

Title page

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Abstract

【Background】 Childhood cancer survivors (CCSs) and their family members continue to live in fear even after treatment is concluded due to concerns about late effects and recurrences. The consequent long-term psychological burden requires long-term follow-up suited to the anxieties and needs of CCSs, which is why we have conducted the present survey.

【Methods】 We conducted a questionnaire survey at medical facilities in the Chugoku and Shikoku regions of Japan with CCSs who had survived for at least 5 years following treatment, and their family members.

【Results】 In total, 30 (53%) CCSs and 27 (47%) CCS family members answered the questionnaires. The median age of the CCSs and their family members (CCS parents) were 23 years and 51.5years, respectively. The most common diagnosis was acute lymphoblastic leukemia (47 %) and the median length of follow-up after the conclusion of treatment was 11 years. The percentage of participants who responded that they knew about late effects was significantly lower among CCSs than among CCS parents. Almost no significant difference was observed between CCSs and CCS parents in regarding their anxieties in specific life stages. The main consultants for CCSs and CCS parents were their family. However, they sought opportunities for casual consultation for current worries outside the family.

【Conclusions】 It is necessary for medical facilities not only to provide medical support, but also to establish a place where they can provide centralized consultation for the anxieties of CCSs and their parents.

Key words: Anxiety, Childhood cancer, Consultation, Survivors, Family care

Abbreviations : CCS, childhood cancer survivor; HSCT, hematopoietic stem cell transplantation

1. Introduction

Thanks to marked advances in childhood cancer therapy, the 5-year disease-free survival rate has recently increased to 70-80%.¹ In Japan, tens of thousands of children who have undergone cancer treatment are now childhood cancer survivors (CCSs). The number of CCSs who reach adulthood is considered to be 1 out of every 400-1000 young adults,^{2,3} a rate that is predicted to increase over time. Some CCSs experience so-called late effects, which manifest after a certain period of time following the conclusion of treatment. A non-Japanese study reported that 62.3% of CCSs experience at least one late effect, while 37.6% of CCSs experience two or more.⁴ Another study reported that among CCSs in Japan aged ≥ 16 years (mean age, 23.1 years), a late effect was observed in 50% of women and 64% of men; these complications include endocrinopathy, short stature, musculoskeletal disorders, liver dysfunction, skin disorders, and hair loss.^{5,6}

Furthermore, due to expectations of long-term prognosis after treatment for childhood cancer, late effects are not limited to physical aspects, but also extend to psychological and social aspects. Recently, long-term follow-up and support, which includes support for self-reliance, have grown in importance.²⁻¹² In particular, CCSs face many problems after treatment, such as in returning to school and society and resuming their original lives; as well as in subsequent life stages, such as employment, marriage, and having children. Thus, CCSs probably experience anxiety and therefore, require careful long-term follow-up and support tailored to each individual. However, no specific investigation into these issues has been previously conducted.

In provincial towns, residential areas are far from hospitals that perform childhood cancer treatment and, therefore, children in these areas cannot undergo frequent examinations and may lack social resources.

Therefore, as a contribution to more specific long-term follow-up and support tailored to the life stages and characteristics of CCSs, we conducted a survey to determine the examination status and lifestyles of CCSs and their families in provincial towns, their understanding of late effects, and the nature of their anxieties and problems in various life stages.

2. Methods

2.1. Survey participants and period

From April 2013 to March 2014, we distributed questionnaires to 57 CCS family member pairs who attended a long-term outpatient follow-up (CCSs aged 15-39 years). CCSs who qualified for the study were those who had survived for at least 5 years following the conclusion of treatment for leukemia, brain tumors, malignant lymphoma, bone and soft tissue tumors, and other malignant childhood cancers at general hospitals with pediatric wards (one university hospital and two general hospitals with at least 30 pediatric beds) in the Chugoku and Shikoku regions of Japan. The basic family selection criterion was ability to contact the parents, but if this was difficult, the questionnaire was distributed to grandparents and siblings.

Our analysis includes participants who did not provide complete responses; therefore, the numbers of valid responses in each section differ.

2.2. Survey content

The questionnaire survey asked participants about general characteristics, current mental and physical status, notification of diagnosis, anxieties regarding various life stages, and desires for long-term follow up and support. We developed items about anxieties in life stages based on questionnaire items and representative free responses in a study by Ishida et al.⁸ in consultation with two pediatricians, a pediatric ward nurse, two pediatric outpatient nurses, and two pediatric cancer nursing researchers. The questions covered six categories

(returning to school, higher education, employment, finances, marriage, and having children). After preparing the question items, we performed a preliminary survey to obtain opinions from the subjects, and reflected this content in the present survey. Each item was rated using a 4-point Likert-type scale (strongly agree, agree, disagree, strongly disagree). We also provided a free-response box to allow participants to write about anxieties and difficulties not addressed by the items. Questions were identical for CCSs and their family members, but CCS family members were asked to provide proxy responses for the CCSs. We prepared questions such that it was easy for CCS family members to provide proxy responses. Since the present survey subjects were 15 to 39-year old CCS and their family members, there is a difference in life stage events experienced by each subject. Thus, we presented both present and past tenses in the questionnaire, and provided a detailed explanation to look back in time for events already experienced (past tense) and to describe the present feelings on events not yet experienced (present tense).

2.3. Ethical considerations

Participants were selected by individuals responsible for pediatric cancer treatment at the collaborating facilities. The researchers and the staff at the collaborating facilities (physicians and nurses) distributed the questionnaire to participants who consented after explaining the ethical considerations based on an informed consent form that detailed the objective of the study; the anonymous, free, and voluntary nature of responses; and the absence of any detriment if they chose not to participate. Questionnaires were collected by mail. The study was approved by the Institutional Review Board of the Graduate School of Medicine, Dentistry, and Pharmaceutical Sciences at Okayama University.

2.4. Statistical analysis

For all items, we determined the frequencies for the CCS and CCS family member groups' demographic characteristics (gender and age), diagnosis, and experiences of radiotherapy and hematopoietic stem cell transplantation (HSCT). All questionnaires for which consent was obtained were included in the analysis, but in the comparative review of the anxiety in various life stages, analysis using McNemar's test and the kappa coefficient was performed only for CCS-CCS family member pairs. Fisher's exact test was used to compare general characteristics. The p-value for McNemar's test and Fisher's exact test was set at 5%, and the kappa coefficient criteria were set at 0.00-0.20 for slight, 0.21-0.40 for fair, 0.41-0.60 as moderate, 0.61-0.80 as substantial, and 0.81-1.00 indicating almost perfect, in reference to Landis et al.¹³ Data were analyzed with SPSS software, v. 22.0 (IBM Japan, Tokyo, Japan). To determine the difficulties currently being experienced by CCSs, their anxieties about long-term follow-up, and their desires for support systems from their own perspective, we conducted a qualitative analysis of their free responses using the KJ method.¹⁴

3. Results

3.1. Participants' general characteristics

The number of collected questionnaires (and collection rates) was 30 (53%) for CCSs and 27 (47%) for CCS family members. Of those, questionnaires were collected from 26 CCS-CCS family member pairs. In all cases, CCS family members were parents (male 1/female 26 hereafter referred to as "CCS parents"). Since Cronbach's α was 0.956 for CCS and 0.958 for CCS parents, the questionnaire did not have confusing options or ambiguous questions. The participants' characteristics are summarized in Table 1. The median ages of the CCSs and CCS parents were 23 (range: 18.3-26.8) years and 51.5 (range: 48.3-55.8) years, respectively. Half of the CCSs were men. The median age of CCSs at initial examination for childhood cancer was 9.5 (range: 5-12.3) years, and the median length of time since the end of their treatment was 11 (range: 8-16) years.

3.2. Current mental and physical status

Current mental and physical status is summarized in Table 2. Some of the problems indicated by the 20-30% of CCSs who responded that they experienced problems at a department other than the pediatric department at the hospital where they underwent childhood cancer treatment or at another hospital entirely included: "It's hard to know who to talk to"; "They know very little about childhood cancer"; "I know they're going to ask me details about the progress of my illness, but it's hard to explain"; and "They're different from pediatricians because they're not as friendly or easy to talk to."

3.3. Late effects

Late effects are summarized in Table 2. A total of 10 CCSs (33 %) responded that they knew about late effects versus 18 CCS parents (67 %); thus, the percentage of CCSs who knew about late effects was significantly lower (χ^2 test, $p < 0.05$).

3.4. Anxieties in specific life stages

Anxiety information is summarized in Tables 3-5, and Figures 1 and 2. For each item, the 26 CCS-CCS parent pairs were divided into two groups, namely those who selected “strongly agree” and “agree,” and those that selected “disagree” and “strongly disagree.” Comparisons and analyses were performed for these two groups. For anxieties regarding returning to school, in response to the item “I feel (felt) anxious about school because treatment reduced my physical strength,” the percentage of CCS parents who felt anxious was significantly higher than the percentage of CCSs themselves (McNemar’s test $p < 0.05$).

For anxieties regarding finances, many participants felt anxious in regard to the item “Because I had childhood cancer, I can never enroll in health insurance, even if I’m healed.” Participants also stated, “There isn’t much information on health insurance; I want to be given accurate information.”

In regard to having children, free responses included “If something happens with my children, I’d be worried that it has something to do with my illness or treatment” and “There’s no proof that childhood cancer is genetic, but I’m very anxious about it.”

When examining the agreement rate using the kappa coefficient for CCSs and CCS parents, 33 items

out of 34 had positive values: 8 items were “slight,” 13 items were “fair,” 5 items were “moderate,” and 7 items were indicated as “substantial.”

We compared item responses between parents of CCSs who had and had not undergone HSCT by Fisher’s exact test (Table 4). There were 4 items in which the percentage of respondents who felt anxiety was significantly higher among CCSs who had undergone HSCT. Among CCS parents, there were 5 items in which the percentage of respondents who felt anxiety was significantly higher among those whose relative had undergone HSCT.

We also compared those who responded to the item “I currently have physical maladies” with “very true” or “somewhat true” to those who responded “somewhat untrue” or “very untrue” by Fisher’s exact test (Table 5). Among the CCSs, there were 6 items (3 related to finances) in which the percentage of respondents who experienced anxiety was significantly higher among those who have physical maladies. Among CCS parents, there were 9 items in which the percentage of respondents who experienced anxiety was significantly higher among those whose relative has physical maladies.

Other general characteristics were also analyzed, including highest level of education, work experience, and living with or without parents, but no significant differences were found.

The main consultants for most CCSs (Figure 1) were their parents. Examination by life stage reveals that other than parents, for employment and having children the main consultants for CCSs were physicians, and teachers for returning to school and higher education. Overall the main consultants for most CCS parents (Figure 2) were their partners. Examination by life stage reveals that, besides their partners, the main consultants for most CCS parents were teachers for returning to school and higher education, and

physicians for all other life stages.

3.5. Desire for long-term follow-up

Desire for long-term follow-up was divided into 5 categories (“securing opportunities for consultation after treatment,” “long-term medical support,” “consideration for CCS,” “coordination with relevant facilities,” and “support for financial issues”) and 11 subcategories (Table 6).

4. Discussion

4.1. Current mental and physical status

Approximately 20% of CCSs suffer from physical maladies, are impaired in their daily lives, or experience mental distress. In an earlier study, Ishida et al. reported that the medical facilities most frequently visited by CCSs in the past year were those where they originally underwent treatment (74% of women, 64% of men).¹⁵ However, in the present survey, more than half of respondents indicated hospitals other than those where they underwent childhood cancer treatment. Since the present survey was conducted primarily in provincial towns, the hospitals where CCSs underwent treatment are assumed to be far away from their homes resulting in difficulty accessing hospitals. In the present survey, some of the CCSs who sought healthcare at departments or hospitals besides the pediatric department where they underwent childhood cancer treatment stated that it was hard to know who to talk to and that the physicians knew little about childhood cancer. In past surveys, childhood cancer specialists and pediatric surgeons considered the creation of original long-term follow-up guidelines, suited to Japan, for general practitioners who treat adult CCSs to follow as the most important issue in the care of CCSs.¹⁶ Cooperation with hospitals and general practitioners other than those involved in the CCSs' childhood cancer treatment is considered necessary, as is the introduction of specific health-care sites for CCSs and CCS parents.

4.2. Late effects

In the present survey, only approximately 30% of CCSs responded that they knew about late effects; the fact

that many CCSs do not know about potential complications after healing indicates that they have not received sufficient information. To date, 24 % of CCSs have responded that they feel anxious about late effects,⁸ but there are no previous studies surveying the knowledge of late effects. Although the present study does not confirm the specific nature of late effects and does not comprehensively indicate the participants' level of understanding of late effects, we consider the percentage to be low. Some CCSs who responded that they knew about late effects indicated that they found out from lectures and books, thus raising the possibility that these CCSs also lacked sufficient understanding of the issue. In contrast, 70% of CCS parents knew about late effects, demonstrating a tendency towards a statistically higher percentage than among CCSs themselves.

In the present study, we did not observe any differences in characteristics between those CCSs who did and did not know about late effects. When transitioning from diagnosis and treatment of childhood cancer to a form of medical care centered on long-term follow-up and support, it is important to develop a summary of treatment, an assessment of the required level of follow-up, and long-term follow-up guidelines; in addition, it is necessary to make CCSs and their families aware of the importance of long-term follow-up after treatment has concluded.¹⁷ We asked CCSs only about how they learned about late effects and did not inquire about what sort of explanations they had received from medical care staff. However, the fact that approximately 70% of CCSs responded that they did not know about late effects indicates the possibility that CCSs and their families require further explanation of the risks associated with late effects at an appropriate time after the conclusion of treatment. When doing so, if there is a change in the CCS's condition, he or she should consult the medical facility and should receive an explanation including information regarding likely future late effects, as well as types and frequencies of necessary follow-up tests to enable the CCS to consult with a

specialist as necessary.^{18,19}

4.3. Anxieties in specific life stages

Regarding anxieties experienced in specific life stages by CCSs and CCS parents, the agreement rates found using the kappa coefficient were positive for all items except one, with 12 out of the 34 items scoring from “moderate” to “quite high.” In past studies, negative mental states are known to be transmitted between parents and children who are treated in psychiatric hospitals.²⁰ Moreover, the bond between CCSs and their families is said to generally be stronger than normal.²¹ However, no reports have been found on agreement rates relating to anxiety in CCSs and CCS parents. Although more detailed surveys need to be conducted in the future, the current survey suggests that CCS parents have a broad understanding of the anxieties experienced by CCSs.

Concerning the level of anxiety regarding returning to school, Hiraga has reported that guardians are particularly anxious about their child’s physical condition.²² The present study also found that the percentage of respondents who felt anxious regarding a deterioration in physical condition caused by treatment was significantly higher among CCS parents than among the CCSs themselves.

The percentage of respondents who were anxious about having children, fearing that their own children may have cancer, was significantly higher among the CCSs than among their parents. Furthermore, a similar number of participants who indicated anxiety in the two items on having children, namely “I feel (felt) anxious about producing children” and “I am (was) worried that I cannot have children.” This result indicates that in order to prevent CCSs and their families from believing the mistaken and baseless idea that their

cancer is genetic, medical care providers need to convey accurate information when they discuss late effects.

However, one CCS stated, “I worry that my children will have something that will cause cancer in them,”

despite knowing that there is no evidence that cancer is genetic, indicating that CCSs and their families may require a system that provides long-term support and opportunities for consultation when they feel anxious.

For several items, the percentage of respondents who felt anxious was significantly higher among CCSs who had undergone HSCT than among those who had not. HSCT is highly invasive and a previous study has reported that health survey subscale scores (SF-36) were lower among CCSs who had undergone transplantation than among CCSs who had not.²³ Large numbers of CCSs are inferred to be susceptible to anxiety in post-treatment life stage events, supporting the need for careful follow-up and continued support.

In addition, in comparison to respondents without physical maladies, a significantly high percentage of CCSs who currently have physical maladies felt anxious regarding finances, while a significantly high percentage of CCS parents felt anxious regarding finances and employment. The CCSs with physical maladies were either employed or students. The nature of their financial anxieties was deduced to stem from anxiety that their current physical malady could prevent them from being able to obtain a job or to continue in their present position, and from anxiety that being unable to work satisfactorily would prevent them from obtaining a stable income, thus rendering them unable to afford necessary treatment and examinations for physical maladies. Although CCSs receive subsidies for specific chronic pediatric diseases and other forms of public assistance for medical care and cancer treatment in childhood, some CCSs are denied health insurance in adulthood, placing a particularly harsh financial burden on adult CCSs who suffer from late effects and other illnesses. Therefore, it is necessary to provide CCSs with information during long-term follow-up

outpatient visits regarding available subsidy programs and to demand the construction of long-term subsidy programs from public facilities.

The main consultants for most CCSs were their parents, while the main consultants for most CCS parents were their partners. Although respondents named teachers and physicians as other consultants, depending on their life stage, many respondents stated that consultation regarding anxieties in life stages takes place within the family. However, CCSs and their parents seek opportunities for casual consultation for current worries outside the family, as evidenced by responses of “I want someone to create opportunities for casual consultation about late effects and worries” and “I want to be able to get immediate consultation and medical advice when I have trouble.” In nursing care for CCSs outpatients, understanding of the physical and mental aspects of CCSs and the promotion of understanding regarding symptoms and treatment tend to be prioritized and practiced less than are supports for higher education, living in adult society, and self-reliance.²⁴ In pediatric outpatient care, the long-term follow-up and support sought by CCSs and their families is currently considered difficult to provide. Past reports on various types of long-term follow-up suggest that long-term follow-up support is important and that there is a requirement for a new type of outpatient contact point tasked with long-term follow-up. However, as described above, CCSs and their parents require, not only medical facilities to provide medical support, but also a place where centralized consultation can be provided for their anxieties, and it has been suggested that, at least in the provincial towns where the survey was conducted, there are insufficient resources for the provision of these consultation points. On the other hand, compared to those in metropolitan areas, there are few CCSs in provincial towns, and hospital staff, as well as economic and social resources are expected to be in short supply, making it difficult to establish many consultation

points that are easily accessible for CCSs and their parents. Future specific study is desirable to determine methods for new long-term follow-up support in provincial towns that employs information network technologies represented by the internet.

Limitations of the present study

The present study was limited to CCSs and their families undergoing regular outpatient examinations at the facilities that conduct childhood cancer treatment in the Chugoku and Shikoku regions, and only a small number of questionnaires were collected, which may have created a selection bias. Furthermore, the study had no control group (e.g., siblings or the general population) and a complete picture of the characteristic anxieties in CCSs could not be formulated. Thus, caution is necessary when generalizing the results of the present study to CCSs throughout Japan. Future studies should be conducted using sampling methods that allow for a higher level of generalization through the use of complete surveys and the inclusion of control groups. Additionally, validity and reliability of the survey items in the present questionnaire could not be examined sufficiently since our main objective was to ascertain the present situation. In the future, we would like to develop a properly verified scale that facilitates the straightforward confirmation of anxiety in CCSs and their family members, based on the present study and studies relating to long-term follow-up support. Furthermore, since this study only performed univariate analysis for anxiety in various life stages, other than undergoing HSCT or having a positive or negative subjective view of one's health, there may have been a variety of confounding factors affecting the results. In the future, multivariate analyses using a suitable scale must be performed to study important factors heightening anxiety.

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Disclosure

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Author contribution

Naoko Iwai and Akira Shimada contributed to the conception and design of this study; Atsushi Iwai, Sonoe Yamaguchi, Hirokazu Tsukahara, and Megumi Oda provided a critical review of the manuscript and supervised the whole study process. All authors read and approved the final manuscript.

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Table 1 Background of participating CCSs

	CCSs (N=30)
Gender	
Male	15(50 %)
Female	15(50 %)
Diagnosis of cancer	
Acute lymphocytic leukemia	14(47 %)
Malignant lymphoma	5(17 %)
Acute myeloid leukemia	3(10 %)
Bone and soft tissue tumors	3(10 %)
Other cancers	5(16 %)
Treatment	
Chemotherapy	29(97 %)
Radiotherapy	16(53 %)
Hematopoietic stem cell transplantation	8(27%)
Surgery	3(10 %)
Occupation	
Worker	15(50 %)
Homemaker/unemployed	2(7 %)
Student	13(43 %)
Work experience	
Yes	18(60 %)
No	12(40 %)
Education†	
Junior high school	1(6 %)
High school	2(12 %)
College or vocational school	4(24 %)
University or graduate school	7(41 %)
No response	3(17%)
Housing and livelihood	
Self-supporting	12(40 %)
Dependent on parents	18(60 %)
Marital status	
Married	5(17 %)
Single	25(83 %)
Have children	
Yes	2(7 %)

No

28(93 %)

† Current students (n=13) excluded.

Table2 Current mental and physical status and late effects

	CCSs (N=30)	CCS parents (N=27)
Current mental and physical status		
(CCSs and CCS parents responded “very true” or “somewhat true” to the items)†		
I have physical maladies	5(17%)	8(30%)
I am impaired in my daily life	4(13%)	6(22%)
I experience mental stress	7(23%)	9(33%)
Examination status (only CCSs)		
Facility where examination takes place in case of physical maladies		
The same hospital where CCSs underwent childhood cancer treatment	9(30%)	
Other department (non-pediatric) at the hospital where CCSs underwent childhood cancer treatment	0(0%)	
Another hospital than where CCSs underwent childhood cancer treatment	19(63%)	
No examination	2(7%)	
Attitude toward examination by other (non-pediatric) department in hospital where childhood cancer treatment was received		
No particular problem	23(77%)	
Have a problem	7(23%)	
Attitude toward examination in another hospital than where childhood cancer treatment was received		
No particular problem	20(67%)	
Have a problem	8(27%)	
No response	2(6%)	
Late effects		
Percentage responding that they knew about late effects	10(33%)	18(67%)
The point of time that CCSs/CCS parents learned about late effects		
Beginning of treatment	0(0%)	5(28%)
During treatment	1(10%)	7(39%)
After treatment	6(60%)	4(22%)
Unknown and no response	3(30%)	2(11%)
How did CCSs/CCS parents learn about late effects		
Physicians	3(30%)	9(50%)
Other CCSs	3(30%)	0(0%)
Book and newspaper	0(0%)	6(33%)
Lecture	1(10%)	3(17%)
CCS parents	1(10%)	-
Unknown and no response	2(20%)	0(0%)

† Questions were identical for CCSs and their parents, but CCS parents were asked to provide proxy responses for the CCSs.

Table 3 Anxieties in specific life stages

	CCSs (n=26)	CCS parents (n=26)	McNemar's test (<i>p</i> value)	<i>K</i> coefficient	
Returning to school					
1-1	I feel (felt) anxious about returning to school because treatment reduced my physical strength. 治療によって体力が低下し、復学が不安である(または不安であった)。	15(58%)	22(85%)	0.039	0.225
1-2	I feel (felt) anxious about returning to school because treatment caused my physical disability. 治療によって身体的な障害ができ、復学が不安である(または不安であった)。	7(27%)	11(42%)	0.289	0.324
1-3	I feel (felt) anxious about returning to school because treatment changed my appearance (hair loss, obesity, short stature, etc.). 治療によって外見が変化するため(脱毛、肥満、低身長等)、復学が不安である(または不安であった)。	15(58%)	20(77%)	0.125	0.413
1-4	I feel (felt) anxious about returning to school because treatment has (had) caused a delay in my studies. 治療によって学習が遅れたため、復学が不安である(または不安であった)。	13(50%)	12(46%)	1.000	0.462
1-5	I feel (felt) anxious about my relationships with my friends after I returned to school. 復学後の友人との関係が不安である(または不安であった)。	14(54%)	16(62%)	0.754	0.217
1-6	I feel (felt) anxious about my relationships with my school teachers after I returned to school. 復学後の学校の先生との関係が不安である(または不安であった)。	9(35%)	10(38%)	1.000	0.255
1-7	I feel (felt) anxious about whether people in my school would understand about my illness. 病気について周囲の理解が得られるか不安である(または不安であった)。	16(62%)	18(69%)	0.754	0.156
Higher education					
2-1	I feel (felt) anxious about higher education because treatment reduced my physical strength. 治療によって体力が低下し、進学が不安である(または不安であった)。	13(50%)	14(54%)	1.000	0.154
2-2	I feel (felt) anxious about higher education because treatment caused my physical disability. 治療によって身体的な障害ができ、進学が不安である(または不安であった)。	4(15%)	10(38%)	0.070	0.259
2-3	I feel (felt) anxious about higher education because treatment changed my appearance (hair loss, obesity, short stature, etc.). 治療によって外見が変化するため(脱毛、肥満、低身長等)、進学が不安で	8(31%)	11(42%)	0.453	0.428

ある(または不安であった)。

2-4	I feel (felt) anxious about higher education because treatment has (had) caused a delay in my studies. 治療によって学習が遅れたため、進学が不安である(または不安であった)。	9(35%)	7(27%)	0.625	0.641
2-5	I feel (felt) anxious about my relationships with my friends after I started higher education. 進学後の友人との関係が不安である(または不安であった)。	9(35%)	10(38%)	1.000	0.653
2-6	I feel (felt) anxious about my relationships with my school teachers after I started higher education. 進学先の学校の先生との関係が不安である(または不安であった)。	6(23%)	9(35%)	0.250	0.723
2-7	I feel (felt) anxious about whether people in my school (higher education) would understand about my illness. 病気について進学先の学校の周囲の理解が得られるか不安である(または不安であった)。	10(38%)	11(42%)	1.000	0.426

Employment

3-1	I feel (felt) anxious about working because treatment reduced my physical strength. 治療によって体力が低下し、仕事することに不安がある(または不安であった)。	6(23%)	9(35%)	0.688	0.329
3-2	I feel (felt) anxious about working because treatment caused my physical disability. 治療によって身体的な障害ができ、仕事することに不安がある(または不安であった)。	5(19%)	7(27%)	1.000	0.609
3-3	I feel (felt) anxious about my relationships with my supervisors at work. 職場の上司との人間関係が不安である(または不安であった)。	7(27%)	10(38%)	0.688	0.360
3-4	I feel (felt) anxious about my relationships with my colleagues at work. 職場の同僚等との人間関係が不安である(または不安であった)。	6(23%)	6(23%)	1.000	0.248
3-5	I feel (felt) anxious about whether people in my workplace would understand about my illness. 病気について職場の周囲の理解が得られるか不安である(または不安であった)。	6(23%)	13(50%)	0.125	0.276
3-6	I'm having difficulty because I cannot find work (I feel anxious that I may not be able to find work). 就職できない(雇用してもらえない)ため困っている(または就職できないのではないかと不安である)。	7(27%)	10(38%)	0.625	0.556
3-7	I'm having difficulty because I am unlikely to be hired as a full-time employee (I feel anxious that I may not be hired as a regular employee). 正規職員として雇用されにくいため困っている(または正規職員として雇用されないのではないかと不安である)。	7(27%)	10(38%)	0.500	0.778

Finances

4-1	I feel anxious about finances. 経済面について不安な気持ちがある。	11(42%)	11(42%)	1.000	0.618
4-2	My income is low and I feel anxious about whether I will be able to live on it. 収入が少なく、生活していくか不安である。	8(31%)	9(35%)	1.000	0.694
4-3	I feel anxious because there is no system that provides financial assistance from the (national and prefectural) government. 行政(国や県)からの経済的な援助の制度がなく、不安である。	8(31%)	8(31%)	1.000	0.167
Marriage					
5-1	I am (was) anxious about whether I can (could) get along with my partner's parents, siblings, and other family members. パートナーの両親、兄弟姉妹等、家族とうまくつきあえるか不安である(または不安であった)。	13(50%)	13(50%)	1.000	-0.017
5-2	I am (was) anxious about whether my partner's parents, siblings, and other family members will (would) understand my illness. パートナーの両親、兄弟姉妹等、家族に自分の病気について理解が得られるか不安である(または不安であった)。	13(50%)	19(73%)	0.508	0.108
5-3	I feel (felt) anxious because of differences in lifestyle habits between me and my partner. パートナーとの生活習慣の違いが不安である(または不安であった)。	6(23%)	11(42%)	0.289	0.241
5-4	I feel (felt) anxious about changes in living environment resulting from marriage. 結婚による生活環境が変化することが不安である(または不安であった)。	7(27%)	8(31%)	1.000	0.299
5-5	I feel (felt) anxious about whether I will be able to do housework in my married life. 結婚生活において、家事ができるか不安である(または不安であった)。	5(19%)	7(27%)	0.688	0.320
5-6	I feel (felt) anxious about financial issues in my married life. 結婚生活において、経済的な面で不安である(または不安であった)。	9(35%)	11(42%)	1.000	0.168
Having children					
6-1	I feel (felt) anxious about producing children. 子どもをつくることについて不安な気持ちがある(または不安な気持ちがあった)。	14(54%)	16(62%)	1.000	0.069
6-2	I am (was) worried that I cannot (could not) have children. 子どもができないのではないかと不安に思う(または不安に思った)。	15(58%)	18(69%)	0.727	0.059
6-3	I am (was) worried that my children will (would) have the same illness as me. 子どもが自分と同じ病気になるのではないかと不安に思う(または不安に思った)。	15(58%)	10(38%)	0.070	0.282
6-4	I feel (felt) anxious about whether I will be able to raise children. 子どもが育てられるか不安に思う(または不安に思った)。	6(23%)	3(12%)	0.453	0.039

[†] CCSs and CCS parents responded "strongly agree" or "agree" to the items.

[‡] Questions were identical for CCSs and their parents, but CCS parents were asked to provide proxy responses for the CCSs.

Table 4 Difference of anxieties in life stages between participants who had and not undergone HSCT

	Item	CCS			CCS parents		
		HSCT (+) <i>n</i> =6	HSCT (-) <i>n</i> =24	Fisher's exact test (<i>p</i> value)	HSCT (+) <i>n</i> =6	HSCT (-) <i>n</i> =19	Fisher's exact test (<i>p</i> value)
1-1	I feel (felt) anxious about school because treatment reduced my physical strength.	6(100%)	10(44%)	0.020	6(100%)	15(79%)	0.540
1-2	I feel (felt) anxious about returning to school because treatment acquired my physical disability.	3(50%)	5(23%)	0.311	4(67%)	5(28%)	0.150
1-3	I feel (felt) anxious about returning to school because treatment changed my appearance (hair loss, obesity, short stature, etc.).	5(83%)	12(50%)	0.196	5(83%)	14(74%)	1.000
1-4	I feel (felt) anxious about returning to school because treatment has (had) caused a delay in my studies.	6(100%)	9(38%)	0.017	4(67%)	8(42%)	0.378
1-5	I feel (felt) anxious about my relationship with my friends after I return to school.	4(67%)	13(54%)	0.672	3(50%)	12(63%)	0.653
1-6	I feel (felt) anxious about my relationship with my school teachers after I return to school.	3(50%)	7(29%)	0.372	2(33%)	7(37%)	1.000
1-7	I feel (felt) anxious about whether people in my school would understand about my illness.	5(83%)	12(52%)	0.354	5(83%)	12(63%)	0.624
2-1	I feel (felt) anxious about higher education because treatment reduced my physical strength.	3(50%)	11(46%)	1.000	5(83%)	7(37%)	0.073
2-2	I feel (felt) anxious about higher education because treatment acquired my physical disability.	1(17%)	4(18%)	1.000	4(67%)	6(33%)	0.192
2-3	I feel (felt) anxious about higher education because treatment changed my appearance (hair loss, obesity, short stature, etc.).	3(50%)	5(22%)	0.305	4(67%)	5(26%)	0.142
2-4	I feel (felt) anxious about higher education because treatment has (had) caused a delay in my studies.	3(50%)	6(26%)	0.339	2(33%)	5(26%)	1.000
2-5	I feel (felt) anxious about my relationship with my friends after I go to higher education.	3(50%)	8(35%)	0.646	2(33%)	8(42%)	1.000
2-6	I feel (felt) anxious about my relationship with my school teachers after I go to higher education.	3(50%)	3(13%)	0.075	3(50%)	5(26%)	0.344
2-7	I feel (felt) anxious about whether people in my school (higher education) would understand about my illness.	3(50%)	8(33%)	0.641	4(67%)	6(33%)	0.192

3-1	I feel (felt) anxious about working because treatment reduced my physical strength.	3(50%)	4(24%)	0.318	6(100%)	2(11%)	0.001 >
3-2	I feel (felt) anxious about working because treatment acquired my physical disability.	1(17%)	5(33%)	0.623	3(50%)	3(17%)	0.139
3-3	I feel (felt) anxious about my human relationships with my supervisors at work.	2(33%)	6(35%)	1.000	4(67%)	6(32%)	0.175
3-4	I feel (felt) anxious about my human relationships with my colleagues at work.	2(33%)	5(29%)	1.000	3(50%)	3(18%)	0.279
3-5	I feel (felt) anxious about whether people in my workplace would understand about my illness.	4(67%)	4(25%)	0.137	5(83%)	7(39%)	0.155
3-6	I'm having difficulty because I cannot find work (I feel anxious that I may not be able to find work).	3(50%)	5(33%)	0.631	3(50%)	7(39%)	0.665
3-7	I'm having difficulty because I am unlikely to be hired as a full-time employee (I feel anxious that I may not be hired as a regular employee).	3(50%)	5(33%)	0.631	3(50%)	7(39%)	0.665
4-1	I feel anxious about finances.	4(80%)	7(33%)	0.128	4(80%)	8(42%)	0.317
4-2	My income is low, and I feel anxious about whether I will be able to live on it.	4(80%)	5(25%)	0.040	4(80%)	5(26%)	0.047
4-3	I feel anxious because there is no system that allows for receiving financial assistance from the (national and prefectural) government.	4(80%)	4(20%)	0.023	4(80%)	5(26%)	0.047
5-1	I am (was) anxious about whether I can (could) get along with my partner's parents, siblings, and other family members.	5(83%)	11(55%)	0.352	4(67%)	8(42%)	0.378
5-2	I am (was) anxious about whether my partner's parents, siblings, and other family members will (would) understand my illness.	5(83%)	11(55%)	0.352	5(83%)	12(63%)	0.624
5-3	I feel (felt) anxious because of differences in lifestyle habits between me and my partner.	2(33%)	5(25%)	1.000	5(83%)	6(32%)	0.056
5-4	I feel (felt) anxious about changes in living environment resulting from marriage.	2(33%)	7(35%)	1.000	3(75%)	4(24%)	0.088
5-5	I feel (felt) anxious about whether I will be able to do housework in my married life.	1(17%)	5(25%)	1.000	4(67%)	3(16%)	0.032
5-6	I feel (felt) anxious about financial issues in my married life.	3(50%)	7(35%)	0.644	5(83%)	6(32%)	0.056
6-1	I feel (felt) anxious about producing children.	5(100%)	12(60%)	0.140	3(60%)	11(58%)	1.000
6-2	I'm worried that I can't have children.	4(80%)	14(70%)	1.000	3(75%)	13(68%)	1.000
6-3	I am (was) worried that my children will (would) have the same illness as me.	4(100%)	13(65%)	0.283	3(60%)	6(32%)	0.326
6-4	I feel (felt) anxious about whether I will be able to raise children.	1(25%)	5(25%)	1.000	3(60%)	0(0%)	0.005

†CCS and CCS parents responded "strongly agree" or "agree" to the items.

††Questions were identical for CCSs and their parents, but CCS parents were asked to provide proxy responses for the CCSs.

Table 5 Difference of anxieties at life stages between ill-conditioned and well-conditioned participants

Item	CCS			CCS parents			
	Ill-conditioned <i>n</i> =5	Well-conditioned <i>n</i> =25	Fisher's exact test (<i>p</i> value)	Ill-conditioned <i>n</i> =8	Well-conditioned <i>n</i> =19	Fisher's exact test (<i>p</i> value)	
1-1	I feel (felt) anxious about school because treatment reduced my physical strength.	3(60%)	13(54%)	1.000	8(100%)	15(79%)	0.285
1-2	I feel (felt) anxious about returning to school because treatment acquired my physical disability.	2(40%)	6(26%)	0.606	5(63%)	6(33%)	0.218
1-3	I feel (felt) anxious about returning to school because treatment changed my appearance (hair loss, obesity, short stature, etc.).	3(60%)	14(56%)	1.000	7(88%)	14(74%)	0.633
1-4	I feel (felt) anxious about returning to school because treatment has (had) caused a delay in my studies.	3(60%)	12(48%)	1.000	4(50%)	9(47%)	1.000
1-5	I feel (felt) anxious about my relationship with my friends after I return to school.	3(60%)	14(56%)	1.000	5(63%)	12(63%)	1.000
1-6	I feel (felt) anxious about my relationship with my school teachers after I return to school.	3(60%)	7(28%)	0.300	4(50%)	6(32%)	0.415
1-7	I feel (felt) anxious about whether people in my school would understand about my illness.	3(60%)	14(58%)	1.000	7(88%)	12(63%)	0.364
2-1	I feel (felt) anxious about higher education because treatment reduced my physical strength.	2(40%)	12(48%)	1.000	6(75%)	8(42%)	0.209
2-2	I feel (felt) anxious about higher education because treatment acquired my physical disability.	2(40%)	3(13%)	0.207	6(75%)	4(22%)	0.026
2-3	I feel (felt) anxious about higher education because treatment changed my appearance (hair loss, obesity, short stature, etc.).	2(40%)	6(25%)	0.597	4(50%)	7(37%)	0.675
2-4	I feel (felt) anxious about higher education because treatment has (had) caused a delay in my studies.	2(40%)	7(29%)	0.633	3(38%)	4(21%)	0.633
2-5	I feel (felt) anxious about my relationship with my friends after I go to higher education.	3(60%)	8(33%)	0.339	4(50%)	6(32%)	0.415
2-6	I feel (felt) anxious about my relationship with my school teachers after I go to higher education.	3(60%)	3(12%)	0.041	4(50%)	5(26%)	0.375
2-7	I feel (felt) anxious about whether people in my school (higher	3(60%)	8(32%)	0.327	6(86%)	5(26%)	0.021

	education) would understand about my illness.						
3-1	I feel (felt) anxious about working because treatment reduced my physical strength.	3(60%)	4(22%)	0.142	6(75%)	3(16%)	0.006
3-2	I feel (felt) anxious about working because treatment acquired my physical disability.	3(60%)	3(19%)	0.115	4(50%)	3(17%)	0.149
3-3	I feel (felt) anxious about my human relationships with my supervisors at work.	3(60%)	5(28%)	0.297	6(75%)	4(21%)	0.025
3-4	I feel (felt) anxious about my human relationships with my colleagues at work.	3(60%)	4(22%)	0.142	3(43%)	3(17%)	0.298
3-5	I feel (felt) anxious about whether people in my workplace would understand about my illness.	3(60%)	5(29%)	0.309	7(88%)	6(33%)	0.030
3-6	I'm having difficulty because I cannot find work (I feel anxious that I may not be able to find work).	3(60%)	5(31%)	0.325	5(63%)	5(29%)	0.194
3-7	I'm having difficulty because I am unlikely to be hired as a full-time employee (I feel anxious that I may not be hired as a regular employee).	3(60%)	5(31%)	0.325	5(63%)	5(29%)	0.194
4-1	I feel anxious about finances.	4(100%)	7(32%)	0.022	6(86%)	6(33%)	0.030
4-2	My income is low, and I feel anxious about whether I will be able to live on it.	3(100%)	6(27%)	0.037	6(86%)	3(17%)	0.003
4-3	I feel anxious because there is no system that allows for receiving financial assistance from the (national and prefectural) government.	4(100%)	4(19%)	0.006	5(71%)	4(22%)	0.058
5-1	I am (was) anxious about whether I can (could) get along with my partner's parents, siblings, and other family members.	3(75%)	13(59%)	1.000	6(75%)	7(37%)	0.103
5-2	I am (was) anxious about whether my partner's parents, siblings, and other family members will (would) understand my illness.	3(75%)	13(59%)	1.000	7(88%)	12(63%)	0.364
5-3	I feel (felt) anxious because of differences in lifestyle habits between me and my partner.	2(50%)	5(23%)	0.287	6(75%)	5(26%)	0.033
5-4	I feel (felt) anxious about changes in living environment resulting from marriage.	3(75%)	6(27%)	0.104	4(67%)	4(24%)	0.131
5-5	I feel (felt) anxious about whether I will be able to do housework in my married life.	3(75%)	3(14%)	0.028	4(50%)	3(16%)	0.145
5-6	I feel (felt) anxious about financial issues in my married life.	3(75%)	7(32%)	0.264	6(75%)	6(32%)	0.087
6-1	I feel (felt) anxious about producing children.	4(100%)	13(62%)	0.269	5(71%)	11(58%)	0.668
6-2	I'm worried that I can't have children.	4(100%)	14(67%)	0.294	6(100%)	12(63%)	0.137
6-3	I am (was) worried that my children will (would) have the same illness as me.	4(100%)	13(65%)	0.283	3(43%)	7(37%)	1.000
6-4	I feel (felt) anxious about whether I will be able to raise children.	3(75%)	3(15%)	0.035	3(43%)	0(0%)	0.013

†CCS and CCS parents responded "strongly agree" or "agree" to the items.

††Questions were identical for CCSs and their parents, but CCS parents were asked to provide proxy responses for the CCSs.

Table 6 Desire for long-term follow-up

Category	Subcategories	Examples
Securing opportunities for consultation after treatment	Securing opportunities for consultation regarding medical care	A platform should be created that allows for casual consultations regarding late complications and other concerns. I want to be able to immediately consult and receive medical advice when I'm having difficulty.
	Securing opportunities for mutual consultation between people who have experienced childhood cancers	I want a platform that allows for people with the same disease to listen to each other's experiences and to talk about each other's difficulties. I want to obtain information on the status of people with experience of the disease after they have been cured.
	Securing opportunities for consultation regarding financial issues	I want to be able to consult someone regarding financial matters, including services I can use, as well as the conditions there of. I want institutions that allow for consultations regarding employment.
	Long-term medical support	Medical support in terms of physical issues I want clinical laboratory tests and clinical examinations by physicians to be carried out on a regular basis. Medical support in terms of psychological issues I want a platform that allows for receiving counseling.
Consideration for CCSs	Consideration at school	Consideration should be given regarding the number of days of attendance, school dropout, and appropriate responses in cases of bullying.
	Consideration in terms of employment and life in the workplace	Personal medical history should not be used as a reason for non-recruitment. Consideration should be given so that patients can work with confidence even if there are limitations and sequelae resulting from the disease.
Coordination with relevant facilities	Collaboration between the department of pediatrics and other departments	There should be a smooth transition from the department of pediatrics to the department of internal medicine and other departments for adults.
	Collaboration during readmission to school	A close exchange of information should be maintained between teachers in charge of in-hospital school education and the patient's school homeroom teacher.
	Collaboration to assist patients proceeding to the next stage of education	Sharing of information should be carried out between schools in regard to the nature of the disease and the patient's condition while he/she was in school.
Support for financial issues	Support for financial issues	There should be an increase in the amount of compensation that allows for a reduction in medical expenses. Assistance for medical expenses should be provided even when the patient becomes older than 20 years old.

Figure legends

Figure 1

The main consultants for CCSs in specific life stages (multiple replies allowed)

Overall, the main consultants for most CCSs were their parents.

The maximum number of responses by main consultants were as follows. These numbers were calculated from family situations at the time of the survey.

parents, doctor, teacher, friend, other: 30 family (excluding parents) : 24

Figure 2

The main consultants for CCS parents in specific life stages (multiple replies allowed)

Overall, the main consultants for most CCS parents were their partners.

The maximum number of responses by main consultants were as follows. These numbers were calculated from family situations at the time of the survey.

partner, family (excluding partner): 24 doctor, teacher, friend, other: 30

Figure1 The main consultants for CCS

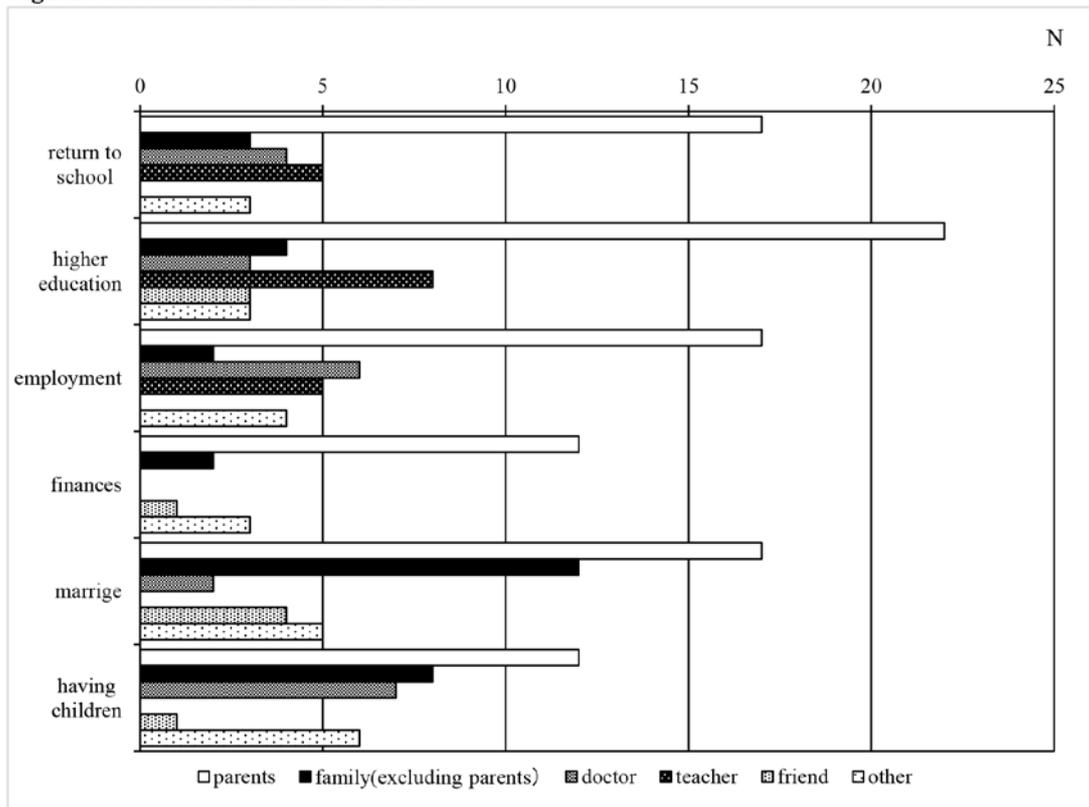


Figure 2 The main consultants for CCS parents

