EUROPEAN JOURNAL OF CANCER 46 (2010) 1062–1068

available at www.sciencedirect.com

ScienceDirect

journal homepage: www.ejconline.com

Aspects of quality of life, anxiety, and depression among persons diagnosed with cancer during adolescence: A long-term follow-up study

Gunnel Larsson *, *Elisabet Mattsson, Louise von Essen*

Psychosocial Oncology and Supportive Care, Department of Public Health and Caring Sciences, Uppsala University, Sweden

ARTICLE INFO

Article history:
Received 30 June 2009
Received in revised form 4 December 2009
Accepted 15 January 2010
Available online 26 February 2010

Keywords:
Adolescents
Cancer
HADS
Long term
SF-36

ABSTRACT

Aim: Quality of life, anxiety, and depression among persons diagnosed with cancer during adolescence up to 4 years after diagnosis, and in comparison with a reference group were investigated.

Methods: The cancer group ($N = 61$) completed the SF-36 mental health and vitality and the HADS anxiety and depression subscales shortly after and at 6, 12, 18, 24, 36 and 48 months after diagnosis. A reference group ($N = 300$) randomly drawn by Statistics Sweden from their civil register of the Swedish population completed the same instruments at one assessment. Data were collected by telephone interviews.

Results: Up to 6 months after diagnosis the cancer group reports lower levels of mental health and vitality and a higher level of depression than the reference group. At 18 months after diagnosis a reverse situation occurs and at 48 months after diagnosis the cancer group reports a higher level of vitality and lower levels of anxiety and depression than the reference group.

Conclusion: The findings suggest that a positive psychological change may develop in the aftermath of cancer during adolescence. However, efforts should be made to enable clinicians and nursing staff to identify and to provide psychological support to individuals who experience low quality of life and high emotional distress. If these problems remain undetected and appropriate support is not provided the distress may become a barrier to physical recovery, resulting in a vicious cycle of physical and mental disability.

1. Introduction

Cancer during adolescence is uncommon but when it occurs a number of challenges follow. Due to advances in treatment there have been remarkable improvements regarding the survival of persons diagnosed with cancer during adolescence,[1–3] and attention has increasingly been directed towards survivors' quality of life and psychosocial function.

Reviews concerning quality of life and psychosocial function of survivors of childhood and adolescent cancer comment upon the difficulty of drawing conclusions due to, e.g. heterogeneity of designs, lack of standardised methods, small sample sizes, a shortage of appropriate comparison groups, a lack of longitudinal research, attrition[2,4,5] and a tendency to not differentiate between childhood and adolescent cancer.[7] Adolescence is a period characterised by change, and facing cancer during this time may be particularly challenging.[7–9]

---

* *Corresponding author:* Department of Public Health and Caring Sciences, Psychosocial Oncology and Supportive Care, Uppsala University, Box 564, S-751 85 Uppsala, Sweden. Tel.: +46 18 471 3508; fax: +46 18 471 34 90.

E-mail address: gunnel.larsson@medsci.uu.se (G. Larsson).

0959-8049/$ - see front matter © 2010 Published by Elsevier Ltd.
doi:10.1016/j.ejca.2010.01.021

Most findings do not demonstrate any difference between persons diagnosed with cancer during adolescence and control groups with regard to quality of life and psychosocial function.[2,4,8,10,11] However, some results show that persons diagnosed with cancer during adolescence report a better psychosocial function than control groups[12–14] whereas others point in the opposite direction.[2,15]

In a previous study[17] we reported aspects of quality of life, anxiety, and depression among persons struck by cancer during adolescence up to 18 months after diagnosis. The result demonstrates that the group report better vitality and less anxiety and depression than a reference group 18 months after diagnosis. The primary aim of this study is to investigate aspects of quality of life, anxiety, and depression for the same group and an additional group struck with a recurrence of cancer during adolescence up to 4 years after diagnosis. Taking age and gender into consideration it will be investigated whether, and if so, how aspects of quality of life, anxiety, and depression differ between this group and a reference group shortly after diagnosis (T1) and at 6 (T2), 12 (T3), 18 (T4), 24 (T5), 36 (T6) and 48 (T7) months after diagnosis. A secondary aim is to investigate whether those in the cancer group who participated at T1 and T7 differ from those who did not participate at T7 with regard to aspects of quality of life, anxiety and depression at T1.

2. Materials and methods

2.1. *Participants and procedures*

The study is based on a longitudinal design and is part of an ongoing project entitled: Cancer during adolescence: psychosocial and health economic consequences. The design covers seven assessments, the first four with approximately 6 months intervals and the last three with a 1 year interval. Assessments were chosen according to time since diagnosis and not according to diagnosis and/or treatment.

2.1.1. *Cancer group*

Persons diagnosed with cancer or a recurrence of cancer during adolescence (13–19 years of age) were included between 1999 and 2003, at three of the six Swedish paediatric oncology centres: Lund, Umeå and Uppsala. Data were collected between 1999 and 2007. To be eligible the person should be Swedish speaking, diagnosed with cancer for the first time or after having been disease-free and off treatment for at least 1 year, treated with chemotherapy, and cognitively, emotionally and physically able to participate. A co-ordinating nurse was responsible for recruitment and assessed, in collaboration with a treating physician, each person's ability to participate.

Ninety persons were diagnosed with cancer for the first time, and 10 with a recurrence of cancer during the period of inclusion. Of these, 11 were not eligible, five were in too poor physical condition, five did not speak Swedish, and one was not included due to administrative failure. Of 89 eligible persons 65 agreed to participate. Four were not included, as two became too ill before the interview at T1, and two were missed due to administrative reasons. Sixty-one persons were included, 56 newly diagnosed and five diagnosed with a recurrence. See Table 1 for a presentation of clinical and demographic characteristics at T1–T7 and reasons for attrition at T2–T7. Thirty-one persons participated at all assessments and thus constitute the group of completers.

2.1.2. *Reference group*

The sample was randomly drawn by Statistics Sweden from their civil register of the Swedish population. The target population included all individuals covered by civil registration 13 and 23 years of age, living in one of the three healthcare re-

Table 1 – Clinical and demographic characteristics for the cancer group at T1–T7, and reasons for attrition at T2–T7.

	T1 *n* = 61	T2 *n* = 56	T3 *n* = 50	T4 *n* = 48	T5 *n* = 38	T6 *n* = 42	T7 *n* = 39
Diagnosis							
CNS tumour	3	3	3	3	1	2	2
Ewing sarcoma	4	3	2	2	1	1	1
Leukaemia	21	17	14	13	12	12	10
Lymphoma	20	20	20	20	15	17	18
Osteosarcoma	8	8	6	6	5	6	5
Other	5	5	5	4	4	4	3
On/off treatment	61/0	42/14	14/36	11/37	9/29	4/38	1/38
Age, years							
Mean	15.5	16.0	16.7	17.2	18.0	18.7	19.8
(sd)	(1.7)	(1.6)	1.6)	(1.6)	(1.6)	(1.6)	(1.7)
Gender							
Male	37	35	29	28	22	23	21
Female	24	21	21	20	16	19	18
Attrition							
Death		1	8	10	12	12	15
Withdrawal from further participation		1	2	2	5	5	5
Withdrawal from participation at one occasion		3	1	1			1
Administrative reason					6	2	1

gions where the three Swedish paediatric oncology centres from which participants were included are situated. The sample was stratified regarding gender, age and region. The eligible sample consisted of 391 individuals who were invited to participate in a telephone interview. The response rate was 77% ($N = 300$). One-way ANOVA did not indicate any difference between regions, consequently, region was not considered in the analyses. The full report is presented elsewhere.[18]

2.2. Procedure

Ethical approval was obtained from the local ethics committee at the Faculties of Medicine at the universities of Lund, Umeå and Uppsala.

2.2.1. Cancer group

A co-ordinating nurse provided potential participants with oral and written information about the study, approximately 3 weeks after diagnosis. For those under 18 years, information was also provided to the parents, if a person was younger than 18 years, parents were asked to provide consent on behalf of their child. At each assessment the interviewer (the second author or another person) read the questionnaire items (at T1–T4: the SF-36 mental health and vitality and the HADS anxiety and depression subscales; at T5–T7: the entire SF-36 and the HADS anxiety and depression subscales) aloud to the respondent and recorded the responses. Shortly before interviews at T2–T7, the co-ordinating nurse at the respective centre was contacted to ensure that the participant was cognitively, emotionally and physically able to participate. All data were collected by telephone. It took 5–10 min for participants to answer the questions. The interviewers noted no problems for participants to answer the questions.

2.2.2. Reference group

After completing a training programme, five interviewers performed the telephone interviews. Potential participants received a letter containing information about the study. For those under 18 years, a separate information letter was addressed to the parents. Potential participants were contacted over the telephone by one of the interviewers within a week of the information letter being mailed. Provided that the respondent agreed to participate, and that parental consent was obtained for those under 18 years of age, a time was either booked for the interview or the interview was conducted directly. The interviewer read the questionnaires (the entire SF-36 and the HADS anxiety and depression subscales) aloud to the respondent and recorded the responses. As for the cancer group it took the participants 5–10 min to answer the questions.

2.3. Measures

When choosing instruments two main factors were considered. One was that the cancer group should be followed for at least 10 years resulting in an age range from 13 to at least 29. Another was that comparison with healthy controls should be made with regard to psychosocial function. Bearing these factors in mind, two extensively used instruments were chosen the SF-36[19] and the HADS[20] .

The SF-36 is a generic instrument for assessment of quality of life[19] consisting of 36 items measuring: physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health. In addition, one single item determines difference in state of health over the past year. The scale scores are transformed from 0 (worst possible quality of life) to 100 (best possible quality of life).[21] Based on the eight subscales, two summery scales have been constructed for physical (Physical Component Summary) and mental health (Mental Component Summary). The summary scores are standardised to a mean of 50, with a score above 50 representing better than average and below 50 poorer than average function.[22] The SF-36 is described as adequate to use for assessment of quality of life from early adolescence (14 years).[19] Chronbach's alpha values for the reference group, collected by telephone interviews, are for mental health 0.82 and vitality 0.81.[18] Corresponding values for the cancer group are between 0.68–0.72 for mental health and 0.68–0.90 for vitality at T1–T7.

The HADS identifies anxiety and depression in somatically ill patients.[20] Anxiety and depression is measured with separate subscales, each consisting of seven items with response alternatives from 0 (no distress) to 3 (maximum distress). Subscale scores range from 0 (no distress) to 21 (maximum distress). The HADS was developed to be answered by adults, but has been found valid and adequate for use with adolescents.[23] Chronbach alpha values, collected by telephone interviews, for the reference group are for HADS anxiety and HADS depression 0.75 and 0.54, respectively.[18] Corresponding values for the cancer group are between 0.59 and 0.80 for HADS anxiety and 0.25–0.77 for HADS depression at T1–T7.

2.4. Statistical analysis

Statistical analyses were conducted using the Statistical Package for the Social Sciences version 14.0 (SPSS Inc Chicago, IL) and R version 2.7.2. (Foundation for Statistical Computing, Vienna, Austria). Descriptive statistics including confidence intervals were computed for all variables for the cancer group at T1–T7 and for the reference group at the single assessment. A repeated measure analysis, Linear mixed model, was used to investigate potential differences for mental health, vitality, anxiety, and depression over time for the cancer group. As participants in the cancer group grow older during the study, and there were more boys than girls in the cancer group, a linear regression, adjusted for age and gender, was used for comparisons between the cancer and the reference group. The mean difference between the groups was estimated by the regression coefficient b_3 according to the following formula: $y = a + (b_1 \times age) + (b_2 \times gender) + (b_3 \times group)$. Potential differences with regard to mean values for investigated variables at T1 between those who participated at T1 and T7 versus those who did not participate at T7 were calculated with t-tests.

3. Results

Table 2 presents means and standard deviations for the SF-36 subscales mental health and vitality and the HADS subscales

Table 2 – Means and standard deviations for the SF-36 subscales mental health and vitality and the HADS subscales anxiety and depression at T1–T7 for the cancer group and at the single assessment for the reference group.

SF-36 and HADS subscales	T1 $n = 61$ Mean (sd)	T2 $n = 56$ Mean (sd)	T3 $n = 50$ Mean (sd)	T4 $n = 48$ Mean (sd)	T5 $n = 38$ Mean (sd)	T6 $n = 42$ Mean (sd)	T7 $n = 39$ Mean (sd)	Reference group $n = 300$ Mean (sd)
Mental health	65.0	71.0	79.1	81.6	84.8	81.7	84.3	80.7
	(18.8)	(17.2)	(16.2)	(15.3)	(13.0)	(16.5)	(17.7)	(15.0)
Vitality	48.0	55.9	69.1	74.7	73.2	72.9	76.0	69.4
	(20.7)	(21.9)	(20.8)	(21.7)	(21.3)	(20.5)	(22.2)	(18.5)
Anxiety	4.9	4.4	3.9	3.5	2.8	3.7	3.1	4.7
	(3.2)	(2.9)	(3.3)	(3.1)	(2.5)	(3.6)	(3.1)	(3.4)
Depression	4.3	3.4	2.1	1.5	1.4	1.6	1.5	2.5
	(2.9)	(2.2)	(1.9)	(1.7)	(1.3)	(1.9)	(2.3)	(2.3)

anxiety and depression (T1–T7) for the cancer group, and at the single assessment for the reference group.

Changes over time for the SF-36 subscales mental health and vitality and the HADS subscales anxiety and depression (T1–T7) for the total cancer group and completers, respectively, are shown in Fig. 1. The means differ over time for all variables ($p < .001$) for the total cancer group illustrating increasing levels of quality of life and decreasing levels of anxiety and depression.

Table 3 presents the estimated mean differences between the cancer and the reference group for the SF-36 subscales mental health and vitality and the HADS subscales anxiety and depression at T1–T7. At T1 and T2 the cancer group report lower levels of mental health and vitality and a higher level of depression than the reference group. At T3 there are no differences between the groups in these respects and at T4 a reverse situation from T1 and T2 occurs. At T4 and T5 the cancer group report lower levels of anxiety and depression than the reference group, the difference for depression remains at T6 and T7. The findings also show that the cancer group report a higher level of vitality and a lower level of anxiety than the reference group at T7.

A visual inspection of Fig. 1 indicates that the total cancer group does not, at any assessment, report different levels of mental health, vitality, anxiety, and/or depression than completers ($n = 31$). This finding is supported by t-tests which did not reveal any difference between those who participated at T1 and T7 ($n = 39$) versus those who participated at T1 but not at T7 ($n = 22$) for mental health, vitality, anxiety and/or depression at T1.

4. Discussion

On a group-level, persons diagnosed with cancer during adolescence show an increase in quality of life and a decrease with regard to anxiety and depression over time. Four years

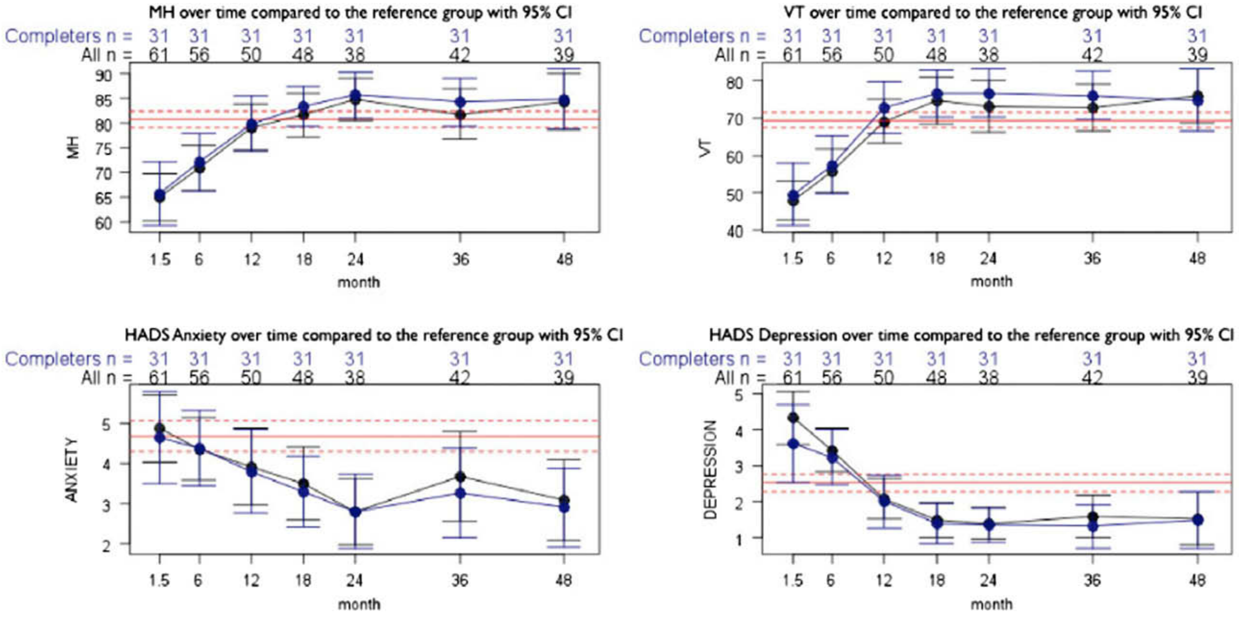

Fig. 1 – Changes over time (T1–T7) for SF-36 subscales mental health (MH) and vitality (VT) and HADS subscales anxiety and depression for the total cancer group and completers, in comparison with the reference group.

Table 3 – The estimated mean differences between the cancer group and the reference group for the SF-36 subscales mental health and vitality and the HADS subscales anxiety and depression at T1–T7.

SF-36 and HADS subscales	T1		T2		T3		T4	
	Estimated difference	95% CI	Estimated difference	95% CI	Estimated difference	95% CI	Estimated difference	95% CI
Mental health	17.6***	60.2–70.0	11.7***	66.3–75.5	2.7	74.5–83.7	−0.1	77.1–86.0
Vitality	24.9***	42.6–53.2	16.6***	50.0–61.8	2.0	63.2–75.0	−4.1	68.4–81.0
Anxiety	−0.4	4.0–5.7	0.0	3.6–5.1	0.5	3.0–4.9	1.0*	2.6–4.4
Depression	−1.9***	3.6–5.1	−1.0**	2.8–4.0	0.3	1.5–2.6	1.0**	1.0–2.0
	T5		T6		T7		Reference group	
	Estimated difference	95% CI	Estimated difference	95% CI	Estimated difference	95% CI	95% CI	
Mental Health	−3.8	80.6–89.1	−1.2	76.6–86.8	−4.4	78.6–90.0	79.0–82.4	
Vitality	−3.3	66.2–80.2	−4.0	66.5–79.2	−8.2*	68.8–83.2	67.3–71.5	
Anxiety	1.7**	2.0–3.6	0.9	2.5–4.8	1.6**	2.1–4.1	4.3–5.0	
Depression	1.1**	1.0–1.8	1.0**	1.0–2.2	1.1**	0.8–2.3	2.3–2.8	

* $p < 0.05$.
** $p < 0.01$.
*** $p < 0.001$.

after diagnosis they report a higher level of vitality and lower levels of anxiety and depression than a reference group. No differences are shown at any assessment for any of the investigated variable between completers and non-completers and there were no difference between those who participated 4 years after diagnosis and those who did not participate 4 years after diagnosis for any of the variables.

The findings support previous results showing that the first period following a cancer diagnosis is highly stressful.[4,24,25] However, from 18 months after diagnosis a reverse situation occurs where the cancer group reports less anxiety and depression than the reference group. Additionally, 4 years after diagnosis the cancer group reports a better vitality than the reference group. There is a growing body of literature suggesting that persons exposed to traumatic events, such as cancer during adolescence, may experience an acceleration of maturation, enhanced emotional development and a heightened appreciation of the value of life.[26–28] These experiences may be linked to increased quality of life and lower levels of anxiety and depression.

Recent research concludes that many survivors of cancer display incredible resiliency and strength.[29,30] Findings from this study even suggest that a change for the better, i.e. post traumatic growth (PTG) may develop in the aftermath of cancer during adolescence. PTG has been conceptualised as a subjective experience of positive psychological change, e.g. increased appreciation of life, improved relations to others and the self, and new values and priorities as a result of a struggle with a trauma.[31] Further research has to be done to conclude whether the cancer group in this study experience PTG and the next step is a 10-year follow-up of this group. The aims of this follow-up will be to reveal whether the participants still 10 years after diagnosis report a better psychosocial function than the reference group, and if so to explore the mechanisms behind these changes for the better.

The importance of identifying persons at risk for psychopathology as a consequence of disease and treatment and in need of psychosocial services has been pointed out.[2,14,32–34] This study shows that persons struck by cancer during adolescence are not necessarily at risk for psychopathology, however, an inspection of the data shows that some individuals report relatively low levels of mental health, vitality, anxiety, and/or depression. If these problems remain undetected and appropriate care and support is not provided the distress may become a barrier to physical recovery, resulting in a vicious cycle of physical and mental disability[35] This underscores the importance of developing valid and reliable screening to identify persons within paediatric oncology in need of psychosocial services.

Efforts were made to address methodological limitations that previous research in the field has suffered from. First, the sample exclusively consists of persons struck by cancer during adolescence. Secondly, the design allows conclusions about quality of life, anxiety, and depression at specific times after diagnosis and development over time with regard to these variables. Thirdly, the reference group allows conclusions for the cancer group in comparison to those without a cancer diagnosis. And, since age, gender and method to collect data may have a crucial effect on self-reports[18] structured telephone interviews were used in both groups, and potential effects of age and gender were considered. Like most studies with repeated assessments this study suffers from attrition and it can be speculated that persons lost to follow up initially were worse or better off compared to persons that completed the study. However, these speculations were not confirmed. The fact that the attrition was relatively small may be explained by data being collected by telephone interviews. A higher overall[36–38] as well as item[36,39,40] response rate has been shown for telephone interviews than self-administered questionnaires. It is recommended to use telephone interviews in studies with a longitudinal design in which attrition is a common and serious problem. When choosing instruments it was considered that the cancer group should be followed for at least 10 years resulting in an age range from 13 to at least 29 years and that comparisons between the cancer group and a reference group should be made. Consequently two extensively used instruments, the SF-36 and the HADS, were chosen.[19,21,23] However, the reliability of the HADS Depression subscale could be questioned due to a low Chronbach's alpha value in telephone interviews. On the other hand, we have successfully used the scale to discriminate between different psychosocial states in the cancer group.[41] The results are presented for the entire group of participants and conclusions cannot be drawn for subgroups. In future studies efforts should be done to include enough participants to allow analyses of the long-term psychosocial function after e.g. specific cancer diagnoses and/or types of treatment.

5. Conclusion

The findings suggest that a positive psychological change may develop in the aftermath of cancer during adolescence. However, efforts should be made to enable clinicians and nursing staff to identify and to provide psychological support to individuals who experience low quality of life and high emotional distress. If these problems remain undetected and appropriate support is not provided the distress may become a barrier to physical recovery, resulting in a vicious cycle of physical and mental disability.

Funding

The study was funded by the Swedish Cancer Society and the Swedish Children's Cancer Foundation.

Conflicts of interest statement

None declared.

Acknowledgements

The authors thank the participants who agreed to share their experiences with us, and the Swedish Cancer Society and the Swedish Children's Cancer Foundation who provided financial support.

REFERENCES

1. Langeveld NE, Grootenhuis MA, Voute PA, de Haan RJ, van den Bos C. Quality of life, self-esteem and worries in young adult survivors of childhood cancer. *Psychooncology* 2004;**13**:867–81.
2. Langeveld NE, Stam H, Grootenhuis MA, Last BF. Quality of life in young adult survivors of childhood cancer. *Support Care Cancer* 2002;**10**:579–600.
3. Stam H, Grootenhuis MA, Caron HN, Last BF. Quality of life and current coping in young adult survivors of childhood cancer: positive expectations about the further course of the disease were correlated with better quality of life. *Psychooncology* 2006;**15**:31–43.
4. Eiser C, Hill JJ, Vance YH. Examining the psychological consequences of surviving childhood cancer: systematic review as a research method in pediatric psychology. *J Pediatr Psychol* 2000;**25**:449–60.
5. Stam H, Grootenhuis MA, Last BF. Social and emotional adjustment in young survivors of childhood cancer. *Support Care Cancer* 2001;**9**:489–513.
7. Bleyer WA. Cancer in older adolescents and young adults: epidemiology, diagnosis, treatment, survival, and importance of clinical trials. *Med Pediatr Oncol* 2002;**38**:1–10.
8. Felder-Puig R, Formann AK, Mildner A, et al. Quality of life and psychosocial adjustment of young patients after treatment of bone cancer. *Cancer* 1998;**83**:69–75.
9. Barr RD. On cancer control and the adolescent. *Med Pediatr Oncol* 1999;**32**:404–10.
10. von Essen L, Enskar K, Kreuger A, Larsson B, Sjoden PO. Self-esteem, depression and anxiety among Swedish children and adolescents on and off cancer treatment. *Acta Paediatr* 2000;**89**:229–36.
11. Pai AL, Drotar D, Zebracki K, Moore M, Youngstrom E. A meta-analysis of the effects of psychological interventions in pediatric oncology on outcomes of psychological distress and adjustment. *J Pediatr Psychol* 2006;**31**:978–88.
12. Apajasalo M, Sintonen H, Siimes MA, et al. Health-related quality of life of adults surviving malignancies in childhood. *Eur J Cancer* 1996;**32A**:1354–8.
13. Pemberger S, Jagsch R, Frey E, et al. Quality of life in long-term childhood cancer survivors and the relation of late effects and subjective well-being. *Support Care Cancer* 2005;**13**:49–56.
14. Zeltzer LK, Lu Q, Leisenring W, et al. Psychosocial outcomes and health-related quality of life in adult childhood cancer survivors: a report from the childhood cancer survivor study. *Cancer Epidemiol Biomarkers Prev* 2008;**17**:435–46.
15. Elkin TD, Phipps S, Mulhern RK, Fairclough D. Psychological functioning of adolescent and young adult survivors of pediatric malignancy. *Med Pediatr Oncol* 1997;**29**:582–8.
17. Jorngarden 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. *Eur J Cancer* 2007;**43**:1952–8.
18. Jorngarden A, Wettergen L, von Essen L. Measuring health-related quality of life in adolescents and young adults: Swedish normative data for the SF-36 and the HADS, and the influence of age, gender, and method of administration. *Health Qual Life Outcomes* 2006;**4**:91.
19. Ware Jr JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36). Conceptual framework and item selection. *Med Care* 1992;**30**:473–83.
20. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand* 1983;**67**:361–70.
21. Ware JE, Snow KK, Kosinski M, Gandek B. *SF-36 Health Survey manual and interpretation guide.* Boston: New England Medical Centre; 1993.

22. Ware JE, Kosinski M. Interpreting SF-36 summary health measures: a response. *Qual Life Res* 2001;**10**:405–13 [discussion 415-20].
23. White D, Leach C, Sims R, Atkinson M, Cottrell D. Validation of the Hospital Anxiety and Depression Scale for use with adolescents. *Br J Psychiatr* 1999;**175**:452–4.
24. Collins JJ, Byrnes ME, Dunkel IJ, et al. The measurement of symptoms in children with cancer. *J Pain Symptom Manage* 2000;**19**:363–77.
25. Docherty SL, Sandelowski M, Preisser JS. Three months in the symptom life of a teenage girl undergoing treatment for cancer. *Res Nurs Health* 2006;**29**:294–310.
26. Servitzoglou M, Papadatou D, Tsiantis I, Vasilatou-Kosmidis H. Psychosocial functioning of young adolescent and adult survivors of childhood cancer. *Support Care Cancer* 2008;**16**:29–36.
27. Parry C, Chesler MA. Thematic evidence of psychosocial thriving in childhood cancer survivors. *Qual Health Res* 2005;**15**:1055–73.
28. Mattsson E, Ringner A, Ljungman G, von Essen L. Positive and negative consequences with regard to cancer during adolescence. Experiences two years after diagnosis. *Psychooncology* 2007;**16**:1003–9.
29. Woodgate RL. A review of the literature on resilience in the adolescent with cancer: Part II. *J Pediatr Oncol Nurs* 1999;**16**:78–89.
30. Hudson MM, Mertens AC, Yasui Y, et al. Health status of adult long-term survivors of childhood cancer: a report from the Childhood Cancer Survivor Study. *JAMA* 2003;**290**:1583–92.
31. Tedeschi RG, Calhoun LG. Posttraumatic growth: conseptual foundations and empirical evidence. *Psychological Inquiry* 2004;**15**:1–18.
32. Maunsell E, Pogany L, Barrera M, Shaw AK, Speechley KN. Quality of life among long-term adolescent and adult survivors of childhood cancer. *J Clin Oncol* 2006;**24**:2527–35.
33. Landolt MA, Vollrath M, Niggli FK, Gnehm HE, Sennhauser FH. Health-related quality of life in children with newly diagnosed cancer: a one year follow-up study. *Health Qual Life Outcomes* 2006;**4**:63.
34. Abrams AN, Hazen EP, Penson RT. Psychosocial issues in adolescents with cancer. *Cancer Treat Rev* 2007;**33**:622–30.
35. Boscarino JA. Posttraumatic stress disorder and physical illness: results from clinical and epidemiologic studies. *Ann NY Acad Sci* 2004;**1032**:141–53.
36. Perkins JJ, Sanson-Fisher RW. An examination of self- and telephone-administered modes of administration for the Australian SF-36. *J Clin Epidemiol* 1998;**51**:969–73.
37. Duncan P, Reker D, Kwon S, et al. Measuring stroke impact with the stroke impact scale: telephone versus mail administration in veterans with stroke. *Med Care* 2005;**43**:507–15.
38. Fournier L, Kovess V. A comparison of mail and telephone interview strategies for mental health surveys. *Can J Psychiatr* 1993;**38**:525–33.
39. Garcia M, Rohlfs I, Vila J, et al. Comparison between telephone and self-administration of Short Form Health Survey Questionnaire (SF-36). *Gac Sanit* 2005;**19**:433–9.
40. Bowling A. Mode of questionnaire administration can have serious effects on data quality. *J Public Health (Oxf)* 2005;**27**:281–91.
41. Mattsson E, El-Khouri B, Ljungman G, Von Essen L. Empirically derived psychosocial states among adolescents diagnosed with cancer during the acute and extended phase of survival. *Ann Oncol* 2009;**20**:1722–7.