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**REVIEW ARTICLE**

# Are there any positive consequences of childhood cancer? A review of the literature

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**Abstract**

The aim was to investigate whether there are any positive consequences of childhood cancer. Studies published 1990 – 2005 reporting survivors' descriptions of positive consequences of childhood cancer were identified through a search in the databases CINAHL, PsycINFO, and PubMed. According to a manifest content analysis, positive consequences were referred to three themes: life values, relations to others, and relation to self. A second search in the same databases was conducted to identify studies investigating whether survivors of childhood cancer differ from comparison groups with regard to variables assigned to these themes. In these studies, no conclusions about positive consequences with regard to the theme life values can be drawn, as only one study was identified. In addition, only a small minority of findings from comparative studies indicate that childhood cancer has any positive consequences with regard to relations to others and relation to self. A majority of the results indicate that survivors do not differ from comparison groups, whereas some findings highlight that friendship and marital status are areas of concern, and parenthood and sexuality are areas of potential concern. It is recommended that survivors of childhood cancer are followed up by a multi-professional team, focusing not only on the survivors' health status but also on relations to family, friends, and partners.

The mortality rate for childhood cancer has declined dramatically over recent decades and the overall five-year relative survival rate has increased to approximately 75% [1]. At least six reviews summarising psychosocial consequences of childhood cancer have been published [2–7]. In the most recent ones [5,6], it is concluded that most survivors do not experience more psychosocial problems than comparison groups.

Up to 1988, positive consequences of childhood cancer had been reported in three studies [8–10]. In one of these [8] 1 234 survivors were asked about the disease and treatment. A small minority (n = 13) reported that the disease had influenced their life positively. In another study [9] 40 young adult survivors of Hodgkin's disease were asked whether they experienced any positive consequences of the disease. Ninety-five percent reported at least one positive consequence, for example increased appreciation of life, patience, tolerance of others, and stronger bonds to the family. In a third study [10] 40 adolescent survivors were asked whether they felt that any good had come out of the disease. Sixty-one percent thought so. They described themselves as more altruistic, confident, empathic, mature, reflective, and tolerant, that they experienced closer relations to family members, a stronger religious faith, were more serious about school, more popular, and had a greater goal orientation than before the diagnosis.

The aim of this review of the literature is to investigate whether there are any positive consequences of childhood cancer. This was done by investigating whether positive consequences of childhood cancer, as described by survivors, were supported by findings from studies with comparative designs. This approach is, to the best of our knowledge, new and may hopefully add new knowledge.

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## Methods

A review of the literature was performed. In the first step, studies with a descriptive design, reporting survivors' descriptions of positive consequences of childhood cancer, were identified through a search in the databases CINAHL, PsycINFO, and PubMed. The keywords adolescence, cancer, childhood, consequence, experience, meaning, paediatric, positive, and survivors were used. Studies meeting the following criteria were included: descriptive design, sample of persons diagnosed with cancer during childhood, off treatment and without any sign of recurrence, article written in English and published in a peer-reviewed journal 1990 – 2005. Seven studies met the criteria [11–17]. See Table I for a presentation of the samples and the type of data collection in these studies.

Reported positive consequences were inductively categorized into three themes by the first (EM) and last (LvE) authors, according to a manifest content analysis [18]. The three themes were life values, relations to others, and relation to self. Taking these as a starting point, a second search was conducted in the databases mentioned above. The purpose was to identify studies with a comparative design in which variables that could be assigned to the three themes were investigated. The keywords adjustment, adolescence, cancer, childhood, existential, existential psychology, faith, family relation, friend, infertility, life expectation, life value, marital, paediatric cancer, parent-child relation, parenthood, philosophy of life, psychological, psychosocial, religion, religious, religious beliefs, religious ethics, response shift, self-concept, self-esteem, self-image, self-perception, sexual, and spiritual were used. Identified articles were hand-searched for further references. Studies meeting the following criteria were included: comparative design, sample of persons diagnosed with cancer during childhood, off treatment and without any sign of recurrence, a comparison group (healthy controls/population norms), article written in English and published in a peer-reviewed journal 1990 – 2005.

There were 51 studies with a comparative design [11,19–68] in which variables related to the three themes were investigated for survivors of childhood cancer: life values [60], relations to others [11, 20–22,24–28,30–53,55–65,67,68], and relation to self [11,19,21–23,29,31,36,39,42,43,47,49,52,54, 55,59,61,62,63,66]. See Table II for a presentation of the samples and the type of data collection in these studies.

Variables were first assigned to categories and thereafter to themes, see Tables III, IV. A more

Table I. A presentation of the samples and the type of data collection in studies with a descriptive design, published 1990–2005 (n = 7), reporting survivors' descriptions of at least one positive consequence of childhood cancer.

| Author | Country | Diagnoses | Sample size [a] | Age, years [b] | Time since diagnosis, years [b] | Time off treatment, years [b] | Data collection |
|---|---|---|---|---|---|---|---|
| [11] | UK | Mixed | S | 16–30 | ≥5 for 32 and <5 for 16 patients | | Unstructured interview. |
| [12] | Canada | Mixed | M | M = 26 | | ≥2 | Interview about impact of cancer on: current lifestyle; relations with peers, family, and partners; personality; philosophy of life; relations with peers at the time of illness; religious beliefs. |
| [13] | USA | Mixed | M | 8–16 | M = 9 | | How do you feel now about surviving a tough disease like cancer? |
| [14] | USA | | XS | 23–26 | | | What is/are the most meaningful event/s in your life? |
| [15] | USA | Mixed | L | 14–29 | | | Having cancer has made me different from others of my age. If they agreed they were asked: In what ways are you different from other people of your age? |
| [16] | USA | Sarcoma | M | 21–37 | M = 14 | | What special abilities do you have that those who have never had cancer do not have? Have there been other positive things that have come out of your experience with cancer? |
| [17] | USA | Mixed | | 17–29 | M = 14 | | Interview about positive consequences of cancer with regard to: existential/spiritual, psychological, physical, and social aspects. |

[a] Sample size: XS = ≤30; S = 31–60; M = 61–200; L = 201–500 persons. If missing, data is not presented in the study.

[b] Range if presented. If missing, data is not presented in the study.

Table II. A presentation of samples and type of data collection in studies with a comparative design, published 1990–2005 (n = 51), investigating whether survivors of childhood cancer differ from comparison groups with regard to variables assigned to the themes: life values, relations to others, and relation to self.

| Author | Country | Diagnoses | Sample size[a] | Age, years[b] | Time since diagnosis, years[b] | Time off treatment, years[b] | Data source[c] | Comparison data[d] |
|---|---|---|---|---|---|---|---|---|
| [19] | USA | Mixed | M | 7–18 | | M = 1.7 | S | R |
| [20] | Finland | Mixed | L | 16–35 | | Md = 12 | S | R |
| [21] | Sweden | Leukemia, lymphoma | XS | 7–19 | 4–16 | Md = 7 | P, S, T | PN |
| [22] | Canada | Mixed | XL | 6–16 | 6–16 | | P | R/M |
| [23] | Australia | Leukemia | S | 12–17 | | M = 8 | S | R |
| [24] | Sweden | Mixed | S | 18–29 | 8–19 | 1–19 | S | M, PN |
| [25] | USA | Leukemia | L | 18–34 | ≥2 | | S | S |
| [26] | USA | Leukemia | M | 18–34 | ≥2 | | S | S |
| [27] | Israel | Mixed | M | 18–35 | 4–25 | 3–21 | S | R/M |
| [28] | UK | Bone tumour | S | 19–28 | 2–15 | | S | PN |
| [29] | Sweden | Mixed | S | 8–18 | M = 3 | | S | PN |
| [11] | UK | Mixed | S | 16–30 | ≥5 for 32 and ≤5 for 16 patients | | S | S |
| [30] | Austria | Sarcoma | S | 20–30 | 2–21 | ≥1 | S | PN |
| [31] | Canada | Mixed | M | 18–37 | | M = 15 | S | NR |
| [32] | USA | Mixed | M | 18–44 | ≥5 | | S | PN |
| [33] | USA | Mixed | XL | M = 23 | ≥5 | | S | S |
| [34] | USA | Mixed | XL | M = 23 | ≥2 | | S | S |
| [35] | USA | Mixed | M | ≥30 | | ≥10 | S | S/M |
| [36] | USA | Mixed | M | 10–15 | | ≥5 | P, S | PN |
| [37] | Finland | Mixed | XS | 16–26 | | Md = 7 | S | R |
| [38] | Netherlands | Mixed | L | 16–49 | | M = 15 | S | NR |
| [39] | Netherlands | Mixed | L | 16–49 | | M = 16 | S | NR |
| [40] | Sweden | Brain tumour | XS | M = 24 | 5–16 | | S | M |
| [41] | UK | Leukemia, Wilms' | M | 19–30 | | ≥5 | S | M |
| [42] | USA | Mixed | XS | 12–18 | | ≥5 | P, S, T | NR |
| [43] | Italy | Leukemia | M | 12–20 | | ≥2 | S | M |
| [44] | USA | Sarcoma | XL | 18–45 | ≥5 | | S | S |
| [45] | USA | Mixed | M | Adult: M = 26<br>Child: M = 13 | ≥2 | | S | S/M |
| [46] | USA | Sarcoma | M | 21–51 | ≥5 | | S | S/M |
| [47] | USA | Mixed | XS | 11–18 | ≥5 | | PE, S, T | M |
| [48] | USA | Ewing's sarcoma | M | 20–48 | 2–29 | | S | S/M |
| [49] | USA | Mixed | XS | 6–16 | | 1–6 | P, S, T | R/M, PN |
| [50] | Italy | Mixed | L | M = 24 | ≥5 | | R | PN |
| [51] | Austria | Mixed | M | M = 23 | | M = 14 | S | PN |
| [52] | USA | Mixed | XS | 11–21 | | M = 1.5 | S | M |
| [53] | Finland | Leukemia | XS | M = 17 | | M = 17 | S | M |
| [54] | Finland | Leukemia | XS | M = 20 | | M = 8 | S | M |
| [55] | USA | Brain tumour | S | 6–18 | 2–5 | | P, S, T | PN |
| [56] | USA | Leukemia, lymphoma | M | 12–19 | | M = 3 | S | PN |
| [57] | USA | Mixed | XXL | 15–48 | ≥5 | | S | PN |
| [58] | USA | Mixed | M | 18–64 | | ≥2 | S | PN |
| [59] | USA | Leukemia | XL | ≥18 | ≥2 | | S | S/M |
| [60] | USA | Mixed | M | 8–13 | 1–12 | | S | R |
| [61] | UK | Mixed | S | 9–18 | M = 5 | | S, T | M |
| [62] | USA | Mixed | S | 5–12 | | M = 3 | P, S, T | NR |
| [63] | Netherlands | Mixed | L | 18–31 | | 5–30 | S | NR |
| [64] | USA | Brain tumour | XS | 8–18 | M = 3 | | PE, S, T | M |
| [65] | USA | Mixed | S | 8–16 | | 1–8 | PE, S, T | M |
| [66] | USA | Mixed | L | 14–21 | | | S | NR |

Table II (*Continued*)

| Author | Country | Diagnoses | Sample size[a] | Age, years[b] | Time since diagnosis, years[b] | Time off treatment, years[b] | Data source[c] | Comparison data[d] |
|---|---|---|---|---|---|---|---|---|
| [67] | USA | Brain tumour | XL | 18–44 | ≥5 |  | S | S |
| [68] | USA | Leukemia | S | 18–34 |  | M = 15 | S | PN |

[a] Sample size XS = ≤30; S = 31–60; M = 61–200; L = 201–500; XL = 501–2000; XXL = ≥2000 persons.

[b] Range, if presented. If missing, data is not presented in the study.

[c] P = Parent report; PE = Peer report; R = Register data; S = Self-report; T = Teacher report.

[d] M = matched; NR = Non-randomized control group; PN = Population norms; R = Randomized control group; S = Sibling controls.

detailed presentation of samples, type of data collection, and results (including a presentation of variables assigned to categories] than that presented in Tables I–IV can be requested from the first author.

## Results

### *Life values*

Positive consequences with regard to existential aspects [15], a deeper appreciation of life [11,12,14,17], enjoying life more [17], worrying less, and living more for today [17] than before the disease were reported in studies with a descriptive design and were assigned to the theme life values. Only one study [60] with a comparative design was identified with regard to this theme. No positive consequences were reported in this study.

### *Relations to others*

Increased empathy [14] and desire to help others [14], stronger bonds to the family [12,14] and friends [14], and more positive relations to others [16] than before the disease were reported in studies with a descriptive design and were assigned to the theme relations to others. See Table III for a presentation of results in studies with a comparative design with regard to this theme. A more positive attitude towards the family [43], a preference for interacting with others [31], more positive emotions when interacting with others [31], better social relationships [43], and less anti-social behaviour [63] than for comparison groups were expressed by self-reports. Teachers reported less aggressive and disruptive behaviour for survivors than for a comparison group [65].

### *Relation to self*

Findings from studies with a descriptive design demonstrate that survivors experience that their personality has changed for the better due to the cancer disease [11,12,15], that they feel more mature than others of the same age [11,13], that the illness has given them strength [13,17], and they experience positive differences with regard to developmental/personality aspects [15,16]. In addition, they feel more positive [13,17], confident [17], and independent than before the disease [17]. These consequences were assigned to the theme relation to self. See Table IV for a presentation of results in studies with a comparative design with regard to

Table III. A presentation of results in studies with a comparative design, published 1990–2005 (n = 45), investigating whether survivors of childhood cancer differ from comparison groups with regard to the theme relations to others.

|  | Results[a] |  |  |
|---|---|---|---|
| Category | + | = | − |
| Family function | [43] | [36,42,49,56,60] | [31,42,55,56] |
| Social life | [31,43,63] | [11,21,31,36,39,42,47,51,52,55,58,61,62] | [21,28,41,42,45,49,52,55,63] |
| Relations to friends |  | [47,64,65] | [22,31,41,61,64,65] |
| Behaviour in school | [65] | [47,61,64,65] | [47,64,65] |
| Living with parents |  | [24,40,63] | [30,37,38] |
| Married/cohabiting |  | [11,24,27,35,46,59] | [26,30,32,37–40,44,45,48,50,57,63,67,68] |
| Sexuality |  | [20,42,43,53] | [31,37,41,53,63] |
| Parenthood |  | [24,25,27,30,46] | [26,33,34,38,40,48] |

[a](+) = Significantly more positive ratings, indicating higher function, better well-being, and/or fewer symptoms for the cancer group compared to the comparison group; (=) = Non-significant result, indicating no difference between the cancer group and the comparison group; (−) = Significantly more negative ratings, indicating lower function, worse well-being, and/or more symptoms for the cancer group compared to the comparison group.

Table IV. A presentation of results in studies with a comparative design, published 1990–2005 (n = 20), investigating whether survivors of childhood cancer differ from comparison groups with regard to variables assigned to the theme relation to self.

| | Results[a] | | |
|---|---|---|---|
| Category | + | = | − |
| Global self-esteem | [43] | [11,19,21,23,29,31,36,39,42,47,49,55,61,62] | [22,29,59] |
| Self-esteem with regard to appearance | [39,43,66] | [19,23,36,47,52,54,55,61,62] | [42,54] |
| Self-esteem with regard to emotional function | [19] | [19,21,23] | [29] |
| Self-esteem with regard to competence | [19] | [21,23,29,36,47,55,61,62] | [23,29,55] |
| Self-esteem with regard to personality/behaviour | [19] | [23,36,47,55,61,62] | [63] |
| Self-esteem with regard to relations | | [19,21,23,29,36,47,55,61,62] | |

[a](+) = Significantly more positive ratings, indicating higher function, better well-being, and/or fewer symptoms for the cancer group compared to the comparison group; (=) = Non-significant result, indicating no difference between the cancer group and the comparison group; (−) = Significantly more negative ratings, indicating lower function, worse well-being, and/or more symptoms for the cancer group compared to the comparison group.

this theme. According to self-reports, survivors experience better total self-esteem [43], a better body image [43], worry less about what their own body looks like [39,66], experience higher levels of happiness and satisfaction [19], and have a better self-concept with regard to intellectual and school status and behaviour [19] than comparison groups.

## Discussion

In descriptive studies, survivors of childhood cancer report positive consequences of the disease with regard to life values, relations to others, and relation to self. In comparative studies, no conclusions about positive consequences with regard to the theme life values can be drawn, as only one study was identified. In addition, only a small minority of findings from comparative studies indicate that childhood cancer has any positive consequences with regard to relations to others and relation to self. A majority of the results indicate that survivors do not differ from comparison groups, whereas some findings highlight that friendship and marital status are areas of concern, and parenthood and sexuality are areas of potential concern.

When treatment ends, those struck by childhood cancer may experience a profound need to socialise with others in their striving to achieve a normal life. This may explain why survivors report a preference for interacting with others [31] and more positive emotions when interacting with others [31] than comparison groups. Trying to fit in with their former social life, survivors may be eager to present themselves favourably [42], and may exhibit less anti-social [63], aggressive and disruptive behaviour [65] than comparison groups. However, most results with regard to friendship demonstrate poorer function regarding friendship [41] as well as lower satisfaction regarding friendship [31] for survivors as compared to comparison groups. In addition, reports by parents demonstrate that survivors less often use friends as confidants [22] and have less close friends [22], while reports by teachers demonstrate that survivors are less popular than their peers [61], and reports by peers demonstrate that survivors are less often selected as best friends [64,65]. Other findings indicate that survivors are more sensitive and isolated in class compared to comparison groups [47,64,65]. Taken together the findings illustrate that friendship is an area of concern for survivors.

Survivors are married/cohabit less often than comparison groups [26,30,32,37–40,44,45,48,50, 57,63,67,68]. Concerns about future fertility and the health of offspring may explain the finding. In general, childhood cancer and subsequent treatment do not have a significant impact on pregnancy outcomes and the health of offspring [69]. Despite this, a number of studies show that survivors are uncertain about their fertility status [12,38,66, 68,70], that a fifth of young women who have survived cancer report high anxiety about pregnancy causing a recurrence and fear of birth defects [71]. A perceived loss of opportunity for parenthood may be devastating for self-esteem and damaging to marital or other intimate relationships [70]. Sexual [37,53] and psycho-sexual development [63], sexual function [41], and sex life [31] are potential concerns for survivors. In spite of evidence of sexual dysfunction little has been done to help survivors in this respect [72]. Bearing this in mind, there is a need for practical guidelines and sexual rehabilitation programs for young persons treated for cancer during childhood as well as education with regard to sexual aspects for those working within paediatric oncology. The relationship between worries about fertility issues, sexual function, marital status, and parenthood after childhood cancer may illustrate an important clinical problem and should be further explored.

Efforts were made to assess the scientific value of the reviewed studies and thereby the validity of the findings. Due to methodological shortcomings in the studies, we did not succeed in these efforts. Consequently, each result has been given an equal importance in this review. However, the caveats are legion. First, the great majority of the study samples were heterogeneous with regard to factors of potential importance such as age at diagnosis, time since diagnosis, and diagnosis. Second, the same variables were investigated using different instruments in different studies and were sometimes investigated by self-reports, whereas proxy-reports were used in other studies. Third, comparison groups and norm data were seldom matched to the cancer group for factors of potential importance such as age, gender, and family situation. Furthermore, in the great majority of the studies it was not discussed whether the power in the data analyses was satisfactory. Due to these circumstances, the findings in the respective studies could not be reported according to potentially important factors. Last but not least, although a wide range of keywords was used, it is possible that all eligible studies were not identified

## Conclusion and implications

In spite of the mentioned methodological shortcomings, we find it safe to conclude that survivors of childhood cancer, in most regards, do not differ from comparison groups with regard to relations to others and relation to self. However, friendship and marital status are areas of concern, and parenthood and sexuality are areas of potential concern for survivors. It is recommended that survivors of childhood cancer are followed up by a multi-professional team, focusing not only on health status but also on relations to family, friends, and partners.

Studies with longitudinal designs including homogenous samples with regard to age at diagnosis, time since diagnosis, and diagnosis are needed in order to investigate the temporary or permanent consequences of childhood cancer.

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