**Abstract**

This study aimed to examine the direct and indirect effects of hope on health-related quality of life (HRQoL) via anxiety of children/adolescents with cancer. We proposed to test if the mediation model was moderated by the child/adolescent’s treatment status.

The participants were 211 children/adolescents diagnosed with cancer, divided into two clinical groups according to treatment status: 97 patients on-treatment and 114 off-treatment. Self-reported questionnaires measured the youths’ hope, anxiety and HRQoL perceptions. The results revealed that children/adolescents on and off-treatment only differed in levels of HRQoL, with a more compromised HRQoL found for the on-treatment group. Hope was positively associated with HRQoL, directly and indirectly via anxiety reduction. Moreover, only the association between anxiety and HRQoL was moderated by clinical group, revealing stronger associations for on-treatment patients.

Findings highlight the importance of hope as a decisive resource in pediatric cancer adaptation, which may be strategically targeted in psycho-oncological interventions.

**Keywords:** Pediatric cancer, Hope, Anxiety, Health-related quality of life, Treatment status

Does Hope Matter?Associations among Self-reported Hope, Anxiety and Health-related Quality of Life in Children and Adolescents with Cancer

Pediatric cancer is the main cause of non-accidental death between the first year of life and 14 years of age in developed countries (Kaatsch, 2010; Siegel et al., 2012). Recent advances in the treatment of pediatric cancer have allowed a significant increase in the number of cancer survivors (Robinson, Gerhard, Vannatta, & Noll, 2007).

Treatment now involves intensive and multimodal therapy that may include surgery, chemotherapy, radiation therapy and transplantation, all of which can induce acute and long-term overwhelming side effects (Robinson, et al., 2007; Siegel et al., 2012). In addition to stressful treatment routines, frequent hospitalizations, uncertain prognostics and restricted socialization experiences characterize this challenging pediatric health context. Research on adaptation of children and adolescents with cancer has shown an unexpected variability of results, with some studies indicating much more than others, great vulnerability and impairment in adaptation indicators, such as psychological adjustment or health-related quality of life (HRQoL; Jörngården, Mattsson, & Von Essen, 2007; Kazak, 1994; Landolt, Vollrath, Niggli, Gnehm, & Sennhauser, 2006).

The majority of studies focused on pediatric cancer patients who had completed treatment, and found significant impairment in HRQoL when compared to children/adolescents from the general population (Koopman et al., 2005; Meeske, Katz, Palmer, Burwinkle, & Varni, 2004; Reinfjell, Lofstad, Veenstra, Vikan, & Diseth, 2007). Nevertheless, other studies found similar (Alessi et al., 2007; De Clercq, De Fruyt, Koot, & Benoit, 2004; Servitzoglou, Papadatou, Tsiantis, & Vasilatou-Kosmidis, 2009) or higher (Larsson, Mattsson, & Von Essen, 2010; Shankar et al., 2005) levels of HRQoL in patients who had completed treatment, compared to healthy controls, even after a relapse occurred (Essig et al., 2012). Studies focusing on the active treatment phase seem to show more consistent findings. During this phase, children/adolescents reported lower HRQoL compared to: youths who had completed treatment (Matziou et al., 2008; Meeske et al., 2004; Russell, Hudson, Long, & Phipps, 2006; Shankar et al., 2005; Wu et al., 2007), patients with another chronic illness (Varni, Limbers, & Burwinkle, 2007), and healthy controls (Eiser, Eiser, & Stride, 2005; Landolt et al., 2006; Shankar et al., 2005). Likewise, longitudinal studies revealed that, from the time of diagnosis, during active treatment, to after completion of treatment, the children/adolescents’ overall HRQoL improved (Hinds et al., 2009; Jörngården et al., 2007; Larsson et al., 2010; Penn et al., 2008).

Regarding psychological adjustment, some studies found that anxiety symptoms were common during pediatric cancer treatment (Wu, Sheen, Shu, Chang, & Hsiao, 2013), due to: restrictions on freedom action (Hedstrom, Ljungman, & Von Essen, 2005), thoughts about having cancer, wondering “why” (Enskar & Von Essen, 2007), and uncertainty about the future (e.g., Woodgate & Degner, 2002). However, other studies reported that children/adolescents’ anxiety levels did not significantly differ from their healthy peers (Eiser, Hill, & Vance, 2000; Elkin, Phipps, Mulhern, & Fairclough, 1997; Neville, 1996; Zebrack & Zeltzer, 2003) or peers with other medical conditions (Noll, Reiter-Purtill, Vannatta, Gerhardt, & Short, 2007; Noll et al., 2000).

The identification of resources associated with adaptation outcomes may clarify the heterogeneity of the current findings. The present research focuses on an understudied intrapersonal resource: self-reported hope.

Hope has recently gained a renewed focus of attention as a potential intrapersonal factor influencing adaptation to stressful conditions. Snyder’s (1989) Hope Theory provides a useful model. The theory associates hope with goal-setting and defines hope as “a cognitive set involving the beliefs in one's capability to produce workable routes to goals (the pathways component), as well as the self-related beliefs about initiating and sustaining movement toward those goals (the agency component)” (Snyder, 1997, p. 401).

Pediatric cancer is a condition that society still associates with the absence of hope (e.g. Snyder, 2000), but empirical findings for adult cancer patients show that hope: facilitates the coping process (Chi, 2007; Elliott, Witty, Herrick, & Hoffman, 1991; Herth, 1989); enhances Quality of Life (QoL; Felder, 2004; Herth & Cutcliffe, 2002a; Post-White et al., 1996); and promotes adaptation to loss, uncertainty and suffering (Herth & Cutcliffe, 2002a; Lee, 2001). Despite the growing number of studies among adults, less research has been done in the context of pediatric health. Snyder (2000) considered that hope can help ill children/adolescents to deal with the impediments associated with health problems and focus upon new goals, look for novel ways to accomplish those goals and build the motivation needed to complete the often unpleasant medical regimes and treatment. Recently, one longitudinal observational study (Germann et al., 2012; Leavey et al., 2013) explored the relationships between hope, anxiety, depression and QoL among children/adolescents newly diagnosed with cancer, who were followed for one year. Results revealed that hope was positively associated with QoL one year later, even after controlling for depression and anxiety (Leavey et al., 2013, May). To the best of our knowledge, this is the only study that has examined the relationship between anxiety and QoL in pediatric cancer patients. Studies with other pediatric health conditions demonstrate that anxiety is an important predictor of HRQoL (Adewuya & Oseni, 2005; Annett, Bender, Lapidus, DuHamel, & Lincoln, 2001; Stevanovic, Jancic, & Lakic, 2011). Literature to date provides support for considering hope as a psychological strength (Valle, Huebner, & Suldo, 2006) in both normative and adverse conditions, such as illness. However, two main gaps remain: the examination of hope in different phases of pediatric cancer treatments, as well as hope’s association with adaptation outcomes such as HRQoL and anxiety in different clinical groups.

 The main aim of the present research was to examine associations among self-reported hope, anxiety and HRQoL in two clinical groups (on-treatment vs. off-treatment) of children/adolescents with cancer. We posed and tested three hypotheses based on theory and previous empirical research. First, we expected that hope would be positively associated with HRQoL and negatively related with anxiety. Secondly, we hypothesized that the relationship between hope and HRQoL would be mediated by anxiety. Additionally we aimed to examine if the mediation model was moderated by the child/adolescent’s treatment status. Given the absence of literature on the topic, we posed no specific hypothesis and addressed this goal as an exploratory research question.

**Method**

**Participants**

The total sample comprised 211 children and adolescents with a diagnosis of malignant cancer who attended the oncology wards of two Portuguese public hospitals. Of the 212 families we approached, only one declined to provide data, a 99.5% response rate. The one family that declined participation indicated that they were not interested. Participants (112 boys and 99 girls) ranged from 8 to 19 years (*M =* 13.29, *SD* = 3.56) and had the following diagnoses: leukemias (40.7 %, *n* = 86), lymphomas (27.0 %, *n* = 57), bone sarcomas (15.2 %, *n* = 32), brain cancers (2.8 %, *n* = 6), soft tissue sarcomas (1.9 %, *n* = 4), and others (12.4 %, *n* = 26). Most of the patients’ families were from low (55.9 %, *n =* 118) and middle (34.1 %, *n* = 72) socio-economic backgrounds, assessed according to the classification system of Simões (1994) for the Portuguese context, which is based on parents’ professions and educational level.

Participants were divided into two clinical groups according to treatment status: on-treatment (*n* = 97) and off-treatment (*n =* 114) samples. The first group was composed of children and adolescents receiving active or maintenance treatment during the assessment period (e.g., chemotherapy, radiation therapy). If children had completed antineoplastic therapy within the previous 5 years they were included in the off-treatment group. In the on-treatment sample, 20 participants (20.3%) completed the assessment protocol in an inpatient setting and 77 participants (79.7%) did so in an outpatient setting; for participants off-treatment, only one individual was in the inpatient setting; all others (99.1%) completed the protocol in an outpatient setting, or when they visited the hospital for their medical appointment. Socio-demographic and clinical characteristics of the two sample groups are shown in Table 1. Independent samples *t-*tests and chi-square analyses were conducted to assess whether there were mean differences between the two clinical groups, and these revealed group differences only in time after diagnosis, due to the more recent diagnoses of children/adolescents on-treatment compared to those off-treatment (see Table 1).

*Table 1 about here*

**Procedure**

The present study was approved by the Ethics Committees of two Portuguese state hospitals, namely, the Portuguese Institute of Oncology (IPO-Porto) and the Pediatric Unit-Coimbra Hospital and University Centre. Data collection took place between June 2012 and January 2013.Within a consecutive sampling approach, all families who met the study’s inclusion criteria were invited to participate in the study. The inclusion criteria for participants in the sample were: (1) age between 8 and 19 years of age; (2) clinical diagnosis of cancer for at least three months; (3) on-treatment or off-treatment status less than 5 years since the end of treatment; and (4) absence of major developmental disorders (e.g., Down syndrome). Children/adolescents who were in palliative care during the assessment were excluded from the sample. Children/adolescents and their family caregiver were approached by a research assistant before or after their appointment or during hospitalization, who presented them the study, informed them about its voluntary, confidentiality and anonymity nature, and requested their participation. Ethical procedures were followed with respect to obtaining informed consent from family caregivers of all children/adolescents who agreed to participate in the study. Formal informed consent forms were obtained from adolescent participants over 12 years old, and from one family caregiver of each children/adolescent who agreed to participated; children under 12 provided informal consent, expressing orally their participation agreement. The youths completed the protocols while waiting for their medical appointments or during hospitalization, in a room without interruptions or distracting stimuli, in the presence of a researcher who was available to assist with the completion of the questionnaires when needed.

**Measures**

*Independent variable*

**Children/adolescents’ hope**

The Children’s Hope Scale (CHS; Snyder et al., 1997; Portuguese version: Marques, Pais-Ribeiro, & Lopez, 2009) measures children/adolescents’ hope as a cognitive set involving positive and triumphant determination to initiate and sustain action (agency dimension: “I think I am doing pretty well” and “I am doing just as well as other kids my age”), as well as beliefs in their capability to outline and plan different ways to achieve their goals (pathways dimension: “I can think of many ways to get the things in life that are most important to me” and “When I have a problem, I can come up with lots of ways to solve it”). These two dimensions can be combined to provide an overall hope score (Snyder et al., 1997) that is comprised of a total of six items, three for each dimension), with higher scores indicating higher levels of hope. CHS asks participants to think about themselves and how do they do things in general. Participants answered the scale’s items on a six-point Likert scale ranging from 1 = *none of the time* to 6 = *all of the time*. An adequate psychometric performance and construct validity have been described for this scale in Snyder’s (1989) original study, and in the overview of the available validation of CHS (Snyder, 2003), confirming that this instrument measures children/adolescents’ hope as defined by Hope Theory (Snyder, 1989). Regarding Internal Consistency, Cronbach alphas for CHS scores ranged from.70 to a high of .86 (Snyder, 2003). Temporal Stability was also established (Snyder, 2003). This scale has been validated for Portuguese children with a Cronbach’s alpha of .81 for the total score (Marques et al., 2009). To assure that the Portuguese CHC version were equivalent to the original one, the scale validation first step included translation, back-translation, inspection for lexical equivalence and content validity and cognitive debriefing (Marques et al., 2009). The investigation on reliability (internal consistency and stability), factor structure and criterion-related validity showed psychometric properties similar to the English language CHS, suggesting that “it measures the same construct in the same way” (Marques et al., 2009). For the present study sample, the scale scores presented Cronbach’s alphas of .76 and .79 for children/adolescents on-treatment and off-treatment, respectively.

*Mediator variable*

**Anxiety**

In order to assess anxiety, we used the short-form of the Revised Children’s Manifest Anxiety Scale 2.0 (RCMAS-2; Reynolds & Richmond, 2008). The RCMAS-2 10-item index provided an overall anxiety score that encompasses physiological anxiety (e.g., “Often I feel sick in my stomach”), worry (e.g., “I often worry about something bad happening to me”) and social anxiety (e.g. “I fear other kids will laugh at me in class”). Participants answered the question “Is this true about myself?” without time frame restriction for each scale item, using a dichotomous (yes/no) response format. Positive answers were summed with higher scores indicating higher levels of anxiety. Adequate psychometric performance has been described for this scale in the original study (Reynolds & Richmond, 2008); in our study the Cronbach’s alphas for the scale scores were .63 and .64 for children/adolescents on-treatment and off-treatment, respectively.

*Dependent variable*

**HRQoL**

The children/adolescents’ subjective perceptions of their HRQoL was measured with the first 10 items of DISABKIDS Chronic Generic Measure (DCGM-12) as suggested by Muehlan (2010). This is a short version of the DCGM-12 self-report questionnaire (European DISABKIDS Group, 2006; Portuguese version: Carona, Bullinger, & Canavarro, 2011) for children/adolescents with chronic health conditions. This measure has four items assessing each of the three HRQoL domains in the last four weeks: mental (e.g., “Do you feel like everyone else even though you have your condition?”), social (e.g., “Do you feel lonely because of your condition?”) and physical (e.g., “Do you think that you can do most things as well as other children/adolescents?”). The responses to these items were combined to provide a total HRQoL score. Participants answered items on a five-point Likert scale ranging from 1 = *never* to 5 = *always*, with higher scores indicating better HRQoL. In the original study (European DISABKIDS Group, 2006), the Cronbach’s alpha for the short-form measure was .84 and the split-half reliability coefficient reaches values of .90. Convergent and divergent validity were also demonstrated in the original validation studies. Convergent validitywas confirmed by significant correlations between the present study’s HRQoL measures and other measures of HRQoL, e. g., with KINDL-R (*r* = .60, p < .05), a widely used measure of HRQoL among children and adolescents (Bullinger, Brütt, Erhart, & Ravens-Sieberer, 2008). Discriminant validity of the present study’s HRQoL measure has been confirmed bycomparing HRQoL in children and adolescents with different chronic conditions (European DISABKIDS Group, 2006). To assure that the Portuguese DISABKIDS version were equivalent to the original one, the scale validation included translation, back-translation, inspection for semantically equivalence and psychometric performance exploration in a pilot study (Carona et al., 2011). In the present study, the scale scores for children/adolescents on-treatment and off-treatment demonstrated Cronbach’s alphas of .83 and .81, respectively.

**Treatment intensity**

Clinicians classified treatment intensity using four levels, from level 1 (*Least intensive treatment*) to level 4 (*Most intensive treatment*), of the Intensity of Treatment Rating Scale 3.0 (Kazak et al., 2011; Portuguese version: Santos, Crespo, Canavarro, & Pinto*,* 2014). Clinicians are asked to read several medical criteria that present diagnosis (e.g., brain tumor, leukemia), stage/risk (e.g. stadium 1, 2, 3 or 4, based on medical classification) and treatment modality (e.g., surgery, chemotherapy, radiology, transplants) examples for each of the four treatment intensity levels. It was explained to clinicians that the intensity of the treatment consisted in their perception of the duration of treatments, second medical effects profile, complications risks or relapses, number of agents, treatment modalities, and treatment setting (i.e., inpatient or outpatient). For instant, since it requires a more aggressive treatment, a relapse treatment corresponds mostly to level 4 (*Most intensive treatment*). Illness most reserve prognosis or multimodal therapy that include simultaneous surgery, chemotherapy, radiation therapy or/and transplantation are often classified in level 4. Based on the scale classification and examples and on medical history of their patients, clinicians attribute the treatment intensity level for each patient. Like in original validation studies (Kazak et al., 2011), the Portuguese version was traduced and validated using backward translation and applicability and content clarity requests from three pediatric oncologists from two Portuguese hospitals, independently. In a prior study with a Portuguese sample, inter-rater reliability was excellent, *kappa*=.97; *p*<.001 (Santos et al., 2014*).*

**Statistical analysis**

Analyses were performed with Statistical Package for Social Sciences, version 20 (SPSS, Inc., Chicago, IL). First, we conducted descriptive statistics. Separate Cronbach’s alphas and bivariate correlations were calculated for each of the two clinical groups. Second, we conducted a MANOVA to determine whether children/adolescents on-treatment differed from those off-treatment with regard to hope, anxiety, and HRQoL (Pallant, 2007). Clinical group membership was entered as the between-subjects factor and hope, anxiety and HRQoL as dependent variables. Then, to examine the mediation role of anxiety levels in the relationship between hope and HRQoL, and to determine whether this mediation model would be different for children/adolescents on-treatment as compared to those off-treatment, we performed a moderated mediation analysis. We used the SPSS macros PROCESS to test Hayes’ (2013) proposed model number 59.

The analyses were regression-based and performed with bootstrapping procedures (Hayes, 2013). Indirect effects were calculated based on a point estimate and bias-corrected and accelerated confidence intervals (BCa 95% CI) with a 10,000 bootstrap samples procedure; an indirect effect was considered significant if the respective confidence interval did not include zero.

**Results**

**Descriptive Analyses and Correlations**

Descriptive statistics, Cronbach’s alphas and correlations, for both clinical groups are presented in Table 2.

*Table 2 about here*

We performed a MANOVA to assess if the two clinical groups differed regarding hope, anxiety and HRQoL. The independent variable was clinical group (on-treatment vs. off-treatment group), and three dependent variables were used: hope, anxiety and HRQoL. A significant multivariate effect according to clinical group was found, Wilks’ Lambda = .92, *F*(3, 207) = 6.29, *p* < .001, partial 2 = .08. The univariate analyses demonstrated that groups only differed in HRQoL, *F*(1, 209) = 15.31, *p* < .001, partial 2 = .07. Children/adolescents on-treatment reported poorer HRQoL (*M* = 4.06, *SD* = .67) than their counterparts who were off-treatment (*M* = 4.39, *SD* = .53). The two groups did not differ significantly in hope, *F*(1, 209) =.09, *p* = .767, partial 2 = .000, or in anxiety, *F*(1, 209) = .24, *p* = .624, partial 2 = .001.

*Table 3 about here*

Correlational analyses revealed that, as expected, children’s hope was negatively associated with anxiety and positively associated with HRQoL in both clinical groups. Additionally, also as predicted, anxiety was negatively associated with HRQoL for participants in both the on-treatment and off-treatment groups. The age and the length of time off-therapy was not associated with any of the study variables (see Table 2).

**Moderated Mediation Analyses**

We hypothesized that children and adolescents’ hope scores would be associated with HRQoL via anxiety levels. Moreover, we aimed to examine if the mediation model would be different for on-treatment as compared to off-treatment children and adolescents.

In order to test this model, we conducted a multiple regression and a bootstrapping procedure (Preacher & Hayes, 2008: Hayes, 2013), using hope as independent variable, anxiety as mediator and HRQoL as dependent variable. Our results revealed the presence of a significant indirect effect on the relationship between hope and HRQoL via anxiety. Only one significant interaction was found in this model: anxiety x clinical group (B = -.82; *t* = -2.17, *p* = .03), indicating that the association between anxiety and HRQoL was different for children/adolescents on-treatment and off-treatment. To examine how this association between anxiety and HRQoL varied according to clinical group, we performed regression analyses. Results confirmed the significant interaction between anxiety and clinical group was significantly associated to HRQoL (B = -.88; *t* = -2.38; *p <* .05; see Table 4).

*Table 4 about here*

Post-hoc simple slopes analyses revealed that anxiety levels were more strongly associated with HRQoL in children undergoing treatment, B = -1.91; *t* = -7.18, *p* < .001, than in children in the off-treatment clinical group, B = -1.04; *t =* -4.10, *p* < .001 (see Figure 1).

*Figure 1 about here*

Analyses demonstrated that the aforementioned relationship differed in strength for the two clinical groups, but not in direction, and thus, given that this was the only moderated relationship in the mediation model, we opted to run a simple mediation model with the total sample, where again hope was considered the independent variable, anxiety the mediating variable, and HRQoL the dependent variable. Results confirmed that anxiety mediated the relation between hope and HRQoL (*point estimate* = .10; *CI* = .06/.16); the *R*² for HRQoL was .24 (see Figure 2).

*Figure 2 about here*

In order to examine whether medical centers differed regarding hope, anxiety and HRQoL we ran a MANOVA. Medical center was entered as the between-subjects factor and hope, anxiety and HRQoL as dependent variables. Our analysis revealed that there was no significant difference according to medical center (Wilks’ Lambda = .97, *F*(3, 207) = 2.01, *p* > .05, partial 2 = .03)

**Discussion**

To our knowledge, the present study is among the first to explore the associations of hope with HRQoL, via anxiety levels, of children/adolescents with cancer. In addition, the comparison of these variables in two clinical groups according to treatment status also provides insightful new data. Three main hypotheses were posed and generally supported.

 Confirming our first hypothesis and according with a previous study (Germann et al., 2012, February), we found that hope was significantly and negatively related to children/adolescents’ anxiety and positively related to HRQoL. These results are in accordance with previous studies supporting hope as a psychological strength that helps children/adolescents to deal with adverse life events (Lewis & Kliewer, 1996; Snyder, 2000; Valle et al., 2006). Similarly, studies with adult cancer patients revealed that hope may promote adaptation outcomes (e.g., Felder, 2004). Individuals high on hope endorse active and problem-focused coping (Snyder, Cheavens, & Michael, 1999) and use less avoidance coping, which have been significantly associated with distress in cancer patients (Stanton, 1998; Snyder, 2000). Moreover, according to Snyder (2000), hopeful individuals have numerous goals in different areas of life, including the maintenance of good health. The diagnosis of cancer may be perceived as a “goal blockage” that will encourage high-hope individuals to create alternative pathways to the original goal (e.g., adherence and involvement in the treatment) and multiply their efforts in treatment cooperation, decreasing the emphasis given to the restrictions caused by the disease and its treatment (Snyder, 2000). This may be a possible explanation for the associations found in this study between hope and anxiety and HRQoL.

Our results demonstrated that higher hope was both directly and indirectly related to HRQoL, confirming our second hypothesis. The indirect link suggests the possibility that hope can attenuate the levels of anxiety provoked by the invasive therapy and painful procedures, which in turn, would improve the HRQoL. This finding is in line with the well-established relationship between lower anxiety and better HRQoL outcomes in pediatric cancer (Germann et al., 2012, February; Jurbergs, Russell, Long, & Phipps, 2008; Leavey et al., 2013, May). Considering hope as involving the determination to accomplish goals (Snyder, 1989), this intrapersonal factor may help pediatric cancer patients dealing with painful medical procedures, once they are a requirement to accomplish the treatment regimen. As a consequence of keeping this goal in mind, children/adolescents may report less anxiety when exposed to these procedures. When experiencing less psychopathological symptoms (e.g., anxiety), individuals may perceive that the disease and its treatment have a lower impact on their well-being and functioning in multiple domains (physical, psychological and social), i.e., they may report higher HRQoL (Efficace et al., 2003; Langeveld, Stam, Grootenhuis, & Last, 2002; Varni, Burwinkle, & Lane, 2005).

The results demonstrated that the only significant difference in the mediation model according to treatment status was located in the strength of the association between anxiety and HRQoL: this relationship was stronger for children/adolescents currently undergoing treatment. These findings support the idea that during the treatment period there are specific perceived sources of anxiety, such as the illness (Enskar & Von Essen, 2007), treatment efficacy (Hedstrom et al., 2005) and uncertainty about the future (Enskar, Carlsson, Golsater, & Hamrin, 1997; Hedstrom et al., 2005; Woodgate & Degner, 2002) that may have an additional negative impact on children and adolescents’ HRQoL.

Nevertheless, there are limitations that need to be considered. The cross-sectional nature of this study did not allow for disentangling of the direction of causality among the study’s variables. Although the literature revision supports the mediation model tested, it is possible, for instance, that anxiety is associated with lower levels of hope, which in turn, are associated to worse HRQoL. Secondly, this study did not address specific developmental (e.g. age group) and clinical (e.g. intensity of treatment, cancer type, prognosis) features, which may have an important role in how patients experience this health condition. This approach would allow a more comprehensive understanding of the impact of the developmental stage on youths’ hope. Future research should examine the potential moderator/mediator effect of the patients’ developmental stage in the relationship between hope and adaptation outcomes. Thirdly, it must be noted that given the exclusive focus on youths’ self-reports, caution is crucial due to the single-method response bias, which reinforces the need for further research based on multi-methods response analysis with a group of key informers (e.g., child/adolescent, parents, teachers and/or clinicians). Finally, the sample was recruited from two oncology services of two Portuguese hospitals; we cannot rule out the possibility that results may have been influenced by the quality of institutional care received or other contextual variables, and thus these must be interpreted with caution. These findings encourage future research examining the role of hope in children/adolescents facing cancer and their families. In addition to further studies mapping the importance of hope for HRQoL in the face of adverse conditions, such as a chronic illness (Affleck & Tennen, 1996; Snyder, 2000), subsequent research might examine how hope is related to specific coping styles and cancer-related self-management behaviors. Given the scarcity of research on this topic, qualitative studies could be especially informative by exploring perceptions of hope, as well as their promoting factors in children/adolescents with cancer. Another possible avenue for research is the examination of the developmental course of hope, namely from childhood to adolescence and across treatment phases. Future studies would benefit from including a comparison group (e.g., healthy children or children with another chronic disease) in order to investigate specificities about the perceptions and the impact of hope on pediatric cancer patients compared with the control groups.

The present study endorses the importance of developing interventions that improve cognitive-motivational strengths, such as hope, aimed at helping children/adolescents to cope more effectively with their illness and adversities that may occur during the treatment. The Making Hope Happen for Kids Program (Edwards & Lopez, 2000) is an example of an intervention that has been successfully used with healthy students to enhance their hope levels (Pedrotti, Lopez, & Krieshok, 2000). In order to develop evidence-based interventions to help youths dealing with cancer, the hope intervention suggested by Snyder based on problem-solving, narratives and motivational interviewing (Snyder, 2000) may be beneficial helping youths dealing with cancer (Germann et al., 2012, February). According to Snyder’s conceptualization of hope as goal-directed thinking, promoting the active involvement of the child/adolescent in the therapeutic process would help youths to think in a way which would improve adaptation (Snyder et al., 1997). From the current study it is clear that hope plays a unique role in pediatric cancer, reducing the levels of anxiety induced by the invasive therapy and painful procedures and improving youths’ HRQoL. Thus, it is important to develop knowledge and empirically-validated interventions that maximize youths and health caregivers’ ability to take advantage of this cognitive-motivational strength (Herth & Cutcliffe, 2002b; Snyder, 2000).

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**Human and Animal Rights and Informed Consent**

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

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**Table 1**

Socio-demographic and clinical characteristics of the sample

|  |  |  |  |
| --- | --- | --- | --- |
|  | On-Treatment (*n* = 97) | Off-Treatment (*n*= 114) | Differences between groupsc |
| Age (*M*/*SD*) | 12.96 (3.51) | 13.57 (3.59) | t (209) = 1.24; *p* > .05 |
|  |  |  |  |
| Age group (n/%) |  |  |  |
| Children (8-12) | 44 (45.4) | 44 (38.6) | χ2 (1) = .73; *p* > .05 |
| Adolescents (13-18) | 53 (54.6) | 70 (61.4) |  |
|  |  |  |  |
| Gender (n/%) |  |  |  |
| Male | 58 (59.8) | 54 (47.4) | χ2 (1) = 2.77; *p* > .05 |
| Female | 39 (40.2) | 60 (52.6) |  |
|  |  |  |  |
| School year attended (*M*/*SD*) | 7.05 (3.38) | 7.89 (3.38) | t (209) = 1.79; *p* > .05 |
|  |  |  |  |
| SES(n/%) |  |  |  |
| Low | 55 (56.7) | 63 (55.3) | χ2 (2) = 1.61; *p* > .05 |
| Medium | 30 (30.9) | 42 (36.8) |  |
| High | 12 (12.4) | 9 (7.9) |  |
|  |  |  |  |
| Family structure (n/%) |  |  |  |
| Intact | 74 (76.3) | 90 (78.9) | χ2 (3) = 2.04; *p* > .05 |
| Extended | 11 (11.3) | 15 (13.2) |  |
| Parent | 11 (11.3) | 7 (6.1) |  |
| Step-families | 1 (1.0) | 2 (1.8) |  |
|  |  |  |  |
| Time since diagnosisa (*M*/*SD*) | 17.36 (21.18) | 36.77 (24.12) | t (209) = 6.16; *p* < .001 |
| Time since the end of treatmentb (*M*/*SD*) | NAd | 18.94 (14.45) |  |
|  |  |  |  |
| Treatment intensity (n/%) |  |  |  |
| I | 3 (3.1) | 4 (3.5) | χ2 (3) = 4.91; *p* > .05 |
| II | 30 (30.9) | 51 (44.7) |  |
| III | 49 (50.5) | 42 (36.8) |  |
| IV | 15 (15.5) | 17 (14.9) |  |

*Notes*. aThe time since diagnosis (in months) was reported by parents.

bThe time since the end of treatment (in months) was derived from clinical records.

cResults of comparison tests between on-treatment and off-treatment sample groups.

dNot applicable.

**Table 2**

Descriptive statistics, Cronbach’s alphas and matrix of inter-correlations among study variables for children/adolescents on-treatment (“On”) and off-treatment (“Off”)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Variables | Mean | Range | SD | α | Correlations |  |
|  |  |  |  |  | 1 | 2 | 3 | 4 | 5 | 6 |
|  | On | Off | - | On | Off | On | Off | On | Off | On | Off | On | Off | On | Off | On | Off | On | Off |
| 1. Hope |  4.55|4.52 | 1-6 |  .78|.79 | .76|.79 |  |  |  |  |  |  |
| 2. Anxiety |  2.72|2.59 | 1-10 |  2.00|1.95 | .63|.64 | - .23\*|-.37\*\*\* |  |  |  |  |
| 3. HRQoL  |  4.06|4.39 | 1-5 |  .67|.53 | .83|.81 |  .30\*\*|.26\*\* | -.57\*\*\*|-.38\*\*\* |  |  |  |
| 4. Age | 12.96|13.57 | - |  3.51|3.59 | - |  .03|.15 |  .01|-.09 | -.15|.03 |  |  |
| 5. Gender | - | - | - | - |  -.05|-.13 |  .26\*\*|.09 | -.16|-.02 | .21\*|-.00 |  |
| 6. Time since diagnosis | 17.36|36.77 | - | 21.18|24.12 | - |  -.04|-.06 | -.10|.01 |  .19|.22\* | .17|-.03 | .04|-.23\* |  |
| 7. Time off-treatment |  -|18.94 | - |  -|14.45 | - |  -|-.07 |  -|.13 |  -|.10 |  -|.05 |  -|-.06 |  -|.61\*\* |
|  | *Note.* \* *p* < .05. \*\* *p* < .01. \*\*\* *p* < .001. |  |

**Table 3**

Differences between the two clinical groups (on-treatment and off-treatment) regarding hope, anxiety and HRQoL in children/adolescents with cancer

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variables | Value | *F* | *df* | *p* | Partial Eta Squared |
| 1. Hope | .06 | .09 | 1 | .767 | .000 |
| 2. Anxiety | .01 | .24 | 1 | .624 | 001 |
| 3. HRQoL  | 5.54 | 15.31 | 1 | .000\* | .068 |
|  | *Note.* \* Statistically significant difference:*p* < .001. |  |

**Table 4**

|  |  |  |
| --- | --- | --- |
|  | Dependent Variable: HRQoL |  |
| Step and predictor variable | *B* | *SE B* | Std. β | *R2* | *R2* adjusted |  |
| Step 1 |  |  |  | .22 | .22 |  |
| Constant | 4.24 | .04 |  |  |  |
| Anxiety | -1.48 | .20 | -.47\*\*\* |  |  |
| Step 2 |  |  |  | .28 | .27 |  |
|  Constant | 4.38 | .05 |  |  |  |
|  Anxiety | -1.45 | .19 | -.46\*\*\* |  |  |
|  Clinical Group | -.31 | .07 | -.25\*\*\* |  |  |
| Step 3 |  |  |  | .30 | .29 |  |
|  Constant | 4.38 | .05 |  |  |  |
| Anxiety | -1.04 | .25 | -.33\*\*\* |  |  |
| Clinical Group | -.31 | .07 | -.25\*\*\* |  |  |
| Anxiety X Clinical Group | -.88 | .37 | -.19\* |  |  |

Hierarchical Multiple Regression predicting HRQoL from Anxiety and Clinical Group (on-treatment *vs.* off-treatment)

*Note.* \* *p* < .05. \*\* *p* < .01. \*\*\* *p* < .001.

**Figure 1.** The moderating effect of clinical group (on-treatment and off-treatment) on the link between anxiety and HRQoL.

*Note.* The values on the extremes of each slope represent ranges of HRQoL for each clinical group.

\*\*\* *p* < .001.

Hope

HRQoL

Anxiety

**-.08\*\*\***

**.21\*\*\* (.10\*)**

**-1.35\*\*\***

*.10*

**Figure 2.** Model representing the mediating effect of anxiety on the link between hope and HRQoL.

*Note*. The independent variable’s direct effect on the dependent variable after controlling for the mediator is represented by the value inside parentheses. Bold non-italic figures represent unstandardized coefficients for direct paths; the italic figure represents unstandardized coefficient for the indirect path.

\**p* < .05. \*\*\**p* < .001.; the indirect effect was significant at 95% CI [.06/16].