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Depression, anxiety, and behavioral activation in Mexican cancer patients: comparisons and predictive factors

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Abstract

Objectives: *To identify the levels of anxiety, depression, and behavioral activation in Mexican oncology patients, as well as sociodemographic and cancer-related predictors.* **Methods:** *One hundred and sixteen patients (mean = 53 years, standard deviation 16.57) responded to a psychological battery (Beck Depression Inventory II, Hospital Anxiety and Depression Scale, and Behavioral Activation Scale for Depression).* **Results:** *About 62.07% presented anxiety and 56.03% depression; 59.5% reported being somewhat active, suggesting that they maintain basic and instrumental activities. Multiple linear regression analysis revealed that behavioral activation (β = –0.381, p = 0.000) and age (β = –0.133, p = 0.037) have a positive effect on depression, while anxiety (β = 0.507, p = 0.000) and religion (β = 0.141, p = 0.019) a negative effect.* **Conclusions:** *It is necessary to continue investigating about the negative effects of the religion variable on anxious-depressive symptoms, as well as to know if the adequate programming of activities and the clarity in the values reduce the presence of depression in the cancer population.*

Keywords: *Anxiety. Depression. Behavioral activation. Neoplasms.*

Depresión, ansiedad y activación conductual en pacientes oncológicos mexicanos: comparaciones y factores predictores

Resumen

Objetivo: *Identificar los niveles de ansiedad, depresión y activación conductual en pacientes oncológicos mexicanos, así como los factores predictores sociodemográficos y relacionados con el cáncer.* **Método:** *116 pacientes con cáncer (media 53 años, desviación estándar 16.57) respondieron una batería psicológica (Inventario de Depresión de Beck II, Escala Hospitalaria de Ansiedad y Depresión, y Escala de Activación Conductual para la Depresión).* **Resultados:** *El 62.07% presentó ansiedad y el 56.03%, depresión; 59.5% se reportó algo activa. El análisis de regresión lineal múltiple reveló que la activación conductual (β = -0.381, p = 0.000) y la edad (β = -0.133, p = 0.037) tienen un efecto positivo sobre la depresión, mientras que la ansiedad (β = 0.507, p = 0.000) y la religión (β = 0.141, p = 0.019) un efecto negativo.* **Conclusiones:** *Es necesario seguir investigando los efectos negativos de la variable religión sobre la sintomatología ansioso-depresiva, así como conocer si la adecuada programación de actividades y la claridad en los valores reducen la presencia de depresión en población oncológica.*

Palabras clave: *Ansiedad. Depresión. Activación conductual. Neoplasia.*

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Introduction

Suffering from an oncologic disease not only entails physical deterioration and cessation of activities of daily living, typically associated with tumor activity or medical treatment side effects, but also having to face social problems and economic limitations, which favor the development of symptoms of stress, anxiety, depression, and even higher mortality risk[1-4]. Although anxiety and depression are problems, patients may experience throughout the course of the disease, there is much that remains to be known about these disorders; for example, identifying the predictive variables related to their origin and severity, as well as developing psychological assessment strategies for their timely detection before and after cancer diagnosis[5-7]. Although there are intervention protocols with evidence of their efficacy, such as behavioral activation therapy[8,9], the identification of variables related to cancer and their association with depression and anxiety will reveal elements that, beyond their prediction, will allow the development of interventions adjusted to the real problems patients experience in their daily lives and as part of the process of disease.

Studies carried out in cancer populations reveal that anxiety affects around 10% of cancer patients, while depression affects 20%, in contrast with the general population[10]; in addition, the presence of both problems ranges between 12.9 and 25.9%, with the female population reporting it most frequently[11-13]. As for depression, some of the predictors are known to be: cancer type (mainly neoplasms with paraneoplastic syndromes and cytokine release); clinical stage (a higher presence of mental disorders is observed in the most symptomatic patients); ongoing cancer treatment (makes for more side effects to be likely to occur); history of depression (presence of relapsing depressive episodes or severe depressive symptoms); pain (especially chronic or uncontrolled pain); limited social network (limited size of the social network or perception of poorly functional social support); limited functional status (loss of autonomy for carrying out activities of daily living or leisure); and age (younger patients are more prone to suffer from depression)[7]. Other variables associated with the presence of anxiety and depression are: place of residence (e.g., insecurity, violence), religion[14-16] and occupation[14], cancer recurrence, other chronic diseases (diabetes and hypertension), history of psychiatric disorders, presence of secondary cancer, presence of metastases, low level of education and income, being single or divorced,[17] and smoking[18].

In the Mexican population, some predictive factors have been identified in patients with malignant breast neoplasms (one of the populations most broadly studied by psychologists and psycho-oncologists) such as: work inactivity, low or no schooling, presence of metastases, presence of cognitive distortions or perceived disability are variables associated with symptoms of anxiety and depression[19,20].

On the other hand, cessation of rewarding activities and activities of daily living is another of the problems cancer patients are faced with; in fact, it is one of the nosological conditions related to essential depressive disorders or to comorbidity[8,21]. It is necessary mentioning that, from a contextual plane, and considering patient physical status, there can be a significant reduction in basic and instrumental activities of daily living. In fact, it is for this reason that the behavioral activation model understands depression as the result of cessation or decrease in contact with positive reinforcement and an increase in avoidance behaviors; moreover, it has its origin in the occurrence of a triggering event that is sudden (such as being diagnosed with a neoplasm)[22,23]. Inactivity may have a function, for example, delegating responsibilities or avoiding negative experiences, concerns, or thoughts[24]. However, the permanence of this reduction or withdrawal from activities will result in a perpetuation of the anxious or depressed mood and will nullify contact with valuable conditions of life and other secondary benefits such as esteem for the family and expansion of the social support system[8,21]. Factors that predict inactivity increase include insomnia, physical pain, medication, self-efficacy perceived as poor, cognitive factors such as rumination, intolerance to uncertainty, anxiety, and depression[25].

As for protective factors against anxiety and depression, religion/spirituality[26] and high level of resilience[27] have been suggested to be dispositional elements for reducing the symptoms associated with these disorders, but there are no conclusive data in this regard, but some elements that can favor behavioral activation include social support, appropriate activity programming, adherence to scheduled activities, religion, clear knowledge of values, and environmental reward measured by the relationship between activity increase and depressive symptoms.[25]

It is evident that, despite these findings, it is necessary to continue identifying factors that contribute both to the presence of anxiety and depressive symptoms, and to an increase or decrease of behavioral activation with the purpose to improve evaluation and intervention mechanisms in the cancer population[28]. The purpose

of this research was to identify the levels of anxiety, depression, and behavioral activation of a group of Mexican cancer patients, as well as predictive factors of a sociodemographic nature and related to the disease. A secondary goal is to carry out comparative analyses between these variables.

Material and Methods

Design

A non-experimental, cross-sectional, predictive-scoped, and quantitative study was carried out[29].

Participants

Through a purposive non-probability sampling, 116 patients with a mixed-location cancer diagnosis from three tertiary care hospitals of Mexico City were recruited. It was considered appropriate to have a heterogeneous sample and thus have analytic units of a different nature (neoplasm location and stage) to clearly differentiate the predictive elements associated with anxiety, depression, and behavioral activation level. Average age was 53 years (standard deviation [SD]: 16.57; median [Mdn]: 54). The inclusion criteria were being of legal age (≥ 18 years), being aware of having been diagnosed with any neoplasm at the time of application, and having a medical record at one of said institutions. The elimination criteria were answering < 80% of the psychological battery and being under psychological or psychiatric treatment at the time of application; 51.7% of subjects were Mexico City residents, 47.5% were married and 32.8% worked as general employees. Table 1 shows the sociodemographic and cancer-related variables of this sample.

Instruments

- Sociodemographic and clinical data collection form: expressly prepared document made up of 15 questions. It collects information on gender, age, place of residence, marital status, socioeconomic status, comorbidities, schooling, occupation, religion, support network, identification of health problems, presence of an informal primary caregiver, type of cancer, and clinical stage.
- Beck Depression Inventory II (BDI-II): it evaluates depressive symptoms severity. It was adapted to Mexican cancer patients by Galindo et al.[30], who obtained a two-factor structure made up of the "cognitive-affective" and "somatic-motivational" dimensions, which explain 42.23% of variance. The scale is made up of 21 items with four response options on a Likert-type scale (0-3 points). Total internal consistency (α = 0.85) and for the cognitive-affective (α = 0.83) and somatic-motivational (α = 0.77) dimensions is acceptable.
- Hospital Anxiety and Depression Scale (HADS): it measures symptoms of anxiety and depression in outpatients. Galindo et al.[31] adapted the instrument in Mexican patients with cancer; they obtained a two-factor structure made up of the "anxiety" and "depression" dimensions, which explain 46.73 and 48.72% of variance, respectively. The scale is made up of 12 items with four response options on a Likert-type scale (0-3 points). Total internal consistency (α = 0.86) and that for the anxiety (α = 0.79) and depression dimensions (α = 0.80) is appropriate.
- Behavioral Activation for Depression Scale (BADS): it is a scale that offers information on when and how the patient starts carrying out activities, as well as his/her avoidance patterns. Villanueva et al.[32] adapted it in Mexican patients with cancer, with a structure made up of the "activation", "rumination", "social deterioration", and "avoidance" dimensions being confirmed. The instrument is composed of 12 items with seven answer options on a Likert-type scale (0-6). Total internal consistency is 0.83. In addition, it has the following cutoff points to identify the level of behavioral activation in the patient: a little from 0 to 31, somewhat from 32 to 43, quite a lot from 44 to 55 and a lot from 56 to 72.

Procedure

Before informed consent and after patient identification, the participants were recruited during outpatient medical appointments at the breast, head-and-neck tumors, gynecologic oncology, and mixed tumors clinics. Psychological test battery application was in charge of the researchers, who were trained and have experience in the evaluation and interpretation of the selected instruments. All patients interested in participating received brief information on the objectives pursued by this research, doubts were solved and data were collected; in addition, support was provided to those who had complications for understanding the items, with the questions and the magnitude of the different answer options being explained. Data collection in some cases was carried out using clinical notes.

Table 1. Participants' sociodemographic and cancer-related characteristics

Characteristic	*f*	%	Characteristic	*f*	%
Gender			**Hereditary-family history of cancer**		
Females	74	63.8	Yes	39	33.6
Males	42	36.2	No	77	66.4
Place of residence			Tumor location		
			Head & neck tumors (H&NT)		
Mexico City	62	51.7	Thyroid	5	4.2
State of Mexico	30	25.9	Eye	1	1.7
Other	22	19	Larynx	1	0.8
No answer	4	3.4	Other	2	1.7
Marital status			Not specified	1	0.8
Married	56	47.5	Gynecological and breast tumors (GT and BrCa)		
Single	18	15.5	Breast	14	11.9
Widowed	15	12.9	Ovary	7	5.9
Separated	14	12.1	Uterine cervix	6	5.1
Cohabitating	8	6.9	Vulva	3	2.5
No answer	5	4.3	Mixed tumors (MT)		
Socioeconomic status			Colon	13	11
Low	52	44.8	Sarcoma	9	7.6
Medium	55	47.4	Stomach	9	7.6
No answer	9	7.8	Testicle	9	7.6
Schooling			Other	6	5.9
Primary school	33	28.4	Rectum	5	4.2
Junior high school	25	21.6	Vesical	3	2.5
High school	31	26.7	Liver	3	2.5
College degree	17	14.7	Prostate	3	2.5
Literate	4	3.4	Pancreas	1	0.8
Illiterate	3	2.6	Bone	1	0.8
No answer	3	2.6	Thoracic tumors (TT)		
Occupation			Lung	7	5.9
General employee	38	32.8	Hematologic malignancies (HM)		
Homemaking	35	30.2	Non-Hodgkin lymphoma	4	3.4
None	20	17.2	Hodgkin's lymphoma	3	2.5
Businessperson	10	8.6	Clinical stage		
Pensioner	6	5.2	I	9	7.8
Student	3	2.6	II	8	6.9
No answer	3	2.6	III	13	11.2

(Continues)

Table 1. Participants' sociodemographic and cancer-related characteristics *(Continued)*

Characteristic	*f*	%	Characteristic	*f*	%
Professional	1	0.9	IV	26	22.4
Religion			Unknown	60	51.7
Catholic	95	81.9	Comorbidities		
Christian	12	10.3	None	86	74.14
None	7	6	Diabetes mellitus	14	12.07
Jehovah's witness	2	1.7	Hypertension	8	6.9
Support network			Other	5	4.31
Two or more relatives	66	56.9	Other type of cancer (second primary)	3	2.59
One relative	42	36.2			
None	8	6.9			
Does the patient have a primary caregiver?					
Yes	101	87.1			
No	15	12.9			

Ethical considerations

Data collection was carried out after patient informed consent was obtained; the research was carried out after analysis and approval by the Research, Ethics and Biosafety Committees of *Hospital Juárez de México* (1232/19.03.04). The authors declare that the procedures that were followed adhered to the standards for the preparation of research protocols established in the ethical code for psychologists[33].

Analysis of results

The data obtained were captured in the statistical program SPSS®, version 25 for Windows®. Descriptive statistical analyses of the sample were carried out using Kolmogorov-Smirnov-Lilliefors normality tests[34], with study variables distribution being identified not to be normal ($p > 0.05$). Therefore, carrying out non-parametric tests such as Mann–Whitney's U-test was decided in order to analyze the differences between psychological variables based on gender, hereditary and family history, and presence of a caregiver. The Kruskal–Wallis test was used to assess differences between psychological variables and place of residence, marital status, socioeconomic status, schooling, type of cancer, occupation, religion, social support, and age group. To assess the degree of association between variables, Pearson's r coefficient was resorted to, given that the association between these three constructs has been shown to be linear[35].

To analyze the variables that have an effect on depressive symptoms, a multiple regression analysis was carried out, for which the variables that showed significant differences were used. To carry out this analysis, multivariate assumptions were considered, starting with multivariate normality by visual inspection of the scatterplot and calculating the predicted values and standardized residuals (ZPRE and ARES); gross residual values (RESID) were also calculated, as well as deleted (DRESID), standardized (ZRESID), studentized (SRESID) and studentized deleted residuals (SDRESID) to identify potential outlier cases. The leverage distance, Mahalanobis and Cook's D statistics were also obtained, as well as the statistics with influence on the beta value (DfBeta) and DfFit. To test the homoscedasticity assumption, a scatterplot was created with the predicted and residual values. The linearity assumption was tested by visual inspection, and the independence assumption, using the Durbin-Watson (d) statistic, with an acceptance range between 1.5 and 2.5. Finally, the collinearity assumption was tested by calculating the tolerance coefficients and the variance inflation factor (VIF)[36]. The results are presented using standardized beta-values (β) and 95% confidence intervals (CI). Statistical significance was determined at $p < 0.05$.

Results

Descriptive analysis

- Levels of anxiety and depression: considering the cutoff points established by HADS[31], 62.07% (n = 72) of participants experienced symptoms of anxiety, and 56.03% (n = 65), depressive symptoms; in both, most cases are concentrated on a mild level. As for BDI-II, 32.8% exhibit a moderate level of depression (Table 2). On said scale, the somatic-motivational dimension was the most commonly reported, which implies that patients are experiencing a higher number of physical discomforts, given that they are on the treatment phase.
- Level of behavioral activation: 59.5% of the sample reported being somewhat active, which suggests that they maintain basic and instrumental activities of daily living. No participant was at the highest level of behavioral activation. The activation dimension was identified to have obtained the highest score with regard to the other dimensions (mean [M]: 7.15, Mdn: 7); the rumination, social deterioration, and avoidance dimensions maintained a mean score of 6.32, 5.65, and 6.54, respectively.

Correlation analysis

The association between the anxiety, depression, and behavioral activation variables was analyzed considering only the total scores, with a positive correlation of moderate magnitude being found between depression (BDI-II) and anxiety (HADS) (r: 0.723; $p < 0.01$); a correlation was also corroborated between the anxiety and depression dimensions of the HADS scale (r: 0.473; $p < 0.01$). A negative correlation of moderate magnitude was identified between behavioral activation (BADS) and anxiety (HADS) (r: –0.537; $p < 0.01$), as well as with depression (BDI-II, r: –0.646; $p < 0.01$) (HADS, r: –0.537; $p < 0.01$). Subsequently, the association between sociodemographic variables was analyzed, with two negative and significant correlations being found: age and depression (BDI-II, r: –0.268; $p < 0.01$); age and anxiety (HADS, r: –0.207; $p < 0.05$). Since significant correlations in one of the dependent variables of interest (symptoms of depression) with these variables were found, continuing with the multiple linear regression analysis was decided[36].

Comparative analysis

The sociodemographic variables in which significant differences were found were religion and age group. Regarding religion, differences were found on behavioral activation (z: 11.051; $p = 0.011$); when the *post hoc* analysis was performed, people who are Christian were found to have more behavioral activation conducts (Mdn: 38.5) than people who are Catholic (Mdn: 33). In addition, religion showed differences in the depressive symptoms evaluated with the HADS scale (z: 8.155; $p = 0.043$); however, after *post hoc* analyses with the Bonferroni correction was performed, the differences of depressive symptoms between Catholic and Christian people were not significant ($p > 0.01$).

The analysis of dependent variables was carried out based on four age groups: younger subjects (18-24 years), young adults (25-44 years), mature adults (45-59 years), and older adults (60 years and older)[37]. Significant differences were identified in depressive symptoms evaluated by the BDI-II (z: 10.992; $p = 0.012$). The *post hoc* analyses show that young adults have a higher score for depressive symptoms (Mdn: 33), in comparison with older adults (Mdn: 35; $p = 0.010$). In addition, significant differences were found for anxiety symptoms (HADS, z: 8.484; $p = 0.037$). Adjusted significance in *post hoc* analyses with Bonferroni's correction was not statistically significant ($p > 0.01$). The results deriving from the comparative analysis between psychological and sociodemographic variables and cancer-related variables are presented in table 3. Although only two sociodemographic variables turned out to be significant, integrating all of them in the regression model was decided, given that studies carried out in the Mexican population point at them as factors related to depressive symptoms[19,20].

Regression and multiple linear regression model

The tolerance coefficients and IVF indicated a lack of collinearity between the model variables, ranging between 1.065 and 1.555. In the analysis of multivariate assumptions, we found that the distance (leverage, Mahalanobis, and Cook's D) and influence statistics (DfBeta and DfFit) failed to identify the presence of outliers; therefore, data had multivariate normality. Homoscedasticity was found, and the scatterplot showed that, although the cases were not clustered near the best-fit line, they do show a linear trend in all variables. In addition, the independence assumption was met by obtaining a d-value of 2.072. After multivariate assumptions were tested, all sociodemographic (gender, age, marital status, cancer type, occupation, religion, and support network) and psychological

Table 2. Analysis of the scores obtained on BDI-II, HADS and BADS

Scale or dimension	M	SD	Mdn	Range	Levels	*f*	%
HADS Anxiety	6.90	4.14	7	0-17	No anxiety Mild Moderate Severe	44 34 17 21	37.9 29.3 14.7 18.1
HADS Depression	6.28	4.12	6	0-16	No depression Mild Moderate Severe	51 27 27 11	44 23.3 23.3 9.5
BDI-II Total – Cognitive-affective – Somatic-motivational	 17.16 4.45 12.71	 9.74 4.18 6.42	 15 3 12	 0-42 0-15 0-29	 Minimal Mild Moderate Severe	 30 32 38 16	 25.9 27.6 32.8 13.8
BADS Total – Activation – Rumination – Social deterioration – Avoidance	 34.43 7.15 6.32 5.65 6.54	 5.63 1.51 2.17 1.52 2.26	 34.5 7 6 6 6	 21-45 3-11 3-12 3-10 3-12	 A little Somewhat Quite a lot A lot	 36 69 11 -	 31 59.5 9.5 -

HADS: Hospital Anxiety and Depression Scale: BDI: Beck Depression Inventory; BADS: Behavioral Activation for Depression Scale.

Table 3. Comparison between sociodemographic and cancer-related variables and the scores obtained on BDI, HADS, and BADS

Sociodemographic/cancer-related variable	HADS-Anxiety		HADS-Depression		BDI-II		BADS	
	z	p	z	p	z	p	z	p
Gender	–0.879	0.380	–0.196	0.845	–0.905	0.365	–0.184	0.854
Place of residence	1.920	0.589	4.247	0.236	1.105	0.776	0.305	0.959
Marital status	7.497	0.186	5.931	0.313	6.254	0.282	10.405	0.065
Socioeconomic status	1.443	0.486	2.444	0.295	3.433	0.180	4.092	0.129
Schooling	4.196	0.650	6.911	0.329	4.434	0.618	3.631	0.727
Hereditary-family history	0.366	0.714	1.612	0.107	0.272	0.786	0.167	0.867
Caregiver	0.689	0.491	–0.673	0.501	–0.556	0.578	0.589	0.556
Type of cancer	5.589	0.471	8.007	0.238	3.014	0.807	2.565	0.861
Occupation	14.061	0.050	4.779	0.687	10.031	0.187	5.383	0.613
Religion	7.584	0.055	8.155	**0.043***	3.707	0.295	11.051	**0.011***
Social support	1.902	0.386	3.338	0.188	5.635	0.060	1.629	0.443
Age group	8.484	**0.037***	3.838	0.280	10.992	**0.012***	2.896	0.408

*$p < 0.05$.
HADS: Hospital Anxiety and Depression Scale; BDI-II: Beck Depression Inventory II; BADS: Behavioral Activation for Depression Scale.

variables (anxiety and behavioral activation) were entered into the linear regression model using the standard method, with age, religion, anxiety, and behavioral activation being significant ($p < 0.05$). This model yielded a correlation of 0.813 and an explained variance of 63.1%. The analysis of variance demonstrated

that the model was significant (F [9, 104] = 22.46, p < 0.01, and therefore, it is susceptible to be generalized to the population (Table 4). Figure 1 shows a graphical representation of the model.

Discussion

The purpose of this research was to identify the levels of anxiety, depression, and behavioral activation of a group of Mexican cancer patients, as well as predictive factors of a sociodemographic nature and related to the disease. In accordance with the above, with regard to anxiety and depression levels, 62.07% of participants were found to report symptoms of anxiety, while 56.03% reported depressive symptoms according to the HADS scale. In both cases, women had higher scores, a finding that is consistent with the previous studies, which suggest that females are at greater risk of depression than males, especially during reproductive years and even more after a positive cancer diagnosis[12,13]. When these data are contrasted with those reported in the literature, it is evident that the percentage of patients with anxiety-depressive symptoms is comparable and consistent considering the stage of the disease and the socioeconomic complications that suffering from cancer entails[10]. This study considered different neoplasm variants, which allows assuming that the neoplasm location is not a relevant element for experiencing more anxiety-depressive symptoms, but other variables of a socioeconomic nature and associated with the medical treatment stage are[19,20].

The level of behavioral activation was another variable of interest in this study. The results reveal that 59.5% of participants reported being somewhat active despite being on treatment phase. The activation dimension of the BADS scale was the one that obtained an elevated score; however, the rumination and avoidance dimensions maintained an average of 6.32 and 6.54 on the sample total score; this information suggests that, despite the fact that the participants reported maintaining their basic and instrumental activities of daily living, the presence of cognitive distortions, as well as avoidance behaviors (avoiding contact with experiences perceived as aversive or avoiding contact with pleasant situations incompatible with depression) are a constant in the lives of participants[24]; in other words, keeping active and relatively functional in the interaction with the context does not necessarily imply absence of depression or anxiety[8], and neither does it imply true contact with sources of natural positive reinforcement[9]. Having said this, and in adherence to the logic of the theoretical model of behavioral activation[22,23], it would be expected that the implementation of interventions would have the purpose to increase behaviors oriented towards values in patients and to arrange the programming of activities on a daily basis considering the patient medical condition, age and levels of anxiety[7,8,21]. It is necessary to continue investigating whether an adequate programming of activities, monitoring, clarity in values (understood as things, people or situations that are valuable for an individual) and environmental reward result in lower risk of depressive symptoms and their severity throughout the stages of oncological diseases[8,24].

On the other hand, the correlations made between variables corroborate that anxiety is statistically and positively associated with depression[5-7]. As for behavioral activation, it showed a negative association of moderate magnitude in both variables. This suggests that the execution of activities that are perceived as valuable and reinforcing for the individual can be perceived as protective behaviors, which is why, theoretically, their covariation will always be negative[32]. According to the model proposed by Diz et al.,[7] age was confirmed to have an effect on the symptoms of depression and anxiety; that is, the younger the age, the higher the probability of experiencing them, as observed in this sample.

Finally, after performing the multiple linear regression analysis, it was possible to identify that age and behavioral activation are factors that decrease depressive symptoms, while anxiety and religion have a negative effect on it. Strangely enough, the latter finding is different from the research carried out by Abbas et al.[26], where they point out that practicing some type of doctrine allows patients with any neoplasm to better cope with the disease. When analyzing this result, and considering what was stated in a systematic review of the literature carried out by Gallardo et al.[15], it can be said that the possible dimensions related to said effects are the type of religious attachment, the type of religious coping and spiritual struggle. Although much has been said about the protective effects of religion/spirituality on physical and mental health, it would be worth to clearly define these constructs and consider the psychosocial determinants that influence religion and its impact on health[16].

Some of the limitations of the present study are related to the sample size; in view of the fact that different neoplasms were considered, it is necessary to have more participants or to analyze dependent variables that are related to others such as performance

Table 4. Multiple linear regression analysis of variables that predict depressive symptoms in cancer patients

Variables	Standardized ß	95% confidence interval		p
		Lower	Upper	
Symptoms of anxiety	0.507	0.855	1.516	**0.000***
Gender	–0.076	–3.946	0.900	0.215
Age	–0.133	–0.150	–0.005	**0.037***
Marital status	0.059	–0.462	1.262	0.359
Type of cancer	0.062	–0.400	1.298	0.297
Religion	0.141	0.229	2.465	**0.019***
Occupation	0.018	–0.317	0.424	0.775
Support network	–0.041	–1.557	0.754	0.492
Behavioral activation	–0.381	–0.890	–0.423	**0.000***

Depressive symptoms were evaluated with BDI-II (Beck Depression Inventory II).

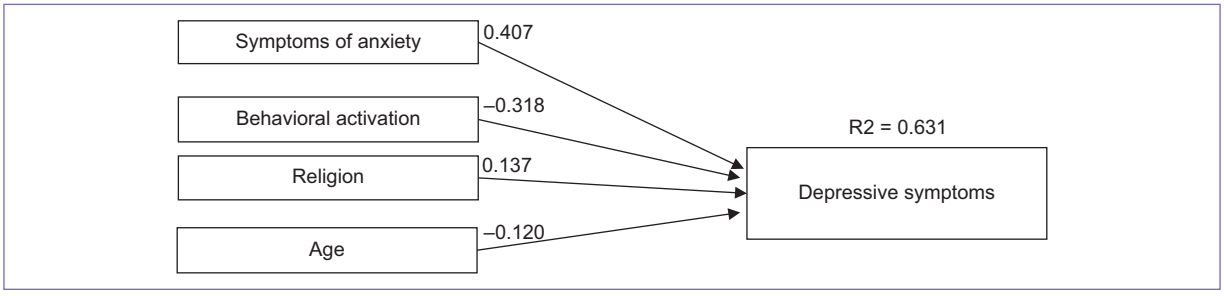


Figure 1. Effect of age, religion, symptoms of anxiety, and behavioral activation on depressive symptoms in cancer patients.
The factor that most explains depression in the patients of this sample is anxiety, followed by behavioral activation, religion, and age. About 63.1% of the depression experienced by a patient is explained by the variables that are exposed in this model.

status, age, and religion within the same tumor variant according to its location. In the future studies, integrating variables such as stress, pain perception, functionality (cognitive and motor) and therapeutic adherence, and their effects on the anxiety, depression, and behavioral activation variables are suggested. Given that participants in this study were on treatment phase, the perception of having symptoms of anxiety and depression may be related to the harmful effects of medications and other medical procedures, which is why it would be worthwhile to integrate to this type of studies a brief behavioral clinical interview and add other types of measurement such as the Karnofsky[24] and the Eastern Cooperative Oncology Group performance status scores to know oncological diseases functional repercussion on the patient as a criterion of progression and level of ability for executing certain activities.

Conclusions

It is concluded that identification of predictive and protective factors will contribute to the development of prevention and care strategies for cancer patients living with anxiety and depression; in addition, the design of treatments based on behavioral activation therapy is highly useful for addressing these issues; however, much remains to be explored when it comes to those elements that contribute to the execution and maintenance of activities and the reduction of symptoms.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this research.

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained informed consent from the patients and/or subjects referred to in the article. This document is in the possession of the corresponding author.

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