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Positive Psychological Functioning, Emotional Regulation and Coping Strategies as Predictors of Adaptation to Illness in Uruguayan Adolescents in Treatment for Cancer

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Abstract

This study aimed to analyze whether there is a relationship between the variables: Positive Psychological Functioning (PPF), Emotional Regulation (ER) and Coping Strategies (CS) in relation to Adaptation to Illness (AI), and which of these variables is the best predictor of adaptation in adolescents undergoing cancer treatment. The clinical sample was of 33 adolescents aged 12-17 years (M =15.15, ST=1.67). The results indicated that emotional suppression was used more by females, while the coping strategies of religion and behavioral disengagement were used more by males. Participants from the interior of the country showed higher values in PPF than those from the city, and religious belief was more highly related with AI and ER. A linear regression study showed that, although the three independent variables predict the dependent variable, the best predictor is PPF, followed by ER and CS. The t value of the stepwise linear regression model indicated a significance of .02. These results may be useful when planning treatment in adolescents with cancer, with an approach based on psychological resources.
Keywords: cancer, adolescents, positive psychological functioning, emotional regulation, coping strategies.

Resumen

Funcionamiento Psicológico Positivo, Regulación Emocional y Estrategias de Afrontamiento como Predictores de Adaptación a la Enfermedad en Adolescentes Uruguayos en Tratamiento por Cáncer. Este estudio se propuso analizar si existe relación entre las variables: Funcionamiento Psicológico Positivo (FPP), Regulación Emocional (RE) y Estrategias de Afrontamiento (EA) con relación a la Adaptación a la Enfermedad (AD); y cuál de estas variables es el mejor predictor de la adaptación en adolescentes en tratamiento por cáncer. Se analizó una muestra clínica de 33 adolescentes con edades comprendidas entre 12 - 17 años (M = 15). Los resultados indicaron que la supresión emocional fue más utilizada por las mujeres, mientras que las estrategias de afrontamiento de religión y desvinculación comportamental fueron más usadas por varones. Los participantes del interior del país mostraron valores más altos en el FPP con relación a los de ciudad, y la creencia religiosa, presentó alta relación con la AD y la RE. Por medio de estudio de regresión lineal, se pudo observar que, si bien las tres variables independientes predicen la variable dependiente, el mejor predictor es el FPP, seguido de la RE y las EA. El valor de t indicó un buen índice de relevancia del F. Estos resultados pueden ser de utilidad para ser considerados en la planificación de tratamientos en adolescentes con cáncer, con un abordaje basado en recursos psicológicos.
Palabras clave: cáncer, adolescentes, funcionamiento psicológico positivo, regulación emocional, estrategias de afrontamiento.

Adolescence is that stage of the life cycle in which processes of biological, psychological, cognitive, and social maturation enable the passage from childhood to adulthood (Gaete, 2015). The main characteristic of this stage is the search for identity, motivation to belong to a group of peers, and a certain movement of independence from the family group.

The term "cancer" refers to a wide range of diseases with the common feature that they originate from the continuous, abnormal, uncontrolled proliferation of cells in any part of the body, which, in addition, can invade and destroy other zones. These diseases are classified by the cell and the tissue from which the cell multiplication originated (Ramirez et al., 2019).

The diagnosis of cancer at this stage of development has a great impact on psychological, biological, and family well-being, also causing distancing from ties with peer groups, and distortion in the body

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scheme caused by medical treatments. Thus, these adolescents have to deal, in addition to the connotation of the disease itself, with the factors that treatment triggers at a personal, family, and social level (Bellver & Verdet, 2015). A study by Cadena et al. (2014) used a qualitative method to study the impact of cancer in adolescents, finding that internal resources, resilience, religion, and personal strengths are protective factors, also linked to personal growth after the illness.

The diagnosis of cancer usually constitutes a source of stress in people and their environment. In the case of adolescents, there is the added factor of going through an evolutionary stage considered as intense. It is a normal stage of development in which there is a greater interest in socializing with the peer group. A diagnosis of cancer at this stage, in addition to what the disease itself implies, often leads to the adolescent's social isolation, related to the treatments and to the changes in body image that are a consequence of these. Thus, the diagnosis of cancer and its treatments have physical, psychological, social, and family impacts. It is therefore important to delve into the protective factors that patients activate to deal with an unexpected disturbing situation mobilizing (Orozco et al., 2018).

This population has been poorly studied internationally from the perspective of positive psychology. Most studies focus on the impact of the disease on the family, or its effects on the patient in terms of associated symptoms (such as indicators of depression and anxiety in the young cancer population), (Sepulveda & Carrillo, 2019) . This research focused on the protective factors rather than the pathological factors of the oncological population. From the point of view of positive psychology, the aim was to study the incidence of the psychological resources for coping with the negative aspects that we know to arise both from the disease itself and as a consequence of treatment (Rueda & Cerezo, 2020).It would also hopefully also become a starting point for deepening knowledge of psycho-oncology and for describing the situation of the disease in Uruguay, since, while there are common aspects of the disease and its treatment, there are particularities of the national health system and health policies that need to be considered.

Psychological Resources as a Protection Factor

Psychological resources are preponderant protection factors indicating performance skills, as well as adjustment to different life situations, since with these resources, people regulate themselves and their relationships with the environment (Alvaro et al., 2010). Conservation of Resources theory indicates that psychological deployment processes are activated depending on the individual's capacities to deal with stressful situations (Hobfoll, 1989). Resources are instrumented both against the perception of threat and against the perception of loss of resources, which is a source of stress. Hobfoll (2011) posited that activating resources enables better adaptation to the environment, and that the resources are usually interrelated, forming conglomerates, so that obtaining one resource favors the activation of another, and that the same process occurs when a resource is lost (he called this concept "resource caravans").

This theory and the eudaimonic perspective of well-being led to the conceptualization of Positive Psychological Functioning (hereinafter PPF), which is defined as: "a molecule composed of interconnected atoms (i.e., psychological resources) whose contribution varies depending on their magnitude (i.e., factor load)" (Merino & Privado, 2015 p.52). PPF is thus the person's disposition to positive functioning, made up of the mobility of its constituent positive factors, with the particularity that it is being activated by the strength or weakness

of the resources that compose it (Portela, 2021). PPF encompasses eleven first-order psychological resources: autonomy, resilience, self-esteem, purpose in life, enjoyment, optimism, curiosity, creativity, humor, mastery of the environment, and vitality.

Emotional Regulation in Cancer Patients

The concept of emotional regulation is a model based on intuitive theories of emotion, which argue that individuals subjected to situations that require a response assign personal meanings to the event (Gross, 2006), integrate life experiences into it, leading to adaptive coping through emotion regulation (Gross, 1998). Emotional regulation is a set of skills and strategies linked to psychological and physical well-being, in which experience and environmental influences also intervene. It involves a process of identifying, maintaining, or shaping the intensity of the emotion to achieve the objectives, a process by which it can be both increased and suppressed, giving rise to different coping strategies (Hervás, 2002). This process involves: knowledge and understanding of emotions, the ability to control impulsive behaviors, to act in accordance with desired goals when experiencing negative emotions, and the ability to use emotion-regulating strategies flexibly so that they are appropriate to the demand and purpose of achieving the goals set by the individual (Gratz & Roemer, 2004).

Cancer, considered as a traumatic event, causes the person to modify their repertoire of coping strategies to develop emotional regulation and to suppress emotion. The importance of emotional regulation in relation to adaptation to the disease lies in the effort made by the person to find stability and to be able to cope with the stressful situation, which consumes greater cognitive resources that can be used for better functioning (Porro et al., 2012). People subject to chronic diseases show greater effort in the affective area than healthy people, as they need to appeal to personal skills that enable adequate emotional regulation more than healthy individuals (Rodríguez et al. 2009). Emotional self-regulation is the process through which a person can control, guide or correct their own actions as they approach or move away from various objectives (Carver & Scheier, 1998).

Strategies of Coping with the Stress of Illness

Coping strategies are defined as an extra cognitive effort of the person to respond to and handle a specific stressful situation, reducing tension and restoring the balance of the organism (Lazarus & Folkman, 1984). This process, known as the "transactional theory of stress", includes a primary assessment (of the meaning of the event) and a secondary assessment (of resources), taking into account the relationship between the person and the environment (Lazarus & Folkman, 1986).

Some studies (García & Gómez, 2016; Kemeny & Bearison, 2002) find that adolescents with cancer tend to implement coping strategies that are focused on emotion, as well as strategies focused on the problem: they focus on religion as well as on positive thinking, the expression of anger or rage, and on social support. Compared to healthy adolescents, adolescents in treatment report a greater use of emotion-focused strategies, especially avoidance and the search for social support (Ahadi et al., 2014).

Adaptation to Cancer: Dynamic Result of a Process

There are three stages in the psychosocial experiences of adolescents undergoing cancer treatment: the first aims at maintaining a

normal life; the second includes the efforts that must be made to face the alteration of normality; and the third takes place after the disease has passed. All the stages are marked by the attempt to maintain control, redefine and enhance personal resources, and to incorporate the experience into life after the disease (Belpame et al., 2018).

Adaptation to cancer involves a process through which the patient tries to manage emotional suffering, solve problems, and maintain control over life events related to the disease. This process is dynamic and flexible, consisting of both the coping strategies deployed by the individual and the psychological resources that they possess or can activate to face the situation (Brennan, 2001). According to Aldridge & Roesch (2007), good adjustment to the illness is related to positive affect, satisfaction with life, and the ability to return to normal daily functioning. At the same time, symptoms of depression and distress were considered as negative adjustment indices.

Mental adjustment to cancer is understood as the cognitive and behavioral response of the patients, including each person's assessment of the meaning of their illness, as well as what they think they can face, also known as the "survival scheme or cognitive evaluation triad" of emotional response, adaptability, and coping style (Moorey & Greer, 1989). The result of assessment gives the five adaptive response styles to the illness: fighting spirit, avoidance/denial, fatalism/stoic acceptance, helplessness/hopelessness, and anxious preoccupation (Barez, 2002). This study assumes that PPF, as a healthy aspect of individuals, may function as a protective factor in relation to adaptation to the illness, cushioning the negative effects of treatments.

The scientific literature shows few works on adolescents with cancer, most of the publications focus on the child population and/or the affectation of family members. The review study by Sepulveda (2019) shows the need to include clinical variables in research on cancer adolescents, which contribute to appropriate interventions.

The importance of this research lies not only in that it provides data from a poorly studied population, but also that it offers a theoretical-conceptual model for promoting the healthy aspects that may contribute to the effectiveness of psychosocial intervention programs in adolescents with cancer.

Thus, the aim of this work is to determine the predictive value of PPF, emotional regulation, and coping strategies in relation to adaptation to cancer in adolescents undergoing treatment. The following specific hypotheses are proposed: 1) Higher ER scores are associated with higher levels of adaptation; 2) CS are significantly associated with adaptation; 3) PPF is positively associated with adaptation; and 4) PPF has a greater predictive capacity than ER and CS, in relation to adaptation.

Method

A non-experimental, cross-sectional predictive study was conducted (Hernández-Sampieri & Baptista, 2014).

Participants

The clinical sample was taken from a general population of 3,473,727 inhabitants, with 264,871 adolescents between 13 and 18 years old, according to the last census (Calvo et al., 2014). An average of 100 diagnosed cases of children and adolescents up to 15 years of age are reported per year, but no national figures are available for the ages up to 18 years (Dufort, 2021) as used in this sample.

The sample consisted of 33 Uruguayan adolescents undergoing treatment for cancer at the Foundation which is the national reference center for child and adolescent cancer. The participants, aged 12 to 17 years (M = 15.15, SD = 1.67), were 48.5% female and 51.5% male, with 66.7% from the interior of the country, and 33.3% from the capital. The socio-demographic levels were 3% high, 81.8% medium and 15.2% low. 57.6% were religious/believers and 42.4% non-believers.

The health data of the participants showed that 9.1% reported previous illnesses and 90.9% had no previous illnesses. 15.15% had been diagnosed with cancer from 0 to 3 months previously, 18.18% from 4 to 6 months, 27.7% from 7 to 12 months, 18.18% from 2 to 3 years, 21.21% from 4 to 5 years. 39.4% had not been hospitalized but were receiving outpatient treatment. 27.3% had been hospitalized for a week or less; 3% for less than a month; 27.3% from one to three months; and the remaining 3% for more than six months. 63.6% of the participants had undergone surgery. 84.8% had received chemotherapy, of which the highest percentage (57.6%) had had more than 5 cycles, and 27.3% only radiotherapy.

84.8% of the participants reported no personal history of cancer, but 72.80% had family history of the disease: 15.2% more than one relative, 12.1% uncles or aunts, 12.1% paternal grandmother, 12.1% maternal grandfather, 9.1% paternal grandfather, 6.1% maternal grandmother, 6.1% mother. 27.3% had no family history of disease.

Their mental health care data indicates that 51.1% of the sample never underwent psychotherapy, 33.3% were in therapy in the past, and only 15.2% were currently undergoing treatment. The inclusion criteria were age (12-17), current attendance at cancer treatment and not having a previous diagnosis of psychiatric pathology

Procedure and Ethical Issues

The study was presented to the Foundation that the adolescents were attending to receive medical treatment and authorization was requested. Once granted, written informed consent was requested from the adult responsible for the patient/participant and from the adolescent, clarifying the purpose of the study and the estimated time required to answer the questionnaires (15-20 minutes). Both through written and verbal consent, it was clarified that all the information collected would be confidential, that participation could be withdrawn at any time, and that this would not entail any consequences for the medical services received from the Foundation.

The questionnaires, previously adapted and validated, were administered to the participants.

During the administration, the examiner remained present to offer clarifications or explanations in case of doubt and to ensure that the answers were individual. Finally, the scales were scored, and the data was analyzed with the statistical package SPSS 24 for Windows.

Instruments

To carry out this study, the selected scales were adapted and validated for the Uruguayan adolescent population, using a sample of 183 adolescent participants from the general population, except for the Mini-Mac scale, which, being specific for cancer, cannot be considered in a healthy sample. The distribution of these participants by age was: 12 years (5.5%), 13 years (7.7%), 14 years (8.2%), 15 years (16.4%), 16 years (33%), and 17 years (28.9%). 54.6% of the sample were female and 45.4% male. 49.2% of the participants came from the capital of the country, and the remaining 50.8% from the interior. The sampling method was non-probabilistic snowball (Hernández et al., 2010).

Positive Psychological Functioning Questionnaire. This questionnaire, drawn up by Merino and Privado (2015), is composed of 33 items, which are grouped into 11 resources, and these, in turn, make

up a second-order factor. The original data reported by the authors of the scale were: second-order factor loading on first-order factors of >0.74, and first-order factor loading on items of >0.60. The factor loadings proved to be statistically significant ($p < 0.001$. The RMSEA value was 0.060), indicating a good fit to the proposed factorial structure. The incremental fit index showed moderate fit, with an NFI value of 0.702 and CFI of 0.878 (less than 0.90). The parsimony fit index has values greater than 0.50, PNFI 0.644, which also shows a good fit (Merino & Privado, 2015).

In the validation for Uruguay, the parallel analysis based on the minimum range of the factor (Timmerman & Lorenzo-Seva, 2011) reported a single second-order dimension, which is consistent with the original analyses of the scale.

The factorial solution for the Uruguayan adolescent population yields a distribution of the items in seven factors: Factor 1 corresponds to Self-esteem (α 0.84); Factor 2, Autonomy (α 0.87); Factor 3, Vital Purpose (α 0.82); Factor 4, Optimism/enjoyment (α 0.82); Factor 5, Curiosity (α 0.83); Factor 6, Mood (α 0.83); and Factor 7, Environment Domain (α 0.87).

The reliability studies of the scale yielded a Cronbach's Alpha of 0.93, which explains 62.15% of the variance. The scale fit indices with the seven-factor solution indicate the following values considered acceptable: $\chi2 = 5222.96$, $p = 0.00$, CFI = 0.991, TLI = 0.97, and RMSEA = 0.09 (Portela, 2021).

A validation study of the PPF scale in Mexico has recently been published, with a sample of 313 adolescents whose mean age was 12.7 years. This research showed a factorial structure of four factors, which together explain 56.83% of the total variance (González et al., 2018). This factorial grouping may be showing some coherence in the adolescent population.

Emotion Regulation Questionnaire ERQ-CA (Gullone & Taffe, 2012)

This questionnaire for children and adolescents consists of 10 items, which are subdivided into two scales that measure cognitive restructuring and emotional suppression. The items are answered on a 5-point Likert-type scale, ranging from completely disagree to completely agree. The authors report a reliability of α = 0.79 for cognitive reappraisal and α = 0.73 for emotional suppression. The results for Uruguay indicate a reliability of α = 0.74 for cognitive restructuring and α = 0.70 for the emotional suppression subscale. The psychometric properties of the instrument indicate a Cronbach's Alpha = 0.75, distributed in two factors, with the following data: $\chi2 = 888.39$, p = 0.00, CFI = 0.95, TLI = 0.93, GFI = 0.94 and RMSEA = 0.079, with a good fit to the proposed model.

Brief-COPE Coping Strategies Questionnaire (Perczek et al., 2000). This is a synthesized version of the COPE Inventory, in its Spanish version. The scale is made up of 12 subscales of coping strategies, with two items each: active coping, planning, positive reinterpretation, acceptance, humor, religion, emotional support, self-distraction, denial, expression of negative emotions, substance use, and behavioral disengagement. These, in turn, can be grouped into three coping styles: problem-focused, emotion-focused, and avoidance coping.

The validation for Uruguay yielded a Cronbach's Alpha of 0.797. The result of the KMO statistic was 0.67 and the Bartlett sphericity test was significant ($\chi2 = 1430.166$; df = 276; p = 0.00).

Mini-MAC Mental Adjustment to Cancer Questionnaire (Watson et al., 1994). This scale, which assesses mental adjustment to cancer, is the abbreviated version of the original MAC instrument (Moorey & Greer, 1989). In this version of the 29-item Mini-MAC (Watson et al., 1994),

some items were retained from the original MAC, while others were modified (e.g., the denial scale, which did not present good psychometric properties in the original, was replaced by cognitive avoidance). The authors argued that each of these dimensions corresponds to a cognitive representation in which the person gives meaning to the disease, develops an idea of its prognosis, and evaluates the control possibilities available to deal with the disease situation (Moorey & Greer, 1989).

The Mini-MAC was thus made up of 29 items distributed as follows: 8 in the hopelessness/helplessness scale, 8 in anxious preoccupation, 4 in fighting spirit, 4 in cognitive avoidance, and 5 in fatalism. These 29 items have four Likert-type response options: 1-not at all, 2-somewhat, 3-quite a bit, and 4-a lot. The test evaluates the meaning of the diagnosis for the person, their possibility of control, their vision of the prognosis, their emerging emotional response, and their way of coping to minimize the threat.

The scale presents an adequate Cronbach's Alpha for all dimen-

Table 1. Comparative data of the study variables by gender

Variables/ components	Gender						
	Female			Male			
	N	M	ST	N	M	ST	Next
PPF							
Resilience	16	27.6	7.3	17	26.6.	7.5	0.7
Optimism		25.6	7.1		27.4	7.3	0.5
Curiosity		21.6	6.1		22.6	4.0	0.6
Enjoyment		12.1	3.2		11.1.	3.7	0.4
Domain Environment		9.3	2.7		8.8		0.5
ER							
Cognitive restructuring	16	18.13	3.3	17	17.41	4.7	0.6
Emotional suppression		13.69	3.5		12.0	1.1	0.2
CS							
Active coping	16	5.50	1.1	17	5.71	1.7	0.68
Planning		5.00	1.4		4.71	2.5	0.68
Positive Reinterpretation		5.25	1.4		5.65	2.6	0.52
Acceptance		6.94	1.0		6.53	1.4	0.34
Humor		4.63	2.0		4.29	2.6	0.68
Religion		3.44	1.9		5.71		0.00
Emotional Support		6.69	1.3		6.76	1.5	0.87
Self-distraction		5.38	1.8		5.41	2.1	0.95
Denial		3.38	1.7		4.06		0.34
Expression of negative emotions		4.94	0.9		5.65	1.9	0.19
Substance Use		2.56	1.5		2.00	0.00	0.16
Behavioral disengagement		2.38	0.8		3.47	1.7	0.03
AI							
Helplessness/ hopelessness	16	9.25	2.2	17	12.29	5.8	0.05
Anxious preoccupation		14.63	4.3		17.24	7.0	0.21
Avoidance/ denial		8.63	3.2		8.59	3.9	0.97
Fighting spirit		12.38	1.9		11.41	4.1	0.40
Fatalism/stoic acceptance		13.31	2.2		15.12	3.7	0.10

sions: Helplessness / Hopelessness α 0.76; Anxious Preoccupation, α 0.65; Avoidance / Denial, α 0.68; Fighting Spirit, α 0.714, and Fatalism / Stoic Acceptance, α 0.74. The KMO test gave a value of 0.886, explaining 61.63% of the variance. Thus, it constitutes a rapid screening inventory of responses to cancer.

A cultural linguistic adaptation of this instrument was made for the population of Uruguay, so that the terminology used in the items would be understandable in the Uruguayan context.

Table 2. Comparison of the study variables in relation to residence

	City	Interior	U Mann−Whitney	Next
PPF	13.0	19.0	77	0.04
ER	17.59	16.70	82	0.12
CS	18.0	16.50	117.5	0.82
AI	18.32	16.32	62.5	0.02

a. Grouping variable: RESIDENCE

Table 3. Comparison of the study variables in relation to religious belief

	Belief	N	Range	U Mann−Whitney	Next
PPF	Yes	19	16.92	131.5	0.95
	No	14	17.11		
ER	Yes	19	17.08	56	0.00
	No	14	16.89		
CS	Yes	19	18.47	117.5	0.57
	No	14	15.00		
AI	Yes	19	21.24	77.5	0.04
	No	14	11.25		

Grouping variable: religious belief

Results

Initially, the normality of the variables was studied, in which Emotional Regulation, Coping Strategies and Adaptation to Illness presented a normal distribution, while the Positive Psychological Functioning variable was not normally distributed.

As seen in Table 1, in PPF, means were high in resilience, optimism, and curiosity in both genders; in ER, differences were observed only in emotional suppression, while the means showed cognitive restructuring as the most used strategy. Within CS, those most used were acceptance and emotional support, and significant differences were observed only in the dimensions of religion and behavioral disengagement. The forms of adaptation to illness most used were anxious preoccupation, fighting spirit, and stoic acceptance in both genders, with higher averages in men. A significant difference is observed in helplessness / hopelessness.

The PPF in a clinical sample was compared to the sample of healthy adolescents, and it is noteworthy that no significant differences emerged.

As seen in Table 2, differences were found only in AI and PPF.

Another objective was to study the variables in relation to religious belief, which is a significant factor in the literature. Table 3 shows that this was significantly related to AI and ER.

ER is correlated with AI, fundamentally through cognitive restructuring, anxious preoccupation, helplessness, and avoidance/denial. This relationship is moderate (ANOVA = 0.012)

CS is correlated with AI (ANOVA = 0.00) in all its dimensions except mood and substance use. This relationship at = 0.515 indicates that the association of the CS explains 51% of the variance in relation to AI; an *R* value = 0.717 indicates a high or strong correlation between the variables.

Table 4. Correlations between variables with adaptation to illness

	Helplessness/ Hopelessness	Anxious Preoccupation	Avoidance/Denial	Fighting Spirit	Fatalism/ Stoic Acceptance
ER					
Cognitive restructuring	0.46**	0.53**	0.46**	0.29	0.27
Emotional suppression	0.13	0.05	0.27	0.09	0.16
CS					
Active coping	0.33	0.35	0.35*	0.35*	0.38*
Planning	0.21		0.30	0.34*	0.39*
Positive reinterpretation	0.26	0.30	0.22	0.55**	0.41*
Acceptance	0.08	0.10	0.06	0.43**	0.15
Humor	0.26	0.17	0.23	0.16	0.07
Religion	0.55**	0.46**	0.40*	0.28	0.57**
Emotional Support	0.16	0.29	0.24	0.44**	0.52*
Self-distraction	0.04	0.30	0.39*	0.29	0.45**
Denial	0.52**	0.71**	0.02	0.29	0.38*
Expression negative emotions	0.40*	0.58**	0.37	0.55**	0.51**
Substance use	0.09	0.21	0.14	0.01	0.09
Behavioral disengagement	0.38*	0.31	0.13	0.04	0.08
PPF					
Self-esteem	0.34*	0.22	0.17	0.06	0.38*
Autonomy	0.44**	0.34*	0.04	0.11	0.19
Resilience	0.36*	0.29	0.05	0.17	0.42*
Optimism	0.38*	0.32	0.08	0.18	0.52**
Curiosity	0.19	0.18	0.07	0.06	0.33
Enjoyment	0.15	0.24	0.22	0.04	0.20
Mastery of Environment	0.34	0.40*	0.06	0.03	0.03

Table 5. Linear regression

Model	R	R2 _	R2 adjusted _	Estimation error	Change in R2	Change in F	change statistics		Next change in F
							g11	g12	
1	0.62 to	0.38	0.32	85.21	0.38	50.92	3	29	0.00

a. Predictors: (constant), PPF, ER, CS

Table 6. Model significance level

Model		Sum of squares	gl	root mean square	F	next.
1	Regression	1290.74	3	430.24	5.92	0.00
	Residue	2105.79	29	72.61		
	Total	3396.54	32			

a. Dependent variable: adaptation
b. Predictors: (constant) PPF, ER, CS

Table 7. Correlation coefficient between variables

| Model	Non-standardized coefficients		Standardized Coefficients		
	β	Standard error	Beta	T	Next.
1(constant)	10.01	8.56		1.16	0.25
emotional regulation	1.08	0.41	0.39	2.63	0.01
coping strategies	0.39	0.18	0.35	2.16	0.03
PPF	0.17	0.06	0.47	2.85	0.00

a. Dependent variable: Adaptation

PPF is correlated with AI in all its dimensions except curiosity and enjoyment (ANOVA = 0.02). The global correlation analysis between all the variables (PPF, ER and CS) in relation to AI, showed high values between PPF and CS, and moderate values between ER and AI.

To study the predictive value of the variables in relation to AI, the model's assumptions, linearity, normality, homoscedasticity, independence of errors, and non-collinearity, were verified and then a linear regression was performed. The results are shown in Table 5.

The analysis of the data in Table 7 makes it possible to determine that the variable that best predicts adaptation to the disease is PPF (β 0.47 p = 0.00), followed by ER (β 0.39 p = 0.01), and in third place, the CS with a lower predictive power (β 0.35 p = 0.039); the value of t = 2.85 is observed, which, being greater than 2, indicates a good relevance index.

Figure 1. Importance of the Predictor
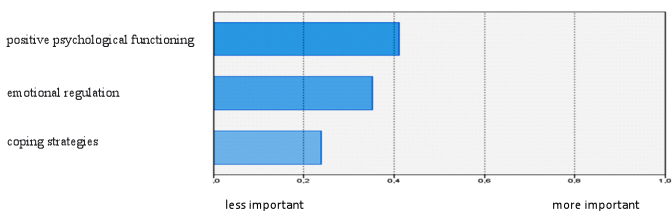
Discussion

With the aim of analyzing which is the best predictor of adaptation to the disease, a multiple linear regression study was carried out testing the three independent variables (PPF, ER, CS) in relation to the dependent variable of Adaptation to illness, finding that the variable that best predicts adaptation is PPF, with good levels of significance and a good relevance index. These results match, in part, the conclusions reached by Cadena, Castro and Franklin (2014), in relation to the protective factor of internal resources that promote better adaptation.

Comparing PPF in a clinical sample with the normal population showed a higher mean in autonomy in the clinical sample than in the healthy sample. This may be related not only to the disease situation but also to their need to travel and stay in the city for the treatments, since most were patients from the interior of the country. This may trigger an extra mobilization of resources, taking into account the model of Hobfoll (1989), in the dimension of autonomy to face the situation of illness and uprooting.

In relation to emotional regulation, a greater use of emotional suppression was reported in females. This agrees with the data provided by (Gullone et al., 2009) which found differences in emotional suppression strategies in relation to gender, but no differences in cognitive restructuring.

The most used coping strategies were acceptance and emotional support. Significant differences were observed in the dimensions of religion and behavioral disengagement in relation to gender, which were strategies more used by males. This partially agrees with data found in studies such as that of García and Gómez (2016), which coincide with regard to coping strategies related to religion, but not with regard to the emotional area, as they found that what prevails, in adolescents with cancer, is emotional discomfort. Other studies (Ahadi et al., 2014; García & Gómez 2016; Kameny & Bearison, 2002) also concluded that the coping strategies used by adolescents with cancer focus on emotion, as well as on the problem. They focus both on religious belief and on positive thinking and social support, reporting a greater use of emotion-focused strategies. Regarding adaptation to the disease, males mostly used helplessness/hopelessness.

In terms of the residence of the participants (city/interior), AI and PPF were higher in adolescents from the interior. This could be related to the uprooting that adolescents from the interior undergoing cancer treatment have to go through, causing some breakdown of social ties

and family support referents. Uprooting has effects at a social, family, and economic level, to which can be added the emotions that it may provoke in the adolescent, beyond those of the disease itself. Therefore, this aspect is an element to consider in future research, to study the incidence it has on adolescents and on treatment.

Religious beliefs were linked to AI and ER. As evidenced in some research (Leyva et al., 2014; Moreira et al., 2017), religious belief seems to be seen as a protective or favorable aspect of adaptation to life-threatening situations of stress, providing additional resources to deal with the situation.

Regarding hypothesis 1, the ER and AI were seen to be related, especially in anxious preoccupation and cognitive restructuring, which may indicate that, faced with the stressful situation of the disease, anxious preoccupation can trigger cognitive restructuring strategies to cope psychologically with the treatments. Cognitive restructuring involves efforts to alleviate the stressful situation, mobilize resources to control the situation and adapt, and even to perceive benefits of the disease and regulate the anguish that it can generate (Baník & Gajdošová, 2014). Positive emotions generate personal resources for future threats and broaden cognition and psychological resistance.

Porro et al. (2012) analyzed emotional regulation in cancer patients, concluding that these use emotional regulation more than the control group. People undergoing chronic diseases showed greater effort in the affective area than healthy people, as they need to appeal to personal resources to achieve adequate emotional regulation (Rodríguez et al., 2009). Córdova et al. (2003) found evidence that less emotional suppression and a greater fighting spirit may be associated with less disturbance of mood, and therefore conclude that the expression of emotions and a positive and realistic attitude improve adjustment and reduce distress in cancer patients. This agrees with the research by Santon et al. (2000) that confirms the hypothesis that coping by emotion processing is a predictor of the adaptation to disease in the study sample. Therefore, the results of this research and the data that appear in the literature seem to indicate that ER is associated with AI processes in the dimension of cognitive restructuring, while there is no association in emotional suppression.

For other in hypothesis 2, the CS showed linkage in AI in all dimensions except humor, substance use, and behavioral disengagement, highlighting the emotional effort that adolescents have to make when undergoing cancer treatment. These data are consistent with studies carried out, for example, in breast cancer, where they conclude that active coping predominates in these patients, as well as the use of multiple coping methods to adapt to the disease (Cheng, 2003; García & Gómez, 2016; Martínez & Tercero, 2017).

However, it should be considered that the CS are not isolated resources, but are related to each other, albeit at different timepoints of the disease process. Avoidant coping from the cognitive point of view, which a priori may be considered a maladaptive strategy, may constitute an extra cognitive effort to redefine the problem and collaborate in achieving the necessary emotional balance (Estévez et al., 2012). It may thus come to be considered a beneficial resource that makes it possible to reduce threatening evaluations related to the disease (Carver et al., 1993; Schou et al., 2005). Problem-directed coping may be effective in controllable situations, while avoidance coping may be adaptive in uncontrollable situations (Cheng, 2001). In relation to hypothesis 3, the PPF was related to AI in all its dimensions, except curiosity and enjoyment. As there are no previous studies of PPF and adaptation to illness, it is not possible to compare these results with previous data, but they agree with some studies of optimism as a predictor of adaptation (Remor et al., 2006; Schou et al.,

2005), as well as studies on resilience (Pintado & Cruz, 2017; Sanjuán & Ávila, 2016).

Finally, analyzing the predictive value of the variables in relation to AI, (H4), the results indicated that the best predictor of adaptation to the disease is PPF (β 0.47 *p* = 0.00), followed by emotional regulation (β 0.39 *p* = 0.01), and finally, coping strategies (β 0.35 *p* = 0.39). The value of *t* = 2.85 indicates a good relevance index.

This data seems to match that of Di Marco et al. (2015), who concludes that risk factors tend to be reduced or faced by personal resources, just as adaptation will be favored by the promotion of these resources. One antecedent was found in a program based on positive psychology applied in a group of cancer patients to facilitate positive change after cancer, and to analyze the effects on well-being, with an experimental methodology. This reported reduced emotional distress and better adaptation to the disease through the facilitation of positive psychological functioning (Ochoa & Casellas, 2017).

Likewise, these results would be aligned with the benefit finding-"the process of deriving positive growth from adversity"- which suggests the promotion of coping strategies and psychological resources (in this case, the Fpp includes resilience) to promote growth in the face of adversity (Castellano-Tejedor et al., 2014).

Limitations

One limitations of this research is the size of the sample, the results of which cannot be generalized to the general population of adolescents with cancer but are valid only for this study sample. However, it is important to note that the clinical sample is representative, with adequate distribution of participants from the capital and interior.

A limitation of the research design is that this is a cross-sectional study, at one point in time, and is thus limited when measuring adaptation, which involves processes that are dynamic.

On the other hand, the possible relationship of sociodemographic variables (such as age groups and diagnosis time) with the variables of this study has not been studied in depth, since it exceeded the objective of this research.

The lack of previous studies, both in terms of study variables in a population with cancer, as well as in adolescents with cancer undergoing treatment, is also a limitation. This highlights the need to continue studying in this area of psychology, and the opportunity to identify new gaps in the literature to be addressed in future research.

Conclusions

The results obtained in this research suggest the need to continue investigating the area of positive psychology and the psychology of health in adolescents undergoing treatment for cancer, since this emerging area of study may be very beneficial in oncological treatments. Longitudinal studies would enable the behavior of psychological variables to be measured over time, reflecting the different stages that cancer patients go through, and would result in much more powerful input to adapt treatments according to the psychological adaptation of patients and their families.

It would also be important to continue in the line of developing intervention programs based on strengthening the patient's resources and testing them in quasi-experimental studies (León & Montero, 2002).

Likewise, it would be advisable to carry out further studies that measure the impact of uprooting on processes of adaptation to illness and on the psychological resources of the patient and the family, in order to implement strategies aimed at minimizing the negative

effects of these stress factors in addition to those of the disease.

This study addressed a population scarcely studied from the point of view of positive psychology at an international level was addressed, with most studies focusing on the impact of the disease on the family or the effects on the patient in terms of associated symptoms (such as indicators of depression and anxiety in the young cancer population), this research focuses on the protective factors of the cancer population rather than the pathological ones. These results have a special relevance for health psychology as it offers evidence for therapeutic treatments focused on promoting psychological resources to improve adaptation to disease. This study is a starting point in order to understand psychological functioning, individual and shared by the analyzed group, with psychosocial factors that interact with health/disease processes. Once again, the need to have interdisciplinary teams that articulate different knowledge from psychological resources is evident.

Conflict of interest

The author of this work declare that there is no conflict of interest.

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