

The mediating roles of cancer-related rumination in the relationship between dispositional hope and psychological outcomes among childhood cancer survivors

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Abstract

Objective: This study aimed to examine the effects of dispositional hope on psychopathology as well as self-perceived positive change in childhood cancer survivors through the potential mediation of cancer-related ruminations.

Methods: A cross-sectional design was used, and a group of childhood cancer survivors ($N=89$; mean age=23.2 years; age range=17.2–31.3 years) were studied. Dispositional hope level was measured by the Hope Scale; positive and negative cancer-related ruminations were assessed by the Chinese Cancer-related Rumination Scale; depression symptoms were measured by Beck Depression Inventory; and anxiety symptoms were measured by Beck Anxiety Inventory. Positive adjustment outcome of posttraumatic growth (PTG) was assessed by the Chinese Post-traumatic Growth Inventory. Multiple regressions were used to analyze the relationship between dispositional hope and the outcome variables of PTG, anxiety and depression and the potential mediators of positive and negative cancer-related rumination.

Results: Dispositional hope was positively related to PTG, and the correlation was specifically mediated by positive cancer-related rumination. Dispositional hope also correlated with lower levels of depression and anxiety, specifically mediated by negative cancer-related rumination.

Conclusion: The present finding supported hope as a significant positive factor for childhood cancer survivors, which was associated with PTG and better psychological adjustment. The findings may inform development of therapeutic intervention programs aimed at increasing childhood cancer patients' hope levels, which may be correlated with more positive cancer-related thoughts and better adjustment. The present study, which examined survivors diagnosed at young age, may enrich existing studies on the effect of onset age and adjustment outcomes.

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Received: 22 May 2013

Revised: 15 September 2013

Accepted: 18 September 2013

Aftermath of childhood cancer

Diagnosis and treatment of childhood cancer might put survivors at risk for psychological distress and poorer quality of life [1]. An estimated 5–20% of survivors had moderate-to-severe posttraumatic stress symptoms including depression and anxiety [2,3]. Previous studies tended to identify survivors' demographic and treatment characteristics as risk factors. For example, survivors diagnosed at younger age [4], engaged in research studies at an older age [5], received cranial irradiation [6,7] or experienced relapse episodes or physical limitations [8] were more prone to psychological distress.

Some other studies on long-term psychological outcomes of childhood cancer survivors, however, have shown that most survivors do not indicate elevated psychological distress [9,10]. There are even studies reporting positive psychological changes including thriving [11], benefit finding [12,13] or posttraumatic growth (PTG) [14]. PTG is the

phenomenon of subjective appraisal of growth after facing a high-impact life challenge [15]. Previous studies on PTG among childhood cancer survivors found correlations between PTG and demographic and treatment characteristics [16,17]. PTG also correlated negatively with mood symptoms and positively with quality of life, optimism [18] and illness-specific appraisals [17]. However, few studies investigate the underlying cognitive processing mechanism associated with PTG among pediatric cancer survivors. The current study attempts to fill this gap by investigating how psychological rumination and cognitive theory of dispositional hope affect PTG. A review of both of the aforementioned factors is provided in the following text.

Rumination and cancer adjustments

Psychological rumination is defined as 'repetitively thinking that is not necessarily intrusive and that includes reminiscing, problem solving and trying to make sense'

of a distressful event [19,20]. Calhoun and Tedeschi argue that rumination is a kind of cognitive engagement to think of how one's struggles against distressful events lead to positive changes [20]. They construe two kinds of rumination: one with a repetitive and intrusive nature and the other is a deliberate attempt of sense making. Intrusive rumination correlates with negative emotions [21], whereas deliberate rumination correlates with PTG [22]. Deliberate rumination allows an individual to persistently think about the trauma to form new adaptive schema.

Empirical studies have shown deliberate and intrusive rumination related with positive and negative trauma adjustment outcomes, respectively. Deliberate focuses on event-related rumination and on the event's positive content, which were related to PTG [22–24]. Reflective rumination, defined as purposeful inward turning thoughts on how to solve problems [25], is conceptually similar to Calhoun and Tedeschi's deliberate rumination. Reflective rumination was found to predict PTG among trauma survivors including those with cancers [26]. Repetitive thinking on negative cancer-related content, for example, cancer recurrence, correlated with psychological distress among adult hematological cancer patients [27]. A breast cancer study supported that negative cancer-related rumination correlated with negative adjustment outcomes, whereas positive cancer-related rumination correlated with PTG [28].

Dispositional hope, rumination and cancer adjustments

Snyder's dispositional hope (referred interchangeably as hope in the following text) defined as 'cross situational enduring patterns of goal-directed thinking' [29] was found to be positively associated with PTG and inversely related with negative adjustment among adult cancer patients [30–32]. Snyder [33,34] conceptualizes hope as a result of a reciprocally derived sense of successful *agency* (goal-directed determination or will power) and *pathways* (planning of ways to meet goals or waypower) in the pursuit of *goals*. Agency is the motivation and determination in achieving goals. Pathways refer to one's ability to generate methods and plans to achieve goals.

Snyder explains the protective mechanism of hope by postulating that low-hope people engage in more negative rumination on goal blockages and possess more negative emotion when facing goal impediment [35,36]. Negative rumination acts as a mediator between hope and negative emotion – low-hope individuals tend to exhibit more negative rumination during goal pursuit leading to more negative emotion. Snyder *et al.* suggested that low-hope people adjusted poorly because they were more likely to spend time ruminating and worrying [35,37] and exacerbating negative self-talk [37,38].

Nonetheless, few empirical supports are available in verifying the aforementioned mechanism apart from the theoretical proposition that high-hope people possess more pathways [39,40] and embrace agency thinking [38,40]. Indirect support from laboratory experiments has shown that low-hope people are more likely to experience negative emotion when facing goal impediments [41]. Previously, Michael and Snyder [42] attempted to build a model on hope, rumination and psychological adjustment among bereaved individuals. The study, which defined rumination solely in negative terms as repetitive worries, managed to find association between hope and positive adjustment but not between hope and rumination.

Despite lack of empirical support on Snyder's aforementioned postulation, ample studies still suggest that hope correlates with positive adjustment. Hope predicted stronger perceived health and vigor among breast cancer patient [30], higher PTG and lower anxiety and depression within oral cavity cancer patients [31,32] and lower anxiety and depression symptoms in patients undergoing genetic colon cancer screening [43]. Dispositionally high-hope college women were more knowledgeable about cancer and reported more hope-related coping responses when shared variances due to academic achievement, cancer experience and affectivity were removed [44]. Hope was also associated with positive adjustment among non-cancer pediatric populations including children diagnosed with asthma [45], receiving renal and liver transplant [46], diagnosed with type I diabetes [47] and suffered from sickle cell disease [48]. Nonetheless, hope has not been specifically examined among childhood cancer survivors. One pediatric oncology study showed that children diagnosed with cancer who appraised great threat to self and others in medically related events reported less hope [49]. There is a need to examine the role of dispositional hope among childhood cancer survivors.

The present study

Informed by previous findings on diverse psychological outcomes found in childhood cancer patients and survivors, the present study attempts to examine both childhood cancer survivors' positive outcome of PTG and negative outcomes indicated in mood symptoms. In addition, it aims at testing whether hope correlates positively with PTG and negatively with mood symptoms. Finally, the study attempts to examine empirically on Snyder's postulation on hope and rumination by expanding the definition of rumination from repetitive worries to Calhoun and Tedeschi's broader definition of cognitive engagement on both positive and negative cancer-related valence. Positive cancer-related rumination is hypothesized to mediate the relationship between hope and

PTG, whereas negative cancer-related rumination mediates the effect of hope on mood symptoms (Figure 1). To further examine whether the association between negative rumination and mood symptoms varied within different hope levels, independent correlational studies were conducted within each stratified hope group. One of the strengths of the present study includes recruitment of survivors who are younger in age at diagnosis. Our findings may provide more information for the existing studies looking into the association between onset age and long-term adjustment outcomes.

Method

Participants

Eighty-nine childhood cancer survivors were recruited from the Children's Cancer Foundation (CCF), a registered non-governmental organization helping childhood cancer patients in Hong Kong. CCF consisted of 270 survivor members to date receiving its psychosocial services. Inclusion criteria were as follows: (1) onset of cancer before age 17 years; (2) in remission during recruitment; (3) possessed normal IQ; and (4) able to comprehend and to complete Chinese inventories. All recruited participants who are 18 years and older provided written informed consent. Parents' written consent was obtained from participants younger than 18 years.

Procedures

Psychological tests and a cover letter explaining the study were mailed to 270 CCF members. Through mail, survivors who are 18 years or older were given an informed consent form, whereas those younger than 18 years were given a children's assent form and a parent's informed consent. A total of 123 survivors (initial response rate: 45.6%) returned their questionnaires, but 34 were excluded because of violation of inclusion criteria. Only 89 participants (final response rate: 33%) were analyzed (Figure 2). Ethical approval was obtained from the Hospital Authority Hong Kong West Cluster.

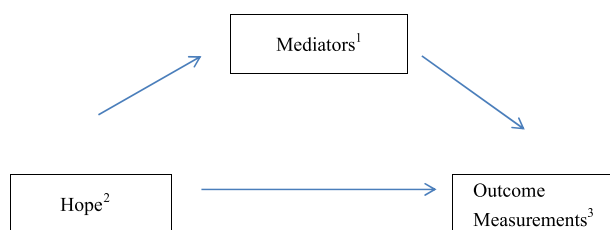


Figure 1. Conceptual figure on the potential mediation. ¹Positive cancer-related rumination (PCRR score) and negative cancer-related rumination (NCRR score). ²Hope (total hope score). ³Positive outcomes: posttraumatic growth (PTG score); negative outcomes: depression (BDI score) and anxiety (BAI score)

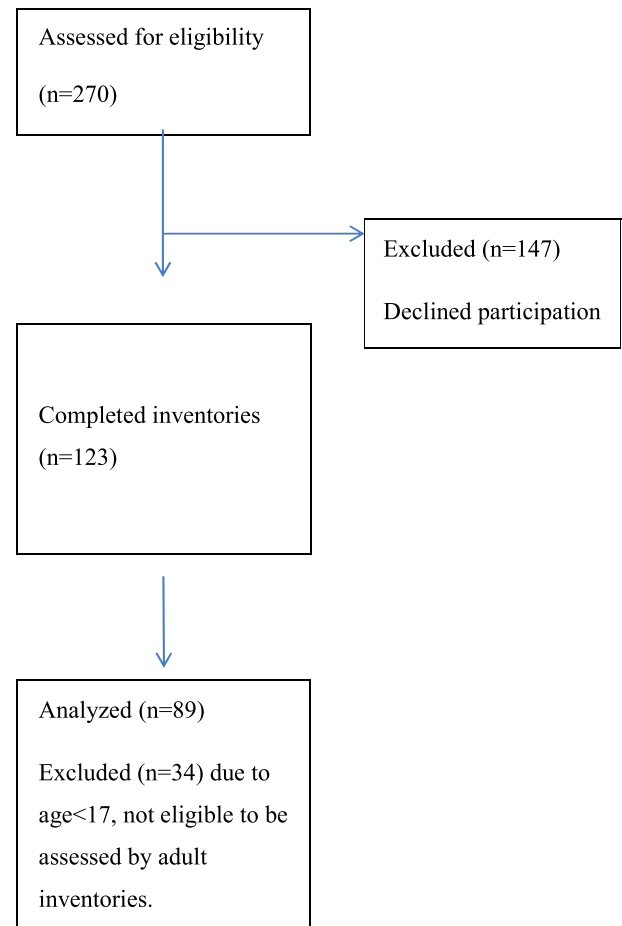


Figure 2. Consortium flow chart

Measures

The Hope Scale

The original Hope Scale (HS) was developed by Snyder [34,50]. The Chinese version was derived from Ho *et al.* [43] consisting of eight items and four filler items. Four items tapped the agency component and another four the pathway component. In HS, each item is rated in an 8-point Likert scale (1 = definitely false to 8 = definitely true). Higher score implies higher dispositional hope level. The present sample showed satisfactory internal reliabilities in full scale HS (full scale, $\alpha = 0.881$).

The Chinese Cancer-related Rumination Scale

The 12-item Chinese Cancer-related Rumination Scale (CCRRS) used in a previous study in Hong Kong was administered [28]. Five items measure negative rumination (e.g. 'Even though I have not deliberately thought about it, I still ruminate about having cancer'), and another five items measure positive rumination (e.g. 'I have thought about how cancer makes me appreciate what I have in life.'). The remaining two items are filler items.

Each item is rated in a 5-point Likert scale (1 = not at all to 5 = a great deal). Two sub-scale scores are obtained: negative cancer-related rumination (NCRR) and positive cancer-related rumination (PCRR). Higher score indicates higher frequency of the related rumination. Internal reliabilities of the present sample were as follows: NCRR, $\alpha = 0.838$ and PCRR, $\alpha = 0.805$.

The Chinese Post-traumatic Growth Inventory

The original English version of the Post-traumatic Growth Inventory was developed by Tedeschi and Calhoun [51], comprising 21 items to measure positive changes brought about by traumatic experience. The Chinese version (CPTGI) was developed [52] with a factor structure designed to measure positive changes among Hong Kong adult cancer survivors. It consists of six filler items and 15 items measuring PTG in four factors: self, interpersonal, spiritual and life orientation. The items are rated in a 6-point Likert scale with 0 = not at all to 5 = extremely. The factorial structure of the CPTGI was validated by cancer patients in Taiwan [53]. Only the total score of the CPTGI (Cronbach's $\alpha = 0.905$ according to the present sample) was used in the present study. A diverse range of internal reliabilities has been reported in the sub-scales with alpha ranging from 0.51 to 0.84 [53], and inclusion of the sub-scale scores might dilute the outcome magnitude as people could have varied magnitude of growth in the sub-scale dimensions.

Beck Depression Inventory

The Beck Depression Inventory (BDI) was developed by Beck [54–56] to measure the prevalence of depressive symptoms. The Chinese version consists of 21 self-reported items, and participants choose one out of four short statements that best describes their cognitive, affective and physiological condition and symptoms over the past 7 days [57]. The present sample showed good internal reliabilities with Cronbach's $\alpha = 0.903$.

Beck Anxiety Inventory

The Beck Anxiety Inventory (BAI) was developed by Beck [58] to tap into anxiety symptoms. The Chinese version [59] consists of 21 self-administered items. Participants have to choose in a 4-point Likert scale (0 = none to 3 = almost always) on each item describing their affective, cognitive and physiological symptoms over the past 7 days. Satisfactory Cronbach's α reliability was found in the present sample ($\alpha = 0.912$).

Data analysis

Independent *T*-tests were conducted to examine differences in the psychological outcomes among demographic and treatment variables. Multiple regression analyses were used

to examine mediation relationships following Baron and Kenny's strategies [60]. Firstly, the predictor (dispositional hope) must significantly correlate with the outcome variables (PTG and depression and anxiety symptoms). Secondly, the predictor must also significantly correlate with the mediators (positive and negative cancer-related rumination). Thirdly, the mediators must be significantly related to the outcome variables. Finally, Sobel test [61] was conducted to examine the relationship between the predictors and the outcome variables. The mediators must account for significant indirect effect in the relationship between the predictors and outcome variables. In order to investigate whether correlation between negative cancer-related rumination and mood symptoms varied with different hope levels, independent correlational analyses were conducted within groups of low-, medium- and high-hope survivors stratified by their total hope scores.

Results

Descriptive statistics

T-test analysis suggested that gender, marital status and education level showed no significant difference in relationship with all psychological variables. No significant difference in total outcome scores was found among participants receiving different treatment protocol types. However, participants receiving radiotherapy had more negative cancer-related rumination ($t(82) = -2.38$, $p < 0.05$.) compared with other treatment groups. Median monthly income in Hong Kong was US\$1538 according to the government 2011 Population Census, and most of the recruited participants had income below the median (Table 1).

Correlations

Pearson correlations were conducted (Table 2). The results showed that hope was negatively correlated with depression ($r = -0.53$, $p < 0.01$) and anxiety ($r = -0.35$, $p < 0.01$) and positively associated with total PTG ($r = 0.57$, $p < 0.01$). Negative cancer-related rumination was positively correlated with depression ($r = 0.38$, $p < 0.01$) and anxiety ($r = 0.33$, $p < 0.01$) but negatively with hope ($r = -0.29$, $p < 0.01$). Negative cancer-related rumination, on the other hand, was not related to PTG ($r = -0.02$, $p > 0.05$). The number of relapses was also correlated with negative cancer-related rumination ($r = 0.23$, $p < 0.05$). Positive rumination, on the contrary, was strongly related with both PTG ($r = 0.56$, $p < 0.01$) and hope ($r = 0.41$, $p < 0.01$).

Mediation role of ruminations

Four regression analyses were performed to test the mediation hypothesis of positive cancer-related rumination in affecting the association between hope and PTG. PTG

Table 1. Demographic and treatment characteristics

	No of participants (n = 89)	%
Gender		
Male	39	43.8
Female	50	56.2
Age (years)		
Mean	23.2	
Standard deviation	3.65	
Range	17.2–31.3	
Onset age (years) ^a		
Mean	8.95	
Standard deviation	4.49	
Range	3.13 months to 16.35 years	
Onset duration (years) ^b		
Mean	14.26	
Standard deviation	5.39	
Range	4.06–26.93	
Relapse history		
No relapse	78	87.6
≥ One relapse	11	12.4
Treatment received ^c		
Chemotherapy	78	87.6
Radiotherapy	43	48.3
Surgery	43	48.3
Bone-marrow transplant	9	12.4
Treatment protocol (n = 70, missing = 19)		
Low-risk	12	17.1
Medium-risk	38	54.3
High-risk	20	28.6
Education level (n = 82, missing = 7)		
Junior high school	5	6.1
Senior high school	33	40.2
Diploma or associate degree	25	30.5
University degree	19	23.2
Marital status (n = 82, missing = 7)		
Single	80	97.6
Married	2	2.4
Monthly income (n = 82, missing = 7)		
Students	35	42.7
Unemployed	6	7.3
US\$1280 and below	23	28
US\$1280–2560	14	17.1
US\$2560–3840	3	3.7
US\$3840 and above	1	1.2

^aOnset age referred to the age of the survivor when first diagnosed with cancer.

^bOnset duration referred to the time between the survivor was first diagnosed with cancer and completion of the measurement in the present study.

^cEach participant may receive more than one type of treatment; thus, a total of $n > 89$ under Treatment received.

was first regressed on hope with a significant association found ($\beta = 0.57$, $SE = 0.13$, $t = 6.44$, $p < 0.001$). A second regression was performed showing that hope was significantly associated with positive cancer-related rumination ($\beta = 0.41$, $SE = 0.05$, $t = 4.12$, $p < 0.001$). PTG was regressed on positive cancer-related rumination and hope in the third and fourth regression analyses. A significant association was established between PTG and positive cancer-related rumination ($\beta = 0.56$, $SE = 0.27$, $t = 6.10$, $p < 0.001$). When the effect of positive cancer-related rumination was controlled, hope remained significantly

related with PTG, but the association was weakened. Sobel test [61] was conducted to test the standard error of indirect effect, which showed that positive cancer-related rumination was a significant partial mediator between hope and PTG ($z = 3.39$, $p < 0.001$). The relationship between hope and PTG decreased in strength but remained significant ($\beta = 0.47$, $SE = 0.12$, $p < 0.001$).

BAI and BDI scores were regressed independently on hope with hope inversely predicting BAI ($\beta = -0.35$, $SE = 0.09$, $t = -3.45$, $p < 0.01$) and BDI ($\beta = -0.53$, $SE = 0.08$, $t = -5.75$, $p < 0.001$). The hypothesized mediator of negative cancer-related rumination was regressed on hope with hope predicting negative cancer-related rumination ($\beta = -0.29$, $SE = 0.05$, $t = -2.76$, $p < 0.01$). BAI and BDI were regressed separately on negative cancer-related rumination. Negative cancer-related rumination was found to predict both BAI ($\beta = 0.33$, $SE = 0.22$, $t = 3.20$, $p < 0.01$) and BDI ($\beta = 0.38$, $SE = 0.21$, $t = 3.67$, $p < 0.001$). Sobel test suggested negative rumination was a significant mediator between hope and anxiety ($z = -2.10$, $p < 0.01$) and between hope and depression ($z = -2.22$, $p = 0.05$). However, the mediator showed stronger indirect effect on BDI than BAI. The relationship between hope and BAI only changed mildly with the presence of mediator but remained significant ($\beta = -0.34$, $SE = 0.10$, $t = -3.33$, $p < 0.01$). Low hope decreased in strength but remained significant in predicting BDI when the indirect effect of negative rumination was partial out ($\beta = -0.47$, $SE = 0.09$, $t = -4.94$, $p < 0.001$).

Negative rumination and mood symptomatology within different hope levels

Correlational analyses were conducted to investigate the association between negative cancer-related rumination and mood symptoms among different hope level groups. Participants who completed the CCRS ($N = 84$) were divided into three groups on the basis of hope score (HS). The first 33.3% was designated to low-hope group (HS range: 12.9–40.9, $N = 28$), above 33.3% and up to 66.6% to medium-hope group (HS range: above 40.9–47.9, $N = 27$) and above 66.6% to high-hope group (HS range: above 47.9–60.99, $N = 29$). Correlational analyses were conducted independently within each group. Negative cancer-related rumination was significantly correlated with BAI ($r = 0.47$, $p < 0.05$) and BDI ($r = 0.55$, $p < 0.01$) in low-hope group but not in high-hope group (BAI: $r = 0.06$, $p = 0.755$; BDI: $r = 0.03$, $p = 0.877$) and medium group (BAI: $r = 0.27$, $p = 0.176$; BDI: $r = 0.35$, $p = 0.073$).

Discussion

Our findings supported the hypothesis that high-hope survivors were likely to have higher PTG and fewer mood symptoms. Our finding also provided empirical support

Table 2. Correlations, means and standard deviations among psychological variables

	1	2	3	4	5	6	7	8
1. BAI	—							
2. BDI	0.65**	—						
3. CPTGI total	-0.11	-0.18	—					
4. HS agency	-0.36**	-0.54**	0.56**	—				
5. HS pathways	-0.30**	-0.45**	0.52**	0.78**	—			
6. HS total	-0.35**	-0.53**	0.57**	0.95**	0.94**	—		
7. NCR	0.33**	0.38**	-0.02	-0.29**	-0.26*	-0.29**	—	
8. PCRR	0.01	-0.05	0.56**	0.43**	0.35**	0.41**	0.34	—
Mean	8.07	8.39	41.28	22.01	22.71	44.72	9.29	11.12
Standard deviation	8.18	8.03	13.45	4.85	4.84	9.15	3.99	4.11

BAI, Beck Anxiety Inventory; BDI, Beck Depression Inventory; CPTGI Total, Chinese Post-traumatic Growth Inventory; HS Total, Hope Scale; HS agency, Hope Scale agency sub-scale, HS pathways, Hope Scale pathways sub-scale NCR, The Chinese Cancer-related Rumination Scale (negative rumination sub-scale); PCRR, The Chinese Cancer-related Rumination Scale (positive rumination sub-scale).

* $p < .05$.

** $p < .01$.

*** $p < .001$.

for Snyder's proposition that low-hope individuals adjusted poorly because of their likelihood to have negative rumination [35,37,62]. By employing a broader definition of rumination including both positive and negative repetitive thoughts, our study provided possible explanation on why higher hope people were likely to adjust better psychologically as they were more likely to engage in positive cancer-related thoughts and such positive rumination associated with more self-perceived positive outcomes (PTG).

Our findings also suggested differential effects of negative and positive cancer-related rumination on psychological outcomes. Positive cancer-related rumination correlated with PTG but not with mood symptoms. Negative cancer-related rumination correlated with anxiety and depression but not with PTG. PTG and psychopathology outcomes were not related to each other. Taken together, the aforementioned results suggested that PTG and psychopathology are two independent constructs governed by different mechanisms. A recent study showing that optimistic explanatory style was related to PTG but not psychopathology, whereas pessimistic explanatory style was correlated with psychopathology but not PTG provided indirect support to our findings [24]. Hence, intervention to reduce negative cancer-related rumination may reduce psychopathology but not increase PTG. Facilitating positive cancer-related rumination may not be effective to reduce anxiety and depression [63,64]. However, an increase in hope may be associated with an increase in PTG and reduction in mood symptoms.

Some limitations must be mentioned. Majority of our sample did not manifest depression or anxiety disorders (BDI: normal (69.7%), mild (17.9%), moderate-to-severe (12.4%); BAI: normal (69.7%), mild-moderate (19.1%), moderate-severe (10.1%), severe (1.1%)). Future study can focus on the clinical sample. Another limitation involved the use of CCRS. Although previous study on breast cancer patients [28] and the present study yielded

satisfactory reliabilities on CCRS, the tool still needed further validation. Besides, cross-sectional design and correlational analyses cannot permit a causal inference. Depressive symptoms such as loss of interest and poor concentration (DSM-5) may also resemble diminished agency and pathway thinking in hope. Future longitudinal studies are warranted to establish causal interpretation.

Large disparity in onset age range might have confounded the outcomes although our findings did not show any correlation between onset age and outcome variables. Moreover, participants diagnosed at young age were likely to learn about their acute cancer treatment from significant others. Previous researchers[16] studying survivors with early onset age proposed that their studies might be tapping survivors' 'event centrality' or how much the cancer experience had become part of survivors' sense of self and worldview rather than solely assessing memories or changes attributable to cancer. Similar theoretical stance was taken in our measurements, which examined participants' present positive and negative cancer-related thoughts. Onset age might be an important factor in affecting psychological outcomes, but many studies on onset age were not specifically targeting young childhood cancer survivors [65,66]. Our investigation involving survivors diagnosed at young age might enrich existing literature.

Finally, the long period of recovery of some participants might cause their present responses to be affected by other life events besides childhood cancer experience. Future studies need to control the impact of the aforementioned confounding variables.

Clinical implication

Our finding suggested hope correlated with lower mood symptoms and higher PTG among childhood cancer survivors. Previous hope-based intervention programs have shown efficacy in reducing anxiety among adults

susceptible to colorectal cancer [67] and in lowering depression among elderly [68]. However, there remains no therapeutic intervention program that aims at increasing childhood cancer patients' and survivors' hope level. Snyder posits that hopeful cognition can be learned through hope-based story-telling among children [69]. Thus, the use of hope-based storybook for childhood cancer

patients and survivors may provide an effective intervention.

Acknowledgement

We would like to acknowledge Children's Cancer Foundation (Hong Kong) for supporting this project.

References

- Zeltzer LK, Recklitis C, Buchbinder D et al. Psychological status in childhood cancer survivors a report from the Childhood Cancer Survivor Study. *J Clin Oncol* 2009;**27**:2396–2404.
- Erickson SJ, Steiner H. Trauma and personality correlates in long term pediatric cancer survivors. *Child Psychiatry Hum Dev* 2001;**31**:195–213.
- Kazak AE, Barakat LP, Alderfer M et al. Posttraumatic stress in survivors of childhood cancer and mothers: development and validation of the Impact of Traumatic Stressors Interview Schedule (ITSIS). *J Clin Psychol Med Settings* 2001;**8**:307–323.
- Glover DA, Byrne J, Mills JL et al. Impact of CNS treatment on mood in adult survivors of childhood leukemia a report from the Children's Cancer Group. *J Clin Oncol* 2003;**21**:4395–4401.
- Michel G, Rebholz CE, Nicolas X et al. Psychological distress in adult survivors of childhood cancer: the Swiss Childhood Cancer Survivor study. *J Clin Oncol* 2010;**28**:1740–1748.
- Hill JM, Kornblith AB, Jones D et al. A comparative study of the long term psychosocial functioning of childhood acute lymphoblastic leukemia survivors treated by intrathecal methotrexate with or without cranial radiation. *Cancer* 1998;**82**:208–218.
- Recklitis C, O'Leary T, Diller L. Utility of routine psychological screening in the childhood cancer survivor clinic. *J Clin Oncol* 2003;**21**:787–792.
- Elkin TD, Phipps S, Mulhern RK, Fairclough D. Psychological functioning of adolescent and young adult survivors of pediatric malignancy. *Med Pediatr Oncol* 1997;**29**:582–588.
- Zebrack BJ, Zeltzer LK, Whitton J et al. Psychological outcomes in long-term survivors of childhood leukemia, Hodgkin's disease, and non-Hodgkin's lymphoma a report from the Childhood Cancer Survivor Study. *Pediatrics* 2002;**110**:42–52.
- Zebrack BJ, Zeltzer LK. Quality of life issues and cancer survivorship. *Curr Probl Cancer* 2003;**27**:198–211.
- Parry C, Chesler MA. Thematic evidence of psychosocial thriving in childhood cancer survivors. *Qual Health Res* 2005;**15**:1055–1073.
- Fritz GK, Williams JR, Amylon JR. After treatment ends: psychosocial sequelae in pediatric cancer survivors. *Am J Orthopsychiatry* 1988;**58**:552–561.
- Wasserman AL, Thompson EL, Williams JA, Fairclough DL. The psychological status of childhood/adolescent Hodgkin's disease. *Am J Dis Child* 1987;**141**:626–631.
- Jörmgårdén A, Mattsson E, von Essen L. Health-related quality of life, anxiety and depression among adolescents and young adults with cancer a prospective longitudinal study. *European J Cancer* 2007;**43**:1952–1958.
- Tedeschi RG, Calhoun LG. *Trauma & Transformation: Growing in the Aftermath of Suffering*. Sage Publications, Inc, 1995.
- Zebrack BJ, Stuber ML, Meeske KA et al. Perceived positive impact of cancer among long-term survivors of childhood cancer a report from the childhood cancer survivor study. *Psycho-Oncology* 2012;**21**:630–639.
- Barakat LP, Alderfer MA, Kazak AE. Posttraumatic growth in adolescent survivors of cancer and their mothers and fathers. *J Pediatr Psychol* 2006;**31**:413–419.
- Arpawong TE, Oland A, Milam JE et al. Posttraumatic growth among an ethnically diverse sample of adolescent and young adult cancer survivors. *Psycho-Oncology* 2013; doi: 10.1002/pon.3286. [Epub ahead of print]
- Martin LL, Tesser A. Clarifying our thoughts. In: Wyer RS, ed. *Ruminative Thoughts: Advances in Social Cognition*. Mahwah, NJ: Lawrence Erlbaum Associates 1996:189–209.
- Calhoun LG, Tedeschi RG. *Handbook of Posttraumatic Growth: Research and Practice*. Lawrence Erlbaum Associates Publishers 2006.
- Nolen-Hoeksema S, Parker LE, Larson J. Ruminative coping with depressed mood following loss. *J Pers Soc Psychol* 1994;**67**:92–104.
- Bower JE, Kemeny ME, Taylor SE, Fahey JL. Cognitive processing, discovery of meaning, CD4 decline, and AIDS-related mortality among bereaved HIV-seropositive men. *J Consult Clin Psychol* 1998;**66**:979–986.
- Calhoun LG, Cann A, Tedeschi RG, McMillan J. A correlational test of the relationship between posttraumatic growth, religion, and cognitive processing. *J Trauma Stress* 2000;**13**:521–527.
- Taku K, Calhoun LG, Cann A, Tedeschi RG. The role of rumination in the coexistence of distress and posttraumatic growth among bereaved Japanese university students. *Death Stud* 2008;**32**:428–444.
- Treynor W, Gonzalez R, Nolen-Hoeksema S. Rumination reconsidered: a psychometric analysis. *Cognit Ther and Res* 2003;**27**:247–259.
- Stockton H, Hunt N, Joseph S. Cognitive processing, rumination and posttraumatic growth. *J Trauma Stress* 2011;**24**:85–92.
- Black EK, White CA. Fear of recurrence, sense of coherence and posttraumatic stress disorder in haematological cancer survivors. *Psycho-Oncology* 2005;**14**:510–515.
- Chan MWC, Ho SMY, Tedeschi RG, Leung CWL. The valence of attentional bias and cancer-related rumination in posttraumatic stress and posttraumatic growth among women with breast cancer. *Psycho-Oncology* 2011;**20**:544–552.
- Snyder CR, McDermott D, Cook W, Rapoff MA. *Hope for the Journey: Helping Children Through Good Times and Bad*. Boulder, CO: Westview 1997.
- Stanton AL, Danoff-Burg S, Cameron CL et al. Emotionally expressive coping predicts psychological and physical adjustment to breast cancer. *J Consult Clin Psychol* 2000;**68**:875–882.
- Ho SMY, Rajandram RK, Chan N et al. The roles of hope and optimism on posttraumatic growth in oral cavity cancer patients. *Oral Oncol* 2011;**47**:121–124.
- Rajandram RK, Ho SM, Samman N et al. Interaction of hope and optimism with anxiety and depression in a specific group of cancer survivors a preliminary study. *BMC Res Notes* 2011;**4**:519.
- Snyder CR, ed. *Handbook of Hope: Theory, Measures and Applications*. San Diego, CA: Academic Press 2000.
- Snyder CR, Harris C, Anderson JR et al. The will and the ways: development and validation of an individual-differences measure of hope. *J Pers Soc Psychol* 1991;**60**:570–585.
- Snyder CR. Hope, goal blocking thoughts, and test-related anxieties. *Psychol Rep* 1999;**84**:206–208.
- Snyder CR. Hypothesis: there is hope. In: Snyder CR, ed. *Handbook of Hope: Theory, Measures and Applications*. San Diego, CA: Academic 2000:3–21.
- Snyder CR, Feldman DB, Taylor JD et al. The roles of hopeful thinking in preventing problems and enhancing strengths. *Appl Prev Psychol* 2000;**9**:249–269.
- Snyder CR, La Pointe AB, Crowson JJ, Early S. Preferences of high- and low-hope people for self-referential input. *Cogn Emot* 1998;**12**:807–823.
- Irving LM, Snyder CR, Crowson JJ. Hope and the negotiation of cancer facts by college women. *J Pers* 1998;**66**:195–214.

40. Snyder CR. Hope theory: rainbows in the mind. *Psychol Inq* 2002;**13**:249–275.
41. Snyder CR, Symptom SC, Ybasco FC *et al*. Development and validation of the State Hope Scale. *J Pers Soc Psychol* 1996;**70**:321.
42. Michael ST, Snyder CR. Getting unstuck: the roles of hope, finding meaning, and rumination in the adjustment to bereavement among college students. *Death Stud* 2005;**29**:435–458.
43. Ho SMY, Ho JWC, Bonanno GA *et al*. Hopefulness predicts resilience after hereditary colorectal cancer genetic testing a prospective outcome trajectories study. *BMC Cancer* 2010;**10**:279.
44. Irving LM, Snyder C, Crowson Jr JJ. Hope and coping with cancer by college women. *J Pers* 1998;**66**:195–214.
45. Berg CJ, Rapoff MA, Snyder C, Belmont JM. The relationship of children's hope to pediatric asthma treatment adherence. *J Posit Psychol* 2007;**2**:176–184.
46. Maikranz JM, Steele RG, Dreyer ML *et al*. The relationship of hope and illness-related uncertainty to emotional adjustment and adherence among pediatric renal and liver transplant recipients. *J Pediatr Psychol* 2007;**32**:571–581.
47. Lloyd SM, Cantell M, Pacaud D *et al*. Brief report: hope, perceived maternal empathy, medical regimen adherence, and glycemic control in adolescents with type I diabetes. *J Pediatr Psychol* 2009;**34**:1025–1029.
48. Lewis HA, Kliever W. Hope, coping, and adjustment among children with sickle cell disease: tests of mediator and moderator models. *J Pediatr Psychol* 1996;**21**:25–41.
49. Fearnow-Kennedy M, Kliever W. Threat appraisal and adjustment among children with cancer. *J Psychosocial Oncology* 2000;**18**:1–17.
50. Snyder CR, Hoza B, Pelham WE *et al*. The development and validation of the Children's Hope Scale. *J Pediatr Psychol* 1997;**22**:399–421.
51. Tedeschi RG, Calhoun LG. The posttraumatic growth inventory: measuring the positive legacy of trauma. *J Trauma Stress* 1996;**9**:455–471.
52. Ho SMY, Chan CLW, Ho RTH. Posttraumatic growth in Chinese cancer survivors. *Psycho-Oncology* 2004;**13**:377–389.
53. Ho SMY, Law LSC, Wang GL *et al*. Psychometric analysis of the Chinese version of the Posttraumatic Growth Inventory with cancer patients in Hong Kong and Taiwan. *Psycho-Oncology* 2013;**22**:715–719.
54. Beck AT, Steer RA, Garbin MG. Psychometric property of Beck Depression Inventory: 25 years of evaluation. *Clin Psychol Rev* 1988;**8**:77–100.
55. Beck AT, Steer RA, Brown GK. Manual for the Beck depression inventory-II. San Antonio, TX: Psychological Corporation 1996; **1**: 82.
56. Beck AT, Steer RA. *Beck Depression Inventory Manual*. Psychological Corporation: San Antonio, 1993.
57. Chan CM, Tsoi MM. The BDI and stimulus determinants of cognitive-related depression among Chinese college students. *Cognit Ther and Res* 1984;**8**:501–508.
58. Beck AT, Epstein N, Brown G, Steer RA. An inventory for measuring clinical anxiety: psychometric properties. *J Consult Clin Psychol* 1988;**56**:893–897.
59. Cheng KW, Wong CW, Wong KC *et al*. A study of psychometric properties, normative scores and factor structure of Beck Anxiety Inventory Chinese version. *Chinese J Clin Psychol* 2002;**10**:4–6.
60. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 1986;**51**:1173–1182.
61. Sobel ME. Asymptotic confidence intervals for indirect effects in structural equation models. . In: Leinhardt S, ed. *Sociological Methodology 1982*. Jossey-Bass: San Francisco 1982: 290–312.
62. Snyder CR, LaPointe AB, Jeffrey Crowson J, Early S. Preferences of high-and low-hope people for self-referential input. *Cogn Emot* 1998;**12**:807–823.
63. Baert S, De Raedt R, Schacht R, Koster EH. Attentional bias training in depression: therapeutic effects depend on depression severity. *J Behav Ther Exp Psychiatry* 2010;**41**:265–274.
64. MacLeod AK, Tata P, Kentish J, Jacobsen H. Retrospective and prospective cognitions in anxiety and depression. *Cogn Emot* 1997;**11**:467–479.
65. Schroevers MJ, Ranchor AV, Sanderman R. The role of age at the onset of cancer in relation to survivors' long-term adjustment: a controlled comparison over an eight-year period. *Psycho-Oncology* 2004;**13**:740–752.
66. Woodward E, Jessop M, Glaser A, Stark D. Late effects in survivors of teenage and young adult cancer: does age matter? *Ann Oncol* 2011;**22**:2561–2568.
67. Ho SMY, Ho JWC, Pau BKY *et al*. Hope-based intervention for individuals susceptible to colorectal cancer a pilot study. *Fam Cancer* 2012;**11**:545–551.
68. Klausner EJ, Snyder C, Cheavens J. A hope-based group treatment for depressed older adult outpatients. *Physical Illness and Depression in Older Adults*. Springer 2002:295–310.
69. Snyder CR. *Hope for the Journey: Helping Children Through Good Times and Bad*. Percheron Press: N.Y., 2002.