Sexual Health Among Adolescent and Young Adult Cancer Survivors: A Scoping Review From The Children’s Oncology Group Adolescent and Young Adult Oncology Discipline Committee

Brooke Cherven, PhD, MPH, RN; Amani Sampson, BS; Sharon L. Bober, PhD; Kristin Bingen, PhD; Natasha Frederick, MD, MPH; David R. Freyer, DO, MS; Gwendolyn P. Quinn, PhD

Abstract: Sexual function is a vital aspect of quality of life among adolescent and young adult (AYA) (ages 15-39 years) cancer survivors. Sexual function encompasses physical, psychosocial, and developmental factors that contribute to sexual health, all of which may be negatively impacted by cancer and treatment. However, limited information is available to inform the care of AYA cancer survivors in this regard. This scoping review, conducted by the Children’s Oncology Group AYA Oncology Discipline Committee, summarizes available literature regarding sexual function among AYA cancer survivors, including relevant psychosexual aspects of romantic relationships and body image. Results suggest that, overall, AYA cancer survivors experience a substantial burden of sexual dysfunction. Both physical and psychosocial sequelae influence survivors’ sexual health. Interventions to support sexual health and psychosexual adjustment after cancer treatment are needed. Collaborations between the Children’s Oncology Group and adult-focused cooperative groups within the National Cancer Institute’s National Clinical Trials Network are warranted to advance prospective assessment of sexual dysfunction and test interventions to improve sexual health among AYA cancer survivors. CA Cancer J Clin 2021;71:250-263. © 2020 American Cancer Society.

Keywords: adolescent and young adult (AYA) cancer, cancer survivor, sexual dysfunction, sexual function, sexual health

Introduction

Optimal sexual function is complex and requires normative interaction of multiple components including psychosexual development, physiology, romantic partnering, body image, and desire. Disruption of one or more of these components can lead to sexual dysfunction that can negatively impact the well-being of adolescents and young adults (AYAs) (ages 15-39 years). For AYA cancer survivors who have completed cancer treatment, the risk for sexual dysfunction is high due to the physical and psychological consequences of both cancer and cancer treatments. Despite the prevalence of sexual dysfunction in this population, there are limited guidelines for oncology clinicians regarding how to screen for and address sexual dysfunction in this vulnerable population.

Adolescence and young adulthood represent a continuum of profound physical and psychosocial development that include physical maturation, formation of romantic relationships, and attainment of sexual milestones. Previous reviews of sexual function among AYA cancer survivors have focused primarily on the hormonal and physiological aspects of sexual function (eg, erectile dysfunction, vaginal dryness); however, the influence of psychosocial factors (eg, romantic relationships, body image) have not received comparable attention. Prior guidelines issued...
by the American Society of Clinical Oncology\textsuperscript{9} stem from literature focused on older adults with breast and prostate cancer and are limited in their acknowledgment of factors related to younger age and developmental stage. The Children's Oncology Group (COG) \textit{Long-Term Follow-Up Guidelines for Survivors of Childhood, Adolescent, and Young Adult Cancers} delineate risk and screening recommendations for sexual dysfunction related to specific cancer therapeutic exposures\textsuperscript{10} but do not emphasize the various psychosocial and interpersonal factors that also represent aspects of sexual function.

To address these gaps, an expanded review of contemporary literature was undertaken by the Sexual Health Task Force of the COG AYA Oncology Discipline Committee. The COG is the world's largest organization devoted exclusively to pediatric and adolescent cancer research aimed at improving survival and quality of life through studies of new and emerging cancer therapies, supportive care, and survivorship. Within the COG, the AYA Oncology Discipline Committee was formed to address compelling medical and psychosocial needs of AYAs with cancer.\textsuperscript{11} Recognizing that sexual health is an understudied AYA issue, the COG AYA Committee created the interdisciplinary AYA Sexual Health Task Force to evaluate the state of the science and care in sexual health and to provide recommendations on salient research questions that are feasible and appropriate for addressing in a cooperative research group setting. Therefore, the purpose of this scoping review was to describe the prevalence and types of sexual dysfunction and relevant psychosocial aspects of romantic relationships and body image among AYA cancer survivors (currently aged 15–39 years and previously treated for either childhood-onset or AYA-onset cancer). The results will be used to: 1) inform future research within the COG and possibly other adult-focused cooperative oncology study groups and 2) lay a foundation for generating comprehensive sexual health guidelines and clinical tools for oncology providers who care for AYA survivors.

\textbf{Methods}

Because sexual functioning includes myriad conditions and assessments, a scoping review was conducted to fully capture the diversity of studies. Scoping reviews present a map of existing heterogeneous literature, most often on topics that are complex in nature and are used to identify knowledge gaps in the literature and guide future research initiatives.\textsuperscript{12} For this review, we focused on sexual dysfunction, sexual desire, satisfaction, body image, and romantic relationships among posttreatment AYA cancer survivors (aged 15–39 years) who were diagnosed with cancer in childhood, adolescence, or young adulthood (aged <39 years). The age range of 15 to 39 years is consistent with the definition of AYA established in 2006 by the National Cancer Institute.\textsuperscript{13,14} This review focuses on AYAs who have completed cancer therapy; studies of on-treatment AYAs were not included because the acute side effects of active treatment are distinctive and preclude accurate comparisons with AYAs who have completed treatment.

\textbf{Information Sources}

Initially, a research librarian facilitated the generation of search terms, which were subsequently reviewed and vetted by all authors. Preliminary searches were conducted on PubMed to ensure the search strategy would produce the desired results. Next, a comprehensive search was conducted in August 2018 of the electronic databases of PubMed, CINAHL, OVID MEDLINE, Embase, and PsycINFO. Combinations of the following terms were used to search all databases: child, OR young adult, OR adolescent, AND cancer survivorship, OR childhood cancer survivors, OR cancer, OR malignant neoplasms, AND sexuality, sexual behavior, OR physiologic sexual dysfunction, OR sexual development, OR sexual behavior, OR sexual partners, OR gonadal disorders/therapy, OR body image, OR sexual health, OR psychosexual, OR sexual quality of life, OR sexual intimacy, OR sexual satisfaction, OR romantic relationships. Additional articles were identified through a review of individual article reference lists. A final search was conducted in May 2020 to identify newer articles.\textsuperscript{15}

\textbf{Inclusion and Exclusion Criteria}

Studies were included if they: 1) were published in peer-reviewed journals in English; 2) used quantitative, qualitative, or mixed methods; 3) addressed the review question; 4) had a sample in which >50% of participants were currently aged 15 to 39 years and previously treated for cancer; and 5) published in 2006 or later, to align with the National Cancer Institute/Livestrong Young Adult Alliance pioneer publication of an AYA oncology national agenda that highlighted sexual health needs in this population.\textsuperscript{14} If 2 studies relied on the same patient sample and same measures, the most recent publication was selected for inclusion.

Studies were excluded if they: 1) were focused primarily on fertility, fertility preservation, or contraception or sexually transmitted infection prevention; 2) reported results for AYAs and older adults in aggregate, such that outcomes for AYAs could not be delineated; 3) had a sample in which >50% were survivors currently aged >39 years; or 4) were case studies, review articles or commentaries, grey literature, and conference abstracts.

\textbf{Data Analysis}

Search results were compiled in Covidence and duplicates were removed using Covidence software (Veritas Health Innovation).\textsuperscript{16} After duplicates were removed, 2 authors
reviewed each abstract independently for inclusion. In the event of disagreement, a third author made the final decision. Pairs of authors then independently reviewed all full texts and determined whether they should be included in the final sample for extraction. Discrepancies between authors were resolved by the senior author G.P.Q. Authors G.P.Q. and A.S. developed the data abstraction form, which included site of study, study method, summary of main finding, type of statistical analysis, study limitations, and notes.

Quality Assessment
The quality of quantitative publications was assessed using the Quality Assessment Tool for Observational Cohort and Cross-Sectional Studies, and the rating was determined based on sampling approach, participation rate, representativeness of study population, use of valid measures, and statistical approach.\(^\text{17}\) Quality assessment for qualitative and mixed methods studies was conducted using the Rapid Critical Appraisal Tools for a Qualitative or Mixed-Methods Study, and the rating was determined based on design, sample, credibility, trustworthiness, and transferability.\(^\text{18}\) The lead author (B.C.) rated each publication according to the tool guidelines, which are based on specific criteria that were used to make an overall quality categorization of poor/low, fair/medium, or good/high.

Results
In total, 1772 articles were retrieved; after duplicates were removed, 793 articles remained (Fig. 1). Of the 793 articles, 706 were excluded because they did not meet study inclusion criteria during the title and abstract review. The remaining 87 articles underwent full text review and, of these, 57 were excluded. Reasons for exclusion of articles were the following: did not report outcomes on sexual function (n = 18); reported ages in aggregate or outside the specified range (n = 13); were a commentary, review article, or case report (n = 18); focused solely on fertility (n = 6); included patients on active treatment (n = 1); or was a duplicate patient sample from an included study (n = 1). The updated search (May 2020) yielded 4 new
Most studies were quantitative and used a cross-sectional (n = 20) or observational cohort (n = 1) design. Only one quantitative study reported longitudinal data. Of the 22 quantitative studies, the quality rating was good for 6 (27.3%) studies, fair for 12 (54.5%) studies, and poor for 4 (18.2%) studies. Of the 8 qualitative studies, quality was rated as high, medium, and low among 5 (62.5%), 2 (25.0%), and 1 (12.5%), respectively. Two studies were mixed methods, one was rated high quality and the other was rated medium quality. The quality ratings are presented in Supporting Tables 1 through 3; no publications were excluded based on quality ratings.

The studies included in this review represent geographically diverse survivors, in that one-half of the studies (n = 16) were conducted in the United States, whereas the other one-half were conducted in Europe (n = 11), Canada (n = 4), and Australia (n = 1). AYA-aged survivors of both childhood and AYA cancers are represented in this review; 19 studies included only participants who were diagnosed at age <21 years, 2 studies were focused on survivors who were diagnosed across childhood and young adulthood (eg, ages 5–38 years),20,21 and the remaining 11 studies included participants who were diagnosed in adolescence and/or young adulthood (ie, ages 15–39 years). Four studies included only males, 5 included only females, and 23 included both male and female cancer survivors. There were 2 studies that focused on specific cancers (breast22 and gynecologic25).

Three themes emerged as important concepts related to sexual health: 1) sexual dysfunction, including the prevalence of sexual dysfunction and other aspects of sexual dysfunction; 2) relationship factors (eg, relationship status, quality of romantic relationships); and 3) body image. Sexuality and sexual functioning are multifaceted, and most studies assessed more than one concept.

Sexual Dysfunction

Sexual dysfunction was examined using various measures (Table 1),19-30 with sexual dysfunction reported as a primary outcome in 12 studies. Measures of overall sexual dysfunction included the Medical Outcomes Study Sexual Functioning Scale,19,30 and the similar Swedish Health-Related Quality-of-Life Scale,24,25 the Life Impact Checklist,24,49 the Female Sexual Function Index,21,26 the Derogatis Interview for Sexual Functioning Self-Report,31 the Brief Sexual Function Questionnaire for Men,35 the International Index of Erectile Function,31 the Sexual Function Questionnaire for Women,27 and the Brief Index of Sexual Functioning for Women.27,45 Graugaard et al included an item assessing self-reported problems with sexual function.30 Sexual dysfunction was also discussed by participants in qualitative studies.28,32

Prevalence of sexual dysfunction

Because of varied measurement, it was difficult to determine an overall proportion of cancer survivors with sexual dysfunction. In studies that used the Swedish Health-Related Quality-of-Life Scale or Medical Outcome Study items, 42% to 52% of survivors reported one or more problem(s) with sexual function,19,30 whereas 29% of survivors reported ≥2 sexual function problems.25 Compared with population norms, survivors reported worse sexual functioning overall.35 By using the Female Sexual Function Index, sexual dysfunction was reported by 31% of Hodgkin lymphoma survivors and by 100% of survivors of gynecologic cancer or hematopoietic cell transplantation.26 In a study of 822 survivors aged 17 to 26 years, 22% of survivors reported sexual dysfunction (eg, problem with orgasm, erection, and/or vaginal dryness) within the past week.30 By using the International Index of Erectile Function in a study of 1622 male survivors, 12% met criteria for erectile dysfunction.40 Across studies, female survivors reported more sexual dysfunction compared with male survivors.23,30,50 Sexual dysfunction was identified as a substantial problem based on qualitative data from cancer survivors.22,28,32,41

Other aspects of sexual dysfunction

Additional concepts of sexual dysfunction were explored in these studies, and the majority suggest that, compared with peers, cancer survivors report more problems with pain, lubrication, desire, and other sexual function factors, including overall sexual satisfaction.21,26,27,31,39,40 In a study of 540 AYA (aged 15–29 years), male survivors reported lower sexual desire, females reported lower frequency of orgasm, and both males and females reported poorer sexual satisfaction compared with sex-matched peers.39 There are exceptions, as both Sundberg et al (2011) and Lehmann et al (2016) found that sexual satisfaction was similar between survivors and peers.31,44 The literature also supports the finding that many survivors experience a delay in meeting sexual milestones (eg, dating, first sexual intercourse) or are less likely to report frequent sexual activity compared with peers.34,44,48

Similar to findings of overall sexual dysfunction, females report more problems with components of sexual function compared with males.23,25,30 In a sample of 291 cancer survivors, a larger proportion of female survivors reported sexual problems (eg, interest, enjoyment, arousal) compared with male survivors (37% vs 20%; P < .01).25 In qualitative studies, women in particular describe more pain, a lack of sexual desire, and difficulty enjoying sex; specific components reported by young men included erectile dysfunction, premature ejaculation, and problems with arousal.22,28
| PUBLICATION       | DESIGN                  | COUNTRY      | TYPE OF CANCER AND AGE (NO. OF PARTICIPANTS) | SEXUAL FUNCTION OUTCOME(S) | MEASUREMENT(S)                        | MAIN OUTCOMES                                                                 |
|-------------------|-------------------------|--------------|---------------------------------------------|----------------------------|---------------------------------------|-------------------------------------------------------------------------------|
| Acquati 2018      | Observational cohort, longitudinal measures | United States | Survivors of various cancers, aged 18-39 y (N = 123) | Sexual dysfunction          | MOS Sexual Functioning Scale         | Of all participants, 52% reported sexual dysfunction.                         |
| Barrera 2010      | Cross-sectional         | Canada       | Lower extremity bone tumors, aged >16 y (N = 28) | Desire, satisfaction, orgasm, enjoyment/pleasure, erection | Brief SFQ-M, BISF-W              | Males reported better sexual function compared with females. Compared with survivors who underwent a limb salvage procedure, survivors who underwent lower extremity amputation or rotationplasty reported better sexual function. |
| Bellizzi 2012     | Cross-sectional         | United States | Survivors of various cancers, aged 15-39 y (N = 523) | Sexual function, sexual dysfunction, body image | Life Impact Checklist              | Cancer had a negative impact on sexual function reported by 40%, 58%, and 59% of survivors aged 15 to 20 y, 21 to 29 y, and 30 to 39 y, respectively. |
| Bellizzi 2012     | Cross-sectional         | United States | Survivors of various cancers, aged 15-39 y (N = 523) | Sexual function, sexual dysfunction, body image | Life Impact Checklist              | The majority (≥60%) of AYAs reported a negative impact on body image.         |
| Bober 2013        | Cross-sectional         | United States | Survivors of various cancers, aged 18-57 y (mean age, 27 y; N = 291) | Sexual function; Sexual dysfunction, arousal, desire, orgasm, enjoyment/pleasure, erection | Swed-QUAL                        | Of all participants, 29% classified as sexual dysfunction cases (reporting ≥2 problems). Associated factors included female sex, physical functioning, poor general and mental health, and fatigue. |
| Carter 2010       | Cross-sectional         | United States | Female survivors of gynecologic cancer or HCT, aged 18-29 y (N = 172) | Sexual dysfunction: Lubrication, pain, arousal, desire, satisfaction, orgasm | FSFI                               | All mean FSFI scores for cancer survivors were in the range of sexual dysfunction (range, 17.6-24.51). Cancer survivors experienced more pain and less lubrication than noncancer infertile women. |
| Crawshaw 2013     | Qualitative             | United Kingdom | Male survivors of testicular cancer or lymphoma, aged 21-40 y (N = 28) | Sexuality, relationship factors | Semistructured interviews          | Masculinity can be affected by treatment and infertility, which affect men’s relationships and sexual activity. |
| Eeltink 2013      | Cross-sectional         | Netherlands | Female survivors of Hodgkin lymphoma, aged 18-40 y (N = 144; 36 survivors and 108 controls) | Sexual dysfunction, lubrication, pain, arousal, desire | FSFI                               | Overall, 31% reported sexual dysfunction. Female survivors aged >30 y who perceived themselves as infertile reported the lowest FSFI scores. |
| Ford 2014         | Observational cohort—cross-sectional measure | United States, Canada | Female survivors of various cancers, aged 18-51 y (N = 408) | Sexual dysfunction, lubrication, pain, arousal, desire | SFQ-Female, Women’s Health Questionnaire, Sexual Self Schema | Survivors reported poorer sexual functioning compared with siblings, including decreased desire, arousal, and satisfaction. |
| Frederick 2016    | Qualitative             | United States | Survivors of various cancers who reported ≥2 sexual functioning problems, aged 18-39 y (N = 22) | Sexual dysfunction          | Semistructured interviews          | The most common sexual function problems were difficulty relaxing and enjoying sex. Five major themes emerged: interruption of psychosexual development, problems with sexual function, perception of body image, fertility concern, and inadequate clinical support. All participants reported inadequate clinical support regarding sexual health. |
| PUBLICATION      | DESIGN   | COUNTRY    | TYPE OF CANCER AND AGE (NO. OF PARTICIPANTS) | SEXUAL FUNCTION OUTCOME(S) | MEASUREMENT(S)                                                                 | MAIN OUTCOMES                                                                 |
|------------------|----------|------------|---------------------------------------------|-----------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Geue 2015⁹⁶      | Cross-sectional | Germany  | Survivors of various cancers, aged 15-30 y (N = 99) | Quality of romantic relationships, sexuality needs | Partnership Questionnaire, Life Satisfaction Scale, Supportive Care Needs Survey | Of all survivors, 75% were satisfied with their romantic relationship. Women reported greater sexuality needs than men; physical function and duration of the relationship were associated with relationship and sexuality satisfaction. |
| Graugaard 2018⁹⁰ | Cross-sectional | Denmark  | Survivors of various cancers, aged 17-26 y (N = 822) | Sexual dysfunction, lubrication, orgasm, erection, desire | Survey items assessed problems with orgasm, erection, vaginal dryness, and desire for sex | Of all survivors, 22% reported a sexual problem within the past wk. |
| Haavisto 2016³¹  | Cross-sectional | Finland  | Male survivors of various cancers, aged 25-38 y (N = 52 survivors, N = 56 control participants) | Sexual dysfunction, arousal, satisfaction, orgasm, fantasy, sexual behaviors/frequency | Derogatis Interview for Sexual Functioning self-report | Survivors had poorer sexual functioning compared with the control group. Poorer sexual functioning was related to depressive symptoms and absence of a relationship. Findings suggest a decline of sexual function at an early age among survivors. |
| Jervaeus 2016³²  | Qualitative | Sweden    | Survivors of various cancers, aged 16-24 y (N = 133) | Childhood cancer survivors’ views about sex and sexual experiences | Focus group discussions | In one-half of the focus group (N = 20 groups), one or more participant(s) in each group reported problems related to sexual life (eg, scars that affected them in intimate situations, being tired, feeling unattractive, or difficulties related to getting and maintaining an erection). Survivors reported concerns related to the physical body and an altered body that affected their sexuality. |
| Lehmann 2016²⁵   | Cross-sectional | United States | Survivors of noncentral nervous system malignancies, aged 20-40 y (N = 174; 87 survivors, 87 controls) | Satisfaction | Global Measure of Sexual Satisfaction | Survivors and controls were similar in sexual satisfaction. Sexual satisfaction was related to relationship status satisfaction. |

**TABLE 1.** (Continued)
| PUBLICATION | DESIGN | COUNTRY | TYPE OF CANCER AND AGE (NO. OF PARTICIPANTS) | SEXUAL FUNCTION OUTCOME(S) | MEASUREMENT(S) | MAIN OUTCOMES |
|-------------|--------|---------|---------------------------------------------|---------------------------|---------------|---------------|
| Lehmann 2018 | Cross-sectional | United States | Survivors of various cancers, aged 20-40 y (N = 90) | Sexual behavior/frequency | Course of Life Questionnaire | Almost all survivors had reached each psychosexual milestone (≥90%), except for sexual debut (83.3%), and most participants felt they reached each milestone at the right time. |
| Lewis 2012 | Qualitative | United States | Survivors of breast cancer, aged 25-45 y (N = 33) | Psychosocial concerns | Semistructured interviews | Cancer treatment had caused ≥1 or more sexual problem in one-third of participants (eg, vaginal dryness, pain, difficulty feeling excitement and pleasure, and difficulty reaching orgasm). |
| Lof 2009 | Cross-sectional | Sweden | Survivors of HCT, aged 19-42 y (N = 73) | Sexual dysfunction | Swed-QUAL | HCT survivors reported worse sexual functioning compared with general population data (Swed-QUAL mean score for survivors, 62.4 vs 85.2 in the general population; P < .001). |
| Martelli 2016 | Cross-sectional | France | Male survivors of rhabdomyosarcoma, aged 7-25 y (N = 18) | Satisfaction, erection, ejaculation | Questions derived from the International Workshop on Bladder-Prostate Rhabdomyosarcoma | Of HCT survivors, 49% considered themselves attractive; 19% felt that those around them considered them less attractive because of treatment/illness. Only 3 patients were sexually active, and all reported satisfying sex and orgasms. |
| Moules 2017 | Qualitative | Canada | Survivors of various cancers, aged 19-26 y (N = 10) | Survivors' perspectives on sexuality during and after adolescent cancer | Interviews | Survivors desire meaningful relationships and can feel behind in romantic experiences compared with peers. Survivors reported changes in their body affected their identity and self-esteem, which affected their sexuality. |
| Nahata 2020 | Qualitative | United States | Survivors of various cancers, aged 23-42 y (N = 40) | Relationship factors, body image | Interviews | Survivors reported a negative impact on romantic relationships and body image issues (feeling self-conscious) that negatively influence sexuality. |
| Olsson 2018 | Cross-sectional | Sweden | Survivors of various cancers, aged 19-36 y (N = 540; 285 survivors, 255 controls) | Satisfaction, desire, pain, lubrication (females), erection (males) | Study-specific instrument | Female cancer survivors reported lower sexual satisfaction and less frequent orgasm compared with female controls. Male survivors reported lower sexual satisfaction and desire compared with male controls. |
| Ritenour 2016 | Cross-sectional | United States, Canada | Male survivors of various cancers, aged 20-50 y (N = 1622; plus 271 siblings) | Erectile dysfunction, desire, satisfaction, orgasm | International Index of Erectile Function (IIEF) | A larger proportion of survivors had erectile dysfunction according to the IIEF compared with siblings (12.3% vs 4.2%, respectively). Among survivors, older age, testicular radiation >10 Gy, and surgery involving spinal cord or sympathetic nerves or prostate or pelvis were associated with erectile dysfunction. |
| PUBLICATION         | DESIGN     | COUNTRY        | TYPE OF CANCER AND AGE (NO. OF PARTICIPANTS)                                                                 | SEXUAL FUNCTION OUTCOME(S)                  | MEASUREMENT(S)                                                                                                           | MAIN OUTCOMES                                                                                                                                 |
|---------------------|------------|----------------|-------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|
| Robertson 2016      | Mixed methods | Australia      | Survivors of various cancers, aged 15-25 y (N = 43; data are based on answers from 16 participants who were in a relationship) | Relationship factors                       | Quantitative data, Psychosocial Adjustment to Illness Scale; Sexual Relationship Scale, qualitative data collected through interviews | One-half of survivors reported some relationship difficulty. AYAs identified emotional support with their partner as positive aspects of their relationships and described relational conflict associated with communication difficulties and loss of sexual interest. |
| Rosenberg 2017      | Mixed methods | United States  | Noncentral nervous system malignancies, aged 14-25 y (N = 35)                                               | Sexual behaviors, sexual function           | Quantitative data derived from the Guidelines for Adolescent Preventative Services risk assessment                       | Survivors reported that sexual relationships contributed to their identity. Males reported problems with sexual function, whereas women reported missed opportunities for sexual experiences. |
| Stinson 2015        | Qualitative | Canada         | Survivors of various cancers, aged 12-17 y (N = 20)                                                          | Survivors’ perspectives on romantic and sexual relationships | Interviews                                                                                                               | Romantic relationships were reported as an important source of support for adolescents during cancer therapy, but there were few opportunities for establishing these relationships in the context of cancer. |
| Sundberg 2011       | Cross-sectional | Sweden       | Survivors of various cancers, aged 18-37 y (N = 224)                                                         | Pain, arousal, desire, satisfaction, orgasm, sexual behavior/frequency | Scale from "Sex in Sweden" study                                                                                           | Sexual function between survivors and comparison group was similar. Male survivors were more likely to feel unattractive and to have low sexual interest compared with the control group. Within the survivor population, males with central nervous system tumors were more likely to report low sexual satisfaction. |
| Teall 2013          | Cross-sectional | Canada       | Survivors of lower extremity bone tumors, aged 18-32 y (N = 28)                                             | Sexual dysfunction, desire, satisfaction, orgasm, enjoyment, fantasy, sexual behavior/frequency | Brief SFQ-M, BISF-W                                                                                                       | There were no differences in sexual function by surgery type (ie, limb salvage, amputation, rotationplasty). |
| Thompson 2013       | Qualitative | United States  | Female survivors of various cancers, aged 18-25 y (N = 18)                                                   | Emerging adult survivors’ perceptions of their romantic relationships | Interviews                                                                                                               | Among participants, satisfaction with relationship and current partner highly correlated with perceived social support. Surivors reported gaining emotional maturity but were cautious with disclosing their cancer history in the context of romantic relationships. Fertility concerns among survivors can also cause strain on relationships. Survivors describe feeling self-conscious as a result of treatment-related physical changes, which can have a negative impact on relationships. |
TABLE 1. (Continued)

| PUBLICATION | DESIGN   | COUNTRY     | TYPE OF CANCER AND AGE (NO. OF PARTICIPANTS) | SEXUAL FUNCTION OUTCOME(S) | MEASUREMENT(S) | MAIN OUTCOMES                                                                 |
|-------------|----------|-------------|---------------------------------------------|-----------------------------|----------------|-----------------------------------------------------------------------------|
| Thompson 2009<sup>47</sup> | Cross-sectional | United States | Survivors of various cancers, aged 18-25 y (N = 120; 60 survivors and 60 controls) | Relationship status, relationship satisfaction | Relationship Assessment Scale, dating/romantic relationships measure | Compared with controls, survivors reported fewer romantic relationships and greater distress at relationship end. Within the survivor group, higher anxiety, older age at diagnosis, and more severe treatment intensity increased risk for relationship difficulties. |
| van Dijk 2008<sup>48</sup> | Cross-sectional | Netherlands | Survivors of various tumors, aged 16-40 y (N = 60) | Satisfaction, fantasy | Psychosocial and Social Functioning Questionnaire | Many survivors reported sexual problems (eg, 41.4% no sexual attraction, 27.6% no intercourse, 44.8% not satisfied with sexual life). Prior sexual intercourse was less common among survivors compared with the Dutch general population (66.7% and 95%, respectively). Survivors treated during adolescence had a delay in sexual milestones compared with survivors treated in childhood. |
| Wettergren 2017<sup>49</sup> | Cohort study, longitudinal | United States | Survivors of various cancers, aged 15-39 y (N = 465) | Sexual dysfunction | Life Impact Checklist | Cancer had a negative impact on sexual function among 59% at 1 y after diagnosis and among 43% at 2 y after diagnosis. |
| Zebrack 2010<sup>50</sup> | Cross-sectional | United States | Survivors of various cancers, aged 18-39 y (N = 599) | Sexual dysfunction | MOS Sexual Functioning Scale | Overall, 42.7% endorsed at least one symptom (32% of male and 52% of female participants). Sexual function was correlated with distress, and those with sexual dysfunction reported poorer health-related quality of life. |

Abbreviations: AYAs, adolescents and young adults; BISF-W, Brief Index of Sexual Functioning for Women; Brief SFQ-M, Brief Sexual Function Questionnaire for Men; FSFI, Female Sexual Function Index; Gy, grays; MOS, Medical Outcomes Study; Swed-QUAL, Swedish Health-Related Quality-of-Life Scale.
Relationship Factors

Five quantitative studies assessed relationship factors, and relationships were a point of discussion among 7 qualitative or mixed-methods studies (Table 1). Relationship status varied across studies, with studies of older survivors having a larger proportion of participants in a relationship. Among 822 Danish young adults diagnosed with cancer between ages 15 and 29 years, 69% were in a relationship at the time of survey completion. In the United States, 72.4% of survivors (aged 20-40 years) were in a relationship or married, similar to the proportion of sex-matched and age-matched controls. Among those aged 15 to 25 years, 37% reported being in a relationship during the first 2 years after treatment completion.

In general, most partnered survivors report being satisfied with their relationship. In a sample of 99 young adults aged >18 years, 76% rated the quality of their relationship as high. Some survivors describe benefits to being in a relationship during and after treatment; however, forming relationships can also be challenging, particularly among younger AYAs who are isolated from peers and partners during cancer treatment. For example, in the Danish sample of AYAs diagnosed with cancer between ages 15 and 29 years who were 1 to 7 years from diagnosis, almost 25% of the 822 participants responded that cancer negatively affected their relationship with their partner (22.0%) or their desire to flirt, date, or have a partner (23.6%). Uncertain fertility status or infertility can also negatively impact survivors’ romantic relationships, and some men describe infertility as threatening to their perceived masculinity and adding stress to their relationships.

In addition, as AYAs express a desire for romantic and sexual relationships they also struggle with how and when to disclose their cancer history. Cancer has changed their perceived identity, and younger survivors often describe feeling more mature than peers, which can lead to some survivors having difficulty sharing emotions with romantic partners.

Body Image

Seven quantitative studies included assessments of body image, feeling attractive, and feeling desirable; these concepts were also addressed by participants in 4 qualitative studies (Table 1). Across studies, survivors reported issues with body image, feeling unattractive, and having uncertainty with their own body; often attributed to the cancer experience. Among 523 survivors aged 15 to 39 years, the majority of respondents reported that cancer had a negative impact on their body image. Findings were similar in a sample of 822 Danish young adults, among whom 54% responded that cancer negatively affected their view of their own body. In qualitative interviews, survivors describe feeling self-conscious and worried about their “altered body” and exposing their scars during intimate situations. However, not all survivors report problems with body image; in a study of 87 long-term survivors with an average age of 27 years and 16 years from their cancer diagnosis, survivors reported similar body image compared with controls. Assessment of body image varied and included scales focused on self-worth and appearance in addition to measures that were not validated.

Discussion

The findings from this review highlight the significant burden of impaired sexual function among AYAs after they complete cancer treatment. Nonetheless, and notably, this review demonstrates the complex relationships between sexual dysfunction, romantic relationships, and body image among AYA cancer survivors. Because these domains have clearly been identified by patients and negatively impact quality of life, there is an imperative to 1) help providers identify problems early and 2) test supportive interventions to address these challenges.

The survivors represented in this review varied in developmental stage from late adolescence through young adulthood as well as in time since diagnosis, both factors that would be expected to influence sexual dysfunction. For example, whereas adolescent and early young adult survivors often experience interruption of psychosexual development and delay in sexual experiences compared with peers, survivors in their late 20s or 30s are less likely to have those concerns but more likely to experience sexual dysfunction. Moreover, this literature review also demonstrates that females are more likely to report sexual problems compared with males. Several studies offered explanations for poorer sexual functioning among females compared with males, suggesting that females experience psychological and emotional sequelae (depression, posttraumatic stress symptoms, feeling unattractive, communication problems with romantic partners) that could contribute to lower sexual desire and decreased satisfaction. Psychosocial implications of cancer treatment may be a driver among females, including poorer body image because of scarring. In addition, female survivors are less likely than males to be asked about sexual health problems by their health care provider, which can result in unaddressed and untreated symptoms. Finally, females experience vaginal dryness and dyspareunia, which likely contribute to sexual distress. It is important to note that certain cancers, such as testicular germ cell tumors in men, are likely to have a particularly detrimental impact on sexual function and/or body image that is sex-specific.
Previous reviews of sexual dysfunction among cancer survivors have focused on survivors of AYA cancer (cancer diagnosis between ages 15 and 39 years) \(^6\) and a clinically focused narrative review of childhood cancer survivors. \(^{54}\) Here, we have conducted a more extensive and sharply focused review that includes AYA-aged survivors of both childhood and AYA cancer with the purpose of informing sexual health research across the spectrum of AYA cancer survivors. In addition, through an analysis of the included studies, we found that body image and romantic relationships emerged as important themes worthy of future academic pursuit, recognizing the intimate interplay between these factors.

Undoubtedly, body image, romantic relationships, and sexual function are related, and challenges in one area may affect another. For example, poor body image may affect survivors’ romantic relationships, \(^{32}\) and sexual dysfunction, including lack of desire, may be influenced by body image, which, in turn, may lead to strain within romantic relationships. Similarly, during and after cancer treatment, survivors describe changes in self-image and identity that also affect sexuality and development of relationships. \(^{37,42}\) In addition, perceptions around infertility have potential to influence all 3 of these domains. \(^{20,26,46}\) Although the studies that explored relationship factors and body image support an interplay of these elements with sexual function, there has not been any significant mediational analysis in the AYA survivorship literature to date that has examined these relationships.

The literature reflects a wide range of psychometric scales that offer various definitions of sexual dysfunction, making it difficult to draw conclusions about the breadth and depth of sexual dysfunction in this population. Variability in research findings may reflect inconsistencies in measurement or other methodological issues. For example, the majority of AYA survivors who are in a relationship report that the quality of relationship satisfaction is high. \(^{29}\) However, relationship quality may be orthogonal to measures of sexual satisfaction or sexual function, which are not mutually exclusive.

Poor-quality ratings for studies in this review were most often due to the study’s small sample size or sampling methodology, which limited the representativeness of the sample to the larger population of cancer survivors. For this reason, when exploring trends in sexual function in relation to cancer diagnoses or treatment exposures, we focused on publications that were rated fair or good quality. In several studies, sexual dysfunction was associated with higher doses of testicular radiation, surgery involving the spinal cord or pelvis, \(^{40}\) and cancers of the breast, genital, \(^{30}\) or central nervous system. \(^{44}\) However, other studies found no relationship between cancer diagnosis, gonadotoxic treatment exposures, treatment intensity, or time from diagnosis. \(^{25,49,50}\) Given the heterogenous populations, variation in cancer diagnoses, and lack of clinical exposures documented in most studies, it is difficult to draw conclusions based on cancer diagnosis and treatment exposures.

Survivors consistently report a lack of sexual health discussions or guidance from health care providers and express a desire for providers to address these issues. \(^{25}\) The COG AYA Oncology Discipline Committee recognizes sexual health among AYAs as an unmet need and thus commissioned this review. Sexual health issues need increased attention in prospective trials aimed at AYAs, perhaps incorporating patient-reported outcomes of sexual health, testing education tools for providers, prospectively testing sexual dysfunction measurement tools in AYAs, and increasing collaboration between adult and pediatric providers for knowledge translation. The cooperative research group setting may serve as an avenue for design and implementation of clinical trials of systematic assessment and interventions on a larger scale to improve sexual health among AYAs during and after cancer. Research in this setting would also provide an avenue for examining sexual health problems in relation to specific cancer diagnoses and treatment exposures, which are critical gaps in the current literature. Spanning the age range of 15 to 39 years, AYAs represent a challenging population for cancer researchers because neither the pediatric nor the medical oncology disciplines are able to study or care for all patients. Thus, as is the case for therapeutic cancer clinical trials, sexual health research for AYAs with cancer may be best achieved through collaboration of the COG with adult-focused cooperative oncology groups that are also members of the National Cancer Institute’s National Clinical Trials Network (NCTN), including the SWOG Cancer Research Network, Alliance for Clinical Trials in Oncology, the Eastern Cooperative Oncology Group–American College of Radiology Imaging Network Cancer Research Group, NRG Oncology, and the Canadian Cancer Trials Group. \(^{55}\) Leveraging the NCTN for sexual health research also offers the opportunity to reach AYAs in the community setting through the National Cancer Institute’s Community Oncology Research Program. \(^{55,56}\)

Pediatric oncology clinicians who care for AYA cancer survivors describe a lack of experience discussing sexual health and recognize the need for further education regarding sexual health communication. \(^{57}\) Educational interventions for oncology providers have demonstrated improvement in provider-reported knowledge and practice, but the impact on patient-reported outcomes has not been routinely evaluated. \(^{58}\) The Educating Nurses about Reproductive Issues in Cancer Healthcare (ENRICH) has demonstrated success in educating providers about sexual health among oncology patients. \(^{59}\) Sexual communication models, including PLISSIT (Permission, Limited Information, Specific Suggestions, and Intensive Therapy) \(^{60,61}\) can be helpful for providers to initiate sexual health discussions with patients. The incorporation of a
sexual health clinic within the oncology setting has been successful among adults with cancer and may serve as a model for AYA cancer survivors in some settings. AYA patients would also benefit from strong collaborations between oncology and survivorship providers and adolescent medicine, gynecology, and urology providers to address sexual problems. This review demonstrates a lack of tested interventions or strategies for addressing sexual dysfunction among AYA cancer survivors. Ultimately, interventions to improve sexual function should consider variability in psychosexual development, relationship status, and the attainment of sexual milestones among AYAs. Thus these findings strongly support the need for developmentally appropriate interventions and using approaches that account for biologic and psychosocial factors to improve AYA cancer survivors’ sexual function. As the number of AYA survivors continues to grow, there is a pressing need for targeted information, education, and intervention around sexual health, intimate relationships, and body image.

We acknowledge several limitations in this scoping review. First, we included only studies published in English in peer-reviewed journals. It is possible that studies of sexual function among AYA cancer survivors were published in other languages and are not represented in this review. Second, the focus of this review was survivors of cancer, and the results do not represent sexual dysfunction experienced by AYA patients currently on active cancer treatment. Most of the studies we included were rated as fair or poor in quality because of limited sample size, biased sampling designs, and unvalidated measurement tools. Finally, there is variation in the measurement across studies and the ability to make direct comparisons of sexual dysfunction between scales is limited. Future research is needed to identify appropriate tools to measure sexual function among AYA cancer survivors. The American Society of Clinical Oncology guidelines highlight the need for oncologists to ask their patients about sexual health concerns. Consequently, providers who see AYA cancer survivors must feel equipped to ask these questions and understand the potential breadth of sexual dysfunction, including significant factors such as body image and romantic relationships. Building on the results of this review, the COG is poised to develop a prospective study of AYA sexual health through the inclusion of key measures within NCTN-wide survivorship studies and concomitantly contribute to ongoing education for providers and patients.

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