Original article

Psychological modeling in youth behind parental cancer experience: the predictive role of emotion regulation

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SUMMARY

Objective

Cancer diagnosis could have significant impact on the family and can be especially distressing for children. Aim of the study was to examine the impact of parent clinical path conditions on levels of distress on young adults offspring.

Methods

An observational study was conducted on 81 young adults (n = 66 female, n = 15 male) cancer patients' children. The psychological battery was composed of n. 4 self-report standardized tests: a) Post Traumatic Growth Inventory, b) Emotional Regulation Questionnaire, c) Impact of Event Revised, d) Perceived Stress Scale.

Results

Our study showed negative emotional reactions, such as perceived stress and post-traumatic stress disorder risk in response to their parental cancer. The emotional reactions were not just limited to participants who had lost a parent to cancer or who had a parent under active treatment; they were shared by participants who had a survived parent. The study favored valuable knowledge about the associations between emotion regulation and its importance on outcomes such as PTSD risk, which are well-known outcomes in parental cancer, in a group that is overlooked in research.

Conclusions

The result is useful for informing healthcare professionals who encounter these young adults about the risk of expressive suppression contributing to symptoms of perceived stress and PTSD symptoms and it draws attention to the importance of recognizing and offering tailored psychological support to these young adults with low adaptive emotion regulation strategies.

Key words: parental cancer, emotional adjustment, psychological distress, children, post traumatic stress disorders

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Introduction

Cancer diagnosis could have a significant impact on the family and can be especially distressing for children [1-3]. Multiple studies demonstrate that children have a high risk of emotional and behavioral problems. The disruption of schedules and daily routine (e.g., frequent clinic visits, unexpected hospital admission, the home turning into a place of care), shifting of household roles (e.g., one parent becomes a caregiver and the ill parent becomes less available physically and emotionally, also children change roles absorbing more responsibility), financial stress, and the physical and emotional availability of either parent all contribute to these emotional and behavioral problems. Specifically, the daily routine disruptions promote problems sleeping in preschoolers and increased post-traumatic stress

symptoms as well as internalizing and externalizing behaviors in adolescents. Adolescents also report the impact that physical unavailability has on their emotional well-being including the ill parent no longer driving them to school/extracurricular activities (offspring may receive less support and attention from the parent who is ill-and who may be struggling with pain and fatigue and spend considerable time in treatment-or from the co-parent, who may be very worried and carry a heavy care burden). Moreover, the literature shows that both children and adolescents have increased personal responsibilities, resulting in a decrease in social activity and subsequent loss of childhood at a time when peer groups are essential for social development. Adolescents notice sacrificing doing something fun to stay at home due to increasing household responsibilities and caretaker roles. Also, frequent appointments and intense treatment plans further increase parents' anxiety and depression, which decreases parenting efficiency and thus, family functioning. Children are affected by the mental health and coping techniques of their parents and learn accordingly. Although the focus on social functioning typically revolves around negative aspects, there have been reports of positivity including children who exhibit posttraumatic growth and thrive despite the challenges and changes they endured.

The psychological and behavioral changes observed in children and adolescents can be categorized as internalizing problems, affecting the mental, cognitive, or emotional functioning and externalizing problems, which include outward directed aggression or disruptions in a social or school setting. Children of all ages display a wide range of emotions including anger, distress, anxiety, depression, psychosomatic symptoms, confusion, sadness, uncertainty, fear, guilt. These mental responses may be partly due to a fear of loss. These problems, if overlooked or untreated, can persist into adulthood [4].

The emotional impact of parent cancer experience for children has been highlighted becoming emerging topic following the increasing of cancer diagnosis by early oncological screening [5]. The implications for cancer experience on children growth, have been identified as experiencing higher levels of distress than younger children when their parent has serious cancer [6,7]. The transition from childhood to adulthood constitutes a time of considerable change involving several areas of life which might put older adolescents and young adults who have a parent with cancer in a particularly vulnerable situation and at higher risk of post-traumatic stress symptoms (PTSS) and alcohol use, depression, suicidal thoughts/plans/attempts, psychotropic medication [7] (Høeg et al., 2023; Kim et al., 2022). This age group is typically more concerned with the well-being of the parent and begins to focus on the parent's well-being more than their own individual well-being due to concerns of long-term implications. Young adult offspring will feel more responsible for helping the sick parent-and the co-parent. Many adolescents and young adults want to protect their parents and try to cope by using diversion and denial. Moreover, even though they may earn money and have established their own family, they may still be emotionally close to their parents and (in the absence of parental illness) be net receivers of various types of support. Furthermore, they may be better able to understand the severity of the situation than, in particular, the youngest children. Finally, the experience of stressful events in young adulthood may affect transitions to tertiary education and establishing careers, with potential long-term consequences. Reviews of studies on the effects of parental cancer on offspring's health and well-being have concluded that while the exact nature of the response may differ by age, the existing evidence does not suggest a difference in the overall impact [11].

A range of factors are known to moderate young people's psychological adjustment following a parent's cancer diagnosis, including their age and gender, their parent's gender, time since parent's diagnosis, having unmet needs, poor family functioning, the presence of parents' own mental health problems (especially depression), and poor coping abilities [12-15].

Despite the considerable burden of a parent's cancer on children, most adjust to the challenges presented by the illness, with some even experiencing positive outcomes [16-18]. However, a substantial minority are at risk of poorer psychosocial outcomes, including elevated levels of stress, psychological distress, emotional and behavioral problems [19,20]. Indeed, a 21-year follow-up study of 60,069 children demonstrated that children whose parent had cancer were more likely to access specialized psychiatric care than their peers, especially females [21].

Previous research on the psychological impact of parental cancer on children has focused primarily on younger children with minimal attention to the concerns of young adults [22]. There is little knowledge on how young adults cope with a parent's cancer. The recognition of young adults as a group with specific needs is quite recent and studies focusing on young adults' adjustment to parental cancer are scarce [23].

To the best of our knowledge, there has been no recent research exploring the emotion regulation strategies that young people use about their parent's cancer and the potential impact of these coping strategies on their psychological adjustment to the illness. Given the gaps in the existing literature, we examined the impact of parent clinical path conditions on levels of distress on young adults offspring.

Not all young adults who have a parent with cancer require a psychological intervention, and therefore, it

is useful to identify risk factors for distress so that services can be appropriately directed. The findings from this study will assist in identifying young adults who are more vulnerable and allow tailoring of psychological support services.

Materials and methods

Ethics Statement

The study has been approved by the Institutional Review Board (IRB) of the University of L'Aquila (Prot. No. 46/2021). Informed consent was obtained from each participant, and the study adhered to the guidelines outlined in the Declaration of Helsinki [24].

Sample

Participants were composed of n = 81 young adults (n = 66 female, n = 15 male) cancer patients' children. We contacted 100 eligible participants, of whom 81 provided informed consent. The sociodemographic characteristics of the participants are reported in Table I.

TABLE I. *Demographic characteristics of the sample.*

	Sample (N = 81)
Age (years), mean±DS	30.2 ± 5.29
Gender, n (%)	
Male	15 (18.51%)
Female	66 (81.48%
Relationship status, n (%)	
Married/With partner	29 (35.80)
Single	52 (64.19)
Occupation, n (%)	
Student	21 (25.92)
Emloyed	44 (54.32)
Self-employed	16 (19.75)
Education level, n (%)	
Did not graduate	4 (4.93)
Graduated high school	21 (25.92)
Bachelor's degree	56 (69.13)
Parent with oncological diagnosis, n (%)	
Father	33 (40.74)
Mother	48 (59.25)
Clinical path, n (%)	
Passed away to cancer	33 (40.74)
In clinical follow-up	26 (32.09)
Under oncological treatment	22 (27.26)
TNM at diagnosis, n (%)	
1	22 (27.16)
2	14 (17.28)
3	23 (28.39)
4	22 (27.16)
Diagnosis timing, n (%)	
≤1 year	33 (40.74)
2-5 years	25 (30.86)
> 5 years	23 (28.39)

The inclusion criteria were as follows: (a) age = 18-40 years, (b) being children of parent with a cancer diagnosis, (c) provision of informed consent.

Exclusion criteria were: (a) psychiatric or neurological disorders, (b) alcohol or substance abuse.

Measures

Sociodemographic variables

Two types of participant information were collected. First, demographic data were collected. Second, parent's clinical data were obtained from participants' self-report regarding parent clinical path, cancer stage and time from oncological diagnosis.

Psychological measurement

The psychological battery was composed of n.4 self-reports that measure emotional (post-traumatic stress disorder, perceived stress, emotion regulation strategies) and positive psychological characteristics (post traumatic growth), detailed as follows.

Post Traumatic Growth Inventory (PTGI)

The PTGI [25] is a 21-item inventory that assesses the positive changes experienced in the aftermath of a traumatic or stressful event. The items are rated using a 6-point Likert scale with values ranging from 0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis). PTGI includes five factors of New Possibilities, Relating to Others, Personal Strength, Spiritual Change, and Appreciation of Life.

Emotional Regulation Questionnaire (ERQ)

The ERQ [26] is a 10-item self report questionnaire which consists of two scales corresponding to two different emotion regulation strategies: Cognitive reappraisal (it is a form of cognitive change that involves construing a potentially emotion-eliciting situation in a way that changes its emotional impact) (6 items) and Expressive suppression (it is a form of response modulation that involves inhibiting ongoing emotion-expressive behavior) (4 items). Instructions ask the subject "some questions about your emotional life, in particular, how you control (that is, regulate and manage) your emotions." The 10 items are rated on a 7-point-Likert scale from strongly disagree to strongly agree.

Impact of Event Scale Revised (IES-R)

The IES-R [27] is self-report to measure the risk of Post Traumatic Stress Disorder. This scale consists of 22 items with three factors including "intrusion" (difficulty in staying asleep, dissociative experiencing, similar to flashbacks) with eight items, "avoidance" (the tendency

to avoid thoughts or reminders about the incident) with eight items, and "hyperarousal" (irritated feeling, angry, difficulty in sleep onset) with six items. In addition to the three subscale scores, the IES-R total with the sum of the three subscale scores is also obtained. The IES-R is scored on a 5-point Likert-type scale from 0 (not at all) to 4 (extremely) which means that the total score range calculated is between 0 and 88 and the cut-off of 33 indicates a high risk of PTSD symptomatology.

Perceived Stress Scale (PSS)

The PSS [28] is a measure of the degree to which situations in one's life are appraised as stressful. Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. The scale also includes a number of direct queries about current levels of experienced stress. The questions in the PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way.

Procedure

Participants were recruited using snowball sampling, a nonrandomized method of sample selection. They were contacted using emails. First, we involved associations and oncologists in the study, who were enrolled via mail. They recruited eligible participants. The staff of our department provided a digital and online self-report form. Afterward, the self-report questionnaire was sent via emails, and participants could access it after providing written informed consent. We conducted a nationwide cross-sectional survey.

Study design

This was a cross-sectional, observational study of the Italian young adult population with a parent (mother/father) with cancer diagnosis, who were recruited through emails.

Statistical analysis

We conducted the observational study to evaluate emotional characteristics and emotion regulation in young adults cancer patients' children. All data were carefully double-checked for possible miscoding, distribution of values, and updating of missing values. Continuity variables were described using median and SD (Medians, Standard Deviations). Categorical variables are described in percentages.

Parent's clinical path was used to classify participants in the following groups: parent passed away to cancer, survived parent in regular clinical follow-ups, and parent under oncological treatment. Descriptive statistics were conducted to analyze the emotional dimensions.

Comparison of difference between three groups of continuous variables using Person's correlations; ANOVA statistical analysis and linear regression were applied to detect the relation across the psychological variables. In this study, all analyses were performed by Jamovi stat software. The level of significance adopted was $\alpha < 0.05$.

Results

A total of n. 81 young adults who have a parent with oncological diagnosis were enrolled in this study. As shown in Table I, the mean age of the sample was 30.2 ± 5.29 years. A total of n. 48 (59.25%) have their mother with oncological diagnosis and 33 (40.74%) have their father with oncological diagnosis. 40.74% of the participants have lost their parent to cancer, 32.09% have survived parent in regular clinical follow-ups, and 27.26% have parent undergoing oncological treatment. 28.39% have parental cancer stage at diagnosis of 3 according to TNM cancer classification. 30.86% have parent with a cancer diagnosis timing of 2-5 years.

Regarding emotional variables, 88.8% of the participants reported perceived stress, and 70.4% reported post-traumatic stress disorder risk.

We analyzed the effect of parent's clinical path condition on emotional variables.

Descriptive analyses were conducted on psychological and emotional data: the mean values (and standard deviations) of the participants in psychological testing are reported in Table II.

First, we wanted to analyze the relationship between parent's clinical path and emotional outcome; the participants have been distributed into 3 groups by parent's clinical path condition: parent passed away to cancer (PA), parent undergoing oncological treatment (UT) and parent in survivorship in regular clinical follow-ups (FU): in Table I the distribution was reported.

One-Way ANOVA statistical analysis was performed comparing the clinical path condition groups (PA, UT, FU) and each psychological (PTGI, IES-R, PSS) and emotional (ERQ) data. Table III shows the results regarding the comparison between clinical path condition groups (PA, UT and FU) on each domain of psychological and emotional data.

The results showed significant differences between the three groups. Post-hoc analysis (Tuckey Post-Hoc Test) evidenced that PA group reported higher post traumatic growth (PTGI TOT) ($F(2, 48.0) = 5.5$; $p = 0.007$) compared to UT group (Mean difference = 17.26; t-value = 3.12; df = 78.0; $p = 0.007$); in particular PA reported higher new possibilities ($F(2,50.5) = 4.3$; $p = 0.018$) compared to UT (Mean difference = 4.55; t-value = 2.638; df = 78.0; $p = 0.027$), higher personal strength ($F(2,45.8) = 4.6$; $p = 0.014$) compared to UT (Mean difference = 3.455; t-value = 2.670; df = 78.0; $p = 0.025$), and higher appreciation for life ($F(2,46.9) = 5.2$; $p = 0.009$) compared to

TABLE II. *Psychological characteristics of participants.*

	Parent clinical path groups	Sample		
Test	Passed away (PA) (N. 33)	In follow-up (FU) (N. 26)	Under treatment (UT) (N. 22)	Tot. (N. 81)
PTGI				
Improved relationship	19.67±8.35	16.19±9.07	14.32±7.84	17.10±8.65
New possibilities	15.00±6.55	11.62±6.80	10.45±5.00	12.68±6.49
Personal strength	12.64±4.07	9.77±4.92	9.18±5.27	10.78±4.89
Spiritual growth	2.55±2.32	2.04±2.27	1.77±2.24	2.17±2.27
Appreciation for life	11.55±3.09	10.46±2.48	8.41±3.72	10.35±3.32
Tot.	61.39±18.87	50.08±21.78	44.14±19.76	53.07±21.13
ERQ				
Cognitive reappraisal	4.81±1.37	4.71±1.44	4.49±1.46	4.69±1.40
Expressive suppression	3.55±1.41	3.21±1.56	3.90±1.60	3.53±1.51
IES-R				
Avoidance	1.78±0.89	1.50±0.80	1.97±0.89	1.74±0.87
Intrusion	2.87±0.77	1.95±0.87	2.20±0.90	2.39±0.92
Hyperarousal	2.03±1.11	1.65±1.06	2.26±1.05	1.97±1.09
Mean Tot.	6.68±2.51	5.10±2.34	6.43±2.55	6.10±2.53
Tot.	49.36±17.98	37.46±16.71	46.95±18.43	44.89±18.24
PSS	20.85±6.38	21.04±6.87	22.95±6.39	21.48±6.53

UT (Mean difference = 3.14; t-value = 3.67; df = 78.0; p = 0.001). Also, PA group showed higher risk of post-traumatic stress disorder (IES-R TOT) (F(2,48.6) = 3.6; p = 0.033). Specifically, post-hoc analysis (Tuckey Post-Hoc Test) evidenced that PA reported higher post-traumatic stress disorder risk compared to FU group (Mean difference = -11.9; t-value -2.56; df = 78.0; p = 0.033). Among post-traumatic stress symptoms risk, PA group showed higher intrusion symptoms (F(2, 47.0) = 9.9; p < .001). Post-hoc analysis (Tuckey Post-Hoc Test) evidenced that PA reported higher intrusion symptoms compared to FU (Mean difference = -0.924; t-value = -4.19; df = 78.0; p < .001) and UT (Mean difference = 0.667; t-value = 2.88; df = 78.0; p = 0.014) groups. In Figure 1 the representation of psychological performance by parent clinical path groups.

TABLE III. *One-Way ANOVA (Welch's) on psychological and emotional regulation strategy dimensions by PA, FU, and UT groups and Tukey Post-Hoc Test.*

	F	df1	df2	p	
PTGI TOT	5.597	2	48.0	0.007	*
Improved Relationships	3.031	2	49.1	0.057	
New Possibilities	4.371	2	50.5	0.018	*
Personal Strength	4.676	2	45.8	0.014	*
Spiritual Growth	0.809	2	49.1	0.451	
Appreciation for Life	5.279	2	46.9	0.009	*
ERQ					
Cognitive Reappraisal	0.331	2	48.1	0.720	
Expressive Suppression	1.104	2	47.4	0.340	
IES-R TOT	3.660	2	48.6	0.033	*
Avoidance	1.917	2	48.8	0.158	
Intrusion	9.915	2	47.0	< .001	*
Hyperarousal	1.984	2	49.3	0.148	
PSS TOT	0.788	2	48.6	0.460	

No differences emerged between the groups according to the ERQ indexes (emotion regulation strategies) and to the perceived stress index (PSS). Also, no differences emerged on psychological variables by parent diagnosis timing (≤1 year, 2-5 years, > 5 years), neither by cancer TNM staging (I-IV). To further analyze the role of demographics, participants were distributed in two groups by median age (29 years). No differences emerged by age.

Then, we examined the relationship between phycological (PTGI, IES-R, PSS) and emotional regulation strategies (ERQ). We conducted Pearson's correlation analysis, and the results are summarized in Figure 2.

Post traumatic growth (PTGI) was positively correlated with cognitive reappraisal (ERQ) (r = 0.42; p < . 001) and post-traumatic stress disorder risk (IES-R) (r = 0.27; p = 0.014); post-traumatic stress disorder risk (IES-R) was significantly correlated with expressive suppres-

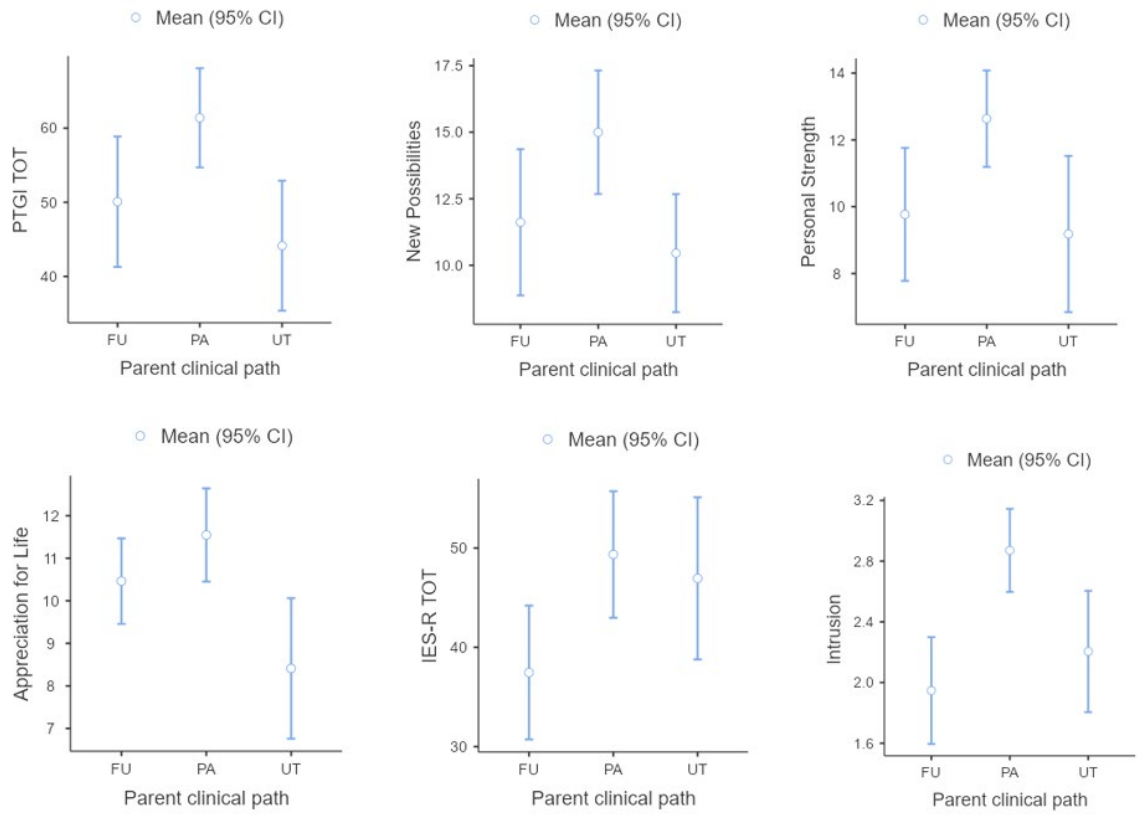

FIGURE 1. *Representation of psychological performance by parent clinical path groups.*

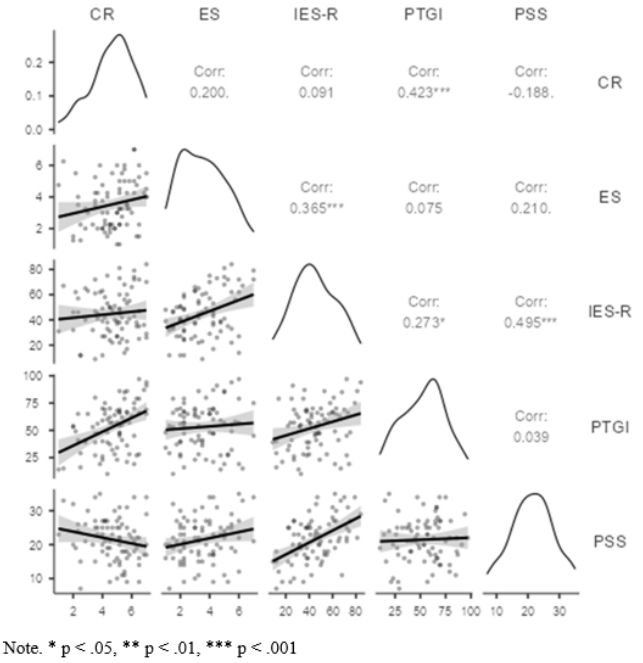

FIGURE 2. *Plot for Pearson r correlations between IES, PTGI, PSS, and ERQ scores for the sample.*

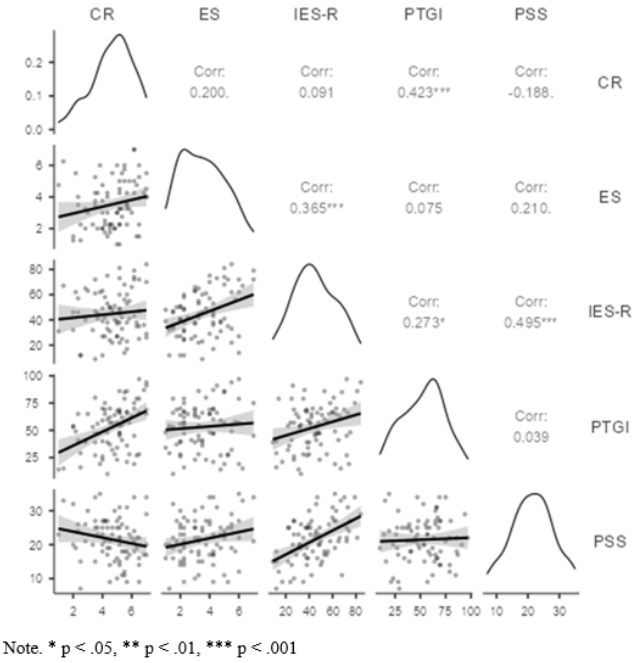

FIGURE 3. *Scatterplot of post-traumatic growth of parent clinical path groups in ERQ test.*

TABELLA IV. *Linear regression with PTGI as dependent variable.*

Model Fit Measures		
Model	R	R^2
1	0.525	0.276

Model Coefficients - PTGI				
Predictor	Estimate	SE	t	p
Intercept*	32.68	7.74	4.22	< .001
CR	5.97	1.46	4.07	< .001
Parent clinical path:				
FU – PA	-10.71	4.81	-2.23	0.029
UT – PA	-15.34	5.07	-3.03	0.003

**Represents reference level*

TABELLA V. *Linear regression with IES-R as dependent variable.*

Model Fit Measures		
Model	R	R^2
1	0.440	0.194

Model Coefficients - IES-R				
Predictor	Estimate	SE	t	p
Intercept*	34.90	5.30	6.589	< .001
Parent clinical path:				
FU – PA	-10.54	4.40	-2.396	0.019
UT – PA	-3.85	4.62	-0.833	0.407
ES	4.08	1.25	3.266	0.002

**Represents reference level*

sion (ERQ) (r = 0.36; p < . 001) and perceived stress (PSS) (r = 0.49; p < . 001).

Considering the significant correlation between cognitive reappraisal emotional regulation strategy and post traumatic growth, a regression analysis was conducted to analyze the predictive effect, as reported in Table IV.

In model (R2 = 0.27; p < . 001) it was revealed that the post traumatic growth index was predicted by cognitive reappraisal emotion regulation strategy with PA group as reference level (Fig. 3).

Also, considering the significant correlation between expressive suppression emotional regulation strategy and PTSD risk, a regression analysis was conducted to analyze the predictive effect, as reported in Table V.

In model (R2 = 0.19; p < . 001) it was revealed that the PTSD risk was predicted by expressive suppression emotion regulation strategy with PA group as reference level.

Discussion

Aim of the study was to analyze the impact of parental cancer on young adult offspring in terms of emotional reactions to their parent's clinical path.

We conducted an observational study to examine the role of individual aspects, as emotion regulation strategies, could influence the psychological adaptation in parental cancer clinical path.

According to the literature, our study showed negative emotional reactions, such as perceived stress and post-traumatic stress disorder risk in response to their parental cancer [29-31]. Parental cancer is a traumatic experience for children. These emotional reactions were not just limited to participants who had lost a parent to cancer or who had a parent under active treatment; they were shared by participants who had a survived parent. Psychological outcomes seem to be uncorrelated to parent diagnosis timing, cancer severity or offspring age. However, differences emerged between parent's clinical path condition (parent passed away to cancer; parent undergoing oncological treatment; parent in survivorship in regular clinical follow-ups) and offspring psychological outcomes: offspring who lost a parent due to cancer reported higher post-traumatic stress disorder risk with intrusion symptoms (intrusive thoughts, nightmares, intrusive feelings and imagery, dissociative-like re-experiencing). They also reported higher post-traumatic growth, in particular after parent death they have developed new interests, new perspectives, adaptability, openness to new ways of living and working (new possibilities); they also have increased resilience, self-reliance, confidence, humility, deepened meaningful narrative, more authentic (personal strength); finally they have increased gratitude, altruism, clear sense of priorities, appreciation for what's good (appreciation for life). Our results showed that positive outcomes might emerge by channeling the pain from such traumatic experience into positive, productive, and meaningful growth through finding meaning in the experience, defining a new set of goals, and proactively trying to achieve them. Our findings are in line with the perspective for children to transform the negative experience in post-traumatic growth (PTG) process [32-34]. Tedeschi & Calhoun [35] defined PTG as positive psychological changes experienced as a result of the struggle with trauma or highly challenging situations. This phenomenon should be considered not as an alternative, but as

a parallel process with respect to negative psychological consequences. PTG may feature positive changes in self-perception, interpersonal relationships and philosophy of life, leading to increased self-awareness and self-confidence, a more open attitude towards others, a greater appreciation of life and the discovering of new possibilities. Although limited, there is unexpected evidence of offspring experiencing positive gains despite a parent's cancer.10 This includes personal development and maturation, strengthened family relationships, and increased gratitude and appreciation [36-38]. One way in which offspring may experience positive gain after a parent's cancer is through PTG. PTG has adaptive significance in terms of psychological and physical functioning implying new understanding (or growth) resulting from adversity. Although largely under researched, PTG has been exhibited among offspring affected by parental cancer [34,37,39]. In each of these studies, growth experiences emerged alongside adversities, highlighting that distress and growth co-occur [25]. In other words, whilst offspring who experience a parent's cancer may encounter significant distress, many also demonstrate positive growth. Significant post-traumatic growth requires psychological distress.

Our findings also identified factors that can help affected young adult children experience posttraumatic growth while minimizing the adverse consequences of having a parent with cancer. In particular, the findings highlighted the role of emotion regulation strategies on psychological adaptation to parent clinical path: cognitive reappraisal seems to be a protective factor for post traumatic growth, whereas expressive suppression seems to be a predictive factor for post-traumatic stress disorder risk. Cognitive reappraisal is defined as the attempt to reinterpret an emotion-eliciting situation in a way that alters its meaning and changes its emotional impact. Expressive suppression is defined as the attempt to hide, inhibit or reduce ongoing emotion-expressive behavior [26]. Offsprings' adaption to their parent's cancer may be improved through interventions aimed at increasing adaptive emotion regulation strategies and positive emotion, which in turn increase resilience and PTG. Such interventions may be particularly beneficial for offspring bereaved by parental cancer.

Conclusions

Findings highlighted the ability to changing the meaning of emotionally evocative stimuli (cognitive reappraisal) comprise a protective factor for children' psychological adjustment. Simultaneously, inhibiting the behavioral expression of emotions (expressive suppression) comprises a risk factor for PTSD symptoms. Difficulties in attempts to change how children think about a situation in order to change its emotional impact may limit children's capacity to cope with a severe stressor such as parental cancer.

The study had some limitations. First, the non-random sampling increases the risk of volunteer response bias and limits the generalizability of findings. However, participants were recruited from various cancer related local community organizations (e.g., oncology unit) as well as other recruitment strategies targeting youth (e.g., university, associations and youth groups) in order to obtain a sample as representative as possible of the Italian population of young adults in the context of parental cancer. The psychological battery is composed of self-report measures of PTSD symptoms and emotion regulation and are not measures of their clinical indicators.

Despite these limits, the study adds valuable knowledge about the associations between emotion regulation and its importance on outcomes such as PTSD risk, which are well-known outcomes in parental cancer, in a group that is overlooked in research. The result is useful for informing healthcare professionals who encounter these young adults about the risk of expressive suppression contributing to symptoms of perceived stress and PTSD symptoms and it draws attention to the importance of recognizing and offering tailored psychological support to these young adults with low adaptive emotion regulation strategies. Also, there is an urgent need to redirect professionals' focus towards offspring health promotion to prevent disease through simple and cost-effective lifestyle strategies through behavior change techniques (BCTs) [40,41]. Lifestyle medicine is based on several pillars as positive psychology (promotion of positive emotions, sense of purpose, gratitude, resilience, happiness); well-being (promotion of presence of physical, social, and emotional fulfilment); stress management, anxiety and depression reduction; mindfulness (purposeful and non-judgmental awareness of one's thoughts, actions, and emotions); avoid risky substances use like tobacco and alcohol; physical activity, good eating habits, and restful sleep promotion, and social connection. The use of evidence-based lifestyle therapeutic intervention can be useful to prevent chronic disease like cancer in healthy offspring who experienced parental cancer [42].

Moreover, future research should consider as variables the presence of brothers or sisters and the support/reaction of the healthy parent as parental cancer has an impact on whole family and family coping strategies (e.g., communication, emotion expression, reallocation of roles) could mediate offspring psychological adaptation to parental cancer.

Conflict of interest statement

The authors declare no conflict of interest.

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None.

Authors' contributions

Conceptualization, J.R.; validation, methodology, F.G., E.C. and E.C.; investigation, N.G.; writing—review and editing, all authors. All authors have read and agreed to the published version of the manuscript.

Ethical consideration

The study has been approved by the Institutional Review Board (IRB) of the University of L'Aquila (ID code 46/2021). The study was conducted in accordance with the Declaration of Helsinki, and Informed consent was obtained from all subjects involved in the study.

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