily activity of at least 31–60 minutes. The patient´s current daily activity was positively correlated to their resilience score ($r = 0.142$, p = 0.005). When comparing the mean value for daily level of activity now ($M = 2.02$), to what the patients stated to have had before their diagnosis ($M = 2.63$), a slight decrease of the mean value could be observed ($t(363) = 11.98$, $p < 0.001$).

Resilience and psychological factors

As psychological factors we summarized general life satisfaction, self-efficacy and sense of coherence. A moderately high correlation for resilience and general life satisfaction was found ($r = 0.461$, $p = 0.001$).

The mean value of self-efficacy was 3.92. The correlation between resilience and self-efficacy was significant on a high level ($r = 0.595$, $p < 0.001$).

Concerning sense of coherence, a mean score of 32,17 was achieved. This score lies in the middle range of the scale.

The perceived resilience and the patients´ sense of coherence were found to be correlated on a significant moderate level, showing that a higher sense of coherence goes along with a higher resilience ($r = 0.339$, $p < 0.001$).

Table 2
Correlations of resilience and reported variables

Variable	***N***	***correlation coefficient***	***p***
Age	412	r = 0.036	> 0.05
Gender	406	η = 0.023	> 0.05
Marital status	416	η = 0.088	> 0.05
Financial coping without income	392	**r = 0.205**	**0.001**
Level of education	409	**r = 0.146**	**0.003**
Religion	409	η = 0.059	> 0.05
Type of cancer	394	η = 0.126	> 0.05
Time since diagnosis	404	**r=-0.115**	**0.021**
General life satisfaction	381	**r = 0.461**	**0.001**
Self-efficacy	405	**r = 0.595**	**0.001**
Sense of coherence	416	**r = 0.339**	**0.001**
Dietary habits	404		**0.018**
Daily activity	382		**0.005**

Discussion

Our results for general life satisfaction ($M = 6.37$) measured by the L1-scale, show close alignment with the mean value of $M = 7.18$ in a study population in the German federal republic [5].

Our findings concerning the patients´ resilience score are in line with the German population´s result of $M = 70$ [27].

The monitored self-efficacy according to the ASKU- questionnaire is only slightly lower than the result of the quota sample consisting of 539 participants from the German federal republic who were sorted by sex, age and education ($M = 4.0$) [4].

Only for the sense of coherence J Schumacher et al. [39] found their study population, also consisting of over 2000 participants from the federal republic of Germany, to score a higher mean score ($M = 51$), while our population shows a mean of $M = 32.17$.

With respect to lifestyle, our patient average lies above that recommendation with about 31–60 minutes a day, both before and after receiving the diagnosis [3, 9], the dietary habits in our population averages 7.8 points in the shortened version with 12 items, while F Johnson et al. [25] report that the adolescents taking part in their study averaged a AFCH-score of 11 of 23 items.

In our cross-sectional study, we have shown a high correlation between resilience and self-efficacy, while between resilience and general life satisfaction there was a moderate correlation as well as between resilience and sense of coherence. In contrast, the financial status, obtained level of education, time since diagnosis, dietary habits, and level of daily activity only show less strong correlations with resilience.

Resilience and demographic data

Resilience and age do not show correlation in our study population, opposed to literature which reports it to be positive. [6, 20].

Especially people over the age of 65 seem to be more resilient [6]. Contrary to what can be found in literature our findings do not match aforesaid observations. Forty-one-point-nine percent of our study population belonged to the group of 65 years or older, suggesting that a large part of our population would happen to have a higher resilience. When comparing the mean resilience score of the over 65-year-old patients´ to the mean resilience score of people younger than 65 years, no significant difference is shown.

On the other hand, it is interesting that a study that especially focused on cancer patients noticed a negative correlation of age and resilience. Here patients with a higher resilience level appeared to be younger than the ones with a lower level [30]. This implies that the factor of having a cancer diagnosis could play a crucial role in terms of the correlation, since our study population consists of cancer patients and patients with cancer in their history, this explains why results differ from literatures only focusing on the correlation of resilience and age.

Also, in contrast to the literature, our results do not show a correlation between resilience and gender. Several authors reported male gender coming with a higher level of resilience in case of traumatic events, other chronic diseases, or incisive events [6, 31, 33].

GE Hodes ,CN Epperson [22] point out that hormonal changes, especially for women in life phases like puberty, pregnancy, and perimenopause, decreases their resilience which would apply to a substantial part of our collective which in part receives treatments interfering with hormonal status as in breast cancer.

In contrast, conscientiousness is reported to be higher in women [28], which may strengthen resilience by better emotion regulation [42].Thus, female patients may gain resilience.

In line with our data, MM Reguera-García et al. [34] have shown that there is no significant correlation between resilience and religion. However, religion might still play an important factor for mental health in general [43].

Evaluating the association of resilience and the marital status, no correlation was found. However, religion and marital status could also be seen as part of social network/support, which makes it even more interesting that apparently no significant correlation is attested. GA Bonanno et al. [6] highlight the link between a low social support and weaker resilience levels. At the same time H Zhang et al. [47] show the strong interaction between a well-established social support and higher levels of resilience. Based on our data, we can only say that the marital status itself is not related to resilience and thus probably not to be equated with social support.

In addition, we found a positive correlation for resilience and the financial status. This is in line with the findings by O Friborg et al. [19] who have shown that a lower income goes along with a worse mental health status. Moreover, health issues with severe diseases even in a country with high standards of health care, imply financial burdens for patients. Accordingly, GA Portnoy et al. [33] reported that a higher resilience is seen in patients a higher income.

We have shown a weak correlation between resilience and education. According to a study among Indian women by N Fahey et al. [16], a higher level of education marks for better coping skills and stress management as well as problem solving, which goes along with our findings in our study. Also GA Bonanno et al. [6] revealed that a higher level of education is inversely associated with resilience.

Moreover, resilience and the time since receiving the diagnosis correlated negatively in our study. This might point to a decrease in resilience if treatment lasts longer, since the process of treatment often means a strong mental as well as physical burden. Further investigations on the effect of long treatment on resilience could give more detailed information on this.

Above that, “time since diagnosis” means that our questionnaire asked for the first time being diagnosed with cancer, at the time of data acquisition some patients commented to have gone through relapses, metastases, or received new cancer diagnoses. All these different aspects will undisputedly also significantly influence resilience and mental health in general.

P Macia et al. [30] reported patients during treatment showing higher resilience. Since our study was pursued in oncological centers, where most of our polled patients certainly will be receiving therapy, this factor might be less effectful, nevertheless the difference of being in palliative cancer treatment after a longer treatment process, in contrast to someone who just recently started therapy, based on a new cancer diagnosis, may influence the patients´ resilience. A patient who is in process of curative treatment

and more hopeful to be cured from the disease will approach therapy with a different mindset than a patient who is in palliative treatment in order elongate the time free of complaints.

Resilience and lifestyle

Our data show a significant association between dietary habits and resilience which is in line with studies other findings [32].

A higher resilience enables patients to adhere to a healthy diet. Moreover, they are likely to be empowered through positive feedback from themselves as well as from their environment.

Quite similar, we have shown a positive association between resilience and physical activity. A study among college students [36] focusing on physical activity and factors such as general resilience and psychological distress showed a higher physical activity goes along with higher average values for resilience. In another study featuring college students ER Dunston et al. [14] pointed out that the intensity seems to play a role. Physical activity may strengthen the patients´ physical and mental resources as being more physically active up to doing moderate exercises and sports has a positive impact on the immune system [37].

Findings by G Ristevska-Dimitrovska et al. [35] report that patients with a lower level of resilience have a more negative body image and report more severe symptoms as well as more negative future perspectives.

Resilience and satisfaction with life

In the literature, few data can be found on general satisfaction with life and none on resilience and satisfaction with life. We found a significant positive correlation of resilience and general life satisfaction.

Examining general satisfaction with life and cancer treatment, L Kroker et al. [26] concluded that the total number of side effects from cancer treatment is negatively correlated to satisfaction with life.

While only few data can be found on resilience and satisfaction with life, more is published on resilience and quality of life. P Macia et al. [30] point out that resilience is found to be negatively correlated with the part of quality of life that is influenced by physical components, whereas resilience and mental components of quality of life seem to be positively related.

Aforesaid finding is supported by M Eicher et al. [15] who point out that fatigue symptoms seem to be less amongst people with a higher resilience, while mental health and quality of life are higher. Several studies [46, 47] confirm these findings.

We report a strong positive correlation between self-efficacy and resilience. Agreeing, a study in adolescents shows that resilience is an important factor in coping and that the way people use their inner resources has strong influence on the outcome [21]. Having a strong self- efficacy helps patients to

master difficult situations successfully. People that are self-efficacious have the ability to be more positive and reject negative thoughts rather than others [21]. In the context of highly complex cancer treatments, self-efficacy is an important trait to improve self-management and cooperation with the physicians, increase adherence and improve the management of side-effects.

Moreover, also resilience and sense of coherence are associated. Also MM Reguera-García et al. [34] observed a moderately high correlation between total coherence and resilience. A higher sense of coherence helps to better cope with threatening situations as the diagnosis of cancer, of a relapse and many treatment situations and to actively work on improving their health outcomes [18].

Conclusion

Resilience is an important individual factor in cancer care.

For physicians and nurses two aspects are important. First, to detect patients who may have a low resilience. Risk factors from our study are a low level of resilience, an instable financial status, poor dietary habits, or a combination of the afore mentioned.

Secondly increasing or at least stabilizing resilience should be integrated into routine cancer care. This includes aspects such as support by psychological support to build self-consciousness, practice positive thoughts and coping with setbacks, as well as setting achievable goals in order to keep motivation up and also taking influence on for example perceived sense of coherence.

To detect patients with more risk factors, a screening for those at risk before starting therapy appears to be an effective method.

Guided by the individual risk factors, additional therapy concepts may be considered, as for instance psychological therapy, psychoeducation, nutritional advice, as well as encouragement into sports and being active. For the purpose of promoting or stabilizing resilience it appears to be helpful to introduce a basic program where individual adaptions according to the patient´s status and needs can be made.

To develop guidance notes for treatment and cancer patient activation, it would be advisable to consider the patient´s individual educational level and screen for cancer patients that might fall out of alignment in terms of a less favorable educational background.

It seems to be beneficial to strengthen patients in resilience, decelerate the remission of resilience that seems to go hand in hand with a longer time since receiving the diagnosis and support them in enhancing psychological resilience over the time of treatment and after. The combination of a low resilience and low income make the patients a more vulnerable group and hence they should be screened for this predisposition.

By approaching different aspects for strengthening resilience and by that, indirect factors, such as the patients´ general life satisfaction, mental health or even dietary habits that can facilitate cancer

treatment, the patient can actively take part in their therapy or conversely by actively integrating the patients in their treatment a positive impact on the different constructs can be achieved.

To resume our findings and examined literature on resilience, it can both be seen as a stable resource [35] or a factor that can be altered, trained and is dynamic. This study encourages both conceptions depending on the considered variable.

Limitations

There are several limitations of our study. The questionnaire was randomly handed out to patients over the age of 18 in the different oncological centers. Thus, the question on how representative the sample is, is hard to answer. On the other side, the centers were heterogenous in different parts of Germany. Concerning the type of cancer, our study population of 394 participants split into 10 different types of cancer, which made it difficult to further investigate on possible relations of resilience and the individually different cancer types.

For several items, our questionnaire does not provide detailed information. For example, we asked the participants to state which religion they adhere to. From this, we may not conclude whether they are actively involved in their religious community. Moreover, we did not ask for more detailed data on cancer treatment. Accordingly, we do not know whether patients are under current treatment or survivors. For the AFHC we cannot distinguish whether the food habits have changed since the diagnosis.

Declarations

Author contributions

Material preparation and analyses were performed by Lara Festerling and Jutta Hübner. Data collection was carried out by Jens Büntzel, Ludwig Fischer von Weikersthal, Constanze Junghans, Bijan Zomorodbakhsch, Christoph Stoll, Franz-Josef Prott, Stefan Fuxius, Oliver Micke and Achim Richter. The first draft of the manuscript was written by Lara Festerling. Catalia Hoppe, Jutta Hübner and Jens Büntzel commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Funding

The authors grant that no funds, grants, or other support were received during the preparation of this manuscript.

Competing interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Ethics approval

All data were taken anonymously. The ethical approval was authorized by the ethics committee at the university hospital of the Friedrich-Schiller-Universität Jena (2021-2130-Bef).

Consent to participate

Informed consent was obtained from all individual participants included in the study.

Availability of data and material

The datasets that were generated and analyzed during this study are available from the corresponding author upon reasonable request.

References

1. Apa APA (2020) Building your resilience. In: American Psychological Association.

2. Babic R, Babic M, Rastovic P et al. (2020) Resilience in Health and Illness. Psychiatr Danub 32:226-232

3. Beckmann I-A (2021) Bewegung und Sport bei Krebs. In:Stiftung Deutsche Krebshilfe, Die blauen Ratgeber

4. Beierlein C, Kemper C, Kovaleva A et al. (2013) Kurzskala zur Erfassung allgemeiner Selbstwirksamkeitserwartungen (ASKU) [Short Scale for Measuring General Self-efficacy Beliefs (ASKU)]

. Methoden – Daten – Analysen 7

5. Beierlein C, Kovaleva A, László Z et al. (2015) Kurzskala zur Erfassung der Allgemeinen Lebenszufriedenheit (L-1). In, ZIS Gesis

6. Bonanno GA, Galea S, Bucciarelli A et al. (2007) What predicts psychological resilience after disaster? The role of demographics, resources, and life stress. J Consult Clin Psychol 75:671-682

7. Braun LA, Zomorodbakhsch B, Keinki C et al. (2019) Information needs, communication and usage of social media by cancer patients and their relatives. J Cancer Res Clin Oncol 145:1865-1875

8. Bredle J, Salsman J, Debb S et al. (2011) Spiritual Well-Being as a Component of Health-Related Quality of Life: The Functional Assessment of Chronic Illness Therapy—Spiritual Well-Being Scale (FACIT-Sp). Religions 2

9. Bzga (2016) Nationale Empfehlungen für Bewegung und Bewegungsförderung. Forschung und Praxis der Gesundheitsförderung Sonderheft 03

10. Bzga (2021) Resilienz oder was die Psyche im Gleichgewicht hält. In, Kindergesundheit-info.de, p CC BY-NC-ND

11. Connor KM, Zhang W (2006) Recent advances in the understanding and treatment of anxiety disorders. Resilience: determinants, measurement, and treatment responsiveness. CNS Spectr 11:5-12

12. Davydov DM, Stewart R, Ritchie K et al. (2010) Resilience and mental health. Clin Psychol Rev 30:479-495

13. Diener E, Emmons RA, Larsen RJ et al. (1985) The Satisfaction With Life Scale. J Pers Assess 49:71-75

14. Dunston ER, Messina ES, Coelho AJ et al. (2020) Physical activity is associated with grit and resilience in college students: Is intensity the key to success? J Am Coll Health:1-7

15. Eicher M, Matzka M, Dubey C et al. (2015) Resilience in adult cancer care: an integrative literature review. Oncol Nurs Forum 42:E3-16

16. Fahey N, Soni A, Allison J et al. (2016) Education Mitigates the Relationship of Stress and Mental Disorders Among Rural Indian Women. Ann Glob Health 82:779-787

17. Färber F, Rosendahl J (2018) The Association Between Resilience and Mental Health in the Somatically Ill. Dtsch Arztebl Int 115:621-627

18. Fok SK, Chair SY, Lopez V (2005) Sense of coherence, coping and quality of life following a critical illness. J Adv Nurs 49:173-181

19. Friborg O, Barlaug D, Martinussen M et al. (2005) Resilience in relation to personality and intelligence. Int J Methods Psychiatr Res 14:29-42

20. Guil R, Ruiz-González P, Merchán-Clavellino A et al. (2020) Breast Cancer and Resilience: The Controversial Role of Perceived Emotional Intelligence. Front Psychol 11:595713

21. Hamill Skoch S (2003) Resilience and Self-Efficacy: The importance of efficacy beliefs and coping mechanisms in resilient adolescents. Colgate University Journal of Sciences 35

22. Hodes GE, Epperson CN (2019) Sex Differences in Vulnerability and Resilience to Stress Across the Life Span. Biol Psychiatry 86:421-432

23. Hoh JC, Schmidt T, Hubner J (2018) Physical activity among cancer survivors-what is their perception and experience? Support Care Cancer 26:1471-1478

24. Huebner J, Micke O, Muecke R et al. (2014) User rate of complementary and alternative medicine (CAM) of patients visiting a counseling facility for CAM of a German comprehensive cancer center. Anticancer Res 34:943-948

25. Johnson F, Wardle J, Griffith J (2002) The Adolescent Food Habits Checklist: reliability and validity of a measure of healthy eating behaviour in adolescents. Eur J Clin Nutr 56:644-649

26. Kroker L, Dubois C, Munstedt K et al. (2019) A Pilot Study of Side Effects of Cancer Therapies and their Impact on Satisfaction with Life. Cancer Invest 37:216-226

27. Leppert K, B K, Elmar B et al. (2008) Die Resilienzskala (RS) – Überprüfung der Langfrom RS-25 und einer Kurzform RS-13. Klinische Diagnostik und Evaluation

1

28. Limura S, Taku K (2018) Gender Differences in Relationship Between Resilience and Big Five Personality Traits in Japanese Adolescents. Psychol Rep 121:920-931

29. Ludolph P, Kunzler AM, Stoffers-Winterling J et al. (2019) Interventions to Promote Resilience in Cancer Patients. Dtsch Arztebl Int 51-52:865-872

30. Macia P, Barranco M, Gorbena S et al. (2020) Expression of resilience, coping and quality of life in people with cancer. PLoS One 15:e0236572

31. Masood A, Masud Y, Mazahir S (2016) Gender differences in resilience and psychological distress of patients with burns. Burns 42:300-306

32. Owen L, Corfe B (2017) The role of diet and nutrition on mental health and wellbeing. Proc Nutr Soc 76:425-426

33. Portnoy GA, Relyea MR, Decker S et al. (2018) Understanding Gender Differences in Resilience Among Veterans: Trauma History and Social Ecology. J Trauma Stress 31:845-855

34. Reguera-García MM, Liébana-Presa C, Álvarez-Barrio L et al. (2020) Physical Activity, Resilience, Sense of Coherence and Coping in People with Multiple Sclerosis in the Situation Derived from COVID-19. Int J Environ Res Public Health 17

35. Ristevska-Dimitrovska G, Filov I, Rajchanovska D et al. (2015) Resilience and Quality of Life in Breast Cancer Patients. Open Access Maced J Med Sci 3:727-731

36. San Roman-Mata S, Puertas-Molero P, Ubago-Jimenez JL et al. (2020) Benefits of Physical Activity and Its Associations with Resilience, Emotional Intelligence, and Psychological Distress in University Students from Southern Spain. Int J Environ Res Public Health 17

37. Schmidt T, Van Mackelenbergh M, Wesch D et al. (2017) Physical activity influences the immune system of breast cancer patients. J Cancer Res Ther 13:392-398

38. Schumacher J, K L, Gunzelmann T et al. (2005) Die Resilienzskala - Ein Fragebogen zur Erfassung der psychischen Widerstandfähigkeit als Personmerkmal. Zeitschrift für Klinische Psychologie, Psychiatrie und Psychotherapie 53

39. Schumacher J, Wilz G, Gunzelmann T et al. (2000) [The Antonovsky Sense of Coherence Scale. Test statistical evaluation of a representative population sample and construction of a brief scale]. Psychother Psychosom Med Psychol 50:472-482

40. Seiler A, Jenewein J (2019) Resilience in Cancer Patients. Front Psychiatry 10:208

41. Vanmeter F, Cicchetti D (2020) Resilience. Handb Clin Neurol 173:67-73

42. Vaughan E, Koczwara B, Kemp E et al. (2019) Exploring emotion regulation as a mediator of the relationship between resilience and distress in cancer. Psychooncology 28:1506-1512

43. Weber SR, Pargament KI (2014) The role of religion and spirituality in mental health. Curr Opin Psychiatry 27:358-363

44. Welter S, Keinki C, Ahmadi E et al. (2021) Lay Etiology, Self-Efficacy and Patient Activation Among Cancer Patients. Cancer Invest 39:219-228

45. Wu X, Xu H, Zhang X et al. (2021) Self-efficacy, Hope as Mediators Between Positive Coping and Resilience Among Patients With Gastric Cancer Before the First Chemotherapy. Cancer Nurs 44:79-85

46. Ye ZJ, Qiu HZ, Li PF et al. (2017) Predicting changes in quality of life and emotional distress in Chinese patients with lung, gastric, and colon-rectal cancer diagnoses: the role of psychological resilience. Psychooncology 26:829-835

47. Zhang H, Zhao Q, Cao P et al. (2017) Resilience and Quality of Life: Exploring the Mediator Role of Social Support in Patients with Breast Cancer. Med Sci Monit 23:5969-5979