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Psychosocial Follow-Up in Survivorship as a Standard of Care in Pediatric Oncology

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Childhood cancer survivors (CCS) have a high risk of medical late effects following cancer therapy. Psychosocial late effects are less often recognized. Many CCS do not receive long-term follow-up (LTFU) care, and those who do are rarely screened for psychosocial late effects. An interdisciplinary team conducted a systematic review of qualitative and quantitative studies to assess social, educational, vocational, psychological, and behavioral outcomes along with factors related to receipt of LTFU care. We propose that psychosocial screening be considered a standard of care in long-term follow-up care and that education be provided to promote the use LTFU care starting early in the treatment trajectory. Pediatr Blood Cancer 2015;62:S514–S584. © 2015 Wiley Periodicals, Inc.

Key words: long-term follow-up care; survivorship; childhood cancer; psychosocial

INTRODUCTION

Rapid improvement in treatment for child and adolescent cancers has led to greatly increased survival with a growing population of over 300,000 long-term childhood cancer survivors (CCS) in the United States.[1] Sixty percent of CCS report medical morbidities.[2–4] Long-term follow-up (LTFU) care is recommended and involves systematic assessment to detect and treat health problems related to childhood cancer and its treatment.[5] However, late effects of childhood cancer are not limited to physical health problems. Previous studies describe CCS as having psychosocial difficulties impacting academic achievement, employment, social, and family relationships,[6–15] affective distress,[16–18] posttraumatic stress symptoms,[19–21] suicidality,[22] and tobacco and heavy alcohol use.[23,24] Few survivors receive dedicated LTFU care,[25–29] and even fewer receive a comprehensive psychosocial assessment.[30]

The Children's Oncology Group (COG) has outlined LTFU guidelines that provide recommendations for regular surveillance and care for those 2+ years from end of treatment based on specific treatment exposures.[31,32] The COG LTFU guidelines are updated periodically using systematic reviews of published scientific literature. While guidelines primarily pertain to physical late effects, recommendations also include screening for psychological, social, and behavioral difficulties.[31] This manuscript builds on the COG recommendations and provides an additional, updated review of the recent literature focusing on the psychosocial sequelae from childhood cancer and the psychosocial factors influencing uptake of LTFU care. The goal of the review is to identify and summarize the evidence so that screening can target the most relevant psychosocial domains. Screening for distress among cancer survivors has been recommended starting at cancer diagnosis and at appropriate intervals thereafter.[33–35] The provision of screening supports patients' wishes since psychological well-being has been described by CCS as more important than physical quality of life (QoL) dimensions.[36]

Psychosocial Standard of Care

- Long-term survivors of child and adolescent cancers should receive yearly psychosocial screening for: (1a) adverse educational and/or vocational progress, social and relationship difficulties; (1b) distress, anxiety, and depression; and (1c) risky health behaviors.
- (2) Adolescent and young adult survivors and their parents should receive anticipatory guidance on the need for life-long follow-up care by the time treatment ends, and repeated at each follow-up visit.

METHODS

This review was performed as part of the collaborative *Standards for Psychosocial Care of Children with Cancer and Their Families* effort. For a full description of the methods used

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Abbreviations: CCS, childhood cancer survivors; CNS, central nervous system; COG, Children's Oncology Group; HRQoL, health-related quality of life; LTFU, long-term follow-up; PTSD, post-traumatic stress disorder; QoL, quality of life

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to develop each standard, please refer to Wiener et al.[37] Search terms specific to this manuscript included "education," "vocation," "depression," "anxiety," "tobacco," "alcohol," or "long-term follow-up." (The full list of search terms is available in Supplemental Table I.) The search identified 813 articles of which 93 met inclusion criteria and were reviewed. (See Supplemental Figure I, PRISMA.) These articles included six systematic reviews, three narrative reviews, one case-control, 67 cross-sectional/cohort or retrospective chart reviews, 10 qualitative and four mixed methods studies, one opinion piece, and one randomized trial. Studies were published January 2011 to April 2015, supplementing the COG LTFU guidelines, Version 4.[31] Inclusion criteria were: CCS (i) diagnosed between ages 0–18; (ii) completed treatment for initial cancer diagnosis; and (iii) psychosocial issues were key outcome measures. Studies were excluded when CCS data were aggregated with adult cancer survivors, main outcomes were focused on measurement validation or interventions, except where unique data on psychosocial factors was provided. Additional articles were identified through references in the included articles, and by group consensus. Standards were developed following a lengthy procedure as outlined in Wiener et al.[37] adhering to suggested methods for guideline development in the existing literature.[38,39] The goal of the paper was to document the type and extent of psychosocial issues in CCS in order to develop recommendations that can be applied across all cancer treatment centers and begin the process of addressing CCS psychosocial issues.

The study team includes epidemiologists (EAL and ARR), social workers (FP and BJ), a psychologist (LAS), an oncologist (ARR), and a stakeholder (EAL). A nurse and a social worker with CCS specialization externally reviewed drafts of the manuscript.

RESULTS

Table I summarizes findings from the literature review. In general, studies describe most CCS as well-adjusted; however, studies have described poorer psychosocial outcomes compared with the controls.

Social, Academic, and Vocational Difficulties

CCS may be at risk for social and relationship difficulties. For example, CCS who participated in the 2009 U.S. Behavioral Risk Factor Surveillance Study (BRFSS) were significantly more likely to report poor social support compared with their peers.[40] Reports from the Italian, Swiss, and U.S. Childhood Cancer Survivorship Studies (CCSS) described lower marriage rates among CCS compared with the population controls and data from the U.S. cohort suggested CCS have poorer sexual health.[13–15,41]

Educational and vocational disadvantages are also reported in CCS. Although some CCS report greater school satisfaction than controls,[42] CCS generally have lower educational attainment.[15,43–45] Likewise, they are less often in high skilled managerial or professional positions, less likely to work full-time, receive lower incomes than their gender-matched siblings,[46] and are more likely to be unemployed.[15,47] Survivors of Wilms tumors are slightly less likely to go to college or obtain employment.[43] Brain tumor survivors are at risk for poor vocational outcomes;[47] however, special education programs can minimize these disparities.[15] Hence, early detection and referral for services has potential to improve patient outcomes. Risk factors for social, academic, and vocational difficulties include diagnosis or treatment for central nervous system (CNS) tumors, premorbid learning or emotional difficulties, low income or education, hematopoietic cell transplant, and younger age at diagnosis.[31]

Mental Health Concerns

Systematic and narrative reviews describe CCS as experiencing lower psychological well-being, greater anxiety, more problem behaviors, and more PTSS.[48] Brain tumor survivors report greater depression, anxiety, suicidal ideation, and behavioral problems.[49] Studies of acute lymphoblastic leukemia survivors report higher risk for adverse psychological outcomes such as depression and somatic distress.[15]

Large, high-quality studies including the CCSS from the U.S. and Switzerland, the U.S. BRFSS, and the Danish Cohort study provide evidence of greater mental health distress,[50] greater utilization of mental health care,[47,51] greater risk for neurodevelopmental, emotional, and behavioral disorders,[52] more psychoactive medication use,[53] suicidal ideation,[54] and higher rate of posttraumatic stress in CCS compared with sibling controls.[55] In a study comparing CCS to healthy peers, CCS reported more days per month of poor mental health.[40] A longitudinal study noted worsening physical health predicted greater depression, anxiety, and somatization.[56] Some large studies report no differences in mental health outcomes between CCS and siblings,[57,58] and no differences in anxiety and depression scores between CCS and population controls.[59] Negative outcomes are generally associated with a diagnosis or treatment for CNS tumors, premorbid learning or emotional difficulties, perceived poor health, female gender, and low socioeconomic status.[31]

Risky Health Behaviors

Compared with a representative sample of matched peers, smoking is more common among adult CCS and use of smokeless tobacco is more common among a sub-sample non-white men aged 35–49.[40,60] As a whole, CCS are less likely to engage in smokeless and dual tobacco use (smokeless and combustible).[60] Past month and binge drinking is not significantly different between adult survivors and controls.[40] In adolescent CCS, tobacco and alcohol use is comparable to siblings though current beer/wine consumption, binge drinking, and smokeless tobacco use in adolescent CCS.[61] Lower household income or education and older age at diagnosis increase risk for risky health behaviors.[31]

Psychosocial Associates of Engagement in Long-Term Follow-Up Care

Our search methods did not identify evidence-based practices to promote ongoing LTFU care for CCS or youth transition to LTFU care in the adult system. Patient-provider communication about health risks and follow-up care may be important to sustain engagement in care and uptake of recommended screening.[62] Cancer-related anxiety and perceived poor health status relates to the likelihood of

TABLE I. Psychosocial Follow-Up in Survivorship-Summary of Literature

Standard	Evidence summary	Methodology	Quality of evidence	Strength of recommendation
1. Long-term survivors of child and adolescent cancers should receive yearly psychosocial screening for:				
(a) Adverse educational and/or vocational progress, social and relationship difficulties;	Subsets have impaired social relationships, lower educational and vocational attainment, and impaired QoL due to psychological distress, medical late effects, or financial hardship. Multiple studies highlight identifiable and possible modifiable risk factors for poor QoL in CCS.	Cross-sectional survey-based, descriptive, and qualitative studies were most common; several large survivorship cohort studies included. Few systematic reviews of descriptive studies; no experimental or quasi-experimental studies. Broad range of selected variables examined QoL.	Moderate: consistent findings from lower level evidence studies.	Strong: Recommendation applies to most patients in most circumstances, low risk and high benefit associated with guideline with potential health benefit for CCS and family. Further research needed to increase confidence in the estimate of effect and to inform future interventions.
(b) Distress, anxiety, and depression;	Subsets of CCS are at higher risk for poor mental health outcomes, especially survivors of CNS tumors.	Systematic reviews, cross-sectional survey-based, cohort, qualitative, and mixed methods studies. Many large survivorship cohort studies with controls are included of descriptive studies.	High: consistent findings from multiple studies with large cohorts. More longitudinal studies are needed.	Strong: Recommendation applies to all survivors, low risk and high benefit associated with guideline and potential health benefit for CCS. Future longitudinal research could better identify trajectory of distress and critical opportunities for intervention.
(c) Risky health behaviors.	Heavy alcohol use, smoking, smokeless tobacco and dual tobacco use are similar or lower in CCS compared with peers or national norms. Some of the most medically vulnerable groups smoke and drink similarly to peers.	Five of the seven studies were cross sectional, several with large samples and controls. One case-control design and one systematic review (COG) citing additional studies with strong methodology.	High-moderate quality of evidence. Studies identified sub-groups at risk.	Strong: Recommendation applies to all survivors. Low risk associated with guideline, high potential health benefit given possible synergistic health risks for CCS. Brief screeners exist but future research needed to test them in CCS population.
2. Adolescent and young adult survivors and their parents should receive anticipatory guidance on the need for life-long follow-up care by the time treatment ends, and repeated at each follow-up visit.	Psychosocial variables impact uptake of follow-up care and readiness to transition to adult care. These include patient knowledge/perception of late effects, vulnerability, motivation to pursue follow-up care, and disease self-management/self-efficacy.	Cross-sectional cohort, qualitative (focus groups and interviews), opinion	Low to moderate: evidence for critical outcomes, from observational and cross-sectional studies.	Strong: Recommendation applies to most survivors. Future research should assess the impact of transition readiness and receipt of LTFU care on long-term outcomes of CCS.

CCS, childhood cancer survivors; PTSD, post-traumatic stress disorder; CNS, central nervous system; HRQoL, health related; COG, Children's Oncology Group; LTFU, long-term follow-up.

having conversations about risk-based care and screening.[62] Hypothesized psychosocial factors that impact uptake of follow-up care and readiness to transition to adult care include patient knowledge/perception of late-effects, feelings of health vulnerability, motivation to pursue follow-up care, and disease self-management.[63–66] Cancer identity and emotional components such as fear, gratitude, and gaining perspective positively influenced likelihood of transition to adult care.[67]

DISCUSSION

While results from the systematic review show that many CCS are able to adjust and move beyond their cancer experience, psychosocial difficulties are also widely described. Findings from the present systematic review are consistent with previous studies. Our review supported prior reports that CCS have lower educational and vocational attainment compared with the controls.[2] Screening for needed educational support during and after cancer treatment may minimize this disparity.[15] A pattern of greater psychosocial distress,[2,17,68,69] (but not greater psychopathology [70]) in CCS compared with controls was also supported in this review.

Reports that PTSD is more common among CCS may be partially explained by methodological differences.[71–73] For instance, lower rates of PTSD are reported when authors employ stricter criteria for diagnosis, or direct the focus on the cancer as the sole traumatic event.[71,74] Full coverage of the PTSD debate falls outside the scope of the present review. However, because considerable debate remains in the field about whether there is additional risk for PTSD among CCS, the authors have not included such screening in the proposed standards. As more definitive studies clarify the traumatic impact of childhood cancer, screening recommendations should be revisited. Previous studies described tobacco or heavy alcohol use as comparable or slightly lower among adult and adolescent CCS compared to peers or siblings.[23,24,75–77] Unfortunately, tobacco and heavy alcohol use is not lower in the most medically vulnerable CCS.

To combat underrecognition and undertreatment of psychological problems in CCS, a first step involves systematic screening to accurately identify those who most need support.[31,35, 78–80] To be effective, screening must be paired with referral for support, education, and treatment as appropriate. Evidence-based interventions to address psychosocial late effects have been described elsewhere.[81,82] CCS with risky health behaviors rarely receive risk-based medical care.[83]

A recent systematic review described psychosocial screening tools for CCS such as those to assess overall distress,[86] depression, anxiety, and suicidality.[84,87–90] Strong recommendations exist for the use of brief screening tools to identify substance use in primary care settings for healthy adults and adolescents.[93,95] Use of these tools has been shown to be effective in reducing problematic drinking and tobacco use when combined with brief interventions in healthy populations.[76,96,98–100] It is recommended that substance use screening occur in the LTFU setting, in addition to primary care, given synergistic health risks for CCS related to treatment exposures. Providers of LTFU care are likely more attuned to these specific health risks. Delivery of interventions that employ survivor focused counseling have been shown to be more effective in reducing smoking among CCS though substance use treatment remains challenging for survivors, as for other populations.[101,102]

With the development of more effective treatments the population of CCS has grown and so too has the number of survivors suffering from psychosocial sequelae. Psychosocial screening in LTFU settings is effective in identifying distress and CCS report minimal burden and high acceptance.[103, 104] In the absence of data on the most effective screening schedule, practical considerations influence the recommendation that screening should be administered according to existing COG LTFU schedules for care (usually yearly based on exposures) and performed for all survivors, regardless of diagnosis or exposure.[31] CCS who consistently screen negative for substance use could receive reduced screening over time consistent with healthy population data showing declining initiation of substance use with age.[105] Larger studies are needed to describe the implementation and adequacy of specific psychosocial screening instruments in a variety of LTFU care setting [84] and thus future research should identify appropriate, sensitive, and acceptable brief instruments for CCS.

Some authors have questioned the utility of screening and suggested that energies could be put to more productive use in treating distress.[106–110] Screening may improve patient-provider communication,[111,112] but there is not clear consistent evidence that it improves survivor well-being.[113–116] Questions remain on what should be screened, how screening should be implemented (on-line, in-person, nurse vs. doctor), whether to assess felt need or contextual need, and what to do with the results.[117] The addition of information on the context of the distress may reveal need for concrete support rather than psychosocial support. Certainly, screening is unlikely to be effective unless is leads to a response, whether that is further clinical assessment, treatment, or just an acknowledgement of the distress. More research is needed to discern the best methods for screening.[117]

Many survivors are not worried about their health,[118] underestimate their health risks,[63,64,119] know few details of their treatment history,[119] and few engage in detailed discussions about their cancer history with a provider or receive regular cancer specific follow-up care [118] creating a barrier to psychosocial screening.[31,120] Less than 20% of adult CCS reported follow-up care that included advice about risk reduction, or screening tests for physical late effects.[26,121] Patient and parent education that starts early in the treatment trajectory and emphasizes the importance of LTFU is needed. Furthermore, primary care providers and other adult health care providers may need focused education about both the physical and psychosocial sequelae of childhood cancer, and published guidelines must emphasize both realms of whole-patient care.[122]

Certain barriers have been identified and include lack of financial or personnel resources, lack of health insurance reimbursement or psychosocial providers, or low motivation for screening. These barriers may be addressed by use of brief standardized instruments, development of hospital and community referrals, and provider education. Future research must focus on the selection, timing, and efficacy of such screening tools in CCS.[123]

A number of limitations exist in the manuscript. We chose to target specific negative psychosocial late effects most often identified in the literature. We did not include studies assessing global or abstract constructs such as QoL, neurological, or cognitive late effects (addressed within this special issue [124]), or positive outcomes, though promoting such outcomes may contribute to survivor well-being and QoL.[125,126] A full review of assessment instruments and effective interventions for each outcome was beyond the scope of the project and is reviewed elsewhere.[81,82] Finally, given the considerable presence of psychological late effects in CCS, the authors recommend screening while recognizing that future research is needed to determine whether screening lessens this morbidity.

In summary, the burden of chronic health problems among CCS is profound in both prevalence and severity.[127] Receipt of LTFU care that addresses both physical and mental health sequelae of childhood cancer is critical to supporting longevity and well-being.[128] In the face of late medical health effects, some of which are not reversible, health care providers can still attend to the human cost of cancer by asking the patient about his or her experience and listening to the answer.[128]

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Author Contributions

This work was conducted collaboratively as part of the *Standards for Psychosocial Care of Children with Cancer and their Families* Workgroup. E.A.L. and B.J. were responsible for the conception and design of the proposed standards in this manuscript. F.P. was responsible for the initial literature search and collection and assembly of data. E.A.L., F.P., L.A.S., and A.R.R. conducted supplementary searches. E.A.L., F.P., L.A.S., and A.R.R. wrote sections related to each standard and E.A.L., A.R.R., and B.J. did final editing including final approval of data analysis, interpretation, and presentation of data, and completed critical revisions for important intellectual content. All authors approved of the final version of this manuscript and take public responsibility for the content presented in this article.

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SUPPLEMENTARY INFORMATION

SUPPLEMENTAL TABLE I. Psychosocial Follow-up in Survivorship–Methods and Search Terms

The search strategy for this manuscript used electronic databases including PubMed, PsychINFO, Google Scholar, and Academic Search Complete.

Baseline search terms used: Childhood Cancer, Pediatric Cancer, Cancer Survivor, Survivorship, Oncology, Cancer, Intrathecal chemotherapy, Methotrexate, Radiotherapy, Cranial radiation, Antineoplastic, Neoplasms, Leukemia, CNS tumors, and Brain tumors.

Search terms specific to psychosocial issues for long-term survivors include: Depression/Global Distress included baseline terms and: depression, low mood, flat affect, sad, sadness, mood disorder, guilt, uncertainty, isolation, poor self-esteem, poor body image, suicidal ideation, grief, bereavement, distress, global distress, mental health, emotional functioning, psychological outcomes, psychosocial outcomes, psychosocial late effects, somatic complaints, somatization, and pain.

Search terms used for the Anxiety category included baseline terms and: anxiety, stress, post traumatic stress symptoms, post traumatic stress disorder, psychological distress, worry, fear, and phobia.

SUPPLEMENTAL TABLE II. Psychosocial Follow-up in Survivorship-Literature Review

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Arpawong, 2013, Post-traumatic growth among an ethnically diverse sample of adolescent and young adult cancer survivors.[1]	Cross-sectional structured interviews collecting data from self report questionnaire	N = 94 childhood cancer survivors (within 6 months of completing cancer therapy)	● The majority of survivors reported positive growth. ● PTG was positively associated with psychosocial functioning and post-traumatic stress symptoms and inversely associated with physical functioning and depressive symptoms. ● PTG was significantly lower among survivors of bone tumors (vs. survivors of other cancers) and Hispanic survivors who primarily spoke English at home (vs. Hispanics who primarily spoke Spanish at home) and non-Hispanics	Small sample size; data collection appropriate to study method; Appropriate analysis; measurement weakness; limited generalizability.	4		x		
Badr, 2013 Health-related quality of life, lifestyle behaviors, and intervention preferences of survivors of childhood cancer [2]	Cross-sectional survey-based	N = 137 CCS and N = 30 AYA survivors at least 6 months post treatment	● No significant differences reported for any of the HRQoL domains among the CCS.	Moderate sample, no controls, 60% response rate with significant responder/non responder bias, multivariate analysis not performed, data collection methods were not precise and comprehensive; Sample size was sufficient but lacked variability; appropriate analysis.	4	x	x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Bagur, 2015, Psychiatric Disorders in 130 Survivors of Childhood Cancer: Preliminary Results of a Semi-Standardized Interview.[3]	Cross-sectional questionnaire and semi-structured interviews	N = 130 CCS (not leukemia) General population norms reported	● 56.2% of CCS who completed the MINI* interview reported experiencing at least one psychiatric disorder since cancer diagnosis, including anxiety (39.2%), mood (27.7%), or major depressive (24.6%) disorders; ● 35.4% reported at least one current disorder. Agoraphobia ($P = 0.02$) and psychotic disorders were more common ($P = 0.003$) and general anxiety disorder less common ($P < 0.001$) among survivors than the general population. ● Most disorders correlated significantly with survivors' ratings of lower QoL. ● Smoking, cancer type, and treatments significantly influenced the prevalence of psychiatric disorders.	Insufficient sample size; data collection appropriate to study method; appropriate analysis; evidence derived from high quality cohort studies; Reporting comprehensive, clearly described	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Berbis, 2013, A French Cohort of childhood Leukemia Survivors: Impact of Hematopoietic Stem Cell Transplantation on Health Status and Quality of Life,[4]	Prospective cohort Study from 5 participating centers, French norms used as comparison	N = 943 childhood leukemia survivors including N = 256 HSCT recipients interviewed 11–12 years post dx.	● Of all the survivors, 674 (71.5%) had at least 1 late effect, with the risk being 5.0 times higher for trans-plantation survivors. ● Compared with norms, the survivor group reported a significantly lower mental composite score. ● HSCT, reported a lower level of QoL for the dimensions (physical functioning, bodily pain, general health perceptions), with significant effect sizes up to .48 for the physical composite score.	Moderate-large sample size, high response rate (85%), comparisons were made between treatment groups and French norms were also used for comparison, Data collection appropriate to study method allow strong conclusions about difference in QoL outcomes between treatment groups; appropriate analysis; evidence derived from high quality cohort study; reporting comprehensive, clearly described. Use of normed data provides additional information but sample differences can limit conclusions.**	4		x		
Berbis, 2015 Cohort Profile: The French Childhood Cancer Survivor Study For Leukaemia (LEA Cohort) [5]	Prospective cohort study	N = 1545 childhood leukemia survivors (AML 24 months after dx. or ALL 48 months after dx.)	● Long after treatment was completed, childhood leukemia survivors reported that effects on psychological well-being are more important than they are on physical QoL dimensions	Large sample, followed CCS for 10+ years data collection e/ 2 years. data collection appropriate to study method; appropriate analysis; evidence derived from high quality cohort study; reporting comprehensive, clearly described; issues with follow-up or missing data clearly described**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Brier, 2011 Profiles of health competence beliefs among young adult survivors of childhood cancer.[6]	Cross sectional secondary analysis of existing data	N = 119 young adult CCS of leukemia, (N = 51) lymphoma (N = 24), and solid tumors (N = 44. Current age range 18–29 years.	● Three distinct profiles or clusters of health competence beliefs were described among young adult CCS: Adaptive (n = 54), Low Autonomy (n = 25), and Vulnerable (n = 40). ● Adaptive survivors had positive beliefs, low distress, and minimal health problems. ● Low Autonomy survivors were similar to the Adaptive cluster except they had low autonomy beliefs. The majority reported living with their parents. ● Vulnerable cluster had more negative beliefs, the most medical problems, and the highest levels of distress. ● Health competence belief profiles identified unique subsets of YA survivors of pediatric cancer that have potentially distinct risk factors. ● Categorizing survivors by health belief patterns may help healthcare providers treat and educate their patients tailored to individual survivors' needs and risks.	Moderate sample size; data collection limited to one clinic; appropriate analysis; reporting comprehensive, clearly described;	6	x	x		

(*Continued*)

SUPPLEMENTAL TABLE II. (***Continued***)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Brinkman & Liptak, 2013, Suicide ideation in pediatric and adult survivors of childhood brain tumors.[7]	Retrospective chart review-cohort	N = 319 adult survivors of childhood brain tumors	• Nearly 12 % of survivors (11.7 %, n = 37) reported suicidal ideation (SI)*. • Five survivors had documented suicide attempts, though none were fatal. • Adjusting for sex and age, history of depression, psychoactive medication treatment, observation or surgery only treatment, and seizures were significantly associated with SI in survivors. • Survivors of pediatric brain tumors appear to be at risk for experiencing SI	Large sample size; data collection from chart review, stigma related to SI might result in under-reporting of SI to health care providers biasing results, appropriate analysis;	6		x		
Brinkman, 2013 Longitudinal patterns of psychological distress in adult survivors of childhood cancer [8]	Prospective cohort study of adult CCS with 3 waves of data	N = 4569 adult survivors of childhood cancers	• This study described longitudinal patterns of distress in adult CCS. • Most survivors reported few or no symptoms of distress over time, although subsets of survivors reported persistently elevated (depression: 8.9%; anxiety: 4.8%; somatization: 7.2%) or significant increases in distress symptoms over the follow-up period (depression: 10.2%; anxiety: 11.8%; somatization: 13.0%). • Increasing distress symptoms were predicted by survivor perception of worsening physical health over time (depression: OR = 3.3; 95% CI = 2.4–4.5; anxiety: OR = 3.0; 95% CI = 2.2–4.0; somatization: OR = 5.3; 95% CI = 3.9–7.4). • Persistent distress symptoms were also predicted by worsening pain and ending analgesic use.	large sample size; 2 follow-ups over long follow-up period, data collection appropriate to study method; strong analysis methodology; evidence derived from high quality cohort studies; reporting comprehensive, clearly described;**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Brinkman, Li, 2013, Restricted access to the environment and quality of life in adult survivors of childhood brain tumors.[9]	Cross sectional survey s with matched controls. Study used Environmental Analysis of Mobility Questionnaire	N = 78 long-term brain tumor survivors and N = 78 population-based controls matched on age, sex, and zip-code. Mean age = 22 y	● Survivors avoided physical activity climbing stairs, walking on uneven surfaces, traveling alone, and traveling in new places. ● Overall, survivors, compared to controls were 4.8 times more likely to avoid activity. ● Low activity levels were associated with reduced physical functioning, poorer general health, poorer social functioning, and reduced HRQoL.	Moderate sample with matching sibling controls, appropriate multivariate statistical techniques, important findings, strong study design.**	4	x			
Brinkman, Zhang, 2013 Prevalence and predictors of prescription psychoactive medication use in adult survivors of childhood cancer.[10]	Cohort study	N = 10,378 childhood cancer survivors N = 3,206 siblings	● Survivors were significantly more likely to report baseline (22 vs. 15%, $p < 0.001$) and new onset (31 vs. 25%, $p < 0.001$) psychoactive medication use compared to siblings, as well as use of multiple medications ($p < 0.001$). ● Female survivors were significantly more likely to report baseline and new onset use of antidepressants and multiple medications ● Antidepressants were associated with impairment across all domains of HRQOL, with the exception of physical function.	large sample size; sibling controls, data collection appropriate; appropriate analysis; evidence derived from high quality cohort; reporting comprehensive.**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Brinkman, Zhang, 2014 Suicide Ideation and Associated Mortality in Adult Survivors of Childhood Cancer.[11]	U.S. CCSS cohort study tracking suicide risk over 3 waves of data spanning up to 15 years.	N = 9128 survivors N = 3028 siblings	● Survivors were significantly more likely to report late (1+ years after baseline with no SI)(odds ratio OR = 1.9,) and recurrent suicide ideation (SI) (OR = 2.6) compared to siblings. ● Poor physical health status was significantly associated with increased risk of suicide ideation in survivors (late report: OR = 1.9; recurrent: OR = 1.9). ● Suicide ideation was associated with increased risk for all-cause mortality (hazard ratio = 1.3) and death by external causes (hazard ratio = 2.4).	Large sample size; sibling controls, multiple waves of data, measure used for SI data collection weak but adequate for the purposes of the study; appropriate analysis; evidence derived from high quality cohort; strong analysis methods, reporting comprehensive, clearly described. Strong study design.**	4		x		
Calaminus, 2014, Quality of life in long-term survivors following treatment for Hodgkin's disease during childhood and adolescence in the German multicentre studies between 1978 and 2002.[12]	Cross-sectional question-naires using cohort data from CCS from the German-Austrian consecutive multicentre trails of CCS.	N = 725 Hodgkin's disease survivors, N = 659 age adjusted German reference sample from the European Organization for Research and Treatment of Cancer (EORTC) data collected in face-to-face interviews.	● Survivors' mean scores were more than 10 points lower on the Qol scales "Emotional" and "Social Functioning". ● Survivors had higher mean scores, exceeding 10 points, for the scales "Fatigue" and "Sleep". ● A gender effect showed lower functioning and higher symptom levels in women, most prominently in the group of young women (21–25 years).	Moderate sample size and relatively large for disease specific sample; strong randomly selected, age-adjusted population comparison, data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described;**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Chan, 2014 Health-related quality-of-life and psychological distress of young adult survivors of childhood cancer in Hong Kong.[13]	Cross-sectional telephone survey	N = 614 young adult CCS and N = 208 nearest in age siblings	● HRQoL and psychological distress was described among young adult CCS in Hong Kong. ● CCS reported significantly lower mean scores in physical role and functioning; mental, social, and psychological well-being was similar to that of their sibling controls. ● Being female, older age, longer survival time, and specific cancer diagnoses were the factors associated with poorer physical and mental adaptation. ● HRQOL was negatively correlated with psychological distress	Moderate-Large sample size with sibling controls; telephone administration of some surveys (eg., SF-36) has not been validated; appropriate analysis; Reporting comprehensive, clearly described.	4	x	x		
Cherven, 2014 Knowledge and risk perception of late effects among childhood cancer survivors and parents before and after visiting a childhood cancer survivor clinic.[14]	Longitudinal cohort study assessing knowledge and perceptions of risk for late effects before and after a survivor clinic visit	N = 65 young adult survivors ≥16 years at baseline and n = 50 who completed baseline and follow-up	● CCS reported low perceived likelihood of developing a late effect of cancer therapy and had many incorrect perceptions of risk for individual late effects. ● Low knowledge before clinic (odds ratio = 9.6; 95% confidence interval, 1.7–92.8; *P* = .02) and low perceived likelihood of developing a late effect (odds ratio = 18.7; 95% confidence interval, 2.7–242.3; *P* = .01) was found to predict low knowledge of late effect risk at follow-up. ● This suggests that perceived likelihood of developing a late effect is an important factor in the individuals' ability to learn about their risk and should be addressed before initiation of education.	Small study, data collection appropriate to study method; appropriate pre and post clinic visit analysis; reporting clearly described; issues with follow-up or missing data clearly described.	4				x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Chung, 2012 Predisposing Factors to the Quality of Life of Childhood Cancer Survivors.[15]	Cross sectional study of CCS receiving medical follow-up in outpatient clinic, single site.	N = 153 CCS (ages 9–16)	● More than half of the participants presented with depressive symptoms as measured by the CES-DC ● The mean depressive symptom scores for childhood cancer survivors (16.75) were found to be relatively higher than those for children without cancer (13.16) ● The mean self-esteem scores for the survivors (25.69) was lower than for similar aged school children (27.89) ● Depressive symptoms are a strong predictor of quality of life in child hood cancer survivors and that systematic screening of this population is important.	moderate sample size; no controls, CCS selection at follow-up visit could bias self-report if those following up were sicker or had more complex medical issues. data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described;	4		x		
Cizek Sajko, 2012, Suicide among childhood cancer survivors in Slovenia [16]	Retrospective cohort study with participants chosen from the general population of Slovenia, matched by sex, year and age to CCS from Cancer Registry	N = 1647 childhood cancer survivors	● The comparison of the observed (3 CCS) and expected probability (3.16) showed that there was no statistically significant difference in the suicide rate between childhood cancer survivors and the general population of Slovenia.	Large sample size with matched population controls; data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described.**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
COG, 2013 Children's Oncology Group. Long-Term Follow-Up Guidelines for Survivors of Childhood, Adolescent and Young Adult Cancers, (2013) Version 4.0. Monrovia, CA: Children's Oncology Group; October 2013.[17]	Systematic review.	37 studies published between 2003 and 2011 with a psychosocial focus were included.	● These risk-based, exposure-related clinical practice guidelines provide recommendations for screening and management of late effects (including psychosocial late effects) in survivors of pediatric malignancies. Specific guidelines are based on specific therapeutic exposures. ● The guidelines are intended for use among long-term CCS who are <=2 years from the end of treatment. ● Psychosocial guidelines describe adverse psychosocial/quality of life effects, mental health disorders, risky behaviors, psychosocial disability due to pain, fatigue and barriers to health care and insurance access. The guidelines recommend yearly psychosocial assessment for each domain.	The study rigor is high. Choice of papers, inclusion and exclusion criteria was carefully documented, reviews were standardized using National Comprehensive Cancer Network Categories of consensus system to assess quality of evidence.**	5	x	x	x	

(*Continued*)

SUPPLEMENTAL TABLE II. (***Continued***)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Cox, 2014 Non-cancer-related mortality risks in adult survivors of pediatric malignancies: the childhood cancer survivor study.[18]	Case control design	N = 445 SCCs who died from non-cancer causes were compared to N = 7,162 surviving participants (matched by primary dx, age, time since diagnosis and time at risk.)	● Adjusting for education, income, chemotherapy/radiation exposures, and number/severity of chronic health conditions, an increased risk for all-cause mortality was associated with exercising fewer than 3 days/week, being underweight, increased medical care utilization ($P < 0.001$), and self-reported fair to poor health ($P < 0.001$). ● Physical activity was associated with a higher risk of death among males reporting no exercise compared to those who exercised ≥3 times per week. ● Ever consuming alcohol was associated with a reduced risk of all-cause and other non-external causes of death. ● Concerns/worries about future health were associated with increased all-cause mortality.	Moderate-large sample size; appropriate comparison group for question asked, strong analysis; evidence derived from high quality cohort studies; reporting comprehensive, clearly described; issues with follow-up or missing data clearly described.**	4			x	

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
D'Agostino, 2013 Psychosocial Challenges and Resource Needs of Young Adult Cancer Survivors: Implications for Program Development.[19]	Qualitative	N = 22 young adult survivors. The 4 focus groups were: Brain tumor dx <18dx; dx w/ Brain >18; Nonbrain cancer dx <age 18; Nonbrain Tumor cancer dx >age 18.	• This study described psychosocial challenges and resource needs among AYA CCS. • Common challenges across the groups included physical appearance, fertility, late effects, social relationships, and changing priorities. • Childhood cancer survivors struggled with identity formation, social isolation, and health care transitions. • Childhood brain tumor survivors struggled with cognitive deficits, limited career options, and poor social skills. • All groups described similar resource needs including peer support, age-specific information, and having health care providers proactively raise salient issues.	research question clearly stated; qualitative approach clearly justified; study context clearly described; sampling strategy appropriate for research question; method of data analysis clearly described; analysis appropriate for research question	6	x			
Doukkali, 2013 Adolescents' and Young Adults' Experiences of Childhood Cancer.[20]	Qualitative telephone interviews	N = 59 childhood cancer survivors	• Three groups of informants were identified according to their descriptions of the influence of cancer treatment on their daily life: "feeling like anyone else" (informants who described that the cancer experience had almost no influence on current life) (49%), "feeling almost like others" (those who described some influence) (44%), and "feeling different" (those describing a great influence on current life) (7%).	research question clearly stated; qualitative approach clearly justified; study context clearly described; sampling strategy appropriate for research question; method of data analysis clearly described;	6		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Ford, 2013 Attendance at a survivorship clinic: impact on knowledge and psychosocial adjustment.[21]	Cross sectional questionnaire examining characteristics of CCS who attended vs. did not attend a LTFU clinic for CCS.	N = 102 survivors who had received care at a LTFU clinic and N = 71 survivors never seen in a LTFU clinic	● Most common reasons that non-LTFU survivors did not attend the clinic were "not aware" (71 %) or "not interested" (16 %). ● Survivors in each group were able to accurately report their cancer diagnosis, but few knew specific treatment information. ● Both groups underestimated their health risks. ● A significant minority in each group reported psychological or emotional problems (16–18 %), post-traumatic stress disorder (4.2–6.9 %), and/or psychological distress (7.8–19.7 %) but there were no differences by receipt of LTFU care. ● Risky health behaviors (alcohol use, sunscreen & physical activity) between those who have attended a LTFU clinic and those who did not were not statistically different.	moderate sample size; data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described;	4		x	x	x
Ford, 2014 Psychosexual Functioning Among Adult Female Survivors of Childhood Cancer: A Report From the CCSS.[22]	Cross sectional Survey-based	N = 2178 female adult CCS, N = 408 female siblings	● Survivors reported significantly lower sexual, lower sexual interest, lower sexual desire, lower sexual arousal, lower sexual satisfaction, and lower sexual activity, compared with siblings. ● Risk factors for poorer psychosexual functioning among survivors included older age at assessment, ovarian failure at a younger age, treatment with cranial radiation, and cancer diagnosis during adolescence.	Large sample size with sibling controls; data collection appropriate to study method; measurement bias; appropriate analysis; evidence derived from high quality cohort studies; reporting comprehensive, clearly described**	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Foster, 2014 Peer and romantic relationships among adolescent and young adult survivors of childhood hematological cancer: a review of challenges and positive outcomes.[23]	Narrative Review	Studies of Adolescent and Young Adult (AYA) CCS	● Both intensity and long treatment may result in atypical socialization ● AYA survivors also report benefits of their cancer experiences such as increased maturity, an ability to cope with life stressors, and perceptions that they can and will have the ability to be good romantic partners and parents ● Factors associated with the development of peer and romantic relationships among AYA survivors of childhood hematological cancers include: ○ perceived health vulnerabilities ○ body image following treatment ○ how attachment to parents relates to later social outcomes ● the impact of fertility concerns on later relationships and identity development	Did not describe methodology for studies included, did not include a table of studies, did not appropriately assess for quality of studies. Reasonable to combine results in this way; Important outcomes considered.	5	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
French, 2013 School Attendance in Childhood Cancer Survivors and Their Siblings.[24]	Cross sectional survey-based plus review of school records	N = 131 survivors N = 77 siblings	● School attendance among CCS and their siblings was described. ● Survivors and siblings missed significantly more school days than the population control group ($p < .0001$). ● Among matched survivor sibling pairs ($N = 77$), there was no difference in absenteeism ● Absenteeism in survivors was significantly associated with a low Pediatric Quality of Life Inventory Physical Health Summary Score ($P = .01$). ● The only predictor of absenteeism in survivors is poor physical quality of health.	Relatively small sample size with sibling controls; data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described; measurement issues; issues with follow-up or missing data clearly described	4	x			
Freycon, 2014 Academic difficulties and occupational outcomes of adult survivors of childhood leukemia who have undergone allogeneic hematopoietic stem cell transplantation and fractionated total body irradiation conditioning.[25]	Cross-sectional registry-based	Adult survivors of childhood leukemia N = 59 (HSCT) with Allogenic Hematopoietic Stem Cell Transplant & TBI N = 19 (fTBI) additional chemo Compared to General French Population	● Average academic delay of .98 years among HSCT, significantly higher than delay of .34 years in general population ● Delay was dependant on age at diagnosis but not FTBI ● Delay increased to 1.32 years by final year of secondary school compared to .51 years in general population ($p = .0002$) ● Number of students who received their diploma significantly decreased for boys HSCT compared to the general population	small sample size with population controls; data collection method not explicitly stated: appropriate to study method; appropriate analysis; evidence derived from high quality cohort studies; reporting comprehensive, clearly described.	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Gianinazzi, 2014 Mental health-care utilization in survivors of childhood cancer and siblings: the Swiss childhood cancer survivor study.[26]	Cross sectional cohort questionnaire	N = 1602 survivors N = 703 siblings	● Overall, 160 (10 %) and 53 (8 %), utilized mental health-care and 203 (14 %) and 127 (14 %) were considered distressed. ● 69 (34 %) survivors and 20 (24 %) siblings had utilized mental health-care. ● Participants with higher distress were more likely to utilize mental health-care. ● Distressed survivors not utilizing mental health-care were more likely to see a medical specialist than non-distressed. ● factors associated with utilizing mental health-care were higher psychological distress and reporting late effects.	large sample size with sibling controls; appropriate analysis; evidence derived from high quality cohort studies; reporting comprehensive, clearly described;**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Gordijn, 2013, Sleep, fatigue, depression, and quality of life in survivors of childhood acute lymphoblastic leukemia.[27]	Cross-sectional survey-based	N = 62, survivors of childhood acute lymphoblastic leukemia from the Dutch Childhood Oncology Group (current mean age 9.7 years (±3.2); median time since treatment 36 months (IQR 22–62), and one of their parents (35 dyads, 26 parent-only surveys)	● Parents reported survivors to have more disturbed sleep (ES 0.67), more fatigue (ES 0.55), and poorer emotional/behavioral quality of life than norms ($p = 0.006$) ● Survivors reported fewer sleep problems (ES 0.57 for children <13 years-old, ES 0.29 for adolescents), less depression ($p < 0.001$ for girls, $p = 0.016$ for boys), and better psychosocial quality of life than norms ($p = 0.001$) ● Higher sleep disturbances and greater fatigue correlated with more depressive symptoms and worse psychosocial and physical quality of life ($p < 0.01$ for all)	Small sample size, no controls, data collection and analyses appropriate, reporting comprehensive	6	x	x		
Howard, 2014 Trajectories of social isolation in adult survivors of childhood cancer.[28]	Qualitative	N = 30 survivors	● Experiences of social isolation evolved over time as survivors moved towards young adulthood. ● 11 CCS never experienced social isolation after their cancer treatment, nor to the present day. ● Social isolation among 19 survivors followed one of three trajectories; (1) diminishing social isolation: it got somewhat better, (2) persistent social isolation: it never got better or (3) delayed social isolation: it hit me later on ● Assessing and addressing social outcomes, including isolation, might promote comprehensive long-term follow-up care for childhood cancer survivors	research question clearly stated; qualitative approach clearly justified; study context clearly described; role of the researcher clearly described; sampling strategy appropriate for research question although lack of information on race/ethnicity is a weakness; analysis appropriate for research question. Social isolation can be strongly influenced by cultural context. The authors did not report information on race/ethnicity so generalizability is unclear.	6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Huang, 2013, Association Between the Prevalence of Symptoms and Health-Related Quality of Life in Adult Survivors of Childhood Cancer: A Report From the St Jude Lifetime Cohort Study.[29]	Cross sectional survey-based	N = 1667 long term survivors	● Pain involving sites other than head, neck and back, and disfigurement represented the most frequent symptom classes, endorsed by 58.7% and 56.3% of survivors, respectively. ● Approximately 87% of survivors reported multiple symptom classes. ● Greater symptom prevalence was associated with poorer HRQOL. ● In multivariable analysis, symptom classes explained up to 60% of the variance in PCS (physical component) and 56% of the variance in MCS(mental component) ● Longer time since diagnosis was associated with higher cumulative prevalence in all symptom classes. ● Participants with higher education levels had better PCS and MCS than those with lower education	Large sample size; no comparison group appropriate analysis ; evidence derived from high quality cohort studies; reporting comprehensive, clearly described; issues with follow-up or missing data clearly described, methodology appropriate for assessing predictors of HRQoL just among CCS.	6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Jervaeus, Lampic, 2014, Clinical significance in self-rated HRQoL among survivors after childhood cancer – demonstrated by anchor-based thresholds [30]	Mixed quantitative and qualitative methods with cross sectional survey	N = 63 CCS, (aged 12–22) and N = 257 comparison group (aged 11–23) randomly selected from Swedish population register.	● Effect sizes between the subgroups “ Feeling like anyone else ” and “ Feeling almost like others ” and the group “ Feeling different ” were large for all dimensions (1.04–2.07). ● The multiple regression models showed that being a survivor was significantly associated with School Environment, where survivors scored higher HRQoL. ● female and older age (17–23 years) significantly contributed to lower self-rated HRQoL. ● *Conclusion.* In clinical practice the KIDSCREEN-27 could be a useful screening tool to identify survivors of childhood cancer in need of extra support, using KIDSCREEN dimension mean values of 45 or less as thresholds	Small sample size, sample derived from larger cohort study; age-matched population controls used; data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described; low response rates and possible selection bias	4	x	x		
Jervaeus, Sandeberg, 2014, Survivors of childhood cancer report high levels of independence five years after diagnosis [31]	Cross sectional survey based.	N = 63 CCS, (aged 12–22) and N = 257 comparison group (aged 11–23) randomly selected from Swedish population register. (Same populatin as reference[30])	● Survivors rated their independence significantly higher 5 years after diagnosis than during initial cancer treatment and higher than the comparison group. ● Neither demographic nor clinical variables (age, sex, diagnosis, initial cancer treatment) predicted self-rated independence 5 years post diagnosis. ● Five years after diagnosis, survivors of childhood cancer appear to have reached a satisfactory level of independence.	small sample size; derived from larger cohort study; age-matched population controls used; data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described; low response rates and possible selection bias.	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Johannsdottir, 2011, Emotional Functioning and School Contentment in Adolescent Survivors of Acute Myeloid Leukemia, Infratentorial Astrocytoma, and Wilms Tumor [32]	Cross-sectional survey-based with controls from a Norwegian health survey	N = 151 Nordic patients treated for acute myeloid leukemia, infratenorial astrocytoma, and Wilms tumor in childhood from 1985–2001, aged 13–18. Age equivalent group control N = 7910	● Emotional functioning and school contentment was described by adolescent survivors of childhood cancer; ● Reported better subjective well-being ($p = 0.004$) and self-esteem ($p < 0.001$) ● Had fewer problems in school ($p = 0.004$) ● School contentment was higher than controls ● Subjective well-being and school contentment were positively influenced by self-esteem ● Reported high levels of psychological distress ($p = 0.002$), mostly attributable to general worrying ● Medical follow-up during this period should include screening for psychosocial difficulties in well-being, school performance, and emotional distress to provide support as necessary	Moderate sample size for CCS, 65% response rate, data collection appropriate to study methods, appropriate analysis, evidence derived from high quality cohort. Reporting comprehensive, clearly described.	4	x	x		
Johannsdottir, 2012, Increased prevalence of chronic fatigue among survivors of childhood cancers: a population-based study.[33]	Cross-sectional survey Nordic Society of Pediatric Hematology and Oncology registry	n = 398 Nordic CCS (>1 year-old at diagnosis, currently >13 years-old)	● Current older age (>18 years) associated with higher fatigue compared to patients ages 13–18 years (14% vs. 6% with chronic fatigue, respectively, $p < 0.05$) ● Patients >18 years with chronic fatigue reported poorer physical health ($p < 0.05$) but better mental health (=0.001) than population controls	moderate sample size, no controls data collection appropriate, reporting comprehensive, missing data described	6	x	x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Jones, 2011, Adolescent cancer survivors: identity paradox and the need to belong [34]	Qualitative	N = 12 adolescent cancer survivors between the age of 12 and 21 at time of interview, post-treatment	● Adolescent cancer survivors experienced both risk and protective factors after cancer treatment. ● Adolescents struggled to form an identity that included both their cancer and their survivor experience ● Adolescents attempted to find a way to belong and receive social support that promoted their health. ● Participants reported finding meaning and positive benefits from facing their disease.	Research question clearly stated; qualitative approach clearly justified; study context clearly described; method of data collection clearly described; analysis appropriate for research question	6	x			
Kim, 2013 Psychological distress in AYA survivors of childhood cancer in Korea.[35]	Cross-sectional survey-based study	N = 223 Korean childhood cancer survivors, between 15–39 years of age.	● 20% of participants were classified as psychologically distressed ● Significant levels of psychological distress were associated with age, economic status, and time since diagnosis.	Moderate sample size, no comparison population, data collection appropriate, Appropriate analysis, reporting clearly described	4		x		
Kim, 2014 Life after cancer.[36]	Cross-sectional survey-based.	Korean adolescent survivors of childhood cancer (n = 223, diagnosed prior to age 19 years, current age 15–29 years), recruited from websites and advocacy groups	● Childhood cancer survivors perceive public stigma ● Increased perceptions of stigma associated with increased patient-reported shame and self-blame, and decreased patient-reported social support and disclosure of cancer-history. ● Patient reported shame, self-blame, and poor social support associated with psychological distress.	Moderate sample size, no control sample, data collection and analyses appropriate, reporting clearly described.	6	x	x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Kirchhoff, 2011, Physical, mental, and neurocognitive status and employment outcomes in the childhood cancer survivor study cohort.[37]	Cross sectional study design using data from the second wave of the US CCSS cohort study.	N = 3,763 childhood cancer survivors over the age of 25 at time of survey	● Poor physical health was associated with an almost eightfold higher risk of health-related unemployment ($P < 0.001$) compared to survivors with normal physical health. ● Employed female survivors with task efficiency, emotional regulation, and memory limitations were 13% to 20% ($P < 0.05$ for all) less likely to work in professional or managerial occupations than norms. Approximately 35% of survivors indicating health related unemployment or seeking work had poor mental health ● Survivors unemployed but seeking work also had depression, somatization, and neurocognitive deficits in levels above the norms.	Large sample size; no controls, but study question did not require controls. Data collection appropriate to study method; appropriate analysis; evidence derived from high quality cohort study; reporting clearly described; issues with missing data clearly described.**	4	x			x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Kirchhoff, 2014 Childhood cancer survivors' primary care and follow-up experiences.[38]	Qualitative-cross-sectional using semi-structured telephone interviews	N = 53 adult CCS randomly selected from SEER registry, (>21 at dx)	• Most survivors had a current primary care physician (PCP) (83%) • Almost half were not worried about health. • Detailed discussions about cancer history with PCP were rare • Few survivors had a follow-up care plan but over half thought Survivorship Care Plan (SCP) could empower their medical decision making • 1/3 were skeptical about the usefulness of survivorship care plan and some were worried about health-care cost • Childhood cancer survivors need better care coordination. Many did not discuss their cancer history with their current PCP and most have no SCP.	Research question clearly stated. Qualitative approach clearly justified. Study context clearly described. Role of the researcher clearly described. Sampling strategy is appropriate, limitations of this clearly acknowledged. Method of data collection clearly described but they could elaborate more on the specific questions asked.	6				x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Kirchhoff, Krull, 2011 Occupational outcomes of adult childhood cancer survivors: A report from the childhood cancer survivor study.[39]	Cross sectional study using U.S. CCSS data	N = 4845 currently employed survivors aged >25 years N = 1727 siblings	● Survivors were less often in higher-skilled Managerial/Professional occupations (relative risk, 0.93; 95% confidence interval 0.89-0.98) than their siblings. ● Survivors who were black, were diagnosed at a younger age, or had high-dose cranial radiation were less likely to hold Professional occupations than other survivors. ● Female survivors' likelihood of being in full-time Professional occupations (27%) was lower than male survivors (42%) and female (41%) and male (50%) siblings. ● Survivors' personal income was lower than siblings within each of the 3 occupational categories in models adjusted for socio-demographics	Large sample with sibling controls; data collection appropriate to study method; appropriate analysis; evidence derived from high quality cohort studies; reporting is comprehensive clearly described; issues with follow-up or missing data clearly described.**	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Klassen, 2011 Identifying determinants of quality of life of children with cancer and childhood cancer survivors: A systematic review.[40]	Systematic Review of descriptive studies	N = 58 studies of QOL in childhood cancer survivors	● Studies described 239 factors (50 unique factors) affecting QOL. ● Most variables represent medical and treatment factors with less research attention paid to child and family factors. ● central nervous system (CNS) or brain tumor patients on treatment and survivors had poorer QOL compared with patients with either leukemia or lymphoma ● Children who experienced a relapse were found to have poorer QOL during treatment or survivorship ● Symptoms of anxiety, depression and psychological distress, and parental QOL were related to poorer child QOL.	Relevant studies included; did not assess for quality of studies; Reasonable to combine results in this way; Important outcomes considered.**	5		x		
Klosky, 2012, Risky health behavior among adolescents in the CCSS cohort.[41]	Cross-sectional U.S. CCSS study.	N = 307 Adolescent survivors and N = 97 adolescent siblings of CCS survivors. Participants were diagnosed between ages 0–3.	● The prevalence of risky health behaviors (sexual behavior, tobacco, alcohol or illicit drug use) among adolescent survivors was comparable to sibling behaviors using continuous data. ● In multivariate analyses, survivors were less likely to engage in smokeless tobacco and alcohol use or to engage in binge drinking. ● good mental health was protective for risky health behaviors. ● Aggressive health education efforts should target survivors.	Moderate sample size with sibling controls, Study is generalizable to survivors diagnosed at a very young age. Sibling controls could result in underestimation of survivor risky behavior given evidence of heavy drinking and smoking in some subgroups of siblings.	4			x	

(*Continued*)

SUPPLEMENTAL TABLE II. **(*Continued*)**

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Klosky, 2013, Smokeless and dual tobacco use among males surviving childhood cancer: a report from the Childhood Cancer Survivor Study.[42]	Cross-sectional cohort study (U.S. CCSS)	N = 3378 CCS males from the U.S. CCSS and controls were chosen from the National Survey on Drug Use and Health.	● Among male survivors: 8.3% were current smokeless tobacco users and 2.3% were current dual tobacco users ○ Survivors were less likely than population males to report smokeless tobacco use (SIR = 0.64, 95%) or dual use tobacco use (SIR = 0.37) ○ Non-white survivors aged 35–49 were more likely to use smokeless tobacco (SIR 2.32) ○ Smokeless tobacco use was associated ($p < 0.05$) with younger age at diagnosis, lower education, being married or divorced/ separated and not living in the northeastern US. History of cardiovascular- and/or pulmonary toxic treatment was protective ○ Dual tobacco use was associated with younger age at diagnosis, lower education, divorce/ separation, high psychological distress. Having active heart or circulatory conditions was protective ○ Smokeless tobacco and dual tobacco use was generally low among childhood cancer survivor. ● Findings suggest that tobacco use screening should be expanded to include smokeless tobacco use and that smokeless tobacco education and cessation intervention should be provided.	Large sample size, data collection appropriate, strong analysis, evidence derived from high quality cohort study, reporting comprehensive and clearly described.**	4			x	

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Klosky, 2014, Risky sexual behavior in adolescent survivors of childhood cancer: a report from the Childhood Cancer Survivor Study.[43]	Cross-sectional cohort study, U.S. CCSS	$N = 307$ survivors of childhood cancer age 14–20 and $N = 97$ sibling controls	● Risky sexual behavior in adolescents CCS is associated with cancer type, time since diagnosis, psychological health, alcohol use, and peer influences. Identified risk factors include: ○ Diagnosis of central nervous system cancer ($p < 0.05$) ○ No history of beer or wine consumption ($p = 0.01$) ○ Fewer negative peer influences ($p = 0.02$) associated with decreased risk of early intercourse ○ Good psychological health (scores ≥ -1.5 SD on the CHIP-AE) associated with decreased risk of multiple lifetime partners ($p = 0.01$) ○ Increased time from diagnosis ($p = 0.02$) and psychological health ($p < 0.01$) associated with decreased risk of unprotected sex at last intercourse, but high parent education associated with increased risk ($p = 0.01$) ● Need for implementing psycho-educational interventions earlier in the cancer trajectory for the promotion of safer sexual behaviors, particularly during periods of elevated health vulnerability.	Moderate sample size, sibling controls, data collection method appropriate, appropriate analysis, reporting is comprehensive, issues clearly described.	4			x	

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Kuehni, 2012, Educational achievement in Swiss childhood cancer survivors compared with the general population.[44]	Cross sectional postal survey, Swiss CCSS	N = 961 CCS aged 20–40, CCS were <age 16 at dx, were 5+ years from dx. Controls, ages 20–40, were selected from respondents to the Swiss Health Survey, a nationally representative telephone survey of 30,179.	● One-third of survivors encountered educational problems during schooling (30% repeated 1 year, and 35% received supportive tutoring). ● More survivors than controls achieved compulsory schooling only (8.7% vs 5.2%) and fewer acquired a university degree (7.3% vs 11%), but more survivors than controls achieved an upper secondary education (36.1 vs 24.1%). ● In those aged > 27 years, differences in compulsory schooling and university education largely disappeared. ● In survivors and controls, sex, nationality, language region, and migration background were strong predictors of achievement. ● Survivors of central nervous system tumors or those who had a relapse had poorer outcomes (P < .05). ● With the exception of patients who had central nervous system tumors and those who experienced a relapse, the final educational achievement in survivors of child cancer was comparable to that of the general population.	Large sample size with representative population controls; data collection method differed for comparison group; appropriate analysis; evidence derived from high quality cohort study; reporting comprehensive, clearly described.**	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Kurtz, 2011 Psychiatric aspects of pediatric cancer.[45]	Narrative review	Not reported	● Survivors report occurrence of avoidance, hyper-arousal, and intrusive thoughts and posttraumatic stress symptomatology ● Significantly increased lifetime risk of suicidal ideation in childhood cancer survivors compared with sibling controls. ● Brain tumor survivors showed increased distress and depression compared with siblings. ● Survivors of a variety of childhood cancers Were found to have increased depression, somatization, and distress compared with siblings	No methodology is included. Important outcomes considered	5	x	x		
Kwak, 2013, Prevalence and predictors of post-traumatic stress symptoms in adolescent and young adult cancer survivors: a 1-year follow-up study [46]	Prospective cohort study with data collected within 4 mo of dx, and follow-up at 6 and 12 months. Patients were recruited from 5 tertiary care academic medical centers.	N = 151 AYA with cancer, ages 15–39 with N = 111 baseline and N = 87 at follow-up for those diagnosed at ages 14–19.	● At 6 months 39% of all participants reported moderate to severe post-traumatic stress symptoms (PTSS). ● There were no changes in level of PTSS scaores between 6-month and 12 month follow-up for those aged 14–19 at diagnosis. ● In multivariate analysis, having cancer as a child was not a significiant predictor for PTSS at follow-up.	Small sample size, 2 follow-up waves, data collection appropriate, appropriate analysis but large number of co-variates might increases risk for type II error. Evidence derived from high quality cohort study, reporting comprehensive and clearly described but multivariate sub-analysis not performed for the childhood cancer survivors separately.	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Li, 2012 A descriptive study of the psychosocial well-being and quality of life of childhood cancer survivors in Hong Kong.[47]	Cross-sectional survey-based	N = 137 Hong Kong Chinese CCS aged 9–16 years	● 52.6% of CCS reported low self-esteem and high levels of depression ● Greater symptoms of depression in CCS were associated with higher state anxiety, lower self-esteem, and poorer QoL. ● Coping: 41.6% relied on emotion focused; 36.5% used mixed strategies; 21.9% relied on problem-focused ● Appropriate and effective psychosocial interventions should consider issues of self-esteem and coping.	Moderate sample size with no controls, data collection appropriate, reporting comprehensive and clearly described,	6		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Li, 2013, The impact of cancer on the physical, psychological and social well-being of childhood cancer survivors.[48]	Mixed Methods, cross sectional survey with qualitative interviews compared to population norms,	N = 137 Hong Kong CCS aged 9–16 years, receiving medical follow-up procedures at out-patient clinic. Each filled out standardized measures on depression and self-esteem. N = 15 (of the 137) selected for semi-structured interview; For comparison purposes, participants from a previous survey were used: healthy children n = 245 ages 9–12 and n = 1555 ages 12–16) used from prior cohorts	● More than half of participants presented depressive symptoms ● Mean depressive symptom scores for childhood cancer survivors were statistically significant higher than those of school children without cancer ($p = 0.01$) ● Mean self-esteem scores for the survivors were statistically significant lower ($p < 0.01$) ● Qualitative interviews indicated that cancer and its treatments have great impact on daily lives of childhood cancer survivors ● Must help survivors develop a positive view of the impact that the cancer experience had had their lives	Moderate sample size, population data used as controls (but no matching and data was not merged), data collection appropriate, appropriate analysis, evidence derived from high quality cohort study, reporting comprehensive and clearly described. Choice of CCS outpatients receiving a follow-up procedure could bias results towards greater distress. Study context clearly described	4	x	x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Lie, 2015 Providing information about late effects after childhood cancer: Lymphoma survivors' preferences for what, how and when.[49]	Qualitative,	Survivors of childhood lymphoma [n = 34), mean age at diagnosis = 13, mean current age 37 enrolled in 5 focus groups	● Patients wanted to know about possible late effects, but information should be specific for each patient, communicated in person with written follow-up. Learning about late effects at age 25 was better than hearing about it too soon after end of treatment. ● In addition to patient-reported priorities regarding reporting information for medical late effects, patients endorse need for counseling regarding: ○ Financial counseling ○ Social security benefits ○ Medical insurance ● Patients report significant suffering from economic hardship	Focus group participants were older and diagnosed earlier compared to non-participants. Low response rate to original study (58%) and to focus group study (50%) ; participants from a previous study may under-represent the sickest and healthiest survivors. Strengths include universal access to care (in Norway) and the 25 year average since diagnosis allows for a breath of experience.	6	x			x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Lund, 2011, A systematic review of studies on psychosocial late effects of childhood cancer: Structures of society and methodological pitfalls may challenge the conclusions.[50]	Systematic Review of descriptive studies	N = 41 descriptive studies related to psycho-social late effects	• Survivors describe HRQoL as normal or better than controls. However, most all diagnostic subgroups report psychosocial impairment. • Central nervous system tumor survivors have significant psychosocial problems in psychological and social late effects compared to other cancer types and peers. • Negative outcomes included higher risk for unemployment, higher rate of depression, and low HRQoL. Negative outcomes were associated with cranial radiation therapy, female gender, and young age at diagnosis. • Methodological weaknesses in current studies hamper knowledge of CCS.	Important, relevant studies included; appropriately assessed for quality of studies; reasonable to combine results in this way; important outcomes considered.**	5	x	x		x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Lund, 2013, Hospital contact for mental disorders in survivors of childhood cancer and their siblings in Denmark: a population-based cohort study.[51]	Cross-sectional population-based cohort study	N = 7,085 Danish children treated for cancer by contemporary protocol between 1975–2010. Controls were CCS siblings- N = 13,105	● Survivors of childhood cancer were at increased risk of hospital contact for mental disorders with hazard ratios of 1.50 (95% 1.32–1.69) for males and 1.26 (1.10–1.44) for females. ● Children <10 at diagnosis had the highest risk ● Increased risks were seem in survivors of CNS tumors, hematological malignancies and solid tumors. ● Survivors had higher risk of neurodevelop-mental, emotional and behavioral disorders than population based comparisons and siblings. ● Male survivors had higher risk for unipolar depression. ● Siblings had no excess risk for mental disorders. ● Siblings who were young at the time of cancer diagnosis of the survivor were at increased risk for mental disorders, older than 15 years at diagnosis were at lower risk than general population ● CCS should be followed up for mental health late effects, especially those diagnosed at a young age ● Clinicians should be aware that siblings who were young at the time of cancer diagnosis might be at increased risk for mental health disorders	Large sample size with sibling controls, data collection appropriate, appropriate analysis, evidence derived from high quality cohort study, reporting comprehensive and clearly described.**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Maurice-Stam, 2011 [52]	Cross sectional survey-based	N = 77 Dutch survivors aged 8–18	● Burden was associated with HRQoL (−), anxiety (+), posttraumatic stress symptoms (+) and behavioral problems. ● Benefit did not correlate with the psychological outcomes. ● The older age at study and at diagnosis, the higher benefit the child reported; $r = 0.27$, $p < 0.05$ and $r = 0.31$, $p < 0.01$ respectively. ● Subsequently, the more time elapsed since the end of treatment, the lower benefit and burden were experienced ($p < 0.05$): <1 year after treatment benefit $M = 36.2$ ($SD = 6.6$) and burden $M = 18.4$ ($SD = 5.6$) versus ≥1 year after treatment benefit $M = 30.7$ ($SD = 8.5$) and burden $M = 15.5$ ($SD = 5.1$). ● Brain tumor survivors reported higher levels of burden than children with a different cancer diagnosis. ● These results suggest that the level of perceived burden is possibly a better predictor of distress than the amount of benefit the child experiences. ● Positive experiences do not simply imply an absence of distress or harmful effects	small sample size; data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described;	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Milam, 2015, Cancer-related follow-up care among Hispanic and non-Hispanic childhood cancer survivors: The Project Forward study.[53]	Cross-sectional survey -based	N = 193 Los Angeles county CCS randomly selected from SEER registry. CCS were dx between 2000–2007, 54% are Hispanic. No controls.	● 73% reported a cancer follow-up within the 2 previous years, positively associated with having health insurance, white ethnicity (vs. Hispanic), younger age and greater treatment intensity ($p < 0.05$) ● 96% reported an intent to receive follow-up care in the next 2 years, positively associated with having health insurance and greater self-efficacy ($p < 0.05$) ● Hispanics and older childhood cancer survivors were more likely to lack previous follow-up care ● Interventions targeting improved self- efficacy may help increase intent to receive follow-up care for this population	Moderate sample size, no controls, but comparisons were made between white, Hispanic and other sub-groups providing important data on understudied population. Appropriate analysis, evidence derived from high quality study, reporting comprehensive and clearly described.	4				x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Nathan, 2011 Critical issues in transition and survivorship for adolescents and young adults with cancers.[54]	Opinion	Description of issue,s related to typical experiences of transition from dx through stages of tx and long-term follow-up care by AYAs, models of survivorship care for AYA are presented, current system (Canada) is described and opportunities for research are presented.	● Transitional services that should be available throughout this journey include health-related education, health surveillance and screening, management of cancer-related complications, and psychosocial support relevant to their developmental needs. ● Survivors require lifelong care that focuses not only on the medical risks arising from their cancer therapy, but also the psychosocial, educational, and vocational implications of surviving cancer. ● Because many community health care providers lack familiarity with the health risks associated with childhood or adolescent/young adult cancer, survivors must have sufficient health knowledge to advocate for risk-based cancer-related follow-up; the provision of a treatment	Comprehensive review of transition issues faced by adolescents and young adults. This is a thorough review of the issues ending with clear recommendations.	7				x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Nilsson, 2014, 'Will I be able to have a baby?' Results from online focus group discussions with childhood cancer survivors in Sweden [55]	Cross- sectional cohort study where qualitative data were collected through 39 online focus group discussions	N = 133 cancer survivors 16–24 years old, ≥5 years after diagnosis	● Risk of infertility was described as having a negative impact on well-being and intimate relationships ● Participants described hesitation about becoming a parent due to perceived or anticipated physical and psychological consequences of having had cancer ● Achieving parenthood, whether or not with biological children, is an area that needs to be addressed by health care services	Moderate sample size, no controls, research question clearly stated, qualitative approach justified, role of researcher clearly described. Sampling strategy appropriate for research question. Method of data collection clearly described.	6				
Ottaviani, 2013 Sociooccupational and physical outcomes more than 20 years after the diagnosis of osteosarcoma in children and adolescents: limb salvage versus amputation.[56]	Cross-sectional survey-based.	N = 38 childhood osteosarcoma CCS w/ limb amputation; and N = 19 CCS w/ limb salvage surgery, 20+ years from dx (mean age, 38 yrs.). Sibling controls	● Survivors with amputation vs. limb salvage surgery did not differ by education, employment, marital status, health-related quality of life, and health insurance. According to self-report, survivors did not differ from their siblings by education, health insurance, employment and marital status. ● Survivors with an amputation suffered significantly more mental health distress compared to survivors with limb salvage. ($p < .05$)	Small sample size, comparisons were primarily between two CCS. Siblings were described as controls, but sibling information was derived from CCS report only. Sibling data was not shown. 44% of original cohort lost to follow-up raising issues of bias in the remaining sample;	6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Ozono, 2014, General Health Status and Late Effects Among Adolescent and Young Adult Survivors of Childhood Cancer in Japan.[57]	Cross sectional survey-based.	CCS and siblings: (i) N = 185 CCSs (mean age 23.6); dx with cancer age <18; were >5 years since dx (mean 15.3 yrs since dx); and in remission >1 year. Controls N = 72 siblings and N = 1000 from general population who were similar by age and gender.	● All categories of quality of life (QoL) (difficulties in daily life, physical problems, psychological stress, and social adaptation) were significantly worse in survivors compared to siblings. Physical problems and psychological stress were much greater in survivors ($p < .01$) compared to population controls. Survivors also reported worse QoL for all domains with the exception of social adaptation compared to population controls. While they measured illicit drug use, results were not reported.	Moderate sample size, controls selected from larger study and matched by many key demographic factors, detailed data collection appropriate to study questions. appropriate, basic analysis methods given limited sample size; evidence derived from high quality study	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Perez-Campepadros, Type of tumour, gender and time since diagnosis affect differently health-related quality of life in adolescent survivors. 2014 [58]	Cross-sectional survey-based	78 survivors (12-20 years), >=1 year free of oncology treatment	● HRQoL mean scores of CNS tumor survivors were lower in comparison with non-CNS tumor in physical well-being and social support and peers dimensions. ● Female gender-related to lower HRQoL scores for both types of tumors in physical well-being and autonomy dimensions. ● Scores on psychological well-being, social support and peers, parent relations, and home life and school environment dimensions decrease with length of time from diagnosis. ● Overall, diagnosis of CNS tumor and gender were related to lower HRQoL among survivors in some dimensions. ● Time from diagnosis was related to impaired HRQoL in other features.	Small sample size, no healthy controls, descriptive, comparison between CNS tumor survivors and other CCSs.	6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Phillips-Salimi, 2012 Physical and mental health status and health behaviors of childhood cancer survivors: Findings from the 2009 BRFSS survey.[59]	Cross- sectional survey-based	N = 651 childhood cancer survivors N = 142,932 non-cancer peer controls from the 2009 Behavioral Risk Factor and Surveillance System Survey	● Compared to national controls and controlling for differences in age, sex, and minority status, CCS had significantly ($p \leq 0.001$) ○ poorer socioeconomic outcomes, ○ more co-morbid conditions, ○ lower life satisfaction, ○ less social and emotional support, ○ poorer general health, and ○ reported more days per month of poor physical and mental health ○ Survivors were more likely to report being a current smoker	Large sample size; population controls; appropriate analysis; reporting comprehensive, clearly described.**	4	x			
Phillips, 2014 Understanding the lived experience of Latino adolescent and young adult survivors of childhood cancer [60]	Qualitative	N = 14 survivors	● Four themes describe the Latino AYA experience: borrowed strength of family and hospital staff; sustained positive attitude; perceived vulnerability; branded a cancer survivor. ● All survivors reported fears and anxiety about relapse and ongoing health concerns	Small qualitative study. research question clearly stated; qualitative approach is justified; study context clearly described; role of the researcher clearly described; method of data collection methods, and analysis clearly described. Inclusion of underrepresented sub-group.	6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Phillips, 2015 Survivors of childhood cancer in the United States: Prevalence and burden of morbidity.[61]	Cross sectional survey-based study using SEER data	Data from US Surveillance Epidemiology and End Results Program (SEER), N = 388,501 CCS	● This study estimated morbidity for CCS by extrapolating from US CCSS data to US SEER data to estimate burden of chronic conditions, neuro-cognitive dysfunction, HRQoL, and health status indicators ● There are an estimated 388,501 CCS in the US as of 1/1/11. ● Estimated prevalence for compromised physical (PCS) and mental (MCS) HRQOL scores in survivors 20 to 49 years of age was 16% and 18%, respectively. ● The proportion of survivors with MCS scores indicative of emotional problems was relatively consistent by time since diagnosis (18%–19%) and age category (16%–20%). ● In contrast with PCS, the prevalence of compromised MCS declined with increasing age. ● Survivors reported pain (12%), and anxiety/fear (13%), pain increased by age ranging from 11%-17%. ● The overall burden on the health care system and on CCS is profound in extent and in severity. The complex management needs for multiple morbidities will tax health care delivery systems.	Large sample size; complex and creative analysis provides important data for health services planning. Findings are clearly described; very high quality study with unique data.**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Pivetta, 2011 Marriage and parenthood among CCS: A report from the Italian AIEOP off-therapy registry.[62]	Cohort study, survey-based, following CCS up to 40 years	N = 6,044 Italian childhood cancer survivors aged >18 years compared to Italian population data prevalence on key outcomes.	• CCS were less likely to marry and to have children compared to the general population. • CNS survivors are least likely to be married. • The inclusion of counseling in the strategies of management and long-term surveillance of childhood cancer patients could be beneficial to survivors as they approach adulthood.	Large sample size; long follow-up period; appropriate analysis to calculate cumulative probabilities; evidence derived from high quality cohort study; reporting comprehensive, clearly described**	4	x			
Quinn, 2013 Missing content from health-related quality of life instruments: interviews with young adult survivors of childhood cancer.[63]	Qualitative interview following standardized questionnaires on HRQoL. Interviews were completed using focus groups or face-to-face Content analysis performed.	N = 30 young adult CCS (dx <18 years of age) a sub-group of a larger group of 151 from a phone survey on QoL in long-term CCS.	• The purpose of the study was to better identify issues related to HRQoL among young adult CCS and to assess the relevance and accuracy of current standardized HRQoL instruments in this population. • Currently used standardized questionnaires fail to include vital information from survivors' perspective, (e.g., perceived sense of self and identify, normalcy, relationships, and parenthood, and feelings of loss due to physical and psychological limitations).	Recruitment ended when saturation of themes was achieved. Research questions–clearly stated; Qualitative approach, study context, role of researcher, sampling strategy and methodology for data collection all clearly justified; white, male and college education sample limits generalizability to all CCS.	6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Rhee, 2014 Impact of psychological and cancer-related factors on HRQoL for Korean childhood cancer survivors.[64]	Cross-sectional survey-based	Childhood cancer survivors seen in long-term follow-up clinic (n = 110, median current age 11 yrs, range 8–18; all <18 year at diagnosis.); their parents; and age-matched healthy controls recruited from local schools.	● Survivors reported lower psychosocial and physical HRQo. ● Among survivors, demographic, treatment, current health status, and psychological variables explained more than 50% of variance for both QoL sub-scales. ● Higher self-perceptions of appearance, academic function, and interpersonal relationships (measured by Self-Concept Inventory) independently and linearly related to higher psychosocial quality of life (adjusted beta = 0.518, $p < 0.0001$).	Moderate sample size and peer controls. Data collection and analyses appropriate, reporting comprehensive, issues with follow-up and missing data described.	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Robison, 2011 Late effects of acute lymphoblastic leukemia therapy in patients diagnosed at 0–20 years of age.[65]	Narrative Review	N = 5,760 ALL survivors	● Survivors of childhood ALL are at increased risk for adverse psychological outcomes including lower cognitive functioning, executive function, depression and somatic distress ● Treatment related impairment resulted in decreased educational attainment ● Those ALL survivors who were provided with special educational services had comparable educational attainment to siblings, whereas those not reporting use of special education had lower educational attainment. ● ALL survivors were significantly more likely to report being unemployed compared with siblings ● In analyses stratified for sex, rates of college graduation, marriage, and having health insurance were significantly lower among ALL survivors than their sibling counterparts. ● Lower rates of marriage, educational attainment, and having health insurance are associated with history of cranial radiation.	Findings are based on studies using large sample sizes and many published studies from the U.S. CCSS. Evidence derived from high quality cohort studies.**	5	x	x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Rueegg, 2013 Health-related quality of life in survivors of childhood cancer: the role of chronic health problems [66]	Cross sectional, survey-based	N = 1,593 survivors and N = 695 siblings from the Swiss CCSS. Mean survivor & sib age = 25 yrs. Mean time since dx is 17 years.	● All health problems decreased HRQoL scores. Health problems had the biggest impact on physical functioning, general health, and energy and vitality. ● On the mental health scales, general health perception was worse among survivors compared to siblings. Overall mental health, social functioning and emotional role limitations were not different between Lower score in the Physical Component Summary was associated with dx of CNS tumor, retinoblastoma or bone tumor, having surgery, cranio-spinal irradiation, or bone marrow transplantation, and older age.survivors and siblings. Recommendations: Start focusing on tailored interventions to improve health outcomes (i.e. cognitive training or physical activity and exercises)	Large sample size; sibling controls, data collection appropriate to study method; appropriate analysis; evidence derived from high quality study; reporting clearly described; issues with follow-up or missing data clearly described.**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Saha, 2014 Late effects in survivors of childhood CNS tumors treated on Head Start I and II protocols.[67]	Cross-sectional survey-based compared to population norms.,	Survivors of childhood brain tumors (n = 22, median age at dx 0.2–7 years, median time at study 15.3 years).	● Mean scores on behavioral assessment (BASC-2) and quality of life (Children's Health Questionnaire, CHQ-PF50) similar to population norms and within average range.	Small sample, no controls, data collection from single institution, basic analyses appropriate to small N, reporting comprehensive	4	x			
Schwartz, 2011 A social-ecological model of readiness for transition to adult-oriented care for adolescents and young adults with chronic health conditions. Child: Care, Health and Development [68]	Cross-sectional cohort study and opinion (model development), SMART model development was informed by related theories, literature, expert opinion and pilot data collection	2 providers reported on transition readiness of 100 consecutive long-term survivors ages 16+ seen in survivorship clinic	● Extant literature, expert opinion, and pilot data collection support the relevance of SMART components and a social-ecological conceptualization of transition. ● Provider report revealed that many components, representing more than age, disease knowledge and skills, related to provider plans for transferring patients. ● Results support SMART's broadened conceptualization of transition readiness and need for assessment of multiple stakeholders' perspectives of patient transition readiness.	Moderate sample size; appropriate analysis; reporting comprehensive, clearly described; issues with follow-up or missing data clearly described.	4, 7				x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Schwartz, 2012 The role of beliefs in the relationship between health problems and posttraumatic stress in adolescent and young adult cancer survivors.[69]	Descriptive-longitudinal, 2 time points	N = 140 CCS	● Beliefs, as measured by scales of the Health Competence Beliefs Inventory (HCBI), negatively related to PTSS while health problems positively related to PTSS. ● Three scales of the HCBI-health perceptions, satisfaction with healthcare and cognitive competence—were significant moderators. ● The relationship between health problems and PTSS was stronger in the presence of less adaptive beliefs. ● These beliefs represent potentially malleable intervention targets for reducing PTSS in childhood cancer survivors.	Moderate sample size, homogenous sample, data collection appropriate to study method; measures lacked variance; appropriate analysis; Reporting comprehensive, clearly described	6		x		x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Schwartz, 2013 Stakeholder validation of a model of readiness for transition to adult care.[70]	Mixed methods: cross-sectional and qualitative interviews and focus groups	Adolescent and young adult CCS (n = 14), parents (n = 18), and pediatric providers (n = 10).	● Validity of the SMART model to support transition to care was assessed 3 ways: (1) ratings on importance of SMART components for transition readiness using a 5-point scale (0–4; ratings >2 support validity), (2) nominations of 3 "most important" components, and (3) directed content analysis of focus group/interview transcripts. Qualitative data supported the validity of SMART, with minor modifications to definitions of components. Quantitative ratings met criteria for validity; stakeholders endorsed all components of SMART as important for transition. No additional SMART variables were suggested by stakeholders and the "most important" components varied by stakeholders, thus supporting the comprehensiveness of SMART and need to involve multiple perspectives. SMART represents a comprehensive and empirically validated framework for transition research and program planning, supported by survivors of childhood cancer, parents, and pediatric providers. Future research should validate SMART among other populations with special health care needs.	Research question clearly stated; qualitative approach clearly justified; study context clearly described; role of the researcher clearly described; sampling strategy appropriate for research question; method of data collection clearly described; method of data analysis clearly described; issues with follow-up or missing data clearly described	4, 6				x

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Shah, 2015 Long-term psychiatric outcomes in pediatric brain tumor survivors. *Child's nervous system: ChNS: official journal of the International Society for Pediatric Neurosurgery.*[71]	Systematic review. A PubMed MeSH search and additional online database searches included pertinent studies on psychological deficits in childhood brain cancer survivors.	A total of 17 papers with 5320 pediatric brain tumor patients were included. (Mean age at dx = 8.13 years, mean follow-up time = 9.98 years)	● Pediatric brain cancer survivors reported higher Incidences of depression (19%), anxiety (20%), suicidal ideation (10.9%), schizophrenia and its related psychoses (9.8%), and behavioral problem (28.7%) compared to non-cancer populations. ● Craniospinal radiotherapy and/or surgery was associated with adverse deficits. ● Astrocytomas or other glial tumors were linked to poorer outcomes. ● CONCLUSION: Physicians treating pediatric brain tumor patients should be aware of the mental health consequences of treatment. Psychiatric monitoring is recommended for survivors of pediatric brain tumors. Additional research needs to be done to elucidate late outcomes regarding tumor type and location.	The studies included were subjected to data extraction to quantify relevant information for further analysis. Right types of papers included; Important, relevant studies included; Appropriately assessed for quality of studies; Reasonable to combine results in this way; Important outcomes considered.**	1		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Steele, 2013, Predictors of risk-based medical follow-up: a report from the CCSS [72]	RCT, 2 time points	N = 5661 survivors ages 25 and older from U.S. CCSS who were categorized as at-risk for heart disease, breast cancer, osteoporosis, or no increased risk.	● Survivors were randomized to receive informational pamphlet about general health risks or a more detailed pamphlet with specific health risk and guidelines information. Regression models tested uptake of recommended surveillance and discussion of risks with provider approximately 24 months later. ● There was no effect of the written information on uptake of necessary screening. ● Among those who visited a doctor in prior 24 months, discussing health risks with doctor was a significant predictor of uptake of screening. ● Cancer-related anxiety and perceived health status, among other non-psychosocial variables, related to engagement in discussion of health risks with provider.	Large sample size; self report & selection bias possible; appropriate analysis; missing data described, evidence derived from high quality cohort study, reporting comprehensive, clearly described.**	2, 6				x
Strauser, 2012, Enhancing psychosocial outcomes for young adult childhood CNS cancer survivors: importance of addressing vocational identity and community integration [73]	Cross sectional survey-based	45 CNS survivors aged 18–30 years old, mean age at dx ws 8.8 years.	● Life satisfaction was significantly correlated with positive affect, community integration and vocational identity.	Small sample size, use of 4 standardized instruments make findings comparable to other populations, new data to be tested in future larger studies.	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Strauser, 2015, Career readiness in adult survivors of childhood cancer: a report from the St. Jude Lifetime Cohort Study.[74]	cross-sectional survey-based	385 adult CCS, >10 years from dx. (42.1 % male, median age 38 years (21-62), sample from St. Jude Lifetime Cohort Study, selecting CCS who reported ever having been employed (full or part time).	● 17.4 % of CCS were categorized as having low career readiness. ● There were no significant cross sectional predictors for cancer treatment-related factors and career readiness. ● low career readiness was greater for CCS who were unemployed, non college graduates, having no personal income. ● In structural equation modeling, the associations between treatment intensity, physical health, age at diagnosis, and career readiness were mediated by emotional health and vocational identity. ● Conclusion: Addressing career readiness may be important to improve employment outcomes for adult CCS.	Moderate sample size, no comparison group; single institution, primarily white sample. comprehensive data collection; appropriate analysis; evidence derived from high quality cohort study; sample recruitment & response clearly described. Exclusion of never employed CCS and low representation of non-whites limits generalizability to all survivors. Lack of sibling or peer controls makes it difficult to interpret whether findings are unique to CCS.	4, 6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Stuber, 2011, Defining medical posttraumatic stress among young adult survivors in the childhood cancer survivor study.[75]	Cross sectional survey-based	N = 6542 survivors N = 374 siblings	● This study categorized different levels of PTSD and notes that the prevalence of PTS in CCS compared to siblings differs according to which definition is used ranging from OR = 4.2 when the definition meets the full criteria plus functional impairment to 1.42 when partial sx are considered along with functional impairment. ● When examining factors associated with PTSD, the authors note that marital status and employment were not equally associated with PTSD depending on the definition used. ● Single CCS had greater risk (90% greater) of having full symptoms plus impairment ● Unemployed survivors had a twofold increased rate of full PTSD with impairment.	Large sample of CCS and moderate number of sibling controls, appropriate analysis; evidence derived from high quality cohort study; reporting comprehensive, clearly described.**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Taylor, 2012, Need for psychological follow-up among young adult survivors of childhood cancer [76]	Cross sectional survey-based	N = 108 survivors in the UK	● Prevalence of clinical PTSD (13.9%) was comparable with US population. ● Risk factors for both PTSS and PTSD included being female and having more late effects. ● PTSS was unrelated to diagnosis or treatment. ● Authors recommend routine psychological screening for all CCS.	Small-moderate sample size; no control group, low response rate (49.5%) appropriate analysis; evidence derived from high quality cohort studies; reporting comprehensive, clearly described	4		x		
Teal, 2013 Psychological resilience in adolescent and young adult survivors of lower extremity bone tumors.[77]	Cross-sectional survey-based	28 CCS having had limb salvage or amputation for lower extremity bone tumor. Participants were age 18–32, mean age of 25 yrs, 5+ yrs from dx. Sample drawn from 3 pediatric cancer centers.	● Compared to normative values, survivors reported significantly less depressive symptoms and higher self-evaluations of intellectual capabilities. ● No significant differences in social support (SS) and benefit finding (BF) were found between surgical and age groups. ● Males perceived significantly higher SS than females. Significant positive correlations between SS and sexual functioning, sexual experiences, and satisfaction with sexual relationships. ● Negative correlation between global SS and depression scores. ● BF was significantly positively correlated with SS but not other variables. ● Conclusion: social support is protective for survivor psychological and sexual functioning.	Small sample size, no information supplied on avg years since dx. but young age indicates that these are relatively early stage LT survivors. normative values for psych outcomes used, hus, no direct statistical comparisons were made. Small sample size limited statistical power and no multivariate statistics could be performed.	6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Termuhlen, 2011 Twenty-five year follow-up of childhood Wilms tumor: A report from the CCSS.[78]	Cross-sectional survey-based study	N = 1256 Wilms Tumor CCS from U.S. CCSS and controls, N = 4023 siblings also from US CCSS	● A slightly higher proportion of siblings graduated from college and had held a job; the differences were marginally statistically significant. ● No differences in marital status, income, insurance coverage, socioeconomic status and mental health between CCSS and siblings.	Large sample size with sibling controls; self report & selection bias possible; appropriate analysis; evidence derived from high quality cohort study, reporting comprehensive, clearly described.**	4	x	x		
Thompson, 2013 Impact of childhood cancer on emerging adult survivors' romantic relationships: a qualitative account.[79]	Qualitative	N = 18 female CCS, ages 18–25, 2+ years off treatment. (CCS of CNS tumors were excluded.)	● Themes that emerged included: redefined life priorities and perspective; concerns with disclosure of cancer history and emotions; negative body image as a result of illness and treatment side effects; and worries about fertility and health of future children. ● Conclusion: CCS describd challenges in moving towards intimacy in relationships. ● Construction of new survey measures was recommended.	Research question was clearly stated and it addresses a gap in understanding and measurement; study context was clearly described; role of all co-authors was clearly described; the sampling strategy, methodology, and analysis was appropriate for research question	6	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Tougas, 2015, The potential role of benefit and burden finding in school engagement of young leukemia survivors: An exploratory study.[80]	Mixed methods with Cross sectional survey-based	N = 49 leukemia survivors	● CCS mentioned benefits from having had cancer, particularly interpersonal benefits. ● Half of the participants mentioned burdens, (dominantly physical and psychological). ● older survivors were more likely to report benefits in terms of qualities and strengths of character. ● Greater elapsed time since dx was associated with more psychological types of burdens. ● A main effect indicated that school engagement was greater for survivors who perceived the presence of benefits. ● An interaction effect revealed that the perception of both benefits and burdens predicts the highest scores of school engagement.	Small sample size for survey portion of the study; no control group, data collection appropriate to study method; appropriate analysis; reporting comprehensive, clearly described; mixed methodology enriches findings.	6	x			
Van der Geest, 2013, Emotional distress in 652 Dutch very long-term survivors of childhood cancer, using the hospital anxiety and depression scale (HADS)[81]	Cross sectional study measuring anxiety and depression (HADS) in CCS.	N = 652 CCS (median age 23 y) median follow-up time 15 y. Population controls N = 440 (mean age 51 y).	● Mean anxiety-depression score in CCS was not different from controls. ● Survivors with a treatment history involving CNS radiation had significantly higher Hospital Anxiety and Depression Score than the control, and than other survivors.	Large sample size with population controls. Strong methodology including large sample size, population-based controls, standardized instrument, and use of appropriate (multivariate) statistical techniques. Controls were much older than survivors but authors note that greater age is not related to greater distress thus reducing this bias.**	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard			
						1a	1b	1c	2
Wakefield, 2010 The psychosocial impact of completing childhood cancer treatment: a systematic review of the literature.[82]	Systematic Review	N = 19 studies, both qualitative and quantita-tive, of CCS who completed cancer treatment <5 year	● positive psychosocial outcomes reported at treatment completion, including high self-worth, good behavioral conduct, and improved mental health and social behavior. ● Significant negative outcomes were also reported after the end of treatment including decreased psychological well-being, mood, liveliness, self-esteem, and increased anxiety and problem behaviors. ● Neither diagnosis nor treatment type were related to emotional distress ● Review cited frequent use of unvalidated instruments, lack of controls, lack of multivariate statistical analysis, lack of relevant, methodologically rigorous studies in the area (1978-2008)	Right types of papers included; Appropriately assessed for quality of studies; Reasonable to combine results in this way.**	5	x	x		
Wengenroth, 2014, Life partnerships in childhood cancer survivors, their siblings, and the general population.[83]	Cross-sectional survey	Swiss CCSS, with CCS (n = 1096, ages <16 at diagnosis and ≥5 years post-therapy), their siblings (n = 500), and population controls (n = 5593)	● Life partnerships less prevalent in survivors than controls (47% and 16% of survivors with partners married vs. 61% and 26% of siblings, respectively) ● Current older age and female sex associated with higher odds of partnership ● History of prior radiation therapy, HSCT, or CNS tumor associated with lower odds of partnership	Large sample size, both sibling and population controls, data collection and analysis appropriate, evidence derived from high quality cohort study, reporting comprehensive, issues with missing data clearly described. Strong study design and analysis methodology.	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Wengenroth, 2015 Health-related quality of life in young survivors of childhood cancer.[84]	Cross-sectional survey-based	CCS from the Swiss CCSS n = 425, ages 8–16 years and ≥5 years post-therapy; dyads) compared to standardized population norms	● Patient-reported psychological, social and school-related well-being higher than standardized population norms (physical well-being similar) ● Parent-reported quality of life similar to population norms, except school higher (& physical well-being lower) ● Parent-reported	Moderate sample size, use of population norms, data collection and analysis appropriate, evidence derived from high quality cohort study, reporting comprehensive, issues with missing data clearly described.	4	x			
Wenninger, 2013, Coping in long-term survivors of childhood cancer: relations to psychological distress.[85]	Cross-sectional survey-based	N = 164 CCS (current mean age 28.9 years, mean age at diagnosis 9 years, ≥7 years post-therapy). Excluded patients with HSCT or CNS tumors	● Female sex, current lack of intimate relationship and presence of late medical effects independently associated with increased psychological distress (these variables explained 12% of variance) ● Suppressing negative thoughts and low levels of optimism identified as coping mechanisms associated with worse distress (addition of coping variables explained 50% of variance)	Moderate sample size, no comparison population, data collection and analysis appropriate, evidence derived from high quality cohort study, reporting comprehensive, issues with missing data clearly described.	6	x	x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Williams, 2013 Screening for psychological well-being in childhood cancer survivors: a preliminary assessment of the feasibility of the strength and difficulties questionnaire as a parent-proxy report.[86]	Cross-sectional survey of parents of CCS and adolescents.	Mothers of CCS ($n = 35$; survivor's mean age at dx = 6 yrs (SD 3.7), mean current age = 11 (SD 3.4), mean years post-therapy = 3.9 (SD 0.76)], plus adolescent survivors ($n = 14$, age ≥ 15)	● 50%, 29%, 21%, and 14% of adolescent survivors reported abnormal emotional symptoms, conduct problems, hyperactivity, and peer relationships problems, respectively. ● Among parents, 52%, 23%, 48% and 57% report the above 4 problems in their children, respectively. ● Concordance poor between adolescents and parents (Kappa −0.13 to 0.32, all $p > 0.10$).	Small sample size, convenience sample, mixed parents and adolescent report which was appropriate for developmental age; rates reported separately for each group; Data collection and analysis appropriate, reporting comprehensive.	4	x			
Winterling, 2015, Perceptions of School Among Childhood Cancer Survivors: A Comparison With Peers [87]	Mixed methods; Cross-sectional, Quantitative survey and qualitative semi-structured in-person interviews	$N = 48$, CCS from Swedish national cohort of CCS, (current age 12–21, median 5 years post-therapy, HSCT patients excluded), and $N = 47$ matched peers.	● 90% of survivors report high levels of well-being in school ● 60% report no difficulties achieving educational goals ● Survivors more satisfied with school environment compared to peers (92% vs. 46%, $p = 0.003$) ● Trends suggest survivors more satisfied with academic performance (71% vs. 53%, $p = 0.076$) and less satisfied with friends at school (76% vs. 91%) compared to peers	Small sample size, strong matched peer comparison group, clear reported findings and analysis appropriate for small sample.	4	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Yağci-Küpeli, 2013 Educational achievement, employment, smoking, marital, and insurance statuses in long-term survivors of childhood malignant solid tumors [88]	Cross-sectional survey-based	CCS in remission for 3+ years, (n = 201, median age at diagnosis 10 (0-19), median current age 23 (18-39); compared with population norms	● 56% and 23% of survivors completed high school and college, respectively, 37% unemployed, 26% living independently, 30% married, 8% with children ● College education less common in survivors of CNS tumors ● Survivors less likely to be married, more likely to be unemployed than population norms ($p < 0.001$)	Moderate sample size, sample from single center; population norms were used for comparison, data collection and analysis appropriate, reporting comprehensive. Use of population norms strengthen rigor, but demographic or other differences between population and CCS cannot be addressed when data is not merged.	4	x			
Yallop, 2013, Self-reported psychosocial wellbeing of adolescent childhood cancer survivors [89]	Case-control, survey New Zealand national registry and population health cohort studies [Correction added after online publication on 15 January 2016. Yallop 2013 was originally misidentified as an Australian study.]	N = 170 CCS (mean age at diagnosis 5.6 years, mean current age 15.3), historical controls (n = 9107)	● CCS psychosocial scores mostly normal (normal range reported for: wellbeing (89%), anxiety (93%), depression (94%), emotional difficulties (82%) ● Survivors no more likely to have abnormal outcomes than peers, and less likely to report abnormal psychological wellbeing (OR 0.44, $p = 0.003$). ● CNS tumor, increased age at diagnosis, and lower socioeconomic status all associated with greater degree of challenges within survivor population	moderate sample size, data collection and analysis appropriate, reporting comprehensive.	4		x		

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	1b	1c	2
Yi, 2014, Perceived long-term and physical health problems after cancer: adolescent and young adult survivors of childhood cancer in Korea [90]	Cross-sectional survey Recruited from websites and advocacy groups	Korean adolescent survivors of childhood cancer (n = 225, diagnosed prior to age 19 years, current age 15–29 years)	● 73% of survivors report chronic health problems including chronic fatigue (36%) and learning/memory problems (26%) ● Survivors reporting fatigue also reported lower physical and emotional quality of life scores. ● Greater numbers of health problems were independently associated with lower QoL scores.	Moderate sample size, no controls, data collection appropriate to study method; appropriate analysis; evidence derived from high quality cohort studies; reporting comprehensive, clearly described; issues with follow-up or missing data clearly described	6	x			
Yi, 2014, Postcancer experiences of childhood cancer survivors: how is posttraumatic stress related to posttraumatic growth?[91]	Cross-sectional survey-based	N = 225 Korean adolescent CCS (diagnosed prior to age 19 years, current age 15–29 years)	● Mean post-traumatic growth scores increase with each increased year in current patient-age (beta = 0.41, $p < 0.001$). ● Lower post-traumatic growth associated with increased time since diagnosis (beta = −0.42, $p < 0.001$) and increased post-traumatic stress (beta = −0.18, $p < 0.01$).	Moderate sample size, data collection and analysis appropriate, reporting comprehensive.	6		x		
Zada, 2013 Prevalence of neuro-behavioral, social, and emotional dysfunction in patients treated for childhood craniopharyngioma: a systematic literature review [92]	Systematic Review	11 studies reviewed. Studies described psychosocial outcomes among patients with pediatric craniopharyngioma	● Pooled studies suggest the following prevalence of poor outcomes: ○ neurobehavioral dysfunction: 51/90 (57%) ○ social impairment: 48/136 (41%) ○ school dysfunction: 58/146 (40%) ● poor health-related quality of life: 49/95 (52%)	Appropriate types of papers included, quality assessment included, reasonable merger of results, important outcomes included, relatively rare subgroup of patients with limited generalizability	5	x			

(*Continued*)

SUPPLEMENTAL TABLE II. (*Continued*)

Author	Design	Sample	Findings	Study Rigor	Level of evidence	Standard 1a	Standard 1b	Standard 1c	Standard 2
Zebrack, 2012 Perceived positive impact of cancer among long-term survivors of childhood cancer: A report from the CCSS.[93]	Cross sectional survey-based.	N = 6425 CCS N = 360 sibling controls	● Survivors were significantly more likely than siblings to report perceived positive impact (PPI). ● Endorsement of PPI was significantly greater among female and non-white survivors, and among survivors exposed to at least one intense therapy, a second malignancy or cancer recurrence. ● Survivors diagnosed at older ages and fewer years since diagnosis were more likely to report PPI. ● Educational attainment and marital/relationship status also appeared to be positively associated with reporting PPI.	large sample size; sibling controls; data collection appropriate to study method; appropriate analysis; evidence derived from high quality cohort study; reporting comprehensive, clearly described; issues with follow-up or missing data clearly described.**	4	x	x		

Abbreviations: In Scientific rigor column ** indicates quantitative studies deemed to be of high scientific rigor. This included carefully described systematic reviews or large epidemiologic studies with controls and that performed multivariate or other appropriate analysis. (For the purposes of consistency in the reviews we defined large cross sectional studies as including 500+, moderate as N = 100–500 and small <100. For longitudinal studies large sample = 200+, moderate samples included 100–200 and small samples were <50.). ALL = acute lymphoblastic leukemia; AML = acute myeloid leukemia; AYA = adolescent young adults; BF = benefit finding; CCS = childhood cancer survivor; CCSS = childhood cancer survivor study; CES-DC = center for epidemiological studies-depression scale for children; CI = confidence interval; CNS = central nervous system; EoL = end of life; ES = effect size; FTBI = fractionated total body irradiation; HADS = The Hospital Anxiety and Depression Scale; HRQoL = health related quality of life; HSCT = Hematopoietic stem cell transplantation; LTFU = long term follow up; LTGU = ; MCS = mental component; MINI = Mini international psychiatric interview; NCCN = National Comprehensive Cancer Network; OR = odds ratio; PBTS = pediatric brain tumor survivor; PCP = primary care physician; PCS = physical component; PPI = perceived positive impact; PTG = post traumatic growth; PTSD = post traumatic stress disorder; PTSS = post traumatic stress symptoms; QOL = quality of life; SCP = specialty care provider; SI = suicide ideation; SS = social support; TBI = total body irradiation; YA = young adult

#.The columns titled Standard indicates the articles that were used to formulate each standard. Some articles pertained to more than one standard. Standard 1a is abbreviated QoL, Standard 1b is MH (mental health), Standard 1c is RHB (risky health behavior) and Standard 2 refers to transition to adult care and long-term follow-up care.

Levels of evidence - Equates to the type of study (e.g., RCT, Qualitative, etc.) that you are reviewing and the level of evidence that the study produces. Please refer to the document *"Types of studies and level of evidence" for a mapping of how level of evidence equates to a type of study performed.* In the last column place a corresponding number (1-7) to the type of study reviewed.

1 = Systematic review or meta-analysis of controlled studies, or evidence-based clinical practice guidelines;
2 = Individual experimental studies (RCT);
3 = Quasi-experimental studies (no randomized);
4 = Non-experimental studies (Case-control, cohort);
5 = Systematic reviews of descriptive or qualitative study;
6 = Individual descriptive or qualitative study;
7 = Opinions of respected authorities and expert committees.

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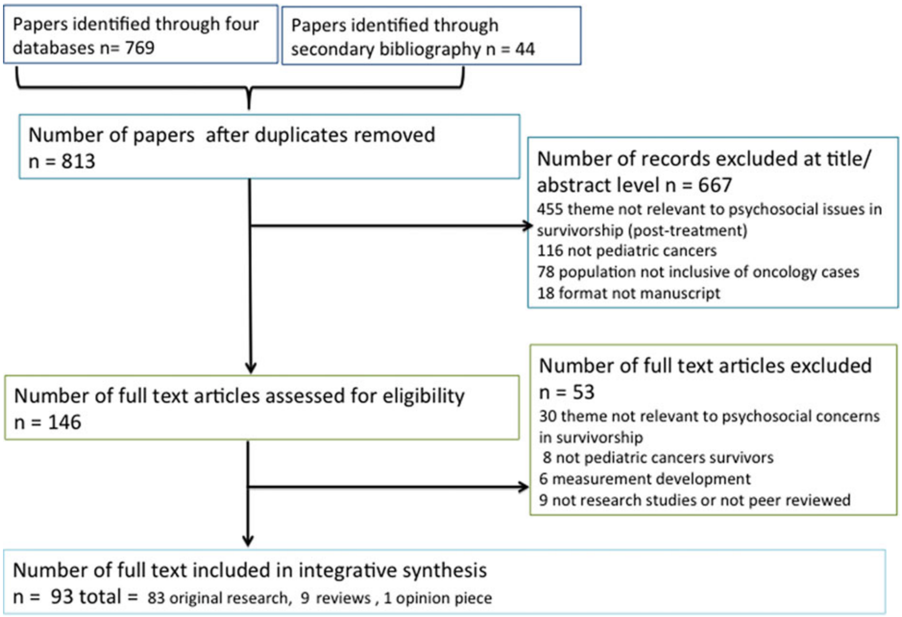

Supplemental Figure I. PRISMA: Preferred Reporting for Systematic Reviews and Meta-Analyses