

## Psychological Distress in Adult Survivors of Childhood Cancer: The Swiss Childhood Cancer Survivor Study

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### ABSTRACT

#### Purpose

To evaluate the degree of psychological distress in adult childhood cancer survivors in Switzerland and to characterize survivors with significant distress.

#### Methods

Childhood cancer survivors who were age younger than 16 years when diagnosed between 1976 and 2003, had survived more than 5 years, and were currently age 20 years or older received a postal questionnaire. Psychological distress was assessed using the Brief Symptom Inventory (BSI). Raw scores were transformed into T scores according to the German norm sample, and the proportion of participants being at increased risk for psychological distress was calculated (case rule:  $T \geq 63$ ). *t* tests and univariable and multivariable logistic regressions were used for statistical analyses.

#### Results

One thousand seventy-six survivors (63.3% of eligible survivors, 71.9% of contacted survivors) returned the questionnaire, 987 with complete data on BSI. Comparison with the norm populations showed lower T scores ( $T < 50$ ) in the Global Severity Index (GSI;  $T = 46.2$ ), somatization ( $T = 47.6$ ), obsessive-compulsive tendencies ( $T = 46.9$ ), and anxiety ( $T = 48.4$ ). However, more childhood cancer survivors (especially women) had increased distress for GSI (14.4%), interpersonal sensitivity (16.5%), depression (13.4%), aggression (16.9%), and psychotic tendencies (15.6%) than the expected 10% from the norm population. Caseness was associated with female sex, being a single child, older age at study, and self-reported late effects, especially psychological problems.

#### Conclusion

Results show that childhood cancer survivors, on average, have less psychological distress than a norm population but that the proportion of survivors at risk for high psychological distress is disproportionately large. Monitoring psychological distress in childhood cancer survivors may be desirable during routine follow-up, and psychological support should be offered as needed.

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### INTRODUCTION

In the past decades, survival rates in childhood cancer have increased and are now reaching 75% to 80%.<sup>1</sup> Somatic late effects have been recognized as an important drawback, and current therapies are aimed at both improving survival rates and reducing adverse outcomes. In contrast, psychological late effects have only recently been considered in large-scale studies such as the US Childhood Cancer Survivor Study (US CCSS).<sup>2</sup>

The cancer experience and the adverse somatic late effects of the disease and its treatment may influence psychological well-being and distress of survivors much later in life.<sup>3-5</sup> Especially when diagnosed in adolescence, a time when young people are usually confronted with developmental tasks, such as decisions about their education or gaining inde-

pendence, survivors may get more disrupted and experience increased psychological distress even long after being cured. Support from family and siblings may help, but recent reports from the US CCSS showed higher levels of depression, anxiety, and somatization in childhood cancer survivors compared with their siblings<sup>6</sup> but similar (in CNS survivors) or lower levels (in survivors of other cancers) than the norm population.<sup>7-10</sup> In these studies, although distress was not associated or only marginally associated with the original diagnosis and treatment, it was more common among survivors with low education or unemployment. Other research showed that survivors who were younger at diagnosis or older at study, were treated with cranial radiation, and experienced relapse or physical limitations were at high risk for psychological distress.<sup>6,11-14</sup>

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So far, none of the large, population-based, childhood cancer survivor studies has described psychological distress comprehensively. Most previous publications focused on three areas of distress (depression, anxiety, and somatization).<sup>7-9,15</sup> However, a number of smaller studies suggest that other psychological problems, especially paranoid ideation, psychotic tendencies, obsessive-compulsive problems, and post-traumatic stress (PTS), might also be important.<sup>3,11,16-18</sup> Thus, the aims of the present study were to evaluate nine domains of psychological distress in a population-based study of childhood cancer survivors in Switzerland and compare the results with a sample of Swiss psychotherapy patients and to characterize survivors at risk for significant distress.

## METHODS

### Sample and Procedure

The Swiss Childhood Cancer Registry (SCCR)<sup>19,20</sup> is a population-based registry including all young people diagnosed before age 16 years with leukemia, lymphoma, CNS tumor, malignant solid tumor, or Langerhans cell histiocytosis. The Swiss Childhood Cancer Survivor Study (SCCSS) is a nationwide, long-term, follow-up study of all patients registered at the SCCR who survived for at least 5 years. For the current study, we included all survivors who were age 20 years and older at the time of the study. Ethics approval for this study was provided through the general cancer registry permission of the SCCR (Swiss Federal Expert Commission for Professional Secrecy in Medical Research), and a non obstat statement was obtained from the Cantonal Ethics Committee of Bern.

All survivors received an initial information letter about the study from their former treating institution asking them to report if they did not wish to participate, if their address had changed, or if they required the questionnaire in another language. Two weeks later, all survivors received a questionnaire with a prepaid return envelope. Nonresponders received another questionnaire after 2 months and were then contacted by phone. Questionnaires were provided in three languages (German, French, and Italian).

The comparison sample consisted of all patients between 20 and 49 years old (mean age, 32.5 years; standard deviation [SD], 8.2 years) who received psychotherapy at the University of Bern Outpatient Clinic between January 2000 and May 2009. This sample included patients with a diverse socioeconomic and professional background. The majority was treated for depression or anxiety disorders.

### Measurements

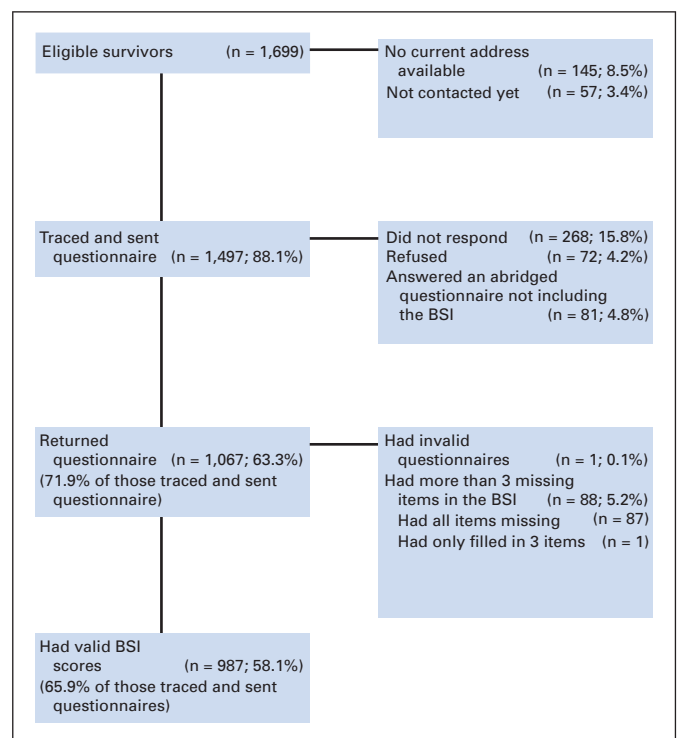
Baseline demographic information and prospectively collected medical information on diagnosis and treatment were extracted from the SCCR. Diagnosis was classified according to the International Classification of Childhood Cancer (third edition).<sup>21</sup> For the analysis, all major diagnostic groups were used (leukemia, lymphoma, CNS tumors, and other solid tumors). As in other studies, treatment was coded according to whether or not survivors had the following treatments<sup>9</sup>: surgery only, chemotherapy (without radiotherapy but may have had surgery), and radiotherapy (may have had surgery or chemotherapy). In addition, occurrence of bone marrow transplantation or relapse was recorded.

The SCCSS used an extensive questionnaire that was standardized similarly to the questionnaires used in the US and United Kingdom childhood cancer survivor studies.<sup>2,22</sup> Furthermore, we included specific sociodemographic measures for comparison with the Swiss population. The main domains of the questionnaire were quality of life, somatic health, fertility, current medication and health service utilization, psychological distress, health behavior, and socioeconomic information.

Psychological distress was assessed using the Brief Symptom Inventory (BSI).<sup>23,24</sup> The BSI is a widely used and well-validated instrument to screen the following nine domains of distress: somatization, obsessive-compulsive tendencies, interpersonal sensitivity, depression, anxiety, aggression, phobic anxiety, paranoid ideation, and psychotic tendencies. Responses to all 53 items are

summarized in the Global Severity Index (GSI). For a description of the BSI, see the Appendix (online only). For French-speaking survivors, we used a translation previously used in Switzerland.<sup>25</sup> For Italian-speaking survivors, we translated the BSI for this study (sensitivity analyses showed no difference between these groups, and therefore, all were included for analyses). For each item, survivors expressed how much they agree with a statement describing the previous 7 days on a scale from 1 (not at all) to 5 (very much). For survivors who missed up to three items, the scores were computed using the average score of the remaining items as suggested in the manual.<sup>23</sup> Cronbach's  $\alpha$  for our data were as follows: somatization,  $\alpha = .67$ ; obsessive-compulsive tendencies,  $\alpha = .79$ ; interpersonal sensitivity,  $\alpha = .81$ ; depression,  $\alpha = .85$ ; anxiety,  $\alpha = .75$ ; aggression,  $\alpha = .76$ ; phobic anxiety,  $\alpha = .65$ ; paranoid ideation,  $\alpha = .77$ ; psychotic tendencies,  $\alpha = .69$ ; and GSI,  $\alpha = .96$ . Scores from all scales were transformed to T scores (mean = 50; SD = 10) according to the German norm population.<sup>24</sup> We calculated scores according to the overall norm group and separate scores for men and women according to the male and female norm groups. A T score of  $\geq 63$  on any scale corresponds to the 90th percentile in the norm population and indicates a risk for being at significant psychological distress in this area (case rule).<sup>24</sup> Being a case would suggest a further detailed psychodiagnostic examination. Therefore, an indicator for high psychological distress (caseness) was generated for each domain.

Late effects were assessed by asking the survivors whether they experienced any late effects of their cancer or treatment. If answered affirmatively, they further described their problems in open format, and we coded them as somatic only or as psychological problems (including a mixture of psychological and somatic problems). To assess educational achievement and current employment, we used questions from the Swiss Census. The 10 levels of educational achievement were recoded into four levels of schooling (compulsory schooling [ $\leq 9$  years]; vocational training, or schooling for 10 to 13 years; upper secondary education [higher vocational training or college]; and university). Income was recoded into three levels ( $< 3,000$  Swiss francs [CHF] per month, 3,001 to 4,500 CHF per month, and  $\geq 4,501$  CHF per month). Survivors were also asked to list their siblings.



**Fig 1.** Participants and nonresponders by June 17, 2009. BSI, Brief Symptom Inventory.

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Table 1. Demographics and Clinical Characteristics of the Study Population

Demographic or Clinical Characteristic	Responders to Questionnaire		Nonresponders to Questionnaire		P*	Responders to BSI		Nonresponders to BSI		P†
	No.	%	No.	%		No.	%	No.	%	
Total	1,076	63.3	623	36.7		987	91.8	88	8.2	
Sex										
Male	595	55.3	365	58.6	.187	535	54.2	60	68.2	.011
Female	481	44.7	258	41.4		452	45.8	28	31.8	
Current age, years				0.0						
20-24.9	409	38.0	257	41.3	.196	375	38.0	34	38.6	.311
25-29.9	313	29.1	157	25.2		293	29.7	20	22.7	
≥ 30	354	32.9	209	33.5		319	32.3	34	38.6	
Age at diagnosis, years										
0-4	307	28.5	179	28.7	.220	275	27.9	32	36.4	.238
5-9	285	26.5	187	30.0		263	26.6	21	23.9	
10-15	484	45.0	257	41.3		449	45.5	35	39.8	
Time since diagnosis, years										
5-14	278	25.8	171	27.4	.186	260	26.3	18	20.5	.538
15-19	285	26.5	156	25.0		263	26.6	22	25.0	
20-24	284	26.4	142	22.8		258	26.1	26	29.5	
≥ 25	229	21.3	154	24.7		206	20.9	22	25.0	
Diagnosis										
Leukemia	394	36.6	189	30.3	.297	364	36.9	29	33.0	.240
Lymphoma	233	21.7	139	22.3		212	21.5	21	23.9	
CNS tumor	122	11.3	75	12.0		115	11.7	7	8.0	
Neuroblastoma	37	3.4	28	4.5		32	3.2	5	5.7	
Retinoblastoma	21	2.0	15	2.4		19	1.9	2	2.3	
Renal tumor	56	5.2	31	5.0		52	5.3	4	4.5	
Hepatic tumor	5	0.5	3	0.5		5	0.5	0	0.0	
Malignant bone tumor	54	5.0	25	4.0		52	5.3	2	2.3	
Soft tissue sarcoma	55	5.1	47	7.5		52	5.3	3	3.4	
Germ cell tumor	34	3.2	25	4.0		27	2.7	7	8.0	
Carcinoma	12	1.1	11	1.8		10	1.0	2	2.3	
Other malignancy	3	0.3	1	0.2		3	0.3	0	0.0	
Langerhans cell histiocytosis	48	4.5	29	4.7		42	4.3	6	6.8	
Therapy										
Surgery only	94	8.7	68	10.9	.141	87	8.8	7	8.0	.784
Chemotherapy‡	530	49.3	277	44.5	.057	490	49.6	39	44.3	.338
Radiotherapy§	443	41.2	263	42.2	.674	402	40.7	41	46.6	.284
Bone marrow transplantation	43	4.0	21	3.4	.542	39	4.0	4	4.5	.785
Experienced ≥ 1 relapse	134	12.5	81	13.0	.042	118	12.0	16	18.2	.090
Education										
Compulsory schooling						121	12.3	6	6.8	
Vocational training						424	43.0	2	2.3	
Upper secondary education						348	35.3	2	2.3	
University education						75	7.6	0	0.0	
Employment										
Full time						579	58.7	53	60.2	.041
Part time						195	19.8	11	12.5	
Still in formation						127	12.9	4	4.5	
Unemployed						65	6.6	9	10.2	
Income of survivor, CHF										
< 3,001 or unemployed						389	39.4	4	4.5	
3,001-4,500						279	28.3	2	2.3	
> 4,500						273	27.7	0	0.0	
Late effects										
No late effects						595	60.3	47	53.4	.130
Somatic problems only						273	27.7	32	36.4	
Psychological problems						107	10.8	6	6.8	

NOTE. Two survivors who responded to the questionnaire had to be excluded from analysis because the questionnaire was not usable.

Abbreviations: BSI, Brief Symptom Inventory; CHF, Swiss franc.

\*P values ( $\chi^2$  test) for difference between survivors responding and not responding to the questionnaire of the Swiss Childhood Cancer Survivor Study.

†P values ( $\chi^2$  test) for difference between survivors responding and not responding to the Brief Symptom Inventory in the questionnaire of the Swiss Childhood Cancer Survivor Study.

‡Survivor had chemotherapy and may have had surgery but not radiotherapy.

§Survivor may have had chemotherapy and surgery.

||May include somatic problems.

Analysis

Analyses were performed with Stata 10.0 (StataCorp, College Station, TX). The outcomes were the scores of the nine domains of the BSI plus the GSI. Sensitivity analyses were performed using standardized scores

weighted according to age groups of the German population norm. For descriptive analyses and comparison with the population norm (mean T score = 50; case index T ≥ 63), we used the T scores normed for the overall population and separately for male and female population norms. We used t

tests and binomial proportion tests to detect mean differences to the T norm score of 50 and the expected proportion of 10% of survivors at risk for significant distress. We used *t* tests to compare the raw mean scores of psychotherapy patients and distressed survivors. For the remaining analyses, the case indices for each domain were used (according to the overall population). Univariable logistic regression analyses were used for each scale separately to analyze associations with caseness. Multivariable logistic regression was used including all variables significant at the 5% level in the univariable regressions. We used Holm's correction to adjust for multiple testing.<sup>26</sup> Holm *P* values were determined to be significant at the 5% level.

## RESULTS

In the SCCR, 2,919 survivors were eligible for the SCCSS, of whom 1,699 were  $\geq 20$  years old (Fig 1). Of the 1,497 survivors who we could trace, 1,076 replied (response rate: 63.3% of eligible survivors; 71.9% of traced survivors). Nonresponders were more likely to have experienced a relapse. The BSI could be evaluated in 987 survivors (87 survivors did not fill in any item and one survivor filled in three items). Three survivors missed three items, eight survivors missed two items, and 49 survivors missed one item. Characteristics of the 987 survivors with BSI information, compared with nonresponders, are listed in Table 1. The mean age of survivors at study was 27.9 years (SD = 6.0 years; range, 20.0 to 49.1 years); mean age at diagnosis was 8.4 years (SD = 4.7 years; range, 0.0 to 16.0 years); and mean time since diagnosis was 19.5 years (SD = 6.5 years; range, 5.8 to 37.9 years).

### Comparison With Norm Population

Sensitivity analyses showed similar results using weighted and unweighted data. For simplicity, we present unweighted results. Childhood cancer survivors had lower T scores than the norm population for GSI, somatization, obsessive-compulsive tendencies, and anxiety (Table 2). However, more childhood cancer survivors (especially females) were at risk for significant psychological distress (T score  $\geq 63$ ) in GSI, interpersonal sensitivity, depression, aggression, and psychotic tendencies than expected from the norm population (Table 2). Two hundred forty-three survivors (24.6%; 95% CI, 21.9% to 27.3%) were cases on two or more domain scales or on the GSI (for sex-specific norms: 98 men [18.3%; 95% CI, 15.0% to 21.6%]; 127 women [28.1%; 95% CI, 24.0% to 32.2%]).

### Comparison With Psychotherapy Patients

Data for 554 patients from the psychotherapy outpatient clinic were available (males, *n* = 252). Survivors identified as having high distress in the nine domains and the GSI had higher or similar mean scores as the psychotherapy patient sample (Table 3).

### Demographic Characteristics

Regarding GSI, women (odds ratio [OR] = 1.88), single children (OR = 2.09), and immigrants (OR = 1.96) were almost twice as likely to report high distress than men, those with siblings, and those born in Switzerland. Survivors older than 30 years were also at higher risk for being cases on the GSI (OR = 1.77). There was no association with education, employment, or income (Table 4). Associations were fairly similar for all domains of the BSI (Fig 2; Appendix Tables A1 to A9, online only).

### Medical Characteristics

There was no association between GSI and cancer diagnosis, treatment, relapse, or time since diagnosis (Table 4). Results were

similar for all domains (Appendix Tables A1 to A9). Survivors who were older at diagnosis were more likely to have high distress on the GSI than those between 0 and 4 years old at diagnosis (OR = 1.74). Self-reported late effects, especially if including psychological problems (or a mixture of psychological and somatic problems), were associated with high distress in all domains (somatic problems: OR between 1.71 and 2.67; psychological problems: OR between 3.72 and 7.66; Fig 2, Appendix Tables A1 to A9).

Multivariable logistic regression confirmed increased risk of being cases in the GSI for women, single children, survivors who were older at study, and survivors reporting somatic or psychological late effects (Table 4). Again, results were similar for all domains of the BSI (Appendix Tables A1 to A9).

## DISCUSSION

To our knowledge, this is the first report evaluating nine dimensions of psychological distress in a representative national cohort study of childhood cancer survivors. Overall results were reassuring, with the majority of survivors reporting low levels of distress. However, one fourth of survivors, instead of the expected 10% in the norm population, reported distress to a degree that makes closer observation and potentially counseling worthwhile. Comparisons with psychotherapy patients indicated that survivors' distress is clinically significant.

Interestingly, mean distress in the overall sample was lower than population norms, whereas a larger proportion of survivors could be considered cases with psychological distress compared with the norm population. This suggests that survivors have either no/very low distress or high distress. Recent studies suggested both outcomes are common (eg, PTS and post-traumatic growth [PTG]) and may even occur together.<sup>27,28</sup> Future studies should include measures of PTS and PTG when assessing psychological distress. Personality characteristics such as optimism might also influence how survivors deal with the cancer experience and might influence distress later on.<sup>29</sup>

Our results confirm previous findings of increased interpersonal sensitivity, aggression, and psychotic tendencies in survivors.<sup>3,16</sup> This may reflect that the cancer experience still makes survivors feel different from peers and supports previous research findings of alienation and loneliness in social contacts in survivors.<sup>30</sup>

The only directly comparable study is the US CCSS, which, however, included only three domains (BSI-18). In contrast to this study, we found higher proportions of cases for the domain of depression and the GSI, as well as interpersonal sensitivity, aggression, and psychotic tendencies. The proportion of survivors classified as cases on the GSI, for instance, was higher in our sample (men: 10.8%; women: 18.6%) than in the US CCSS (men: 8.6% [95% CI, 7.7% to 9.5%]; women: 12.4% [95% CI, 11.3% to 13.5%]).<sup>15</sup> They found a relatively low proportion of survivors with significant psychological distress in at least two domains or in the GSI of the BSI-18 (7.4% of men [95% CI, 6.7% to 8.2%] and 9% of women [95% CI, 8.1% to 9.9%]),<sup>10</sup> compared with our findings of 11.6% of men (95% CI, 8.9% to 14.3%) and 18.8% of women (95% CI, 15.2% to 22.4%) with significant distress in the BSI (only the BSI-18 domains or GSI considered). One reason for this difference might be that we included a nationally representative sample, whereas the US CCSS only included patients treated in major pediatric cancer centers.<sup>2</sup>

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**Table 2.** Comparison of BSI Domains Between Survivors and the German Norm Population (overall and sex-matched norms)

BSI Domain*	t Test for Difference to T = 50 (two-sided)			Test for Difference of Proportion of Cases (T score ≥ 63) to Expected 10%†			
	Mean t Score	95% CI	P	No. of Cases	% of Cases	95% CI	P
<b>Somatization</b>							
All	47.6	47.1 to 48.2	< .001‡	80	8.1	6.4 to 9.8	.047
Men	47.3	46.6 to 48.0	< .001‡	36	6.7	4.6 to 8.9	.012
Women	48.4	47.5 to 49.3	< .001‡	35	7.7	5.3 to 10.2	.110
<b>Obsessive-compulsive</b>							
All	46.9	46.2 to 47.6	< .001‡	104	10.5	8.6 to 12.5	.574
Men	46.5	45.6 to 47.3	< .001‡	43	8.0	5.7 to 10.3	.130
Women	47.8	46.7 to 48.9	< .001‡	61	13.5	10.0 to 16.6	.013
<b>Interpersonal sensitivity</b>							
All	49.1	48.4 to 49.8	.009	163	16.5	14.0 to 18.8	< .001‡
Men	48.3	47.4 to 49.1	< .001‡	55	10.3	7.7 to 12.9	.829
Women	49.9	48.8 to 51.0	.871	72	15.9	13.0 to 19.3	< .001‡
<b>Depression</b>							
All	49.4	48.7 to 50.0	.053	132	13.4	11.0 to 15.5	< .001‡
Men	49.9	49.1 to 50.7	.826	57	10.7	8.0 to 13.3	.614
Women	49.6	48.6 to 50.6	.426	75	16.6	13.0 to 20.0	< .001‡
<b>Anxiety</b>							
All	48.4	47.7 to 49.0	< .001‡	126	12.8	11.0 to 14.8	.004
Men	48.3	47.4 to 49.1	< .001‡	59	11.0	8.4 to 13.7	.428
Women	48.5	47.5 to 49.6	.008	54	12.0	9.0 to 14.9	.168
<b>Aggression</b>							
All	49.9	49.3 to 50.6	.853	167	16.9	15.0 to 19.3	< .001‡
Men	50.3	49.5 to 51.2	.442	82	15.3	12.0 to 18.4	< .001‡
Women	50.3	49.2 to 51.3	.618	85	18.8	15.0 to 22.4	< .001‡
<b>Phobic anxiety</b>							
All	50.5	50.0 to 51.1	.053	101	10.2	8.3 to 12.1	.807
Men	49.8	49.1 to 50.5	.548	41	7.7	5.4 to 9.9	.072
Women	50.8	49.9 to 51.6	.092	60	13.3	10.0 to 16.4	.020
<b>Paranoid ideation</b>							
All	49.5	48.9 to 50.1	.129	115	11.7	9.6 to 13.7	.084
Men	49.1	48.3 to 49.8	.019	51	9.5	7.0 to 12.0	.719
Women	49.9	48.9 to 50.9	.881	64	14.2	11.0 to 17.4	.003
<b>Psychotic tendencies</b>							
All	50.7	50.1 to 51.3	.025	154	15.6	13.0 to 17.9	< .001‡
Men	49.7	49.0 to 50.4	.458	38	7.1	4.9 to 9.3	.026
Women	51.1	50.1 to 52.1	.025	84	18.6	15.0 to 22.2	< .001‡
<b>Global Severity Index</b>							
All	46.2	45.3 to 47.1	< .001‡	142	14.4	12.0 to 16.6	< .001‡
Men	45.4	44.3 to 46.5	< .001‡	58	10.8	8.2 to 13.5	.517
Women	47.2	45.8 to 48.6	< .001‡	84	18.6	15.0 to 22.2	< .001‡

Abbreviation: BSI, Brief Symptom Inventory.

\*All survivors, N = 987; men, n = 535; women, n = 452.

†To test the difference between the proportion of cases compared with the expected 10%, we used an exact two-sided test based on the binomial distribution.

‡Holm's correction was used to determine statistical significance corresponding to a 5% level while taking into consideration multiple comparisons:  $P < .0026$  for t test for difference to 50 and  $P < .0028$  for difference to 10%.

Characteristics of Swiss survivors with distress were similar to those described in the US CCSS. Medical characteristics, including diagnosis and treatment, were not associated with distress, whereas some sociodemographic characteristics were associated with distress.<sup>7-9,15,31</sup> Similar to studies in the general population,<sup>32,33</sup> women and immigrants were at almost double the risk for psychological distress. Immigration is often a stressful event and poses additional risk for psychological distress.<sup>34</sup> However, most immigrant survivors (75.9%; 95% CI, 64.5% to 87.3%) were able to adjust well and did not show high risks for psychological distress. In contrast to findings from

the US CCSS, we found no association with unemployment or low education for the GSI, although there was a trend in this direction for unemployment. Medical insurance is compulsory in Switzerland and provided by the state when unaffordable by individuals. Therefore, health care (eg, follow-up care after childhood cancer) is available to everyone, which might attenuate socioeconomic differentials in mental health.

A new finding is that survivors who had siblings reported less distress than those without siblings. This is important for parents of children with cancer, who often worry about having to share their love

**Table 3.** Comparison of Raw Mean Scores of All BSI Scales Between Survivors With Significant Distress and Psychotherapy Patients of the University of Bern Outpatient Clinic

BSI Domain	Survivors			Psychotherapy Patients			T	P
	No.	Mean Score	95% CI	No.	Mean Score	95% CI		
<b>All</b>								
Somatization	80	0.96	0.89 to 1.02	554	0.73	0.67 to 0.80	6.69	< .001
Obsessive-compulsive	104	1.59	1.51 to 1.67	553	1.40	1.32 to 1.47	4.94	< .001
Interpersonal sensitivity	163	1.54	1.45 to 1.64	553	1.49	1.41 to 1.58	1.10	.273
Depression	132	1.30	1.20 to 1.40	553	1.39	1.31 to 1.46	-1.81	.072
Anxiety	126	1.22	1.14 to 1.30	553	1.17	1.10 to 1.24	1.24	.218
Aggression	167	1.22	1.14 to 1.30	554	0.99	0.93 to 1.05	5.65	< .001
Phobic anxiety	101	0.92	0.83 to 1.00	554	0.73	0.66 to 0.80	4.41	< .001
Paranoid ideation	115	1.48	1.38 to 1.59	553	0.89	0.83 to 0.96	11.33	< .001
Psychotic tendencies	154	0.94	0.86 to 1.01	554	0.96	0.90 to 1.02	-0.60	.552
Global Severity Index	142	1.01	0.95 to 1.07	554	1.07	1.02 to 1.12	-1.96	.052
<b>Male</b>								
Somatization	36	0.81	0.72 to 0.89	252	0.59	0.50 to 0.67	5.10	< .001
Obsessive-compulsive	43	1.53	1.42 to 1.63	252	1.38	1.27 to 1.49	2.90	.006
Interpersonal sensitivity	55	1.49	1.35 to 1.63	251	1.37	1.25 to 1.49	1.70	.095
Depression	57	1.13	1.03 to 1.24	251	1.36	1.24 to 1.48	-4.39	< .001
Anxiety	59	1.04	0.98 to 1.10	251	1.12	1.02 to 1.22	-2.51	.015
Aggression	82	1.13	1.04 to 1.23	252	0.90	0.81 to 0.99	4.87	< .001
Phobic anxiety	41	0.87	0.76 to 0.98	252	0.68	0.58 to 0.78	3.55	.001
Paranoid ideation	51	1.36	1.25 to 1.47	251	0.89	0.79 to 0.98	8.49	< .001
Psychotic tendencies	38	1.03	0.93 to 1.14	252	0.95	0.86 to 1.05	1.59	.121
Global Severity Index	58	0.90	0.83 to 0.96	252	1.02	0.94 to 1.09	-3.71	.001
<b>Female</b>								
Somatization	35	1.13	1.01 to 1.24	301	0.86	0.76 to 0.95	4.75	< .001
Obsessive-compulsive	61	1.64	1.53 to 1.75	300	1.41	1.31 to 1.51	4.12	< .001
Interpersonal sensitivity	72	1.85	1.71 to 2.00	301	1.59	1.49 to 1.70	3.55	.001
Depression	75	1.43	1.28 to 1.58	301	1.40	1.29 to 1.51	0.39	.698
Anxiety	54	1.51	1.37 to 1.65	301	1.21	1.12 to 1.31	4.38	< .001
Aggression	85	1.31	1.18 to 1.43	301	1.06	0.97 to 1.14	3.81	< .001
Phobic anxiety	60	0.95	0.83 to 1.07	301	0.77	0.67 to 0.87	2.93	.005
Paranoid ideation	64	1.58	1.42 to 1.74	301	0.89	0.80 to 0.98	8.48	< .001
Psychotic tendencies	84	1.02	0.91 to 1.14	301	0.96	0.87 to 1.05	1.07	.287
Global Severity Index	84	1.09	0.99 to 1.18	301	1.12	1.05 to 1.19	-0.73	.466

Abbreviation: BSI, Brief Symptom Inventory.

and attention between a severely ill child and a healthy sibling. Sharing the difficult experience with a sibling might help a child coping with problems.

In contrast to results from the US CCSS, the risk for significant distress in the GSI was higher in survivors older than 10 years at diagnosis. Adolescents, in contrast to younger children, will fully understand the life-threatening aspect of the disease, at a time of life when they are confronted with other important developmental tasks.<sup>35-37</sup>

Self-reported somatic late effects were strongly associated with psychological distress in our study. Not unexpectedly, survivors acknowledging psychological problems as late effects were identified as having more than six times the odds of distress of survivors not reporting late effects.

A limitation of the study is the lack of Swiss norms for the BSI, and we do not know how accurate the German norms (established between 1995 and 1997) fit the current Swiss population. However, our comparisons of survivors with high distress with a sample of patients from a psychotherapy outpatient clinic showed that survivors had significantly higher raw mean scores (higher distress) than psychotherapy patients in most domains. This supports the validity of the

use of the German norms to identify survivors with high psychological distress in a Swiss sample. Age-matched norms are not currently available for the German BSI, but sensitivity analyses using standardization according to the age groups in the norm population suggest no major difference to the presented data.

Self-selection of survivors and the self-report measure used might bias results. A detailed clinical interview may result in more accurate assessment of psychological distress. However, the BSI has been shown to be a valid screening instrument in childhood cancer survivors.<sup>38</sup> Highly distressed survivors may choose not to fill out the questionnaire, resulting in an overly positive sample with low distress. This might also be the case in norm populations, and the response rate of 71.9% of contacted survivors was similar to other studies in the United States and United Kingdom,<sup>2,22</sup> suggesting a high representativeness of our sample. The clinical significance of the cutoff score ( $T \geq 63$ )<sup>24</sup> will need to be determined. A recent study supported the use of a lower cutoff score for the BSI-18<sup>39</sup> in childhood cancer survivors ( $T \geq 50$ ).<sup>38</sup> Thus, we may have underestimated the true prevalence of distress in Swiss survivors. Treatment has only been crudely coded into surgery, chemotherapy, or

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**Table 4.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in the Global Severity Index of the BSI and Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	P	OR	95% CI	P
<b>Sex</b>										
Male	535	58	10.8	8.2 to 13.5	1.00			1.00		
Female	452	84	18.6	15.0 to 22.2	1.88	1.31 to 2.69	.001	1.79	1.22 to 2.64	.003
<b>Current age, years</b>										
20-24	373	41	11.0	7.8 to 14.2	1.00			1.00		
25-29	292	44	15.1	11.0 to 19.2	1.44	0.91 to 2.27	.120	1.65	1.01 to 2.67	.044
$\geq 30$	318	57	17.9	13.7 to 22.1	1.77	1.15 to 2.73	.010	1.90	1.18 to 3.04	.008
<b>Siblings</b>										
Yes	888	118	13.3	11.1 to 15.5	1.00			1.00		
No	99	24	24.2	15.8 to 32.7	2.09	1.27 to 3.44	.004	2.53	1.48 to 4.32	.001
<b>Immigration status</b>										
Native Swiss	927	129	13.9	11.7 to 16.1	1.00			1.00		
Immigrant	54	13	24.1	12.7 to 35.5	1.96	1.02 to 3.76	.043	2.11	1.05 to 4.26	.037
<b>Education</b>										
Other degree	912	127	13.9	11.7 to 16.2	1.00					
University degree	75	15	20.0	10.9 to 29.1	1.55	0.85 to 2.80	.152			
<b>Employment</b>										
Employed	901	126	14.0	11.7 to 16.2	1.00					
Unemployed	65	14	21.5	11.5 to 31.5	1.69	0.91 to 3.14	.098			
<b>Income, CHF</b>										
< 3,001	389	60	15.4	11.8 to 19.0	1.00					
3,001-4,500	279	41	14.7	10.5 to 18.8	0.94	0.61 to 1.45	.795			
> 4,500	273	30	11.0	7.3 to 14.7	0.68	0.42 to 1.08	.103			
<b>Age at diagnosis, years</b>										
0-4	275	28	10.2	6.6 to 13.8	1.00			1.00		
5-9	263	40	15.2	10.9 to 19.5	1.58	0.94 to 2.65	.081	1.53	0.88 to 2.65	.129
10-15	449	74	16.5	13.0 to 19.9	1.74	1.09 to 2.77	.019	1.31	0.79 to 2.16	.295
<b>Time since diagnosis, years</b>										
5-14	260	41	15.8	11.3 to 20.2	1.00					
15-19	263	39	14.8	10.5 to 19.1	0.93	0.58 to 1.50	.765			
20-24	258	29	11.2	7.4 to 15.1	0.68	0.41 to 1.13	.133			
$\geq 25$	206	33	16.0	11.0 to 21.0	1.02	0.62 to 1.68	.941			
<b>Diagnosis</b>										
Leukemia	364	49	13.5	10.0 to 17.0	1.00					
Lymphoma	212	27	12.7	8.2 to 17.2	0.94	0.57 to 1.55	.804			
CNS tumor	115	20	17.4	10.5 to 24.3	1.35	0.77 to 2.39	.297			
Other tumor	294	46	15.6	11.5 to 19.8	1.19	0.77 to 1.84	.428			
<b>Treatment</b>										
Surgery	490	60	12.2	9.3 to 15.1	1.00					
Chemotherapy*	402	66	16.4	12.8 to 20.0	1.41	0.96 to 2.05	.076			
Radiotherapy†	87	15	17.2	9.3 to 25.2	1.49	0.80 to 2.77	.204			
<b>BMT</b>										
No	948	136	14.3	12.1 to 16.6	1.00					
Yes	39	6	15.4	4.1 to 26.7	1.09	0.45 to 2.64	.856			
<b>Relapse</b>										
Yes	869	126	14.5	12.2 to 16.8	1.00					
No	118	16	13.6	7.4 to 19.7	0.92	0.53 to 1.62	.785			
<b>Late effects</b>										
No late effects	595	52	8.7	6.5 to 11.0	1.00			1.00		
Somatic problems only	273	46	16.8	12.4 to 21.3	2.12	1.38 to 3.24	.001	2.00	1.29 to 3.11	.002
Psychological problems‡	107	41	38.3	29.1 to 47.5	6.49	4.00 to 10.51	< .001	6.74	4.06 to 11.17	< .001

Abbreviations: BSI, Brief Symptom Inventory; OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

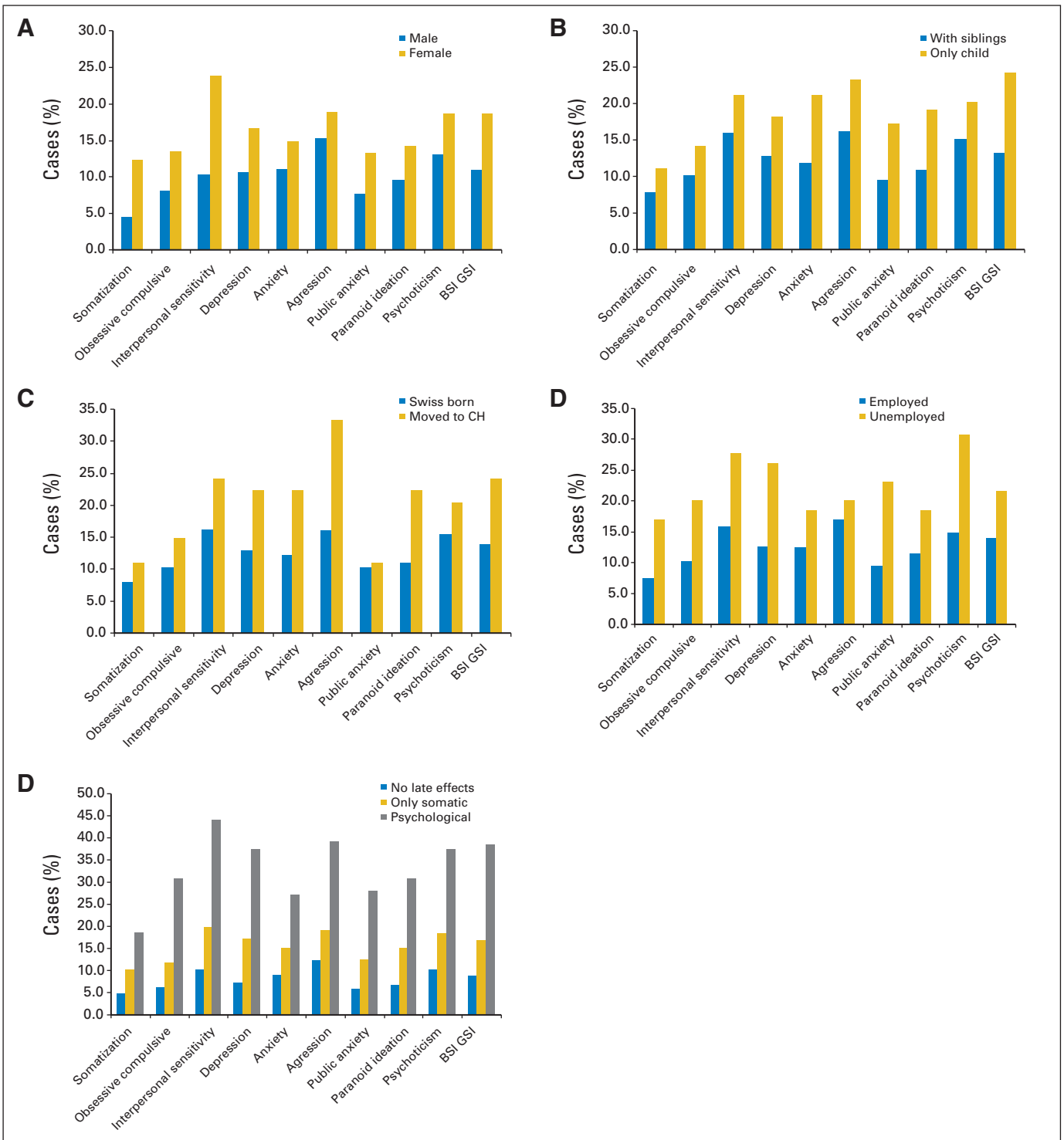
†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.

radiotherapy. Future studies might profit from including more detailed information.

Major strengths of this study are the population-based sample and the use of the complete BSI with nine domains. With demo-

graphic and medical variables from the SCCR, we were able to include prospectively assessed predictors into our analyses. The comparison with psychotherapy patients supported the clinical significance of our findings. A future study may profit from assessing socioeconomic



**Fig 2.** Proportions of cases ( $T \geq 63$ ) in different survivor groups according to (A) sex, (B) siblings, (C) immigration status, (D) employment status, and (E) self-reported late effects. BSI, Brief Symptom Inventory; GSI, Global Severity Index; CH, Switzerland.

predictors prospectively and independently from the assessment of the BSI to establish a causal pathway for the manifestation of psychological distress.

Current socioeconomic and psychological contexts may be more important for current psychological distress than earlier medical characteristics such as diagnosis, treatment, and relapse. Al-

though follow-up care is certainly well organized in the first years after diagnosis, established long-term care including psychosocial support is still lacking in Switzerland. We can conclude that it is desirable to monitor psychological distress in childhood cancer survivors during follow-up care appointments even years after they have been cured. Routine psychological screening has been shown to be feasible in



survivor clinics, and it has been suggested that incidence of psychological distress in survivors attending follow-up may be even higher than in the general survivor population.<sup>11</sup> A close collaboration with key workers in the psychosocial area may provide an optimal environment to immediately deal with imminent psychosocial problems.

#### AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The author(s) indicated no potential conflicts of interest.

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### **Appendix**

#### **Description of the Brief Symptom Inventory**

Psychological distress was assessed using the Brief Symptom Inventory (BSI).<sup>23</sup> The BSI is a widely used and well-validated instrument to screen nine domains of psychological distress. Responses to all 53 items are summarized in the Global Severity Index (GSI). Each item expresses a statement on which survivors had to respond how much they suffered from the problem described during the previous 7 days (scores range from 1 = not at all to 5 = very much).

Scores from all scales can be transformed to T scores (mean = 50; standard deviation = 10) according to the German norm population.<sup>24</sup> Norm scores are available for an adult population (n = 600), separately for men (n = 300) and women (n = 300), and for a student population (n = 589). The German adult norm population was assessed between 1995 and 1997 using a snowballing strategy and stratified according to their educational background. The age groups included 280 individuals age younger than 30 years, 159 individuals between 30 and 40 years old, and 161 individuals age older than 40 years. Currently, there are no specific norms for Switzerland available, and studies in the Swiss population usually use the German norms.

A T score of 63 or more on any scale corresponds to the 90th percentile in the norm population, and having a T score of  $\geq 63$  on the GSI scale or any two other scales indicates clinically significant psychological distress (case rule).<sup>24</sup> Being a case would suggest a further detailed psychodiagnostic examination.

Psychological Distress in Adult Survivors of Childhood Cancer

**Table A1.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in Somatization Domain and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
<b>Sex</b>										
Male	535	24	4.5	2.7 to 6.2	1.00			1.00		
Female	452	56	12.4	9.4 to 15.4	3.01	1.83 to 4.94	< .001	2.95	1.74 to 5.01	< .001
<b>Current age, years</b>										
20-24	373	29	7.8	5.1 to 10.5	1.00					
25-29	292	18	6.2	3.4 to 8.9	0.78	0.42 to 1.43	.422			
≥ 30	318	32	10.1	6.8 to 13.4	1.33	0.78 to 2.25	.292			
<b>Siblings</b>										
Yes	888	69	7.8	6.0 to 9.5	1.00					
No	99	11	11.1	4.9 to 17.3	1.48	0.76 to 2.91	.251			
<b>Immigration status</b>										
Native Swiss	927	74	8.0	6.2 to 9.7	1.00					
Immigrant	54	6	11.1	2.7 to 19.5	1.44	0.6 to 3.48	.417			
<b>Education</b>										
Other degree	912	73	8.0	6.2 to 9.8	1.00					
University degree	75	7	9.3	2.7 to 15.9	1.18	0.52 to 2.67	.686			
<b>Employment</b>										
Employed	901	68	7.5	5.8 to 9.3	1.00			1.00		
Unemployed	65	11	16.9	7.8 to 26.0	2.5	1.25 to 4.99	.010	1.79	0.84 to 3.81	.128
<b>Income, CHF</b>										
< 3,001	389	32	8.2	5.5 to 11.0	1.00					
3,001-4,500	279	23	8.2	5.0 to 11.5	1.00	0.57 to 1.75	.994			
> 4,500	273	18	6.6	3.6 to 9.5	0.79	0.43 to 1.43	.435			
<b>Age at diagnosis, years</b>										
0-4	275	23	8.4	5.1 to 11.6	1.00					
5-9	263	24	9.1	5.6 to 12.6	1.10	0.6 to 2.00	.754			
10-15	449	33	7.3	4.9 to 9.8	0.87	0.5 to 1.51	.620			
<b>Time since diagnosis, years</b>										
5-14	260	17	6.5	3.5 to 9.5	1.00					
15-19	263	26	9.9	6.3 to 13.5	1.57	0.83 to 2.96	.166			
20-24	258	18	7.0	3.9 to 10.1	1.07	0.54 to 2.13	.843			
≥ 25	206	19	9.2	5.3 to 13.2	1.45	0.73 to 2.87	.283			
<b>Diagnosis</b>										
Leukemia	364	34	9.3	6.4 to 12.3	1.00					
Lymphoma	212	15	7.1	3.6 to 10.5	0.74	0.39 to 1.39	.349			
CNS tumor	115	12	10.4	4.8 to 16.0	1.13	0.56 to 2.26	.729			
Other tumor	294	19	6.5	3.7 to 9.3	0.67	0.37 to 1.20	.180			
<b>Treatment</b>										
Surgery	490	36	7.3	5.0 to 9.7	1.00					
Chemotherapy*	402	39	9.7	6.8 to 12.6	1.35	0.84 to 2.18	.209			
Radiotherapy†	87	5	5.7	0.9 to 10.6	0.77	0.29 to 2.02	.593			
<b>BMT</b>										
No	948	75	7.9	6.2 to 9.6	1.00					
Yes	39	5	12.8	2.3 to 23.3	1.71	0.65 to 4.51	.276			
<b>Relapse</b>										
Yes	869	65	7.5	5.7 to 9.2	1.00					
No	118	15	12.7	6.7 to 18.7	1.8	0.99 to 3.27	.054			
<b>Late effects</b>										
No late effects	595	28	4.7	3.0 to 6.4	1.00			1.00		
Somatic problems only	273	28	10.3	6.7 to 13.9	2.31	1.34 to 3.99	.003	2.12	1.22 to 3.71	.008
Psychological problems‡	107	20	18.7	11.3 to 26.1	4.66	2.51 to 8.62	< .001	4.12	2.19 to 7.78	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.

**Table A2.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in Obsessive-Compulsive Domain and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Sex										
Male	535	43	8.0	5.7 to 10.3	1.00			1.00		
Female	452	61	13.5	10.3 to 16.6	1.79	1.18 to 2.70	.006	1.58	1.02 to 2.46	.042
Current age, years										
20-24	373	32	8.6	5.7 to 11.4	1.00					
25-29	292	31	10.6	7.1 to 14.1	1.27	0.75 to 2.13	.374			
$\geq 30$	318	41	12.9	9.2 to 16.6	1.58	0.97 to 2.57	.068			
Siblings										
Yes	888	90	10.1	8.2 to 12.1	1.00					
No	99	14	14.1	7.3 to 21.0	1.46	0.80 to 2.68	.221			
Immigration status										
Native Swiss	927	95	10.2	8.3 to 12.2	1.00					
Immigrant	54	8	14.8	5.3 to 24.3	1.52	0.70 to 3.32	.291			
Education										
Other degree	912	93	10.2	8.2 to 12.2	1.00					
University degree	75	11	14.7	6.7 to 22.7	1.51	0.77 to 2.97	.229			
Employment										
Employed	901	91	10.1	8.1 to 12.1	1.00			1.00		
Unemployed	65	13	20.0	10.3 to 29.7	2.23	1.17 to 4.24	.015	1.69	0.83 to 3.47	.150
Income, CHF										
< 3,001	389	46	11.8	8.6 to 15.0	1.00					
3,001-4,500	279	28	10.0	6.5 to 13.6	0.83	0.51 to 1.37	.468			
> 4,500	273	23	8.4	5.1 to 11.7	0.69	0.41 to 1.16	.161			
Age at diagnosis, years										
0-4	275	21	7.6	4.5 to 10.8	1.00			1.00		
5-9	263	25	9.5	6.0 to 13.1	1.27	0.69 to 2.33	.439	1.19	0.62 to 2.28	.604
10-15	449	58	12.9	9.8 to 16.0	1.79	1.06 to 3.03	.029	1.47	0.78 to 2.75	.230
Time since diagnosis, years										
5-14	260	31	11.9	8.0 to 15.9	1.00			1.00		
15-19	263	33	12.5	8.5 to 16.6	1.06	0.63 to 1.79	.828	1.34	0.74 to 2.43	.331
20-24	258	16	6.2	3.3 to 9.1	0.49	0.26 to 0.92	.026	0.61	0.29 to 1.27	.184
$\geq 25$	206	24	11.7	7.3 to 16.0	0.97	0.55 to 1.72	.928	1.31	0.66 to 2.59	.440
Diagnosis										
Leukemia	364	38	10.4	7.3 to 13.6	1.00					
Lymphoma	212	23	10.8	6.7 to 15.0	1.04	0.60 to 1.81	.878			
CNS tumor	115	17	14.8	8.3 to 21.3	1.49	0.80 to 2.75	.205			
Other tumor	294	26	8.8	5.6 to 12.1	0.83	0.49 to 1.41	.493			
Treatment										
Surgery	490	41	8.4	5.9 to 10.8	1.00			1.00		
Chemotherapy*	402	53	13.2	9.9 to 16.5	1.66	1.08 to 2.56	.021	1.22	0.75 to 1.99	.430
Radiotherapy†	87	10	11.5	4.8 to 18.2	1.42	0.68 to 2.96	.346	1.17	0.54 to 2.55	.696
BMT										
No	948	100	10.5	8.6 to 12.5	1.00					
Yes	39	4	10.3	0.7 to 19.8	0.97	0.34 to 2.78	.954			
Relapse										
Yes	869	94	10.8	8.8 to 12.9	1.00					
No	118	10	8.5	3.4 to 13.5	0.76	0.39 to 1.51	.438			
Late effects										
No late effects	595	37	6.2	4.3 to 8.2	1.00			1.00		
Somatic problems only	273	32	11.7	7.9 to 15.5	2.00	1.22 to 3.29	.006	1.65	0.98 to 2.80	.060
Psychological problems‡	107	33	30.8	22.1 to 39.6	6.73	3.97 to 11.41	< .001	5.78	3.33 to 10.04	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.

Psychological Distress in Adult Survivors of Childhood Cancer

**Table A3.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in Interpersonal Sensitivity Domain and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	P	OR	95% CI	P
Sex										
Male	535	55	10.3	7.7 to 12.9	1.00			1.00		
Female	452	108	23.9	20.0 to 27.8	2.74	1.93 to 3.90	< .001	2.46	1.66 to 3.64	< .001
Current age, years										
20-24	373	64	17.2	13.3 to 21.0	1.00					
25-29	292	50	17.1	12.8 to 21.4	1.00	0.66 to 1.50	.991			
≥ 30	318	49	15.4	11.4 to 19.4	0.88	0.59 to 1.32	.536			
Siblings										
Yes	888	142	16.0	13.6 to 18.4	1.00					
No	99	21	21.2	13.2 to 29.3	1.41	0.85 to 2.37	.186			
Immigration status										
Native Swiss	927	150	16.2	13.8 to 18.6	1.00					
Immigrant	54	13	24.1	12.7 to 35.5	1.64	0.86 to 3.14	.133			
Education										
Other degree	912	153	16.8	14.4 to 19.2	1.00					
University degree	75	10	13.3	5.6 to 21.0	0.76	0.38 to 1.52	.441			
Employment										
Employed	901	143	15.9	13.5 to 18.3	1.00			1.00		
Unemployed	65	18	27.7	16.8 to 38.6	2.03	1.15 to 3.60	.015	1.34	0.68 to 2.62	.401
Income, CHF										
< 3,001	389	77	19.8	15.8 to 23.8	1.00			1.00		
3,001-4,500	279	46	16.5	12.1 to 20.8	0.80	0.53 to 1.20	.277	1.06	0.69 to 1.65	.779
> 4,500	273	30	11.0	7.3 to 14.7	0.50	0.32 to 0.79	.003	0.79	0.48 to 1.30	.357
Age at diagnosis, years										
0-4	275	41	14.9	10.7 to 19.1	1.00					
5-9	263	41	15.6	11.2 to 20.0	1.05	0.66 to 1.69	.826			
10-15	449	81	18.0	14.5 to 21.6	1.26	0.83 to 1.89	.275			
Time since diagnosis, years										
5-14	260	48	18.5	13.7 to 23.2	1.00					
15-19	263	52	19.8	15.0 to 24.6	1.09	0.70 to 1.68	.703			
20-24	258	36	14.0	9.7 to 18.2	0.72	0.45 to 1.15	.165			
≥ 25	206	27	13.1	8.5 to 17.7	0.67	0.40 to 1.11	.120			
Diagnosis										
Leukemia	364	67	18.4	14.4 to 22.4	1.00					
Lymphoma	212	27	12.7	8.2 to 17.2	0.65	0.40 to 1.05	.077			
CNS tumor	115	26	22.6	15.0 to 30.3	1.29	0.78 to 2.16	.322			
Other tumor	294	43	14.6	10.6 to 18.7	0.76	0.50 to 1.15	.197			
Treatment										
Surgery	490	76	15.5	12.3 to 18.7	1.00					
Chemotherapy*	402	72	17.9	14.2 to 21.7	1.19	0.83 to 1.69	.338			
Radiotherapy†	87	14	16.1	8.4 to 23.8	1.04	0.56 to 1.95	.890			
BMT										
No	948	155	16.4	14.0 to 18.7	1.00					
Yes	39	8	20.5	7.8 to 33.2	1.32	0.60 to 2.93	.494			
Relapse										
Yes	869	148	17.0	14.5 to 19.5	1.00					
No	118	15	12.7	6.7 to 18.7	0.71	0.40 to 1.25	.238			
Late effects										
No late effects	595	61	10.3	7.8 to 12.7	1.00			1.00		
Somatic problems only	273	54	19.8	15.1 to 24.5	2.16	1.45 to 3.22	< .001	1.85	1.21 to 2.81	.004
Psychological problems‡	107	47	43.9	34.5 to 53.3	6.86	4.31 to 10.91	< .001	5.93	3.62 to 9.72	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.

**Table A4.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in Depression Domain and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	P	OR	95% CI	P
Sex										
Male	535	57	10.7	8.0 to 13.3	1.00			1.00		
Female	452	75	16.6	13.2 to 20.0	1.67	1.15 to 2.42	.007	1.32	0.86 to 2.03	.200
Current age, years										
20-24	373	46	12.3	9.0 to 15.7	1.00					
25-29	292	41	14.0	10.1 to 18.0	1.16	0.74 to 1.82	.517			
$\geq 30$	318	45	14.2	10.3 to 18.0	1.17	0.75 to 1.82	.481			
Siblings										
Yes	888	114	12.8	10.6 to 15.0	1.00					
No	99	18	18.2	10.6 to 25.8	1.51	0.87 to 2.61	.141			
Immigration status										
Native Swiss	927	120	12.9	10.8 to 15.1	1.00					
Immigrant	54	12	22.2	11.1 to 33.3	1.92	0.98 to 3.75	.056			
Education										
Other degree	912	120	13.2	11.0 to 15.4	1.00					
University degree	75	12	16.0	7.7 to 24.3	1.26	0.66 to 2.40	.488			
Employment										
Employed	901	113	12.5	10.4 to 14.7	1.00			1.00		
Unemployed	65	17	26.2	15.5 to 36.8	2.47	1.37 to 4.44	.003	1.85	0.91 to 3.76	.091
Income, CHF										
< 3,001	389	56	14.4	10.9 to 17.9	1.00			1.00		
3,001-4,500	279	40	14.3	10.2 to 18.4	1.00	0.64 to 1.54	.983	1.34	0.82 to 2.17	.242
> 4,500	273	23	8.4	5.1 to 11.7	0.55	0.33 to 0.91	.021	0.80	0.46 to 1.41	.444
Age at diagnosis, years										
0-4	275	30	10.9	7.2 to 14.6	1.00					
5-9	263	35	13.3	9.2 to 17.4	1.25	0.75 to 2.11	.394			
10-15	449	67	14.9	11.6 to 18.2	1.43	0.90 to 2.27	.125			
Time since diagnosis, years										
5-14	260	39	15.0	10.7 to 19.3	1.00					
15-19	263	38	14.4	10.2 to 18.7	0.96	0.59 to 1.55	.859			
20-24	258	32	12.4	8.4 to 16.4	0.80	0.49 to 1.33	.391			
$\geq 25$	206	23	11.2	6.9 to 15.5	0.71	0.41 to 1.24	.228			
Diagnosis										
Leukemia	364	44	12.1	8.7 to 15.4	1.00					
Lymphoma	212	24	11.3	7.1 to 15.6	0.93	0.55 to 1.58	.783			
CNS tumor	115	19	16.5	9.7 to 23.3	1.44	0.80 to 2.58	.222			
Other tumor	294	45	15.3	11.2 to 19.4	1.31	0.84 to 2.06	.231			
Treatment										
Surgery	490	56	11.4	8.6 to 14.2	1.00			1.00		
Chemotherapy*	402	58	14.4	11.0 to 17.9	1.31	0.88 to 1.94	.183	0.91	0.58 to 1.44	.701
Radiotherapy†	87	17	19.5	11.2 to 27.9	1.88	1.03 to 3.42	.038	1.85	0.96 to 3.57	.067
BMT										
No	948	123	13.0	10.8 to 15.1	1.00					
Yes	39	9	23.1	9.9 to 36.3	2.01	0.93 to 4.34	.075			
Relapse										
Yes	869	117	13.5	11.2 to 15.7	1.00					
No	118	15	12.7	6.7 to 18.7	0.94	0.53 to 1.66	.822			
Late effects										
No late effects	595	43	7.2	5.1 to 9.3	1.00			1.00		
Somatic problems only	273	47	17.2	12.7 to 21.7	2.67	1.72 to 4.15	< .001	2.50	1.53 to 4.08	< .001
Psychological problems‡	107	40	37.4	28.2 to 46.6	7.66	4.65 to 12.63	< .001	7.29	4.23 to 12.59	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.

Psychological Distress in Adult Survivors of Childhood Cancer

**Table A5.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in Anxiety Domain and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Sex										
Male	535	59	11.0	8.4 to 13.7	1.00					
Female	452	67	14.8	11.5 to 18.1	1.40	0.97 to 2.04	.076			
Current age, years										
20-24	373	41	11.0	7.8 to 14.2	1.00					
25-29	292	39	13.4	9.5 to 17.3	1.25	0.78 to 1.99	.353			
$\geq 30$	318	46	14.5	10.6 to 18.3	1.37	0.87 to 2.15	.171			
Siblings										
Yes	888	105	11.8	9.7 to 13.9	1.00			1.00		
No	99	21	21.2	13.2 to 29.3	2.01	1.19 to 3.39	.009	2.13	1.24 to 3.67	.006
Immigration status										
Native Swiss	927	113	12.2	10.1 to 14.3	1.00			1.00		
Immigrant	54	12	22.2	11.1 to 33.3	2.06	1.05 to 4.03	.035	2.24	1.12 to 4.49	.023
Education										
Other degree	912	112	12.3	10.2 to 14.4	1.00					
University degree	75	14	18.7	9.8 to 27.5	1.64	0.89 to 3.03	.114			
Employment										
Employed	901	112	12.4	10.3 to 14.6	1.00					
Unemployed	65	12	18.5	9.0 to 27.9	1.60	0.83 to 3.08	.164			
Income, CHF										
< 3,001	389	54	13.9	10.4 to 17.3	1.00					
3,001-4,500	279	30	10.8	7.1 to 14.4	0.75	0.46 to 1.20	.230			
> 4,500	273	34	12.5	8.5 to 16.4	0.88	0.56 to 1.40	.594			
Age at diagnosis, years										
0-4	275	29	10.5	6.9 to 14.2	1.00					
5-9	263	34	12.9	8.9 to 17.0	1.26	0.74 to 2.13	.391			
10-15	449	63	14.0	10.8 to 17.2	1.38	0.87 to 2.21	.173			
Time since diagnosis, years										
5-14	260	34	13.1	9.0 to 17.2	1.00					
15-19	263	37	14.1	9.9 to 18.3	1.09	0.66 to 1.80	.741			
20-24	258	30	11.6	7.7 to 15.5	0.87	0.52 to 1.48	.616			
$\geq 25$	206	25	12.1	7.7 to 16.6	0.92	0.53 to 1.59	.762			
Diagnosis										
Leukemia	364	45	12.4	9.0 to 15.7	1.00					
Lymphoma	212	24	11.3	7.1 to 15.6	0.90	0.53 to 1.53	.710			
CNS tumor	115	13	11.3	5.5 to 17.1	0.90	0.47 to 1.74	.762			
Other tumor	294	44	15.0	10.9 to 19.0	1.25	0.80 to 1.95	.332			
Treatment										
Surgery	490	48	9.8	7.2 to 12.4	1.00			1.00		
Chemotherapy*	402	64	15.9	12.3 to 19.5	1.74	1.17 to 2.60	.006	1.44	0.94 to 2.21	.094
Radiotherapy†	87	14	16.1	8.4 to 23.8	1.77	0.93 to 3.37	.084	1.64	0.85 to 3.17	.144
BMT										
No	948	120	12.7	10.5 to 14.8	1.00					
Yes	39	6	15.4	4.1 to 26.7	1.25	0.51 to 3.06	.618			
Relapse										
Yes	869	112	12.9	10.7 to 15.1	1.00					
No	118	14	11.9	6.0 to 17.7	0.91	0.50 to 1.64	.755			
Late effects										
No late effects	595	54	9.1	6.8 to 11.4	1.00			1.00		
Somatic problems only	273	41	15.0	10.8 to 19.3	1.77	1.15 to 2.73	.010	1.64	1.04 to 2.59	.035
Psychological problems‡	107	29	27.1	18.7 to 35.5	3.72	2.24 to 6.20	< .001	3.88	2.30 to 6.57	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.

**Table A6.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in Aggression Domain and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Sex										
Male	535	82	15.3	12.3 to 18.4	1.00					
Female	452	85	18.8	15.2 to 22.4	1.28	0.92 to 1.79	.147			
Current age, years										
20-24	373	65	17.4	13.6 to 21.3	1.00					
25-29	292	49	16.8	12.5 to 21.1	0.96	0.64 to 1.44	.827			
$\geq 30$	318	53	16.7	12.6 to 20.8	0.95	0.64 to 1.41	.791			
Siblings										
Yes	888	144	16.2	13.8 to 18.6	1.00					
No	99	23	23.2	14.9 to 31.6	1.56	0.95 to 2.58	.079			
Immigration status										
Native Swiss	927	149	16.1	13.7 to 18.4	1.00			1.00		
Immigrant	54	18	33.3	20.8 to 45.9	2.61	1.44 to 4.72	.001	2.84	1.54 to 5.24	.001
Education										
Other degree	912	154	16.9	14.5 to 19.3	1.00					
University degree	75	13	17.3	8.8 to 25.9	1.03	0.55 to 1.92	.921			
Employment										
Employed	901	153	17.0	14.5 to 19.4	1.00					
Unemployed	65	13	20.0	10.3 to 29.7	1.22	0.65 to 2.30	.534			
Income, CHF										
< 3,001	389	73	18.8	14.9 to 22.6	1.00					
3,001-4,500	279	46	16.5	12.1 to 20.8	0.85	0.57 to 1.28	.448			
> 4,500	273	37	13.6	9.5 to 17.6	0.68	0.44 to 1.04	.077			
Age at diagnosis, years										
0-4	275	45	16.4	12.0 to 20.7	1.00					
5-9	263	41	15.6	11.2 to 20.0	0.94	0.59 to 1.50	.806			
10-15	449	81	18.0	14.5 to 21.6	1.13	0.75 to 1.68	.564			
Time since diagnosis, years										
5-14	260	48	18.5	13.7 to 23.2	1.00					
15-19	263	49	18.6	13.9 to 23.3	1.01	0.65 to 1.57	.960			
20-24	258	45	17.4	12.8 to 22.1	0.93	0.60 to 1.46	.762			
$\geq 25$	206	25	12.1	7.7 to 16.6	0.61	0.36 to 1.03	.064			
Diagnosis										
Leukemia	364	65	17.9	13.9 to 21.8	1.00					
Lymphoma	212	28	13.2	8.6 to 17.8	0.70	0.43 to 1.13	.145			
CNS tumor	115	20	17.4	10.5 to 24.3	0.97	0.56 to 1.68	.909			
Other tumor	294	54	18.4	13.9 to 22.8	1.04	0.69 to 1.54	.866			
Treatment										
Surgery	490	80	16.3	13.1 to 19.6	1.00					
Chemotherapy*	402	70	17.4	13.7 to 21.1	1.08	0.76 to 1.54	.666			
Radiotherapy†	87	17	19.5	11.2 to 27.9	1.24	0.70 to 2.23	.461			
BMT										
No	948	160	16.9	14.5 to 19.3	1.00					
Yes	39	7	17.9	5.9 to 30.0	1.08	0.47 to 2.48	.861			
Relapse										
Yes	869	149	17.1	14.6 to 19.7	1.00					
No	118	18	15.3	8.8 to 21.7	0.87	0.51 to 1.48	.607			
Late effects										
No late effects	595	72	12.1	9.5 to 14.7	1.00			1.00		
Somatic problems only	273	52	19.0	14.4 to 23.7	1.71	1.16 to 2.52	.007	1.72	1.16 to 2.55	.007
Psychological problems‡	107	42	39.3	30.0 to 48.5	4.69	2.96 to 7.43	< .001	4.90	3.08 to 7.79	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.



Psychological Distress in Adult Survivors of Childhood Cancer

**Table A7.** Characteristics of Survivors With High Risk of Psychological Distress (caseness, T ≥ 63) in Phobic Anxiety Domain and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	P	OR	95% CI	P
<b>Sex</b>										
Male	535	41	7.7	5.4 to 9.9	1.00			1.00		
Female	452	60	13.3	10.1 to 16.4	1.84	1.21 to 2.80	.004	1.67	1.04 to 2.67	.034
<b>Current age, years</b>										
20-24	373	36	9.7	6.7 to 12.6	1.00					
25-29	292	33	11.3	7.7 to 14.9	1.19	0.72 to 1.97	.489			
≥ 30	318	32	10.1	6.8 to 13.4	1.05	0.63 to 1.73	.856			
<b>Siblings</b>										
Yes	888	84	9.5	7.5 to 11.4	1.00			1.00		
No	99	17	17.2	9.7 to 24.6	1.98	1.12 to 3.50	.018	2.35	1.26 to 4.37	.007
<b>Immigration status</b>										
Native Swiss	927	95	10.2	8.3 to 12.2	1.00					
Immigrant	54	6	11.1	2.7 to 19.5	1.09	0.46 to 2.63	.839			
<b>Education</b>										
Other degree	912	91	10.0	8.0 to 11.9	1.00					
University degree	75	10	13.3	5.6 to 21.0	1.39	0.69 to 2.80	.359			
<b>Employment</b>										
Employed	901	85	9.4	7.5 to 11.3	1.00			1.00		
Unemployed	65	15	23.1	12.8 to 33.3	2.88	1.55 to 5.35	.001	1.89	0.93 to 3.86	.080
<b>Income, CHF</b>										
< 3,001	389	52	13.4	10.0 to 16.7	1.00			1.00		
3,001-4,500	279	21	7.5	4.4 to 10.6	0.53	0.31 to 0.90	.018	0.65	0.37 to 1.16	.145
> 4,500	273	22	8.1	4.8 to 11.3	0.57	0.34 to 0.96	.035	0.85	0.48 to 1.51	.580
<b>Age at diagnosis, years</b>										
0-4	275	26	9.5	6.0 to 12.9	1.00					
5-9	263	22	8.4	5.0 to 11.7	0.87	0.48 to 1.58	.658			
10-15	449	53	11.8	8.8 to 14.8	1.28	0.78 to 2.10	.326			
<b>Time since diagnosis, years</b>										
5-14	260	33	12.7	8.6 to 16.7	1.00					
15-19	263	28	10.6	6.9 to 14.4	0.82	0.48 to 1.40	.467			
20-24	258	22	8.5	5.1 to 11.9	0.64	0.36 to 1.13	.126			
≥ 25	206	18	8.7	4.9 to 12.6	0.66	0.36 to 1.21	.177			
<b>Diagnosis</b>										
Leukemia	364	40	11.0	7.8 to 14.2	1.00					
Lymphoma	212	17	8.0	4.4 to 11.7	0.71	0.39 to 1.28	.251			
CNS tumor	115	17	14.8	8.3 to 21.3	1.41	0.76 to 2.59	.275			
Other tumor	294	27	9.2	5.9 to 12.5	0.82	0.49 to 1.37	.447			
<b>Treatment</b>										
Surgery	490	45	9.2	6.6 to 11.7	1.00					
Chemotherapy*	402	48	11.9	8.8 to 15.1	1.34	0.87 to 2.06	.181			
Radiotherapy†	87	8	9.2	3.1 to 15.3	1.00	0.45 to 2.20	.997			
<b>BMT</b>										
No	948	97	10.2	8.3 to 12.2	1.00					
Yes	39	4	10.3	0.7 to 19.8	1.00	0.35 to 2.88	.996			
<b>Relapse</b>										
Yes	869	92	10.6	8.5 to 12.6	1.00					
No	118	9	7.6	2.8 to 12.4	0.70	0.34 to 1.42	.322			
<b>Late effects</b>										
No late effects	595	35	5.9	4.0 to 7.8	1.00			1.00		
Somatic problems only	273	34	12.5	8.5 to 16.4	2.28	1.39 to 3.74	.001	1.86	1.11 to 3.11	.019
Psychological problems‡	107	30	28.0	19.5 to 36.5	6.23	3.62 to 10.73	< .001	5.20	2.92 to 9.24	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.

**Table A8.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in Paranoid Ideation and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
Sex										
Male	535	51	9.5	7.0 to 12.0	1.00			1.00		
Female	452	64	14.2	10.9 to 17.4	1.57	1.06 to 2.32	.025	1.22	0.80 to 1.85	.363
Current age, years										
20-24	373	42	11.3	8.1 to 14.5	1.00					
25-29	292	36	12.3	8.6 to 16.1	1.11	0.69 to 1.78	.671			
$\geq 30$	318	37	11.6	8.1 to 15.2	1.04	0.65 to 1.66	.877			
Siblings										
Yes	888	96	10.8	8.8 to 12.9	1.00			1.00		
No	99	19	19.2	11.4 to 26.9	1.96	1.14 to 3.37	.015	2.24	1.25 to 4.02	.007
Immigration status										
Native Swiss	927	103	11.1	9.1 to 13.1	1.00			1.00		
Immigrant	54	12	22.2	11.1 to 33.3	2.29	1.17 to 4.48	.016	2.46	1.17 to 5.18	.018
Education										
Other degree	912	109	12.0	9.8 to 14.1	1.00					
University degree	75	6	8.0	1.9 to 14.1	0.64	0.27 to 1.51	.309			
Employment										
Employed	901	103	11.4	9.4 to 13.5	1.00					
Unemployed	65	12	18.5	9.0 to 27.9	1.75	0.91 to 3.39	.095			
Income, CHF										
< 3,001	389	48	12.3	9.1 to 15.6	1.00					
3,001-4,500	279	36	12.9	9.0 to 16.8	1.05	0.66 to 1.67	.828			
> 4,500	273	23	8.4	5.1 to 11.7	0.65	0.39 to 1.10	.111			
Age at diagnosis, years										
0-4	275	27	9.8	6.3 to 13.3	1.00					
5-9	263	34	12.9	8.9 to 17.0	1.36	0.80 to 2.33	.257			
10-15	449	54	12.0	9.0 to 15.0	1.26	0.77 to 2.05	.361			
Time since diagnosis, years										
5-14	260	33	12.7	8.6 to 16.7	1.00					
15-19	263	35	13.3	9.2 to 17.4	1.06	0.63 to 1.76	.834			
20-24	258	23	8.9	5.4 to 12.4	0.67	0.38 to 1.18	.168			
$\geq 25$	206	24	11.7	7.3 to 16.0	0.91	0.52 to 1.59	.733			
Diagnosis										
Leukemia	364	39	10.7	7.5 to 13.9	1.00			1.00		
Lymphoma	212	11	5.2	2.2 to 8.2	0.46	0.23 to 0.91	.026	0.37	0.18 to 0.77	.008
CNS tumor	115	19	16.5	9.7 to 23.3	1.65	0.91 to 2.99	.099	0.77	0.36 to 1.65	.499
Other tumor	294	46	15.6	11.5 to 19.8	1.55	0.98 to 2.44	.062	1.29	0.77 to 2.14	.331
Treatment										
Surgery	490	45	9.2	6.6 to 11.7	1.00			1.00		
Chemotherapy*	402	54	13.4	10.1 to 16.8	1.53	1.01 to 2.33	.046	1.38	0.86 to 2.23	.187
Radiotherapy†	87	15	17.2	9.3 to 25.2	2.06	1.09 to 3.89	.026	1.94	0.89 to 4.25	.097
BMT										
No	948	107	11.3	9.3 to 13.3	1.00					
Yes	39	8	20.5	7.8 to 33.2	2.03	0.91 to 4.53	.084			
Relapse										
Yes	869	100	11.5	9.4 to 13.6	1.00					
No	118	15	12.7	6.7 to 18.7	1.12	0.63 to 2.00	.702			
Late effects										
No late effects	595	39	6.6	4.6 to 8.5	1.00			1.00		
Somatic problems only	273	41	15.0	10.8 to 19.3	2.52	1.58 to 4.01	< .001	2.30	1.39 to 3.79	.001
Psychological problems‡	107	33	30.8	22.1 to 39.6	6.36	3.77 to 10.73	< .001	6.73	3.83 to 11.83	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.

Psychological Distress in Adult Survivors of Childhood Cancer

**Table A9.** Characteristics of Survivors With High Risk of Psychological Distress (caseness,  $T \geq 63$ ) in Psychotic Tendencies Domain and Association With Potential Explanatory Factors by Univariable and Multivariable Logistic Regression

Factor	No. of Survivors	Cases			Univariable Regression			Multivariable Regression		
		No.	%	95% CI	OR	95% CI	<i>P</i>	OR	95% CI	<i>P</i>
<b>Sex</b>										
Male	535	70	13.1	10.2 to 15.9	1.00			1.00		
Female	452	84	18.6	15.0 to 22.2	1.52	1.07 to 2.14	.018	1.27	0.88 to 1.84	.207
<b>Current age, years</b>										
20-24	373	48	12.9	9.5 to 16.3	1.00			1.00		
25-29	292	43	14.7	10.7 to 18.8	1.17	0.75 to 1.82	.489	1.29	0.81 to 2.05	.288
$\geq 30$	318	63	19.8	15.4 to 24.2	1.67	1.11 to 2.52	.014	1.70	1.08 to 2.66	.021
<b>Siblings</b>										
Yes	888	134	15.1	12.7 to 17.4	1.00					
No	99	20	20.2	12.3 to 28.1	1.42	0.84 to 2.41	.186			
<b>Immigration status</b>										
Native Swiss	927	143	15.4	13.1 to 17.8	1.00					
Immigrant	54	11	20.4	9.6 to 31.1	1.40	0.71 to 2.78	.334			
<b>Education</b>										
Other degree	912	145	15.9	13.5 to 18.3	1.00					
University degree	75	9	12.0	4.6 to 19.4	0.72	0.35 to 1.48	.373			
<b>Employment</b>										
Employed	901	133	14.8	12.4 to 17.1	1.00			1.00		
Unemployed	65	20	30.8	19.5 to 42.0	2.57	1.47 to 4.48	.001	1.95	1.06 to 3.60	.032
<b>Income, CHF</b>										
< 3,001	389	65	16.7	13.0 to 20.4	1.00					
3,001-4,500	279	41	14.7	10.5 to 18.8	0.86	0.56 to 1.31	.483			
> 4,500	273	38	13.9	9.8 to 18.0	0.81	0.52 to 1.24	.330			
<b>Age at diagnosis, years</b>										
0-4	275	35	12.7	8.8 to 16.7	1.00					
5-9	263	43	16.3	11.9 to 20.8	1.34	0.83 to 2.17	.234			
10-15	449	76	16.9	13.5 to 20.4	1.40	0.91 to 2.15	.129			
<b>Time since diagnosis, years</b>										
5-14	260	35	13.5	9.3 to 17.6	1.00					
15-19	263	46	17.5	12.9 to 22.1	1.36	0.85 to 2.20	.204			
20-24	258	36	14.0	9.7 to 18.2	1.04	0.63 to 1.72	.871			
$\geq 25$	206	37	18.0	12.7 to 23.2	1.41	0.85 to 2.33	.183			
<b>Diagnosis</b>										
Leukemia	364	54	14.8	11.2 to 18.5	1.00					
Lymphoma	212	29	13.7	9.1 to 18.3	0.91	0.56 to 1.48	.703			
CNS tumor	115	21	18.3	11.2 to 25.3	1.28	0.74 to 2.23	.379			
Other tumor	294	50	17.0	12.7 to 21.3	1.18	0.77 to 1.79	.448			
<b>Treatment</b>										
Surgery	490	62	12.7	9.7 to 15.6	1.00			1.00		
Chemotherapy*	402	73	18.2	14.4 to 21.9	1.53	1.06 to 2.21	.023	1.03	0.68 to 1.56	.884
Radiotherapy†	87	18	20.7	12.2 to 29.2	1.80	1.01 to 3.23	.048	1.67	0.91 to 3.06	.099
<b>BMT</b>										
No	948	146	15.4	13.1 to 17.7	1.00					
Yes	39	8	20.5	7.8 to 33.2	1.42	0.64 to 3.15	.391			
<b>Relapse</b>										
Yes	869	134	15.4	13.0 to 17.8	1.00					
No	118	20	16.9	10.2 to 23.7	1.12	0.67 to 1.87	.668			
<b>Late effects</b>										
No late effects	595	61	10.3	7.8 to 12.7	1.00			1.00		
Somatic problems only	273	50	18.3	13.7 to 22.9	1.96	1.31 to 2.94	.001	1.88	1.22 to 2.90	.004
Psychological problems‡	107	40	37.4	28.2 to 46.6	5.23	3.26 to 8.39	< .001	5.07	3.09 to 8.32	< .001

Abbreviations: OR, odds ratio; CHF, Swiss franc; BMT, bone marrow transplantation.

\*Survivor had chemotherapy and may have had surgery but no radiotherapy.

†Survivor may have had chemotherapy and surgery.

‡May include somatic problems.