

Child Adjustment to Parental Cancer: A Latent Profile Analysis

Marthe R. Egberts¹, Dineke Verkaik^{1, 2}, Mariken Spuij^{2, 3}, Trudy T. M. Mooren^{1, 4}, Anneloes L. van Baar², and Paul A. Boelen^{1, 4}

¹ Department of Clinical Psychology, Utrecht University

² Child and Adolescent Studies, Utrecht University

³ TOPP-zorg, Driebergen, the Netherlands

⁴ ARQ National Psychotrauma Centre, Diemen, the Netherlands

Objective: This study aimed to identify latent classes of adjustment in children confronted with parental cancer, based on profiles of traumatic stress symptoms, health-related quality of life (HRQoL), and satisfaction with life. In addition, correlates of classes were examined. **Method:** Families were recruited through social media, health care providers, and cancer support centers. The sample consisted of 175 children (52% girls, aged $M = 11.98$, $SD = 3.20$, range = 6–20 years) from 92 families, including 90 parents with a current or past cancer diagnosis and 71 healthy parents. Children and parents completed self-report questionnaires at home. A latent profile analysis was conducted to identify classes based on child traumatic stress symptoms, HRQoL, and satisfaction with life. **Results:** Four classes were identified, which were labeled (a) average functioning across domains (64%); (b) high stress, below-average HRQoL and life satisfaction (14%); (c) high stress, below-average HRQoL, and average satisfaction (11%); and (d) high functioning across domains (11%). Child age, parent traumatic stress symptoms, and perceived parental warmth were significantly associated with class membership. Child gender, which parent was diagnosed with cancer, and illness phase were unrelated to class membership. **Conclusions:** Meaningful subgroups of children can be distinguished based on positive and negative indicators of adjustment to parental cancer. Whereas the majority of children appear to adjust well, 25% of children display high levels of traumatic stress and impaired HRQoL, in some cases combined with low life satisfaction; these children may need specific attention to improve adjustment in the long term.

Keywords: parents, cancer, child adjustment, latent profile analysis, trauma

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When a parent is diagnosed with cancer, this can be stressful and disruptive for the entire family. The life threat associated with the diagnosis, uncertainty about the future, and physical consequences of the illness and treatment may cause significant distress and can be demanding for both children and parents. Research initially focused on the psychological consequences for cancer patients and their partners. In the past decades, the number of studies addressing the consequences for children in

these families substantially increased (Faulkner & Davey, 2002; Krattenmacher et al., 2012; Osborn, 2007; Walczak et al., 2018). Nevertheless, to our knowledge, no studies have yet examined whether different child adjustment profiles can be distinguished, based on both negative and positive indicators of adjustment.

Child adjustment to parental cancer has been operationalized in several ways. First, several studies have examined general

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Marthe R. Egberts  <https://orcid.org/0000-0002-4698-2367>

Dineke Verkaik  <https://orcid.org/0000-0002-2874-3805>

Mariken Spuij  <https://orcid.org/0000-0002-5515-0466>

Trudy T. M. Mooren  <https://orcid.org/0000-0003-0819-8640>

Anneloes L. van Baar  <https://orcid.org/0000-0002-3498-9019>

Paul A. Boelen  <https://orcid.org/0000-0003-4125-4739>

Dineke Verkaik is now at GGZ Centraal, Amersfoort, the Netherlands.

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Correspondence concerning this article should be addressed to Marthe R. Egberts, Department of Clinical Psychology, Utrecht University, P.O. Box 80140, 3508 TC Utrecht, the Netherlands. Email: m.r.egberts@uu.nl

adjustment, including health-related quality of life (HRQoL; Hauken et al., 2018; Jeppesen et al., 2016; Krattenmacher et al., 2013). Only few studies have compared HRQoL of children confronted with parental cancer to a norm or control group, and these have provided mixed results. Whereas some studies indicated impaired HRQoL in certain domains (Hauken et al., 2018; Jeppesen et al., 2016), others found an overall good HRQoL in this group (Krattenmacher et al., 2013) or even reported a higher HRQoL in children affected by parental cancer (Bultmann et al., 2014). Second, apart from HRQoL, several studies examined children's psychological problems (Krattenmacher et al., 2014; Thastum et al., 2009; Visser et al., 2005). Research evidence to date indicates that children confronted with parental cancer have a slightly elevated risk of developing internalizing problems, including depression and anxiety symptoms (Huizinga et al., 2005; Osborn, 2007). Moreover, children may experience symptoms of posttraumatic stress disorder (PTSD) in reaction to parental cancer (Foran-Tuller et al., 2012). One study showed that 21% of sons and 35% of daughters demonstrated elevated levels of traumatic stress symptoms (Huizinga et al., 2005).

Although these studies give valuable information regarding the overall adjustment of children in the context of parental cancer, they provide no information about typical patterns of child adjustment, based on positive and negative indicators of adjustment. Previous studies mostly focused on single outcomes, such as child HRQoL or traumatic stress symptoms (Huizinga et al., 2005; Jeppesen et al., 2016), without taking into account their interrelationships. Moreover, most studies have focused on psychosocial adjustment problems (Krattenmacher et al., 2012), whereas few studies have included positive indicators of well-being. An example of such an indicator is satisfaction with life, which has been shown to be related to children's ability to adjust to adversity (Gilman & Huebner, 2003; Veronese & Pepe, 2020). In addition, previous research has primarily focused on child functioning at a group level (e.g., Jeppesen et al., 2016), rather than on individual differences in functioning, and has reported the presence or absence of problems based on cutoff scores (e.g., Huizinga et al., 2005; Thastum et al., 2009). To obtain a more comprehensive picture of children's adjustment to parental cancer, it is also important to take a person-centered approach and to include several indicators of well-being simultaneously, while also taking into account the family context.

Latent profile analysis (LPA) enables the identification of latent subgroups or classes, based on shared patterns of adjustment (McCutcheon, 1987). This approach is increasingly used to examine patterns of adaptation after potentially traumatic events (e.g., Au et al., 2013; Lai et al., 2015) but, to our knowledge, has not yet been used to study children's functioning when faced with parental cancer. As a person-centered approach, LPA may offer a more complete picture of the possible consequences of parental cancer for children's adjustment and may help to distinguish children demonstrating healthy functioning from those with problems who might need support.

As a next step, it was deemed relevant to determine what variables are associated with membership of subgroups characterized by different patterns of adjustment. Identifying these factors may offer more insight in potential targets for psychosocial intervention. Several factors have been studied in prior research, including illness and medical treatment factors and factors on the child,

parent, and family level (Krattenmacher et al., 2012; Su & Ryan-Wenger, 2007). Overall, little support has been found for the role of illness-related factors including cancer type and time since diagnosis, although worse disease status has been found predictive of worse child adjustment (Krattenmacher et al., 2012; Visser et al., 2006). Regarding child factors, the supporting evidence for the predictive role of child gender and age in child adjustment is insufficient (Krattenmacher et al., 2012). On the parent level, previous studies have underlined the importance of parents' own mental health (Krattenmacher et al., 2012). For example, depressive symptoms of the parent with cancer have been associated with more child internalizing symptoms (Thastum et al., 2009) and distress (Watson et al., 2006). In addition, parents' traumatic stress symptoms have been related to higher levels of traumatic stress in the child (Huizinga et al., 2011). The role of parenting practices in relation to child adjustment is less clear as the few studies that examined parenting have provided inconsistent results (Lewis & Darby, 2004; Sigal et al., 2003; Vannatta et al., 2010). Warm and supportive parenting may promote positive child adjustment in the context of parental cancer, and preliminary evidence suggests that parental warmth is related to less child emotional and behavioral problems (Vannatta et al., 2010). Moreover, a well-functioning, healthy parent may play a protective role in the child's adjustment, possibly compensating the role of the parent with cancer when necessary (Lewis & Darby, 2004; Visser et al., 2006). Therefore, there is a need to include both parents in research where possible.

The first aim of this study was to use a person-centered approach and identify classes of children of parents with cancer, based on their endorsement of both positive and negative indicators of adjustment, specifically indicators of traumatic stress, HRQoL, and satisfaction with life. The second aim was to identify variables associated with class membership. In so doing, child characteristics (gender and age), parent illness characteristics (which parent was diagnosed with cancer and illness phase), traumatic stress symptoms of both parents, and child-perceived warmth of both parents were examined. Given previous findings, it was expected that child and illness characteristics would not be associated with class membership, whereas parents' higher levels of traumatic stress would be associated with children being more likely to belong to a class characterized by high traumatic stress symptoms. Parental warmth was expected to be associated with membership of classes characterized by better adjustment.

Method

Participant Recruitment and Procedure

This study is part of a larger prospective study on family adjustment in the context of parental cancer. Families were eligible to participate if one of the parents had a current or past cancer diagnosis and when the family included at least one child in the age range of 0–18 years. Exclusion criteria included limited Dutch language proficiency and terminal stage of cancer. Between September 2015 and April 2019 and between November 2019 and February 2020, families were recruited through social media announcements, personal contact with health care providers, and support centers for cancer patients. Families were provided a paper or digital flyer with information about the study to consider

participation. If they decided to participate, parents filled out an online application form. One of the researchers thereafter contacted parents by telephone to provide additional study information and obtain further information through a short semistructured interview. That interview included questions about the type and stage of cancer, illness and treatment phase, and family characteristics (e.g., marital state and major life events in the family). Data were obtained through questionnaires filled out by parents and children. Children from 8 to 18 years old were eligible to participate. Home visits were carried out to gather the questionnaire data, primarily focused on supporting (younger) children in filling out the questionnaires. Most home visits were carried out by trained master students in child or clinical psychology. Alternatively, families could choose to fill out the questionnaires themselves and return them by post. Family members were instructed to complete questionnaires independently and to not discuss their answers among themselves. Written informed consent was obtained from participating parents and children. The study was approved by the Institutional Review Board of the Faculty of Social and Behavioral Sciences of Utrecht University (FETC15-061).

Participants

In total, 136 families were enrolled in the project. For the purpose of the current study, families were selected when at least one child between 8 and 18 years old completed at least one of the measures of interest (i.e., measures of traumatic stress symptoms, HRQoL, and satisfaction with life). Data of parents were included if they completed the traumatic stress symptoms measure. This resulted in a sample of 175 children from 92 families, including 90 parents with cancer and 71 healthy parents. Table 1 displays background characteristics of the sample. Children had a mean age of 11.98 (range = 6–20) years.¹ In the majority of the families, the mother was diagnosed with cancer (87%). Most participating parents (99%) were born in the Netherlands.

Missing Data

For 75% of the children, data on predictor variables (i.e., child gender, age, gender of the ill parent, illness phase, traumatic stress symptoms, and perceived warmth of both parents) were complete. The remaining 25% of the children had some missing data (20%, 3%, and 2% had respectively one, two, and three variables missing). Children with missing data did not differ from children with complete data in terms of child traumatic stress symptoms ($p = .78$), HRQoL ($p = .87$), or satisfaction with life ($p = .10$). The highest proportion of missing data (21%) was found for traumatic stress symptoms of the healthy parent. Data on this variable were more often missing for children of divorced parents, $\chi(1) = 50.22$, $p < .001$.

Measures

Child Traumatic Stress Symptoms

The Child PTSD Symptoms Scale (Foa et al., 2001) was used to assess child-reported traumatic stress. Children rated their symptoms in relation to the parent's cancer and its consequences. This scale was developed for children in the age of 8 to 18 and has good reliability and validity (Foa et al., 2001; Nixon et al., 2013).

Table 1
Sample Characteristics

Child characteristics	Children (<i>n</i> = 175)	
Gender, <i>n</i> (%)		
Girl	92 (52)	
Boy	82 (47)	
Nonbinary	1 (1)	
Age (in years), <i>M</i> (<i>SD</i>)	11.98 (3.20)	
Current education, <i>n</i> (%)		
Primary school	91 (52)	
Secondary school	76 (43)	
Other	8 (5)	
Experienced parental divorce, <i>n</i> (%)		
Yes	22 (13)	
No	144 (82)	
No information available	9 (5)	
Parent characteristics	Parent with cancer (<i>n</i> = 90)	Healthy parent (<i>n</i> = 71)
Gender, <i>n</i> (%)		
Female	78 (87)	14 (20)
Male	12 (13)	57 (80)
Age (in years), <i>M</i> (<i>SD</i>)	44.06 (6.11)	44.96 (6.46)
Highest education, <i>n</i> (%)		
Primary/secondary school	33 (37)	35 (49)
College/university	57 (63)	36 (51)
Current employment, <i>n</i> (%)		
Yes	73 (81)	68 (96)
No	17 (19)	3 (4)
Relation to child, <i>n</i> (%)		
Biological parent	90 (100)	67 (94)
Stepparent	0 (0)	4 (6)
Illness characteristics		
Illness phase, <i>n</i> (%)		
Active treatment (e.g., chemotherapy or radiation therapy) or not started treatment yet	36 (40)	
First year after treatment (with possibility of receiving hormone therapy)	18 (20)	
1–5 years after treatment	21 (23)	
5–10 years after treatment	9 (10)	
Palliative phase (not terminal)	5 (6)	
No information available	1 (1)	

It assesses the frequency of 17 PTSD symptoms (as per *DSM-IV*; American Psychiatric Association, 2000) throughout three symptom clusters: reexperiencing, avoidance, and hyperarousal. The 17 symptom items are rated on a 4-point Likert scale (0 = *not at all*, 1 = *once a week or less*, 2 = *two to four times a week*, 3 = *five or more times per week*). The total score is calculated by summing all items, and a total score of 16 or higher was used to indicate clinical relevance of symptoms (i.e., the presence of probable PTSD)

¹ Regarding the age criterion, some exceptions were made for children slightly below or above the 8–18 years range, when parents and researchers considered their participation to be appropriate (e.g., when children below 8 years were regarded cognitively capable to complete the questionnaires and when children above 18 years still lived at home).

as an optimal balance of sensitivity and specificity was found for this score (Nixon et al., 2013). Cronbach's alpha of the total scale was .85, indicating good reliability.

Child HRQoL

Children reported on their HRQoL through the KIDSCREEN-27 (Ravens-Sieberer et al., 2007). This questionnaire consists of 27 items and assesses HRQoL across five dimensions, including physical well-being (five items), psychological well-being (seven items), parent relations and autonomy (seven items), social support and peers (four items), and school environment (four items). Items are rated on a 5-point Likert scale. For the present study, only the 10 items that together comprise the KIDSCREEN-10 (Ravens-Sieberer et al., 2010) were selected to derive a general HRQoL index. *T*-scores with a mean of 50 and a standard deviation of 10 were computed for the general HRQoL index, with higher scores indicating better HRQoL. Cronbach's alpha of the general HRQoL index was .75, indicating acceptable reliability.

Child Satisfaction With Life

Children filled out the Satisfaction With Life Scale for Children (SWLS-C), an adaptation of the Satisfaction With Life Scale (Diener et al., 1985), which assesses global life satisfaction. A validation study of the SWLS-C has indicated sound psychometric properties, including adequate construct validity for children in the age of 9 to 14 years (Gadermann et al., 2010). The instrument consists of five items (e.g., "In most ways my life is close to the way I want it to be") rated on a 7-point Likert scale (ranging from 1 = *strongly disagree* to 7 = *strongly agree*).² Following Pavot and Diener (2008, p. 141), total scores were interpreted as 5–9 = extremely dissatisfied, 10–14 = dissatisfied, 15–19 = slightly dissatisfied, 20 = neutral, 21–25 = slightly satisfied, 26–30 = satisfied, and 31–35 = extremely satisfied. The SWLS demonstrated good reliability (Cronbach's $\alpha = .82$) in the current sample.

Parent Traumatic Stress Symptoms

Parents completed the PTSD Symptom Scale-Self Report (PSS-SR; Foa et al., 1993). This scale assesses 17 symptoms of PTSD (as defined in *DSM-IV*) on a 4-point Likert scale (0 = *not at all*, 1 = *once a week or less*, 2 = *two to four times a week*, 3 = *five or more times per week*). Good psychometric properties have been reported for the English (Foa et al., 1993) and Dutch versions (Engelhard et al., 2007). The presence of probable PTSD (based on *DSM-IV* criteria) was defined as a score of 2 or higher on at least one reexperiencing symptom, three avoidance symptoms, and two hyperarousal symptoms (Brewin et al., 2000). The total PSS-SR scale demonstrated good reliability for the parent with cancer (Cronbach's $\alpha = .91$) and the other parent (Cronbach's $\alpha = .94$).

Parental Warmth

Children rated their parents' warm parenting and involvement through the subscale "warmth and involvement" of the Parenting Practices Questionnaire (Robinson et al., 1995). They completed this measure for both parents separately. The subscale comprises 11 items, rated on a 5-point Likert scale (from 1 = *never* to 5 = *always*). An example item is "My mother/father encourages me to talk about my troubles." The total score comprises the mean of all

items, with higher scores indicating more parental warmth as perceived by the child. Cronbach's alphas were .85 and .92 for child-perceived warmth of the parent with cancer and the other parent, respectively.

Sociodemographic and Illness Characteristics

Parents and children completed a questionnaire with sociodemographic characteristics. They also indicated which parent was diagnosed with cancer. Information regarding illness phase was obtained during the semistructured interview conducted by telephone. Illness phase was divided in the following categories: no treatment yet, active treatment (e.g., chemotherapy or radiation therapy), first year after treatment (with possibility of receiving hormone therapy), 1 to 5 years after treatment, 5 to 10 years after treatment, and cancer in palliative phase (not terminal).

Statistical Analyses

First, clinical relevance of child and parent traumatic stress symptoms was determined based on the cutoff scores reported above. Second, an LPA was conducted to identify latent subgroups of children based on their self-reported traumatic stress symptoms, HRQoL, and satisfaction with life. Total scores were first transformed into *z*-scores to obtain a similar scale for all constructs. The one-class model was estimated first, followed by models with increasing numbers of classes to determine the optimal class solution. The preferred model was chosen based on fit statistics, interpretability, and parsimony. The following fit statistics criteria were used to select the optimal class solution: (a) lower values of the Akaike's information criterion (AIC) and Bayesian information criterion (BIC), (b) a *p* value < .05 for the Lo-Mendell-Rubin likelihood ratio test (LMR LRT; indicating that adding a class yields a significantly better-fitting model compared to a model with a class less), and (c) higher entropy values (with values closer to 1 indicating better class separation and values > .80 being considered acceptable; Nylund et al., 2007; van de Schoot et al., 2017). Analyses were conducted in Mplus 7.4 (Muthén & Muthén, 2010). Full information maximum likelihood was used to deal with missing data in the LPA. Dependency of the data (i.e., multiple children from the same family were included) was accounted for by using adjusted standard errors.

Next, classes were compared in terms of (unstandardized) scores on measures of traumatic stress, HRQoL, and satisfaction with life. Regarding HRQoL, class *T* values were compared with Dutch reference data (KIDSCREEN Group Europe, 2006) using a one-sample *t* test to examine whether they were significantly different from a norm group.³

Third, correlates of class membership were examined using the three-step approach in Mplus (Asparouhov & Muthén, 2014). This approach accounts for the misspecification bias that might result from assigning persons to the class with the highest probability estimate (Vermunt, 2010). Differences between classes were examined in terms of demographic variables (i.e., child gender and

²To keep scoring consistent with the adult/parent version of the SWLS used in the overall study, a 7-point scale was used for the child version instead of a 5-point scale that is normally used.

³Analyses comparing HRQoL scores of the overall sample with reference data are included in the [online supplemental materials](#).

age), illness phase, and the level of traumatic stress and child-perceived parental warmth from both parents. Information regarding illness phase was collapsed into two categories based on previous research (Rolland, 2005). The first category concerned the crisis phase (i.e., parents that received active treatment or had not started treatment yet); the second category comprised the chronic or adaptation phase (i.e., parents within the first year up to 10 years after treatments or parents with cancer in the palliative phase).

Distinct univariate analyses were carried out in the three-step approach because of missing data on predictor variables, for which the default procedure of list-wise deletion was used. Missing data analyses (reported above) indicated that missingness of the variable with the highest proportion of missing data (i.e., healthy parent's traumatic stress symptoms) was related to parental divorce. It was considered unlikely that for divorced couples, these parents were still residing in the same home as the children and the parent with cancer, resulting in a differential impact of healthy parent's traumatic stress symptoms. Therefore, missing data on predictor variables were not imputed.

Results

Descriptive Statistics: Traumatic Stress in Children and Parents

Twenty-seven percent of the children reported clinically relevant traumatic stress symptoms (i.e., probable PTSD). These rates were 22% and 16% for parents with cancer and healthy parents, respectively.

Latent Profile Analysis

Table 2 presents the fit indices for the one-class through five-class models. Based on fit statistics, interpretability, and parsimony of the class solutions, a four-class solution was found to fit the data best. This solution resulted in the lowest BIC value, which is the most preferred fit measure according to an expert panel (van de Schoot et al., 2017). Although the AIC value decreased for the five-class solution, the LMR LRT indicated that the improvement compared to the four-class model was not statistically significant. Entropy values were equally high for the four- and five-class solutions, indicating that individuals were classified with more confidence compared to the other models (alternative class models are shown in the online supplemental materials).

Figure 1 depicts the classes identified in the four-class solution in terms of the mean z -scores for each construct. The first

and largest class was characterized by relatively low levels of traumatic stress and average levels of HRQoL and satisfaction with life and was labeled the "average functioning across domains class" ($n = 112$, 64%). The second class was characterized by relatively high traumatic stress levels and below-average levels of both HRQoL and satisfaction with life ($n = 24$, 14%) and was therefore labeled "high stress, below-average HRQoL and satisfaction class." The third class had a similar type of profile in terms of traumatic stress and HRQoL but had average levels of satisfaction with life ($n = 20$, 11%) and was called "high stress, below-average HRQoL, average satisfaction class." The fourth and smallest class ($n = 19$, 11%) was characterized by low levels of traumatic stress and above-average levels of HRQoL and satisfaction with life and was labeled "high functioning across domains class."

Table 3 summarizes the (unstandardized) scores on the measures of traumatic stress, HRQoL, and satisfaction with life for all four classes. In addition, for each class, it shows the number of children reporting clinically relevant traumatic stress symptoms, a mean level comparison of the HRQoL score compared to the reference population, and the number of children who were in the range of slight to extreme dissatisfaction with life. The HRQoL scores of all classes were lower compared to the reference population, except for the score in the high functioning across domains class, which was higher. However, the difference between the average functioning across domains class and the reference population was small (Hedges' $g = .14$), whereas the other differences were large (Hedges' g of .90, .87, and 1.83 for Class 2, 3, and 4, respectively).

Correlates of Class Membership

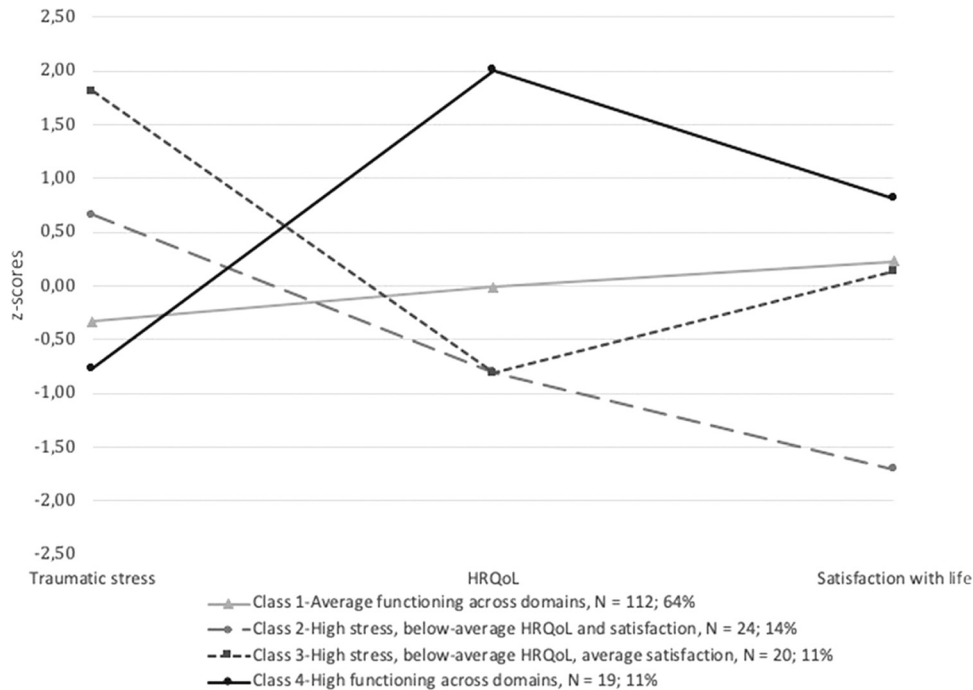
Table 3 shows the mean levels of continuous variables that were considered as correlates of class membership. In Table 4, comparisons between classes in terms of child-, illness-, and parent-related variables (considered in separate analyses) are summarized. Class membership did not differ as a function of child gender, which parent was diagnosed with cancer (i.e., mother or father), and phase of the illness (i.e., crisis or chronic/adaptation). Regarding child age, it was found that a younger age was significantly associated with membership of the high functioning across domains class (Class 4), compared to the average functioning across domains class (Class 1) and high stress, below-average HRQoL and satisfaction class (Class 2). Older children had a higher probability of membership of the high stress, below-average HRQoL and satisfaction class (Class 2), compared to the average functioning across domains class (Class 1).

Table 2
Fit Indices for 1–5 Class Solutions

Model	Loglikelihood	BIC	AIC	Entropy R^2	LMR LRT p value	Sample size by class based on most likely membership
1 class	-742.02	1,515.03	1,496.04	—	—	175
2 class	-708.25	1,468.16	1,436.51	.79	.02	137/38
3 class	-685.00	1,442.30	1,397.99	.81	.27	122/34/19
4 class	-668.16	1,429.29	1,372.32	.84	.03	112/24/20/19
5 class	-662.91	1,439.44	1,369.81	.84	.41	106/26/19/18/6

Note. BIC = Bayesian information criterion; AIC = Akaike information criterion; LMR LRT = Lo-Mendell-Rubin loglikelihood ratio test.

Figure 1
Four-Class Solution With Z-Scores of Traumatic Stress Symptoms, HRQoL, and Satisfaction With Life Per Class



Note. HRQoL = health-related quality of life.

Higher traumatic stress symptoms in the parent with cancer were significantly related to membership of the high stress, below-average HRQoL, average satisfaction class (Class 3; versus the average functioning across domains class [Class 1] and versus the high stress, below-average HRQoL and satisfaction class [Class 2]). Higher levels of traumatic stress symptoms in the healthy

parent were associated with membership of the high stress, below-average HRQoL and satisfaction class (Class 2; versus the average functioning across domains class [Class 1] and versus the high stress, below-average HRQoL, average satisfaction class [Class 3]). Lower child-perceived warmth from the parent with cancer was associated with membership of the high stress, below-average

Table 3

Mean Levels and Standard Deviations of Traumatic Stress Symptoms, HRQoL, and Satisfaction With Life and Continuous Correlates for Each Class

Measures	Possible range	Class 1 average functioning across domains (64%)	Class 2 high stress, below-average HRQoL and satisfaction (14%)	Class 3 high stress, below-average HRQoL, average satisfaction (11%)	Class 4 high functioning across domains (11%)
Traumatic stress symptoms	0–51	8.14 (4.74)	16.71 (6.10)	26.30 (6.19)	4.53 (4.59)
<i>n</i> (%) with probable PTSD		11 (10%)	15 (63%)	20 (100%)	1 (5%)
HRQoL	0–100	52.65 (5.96)*	44.81 (6.25)*	45.08 (5.60)*	73.10 (7.02)*
Satisfaction with life	5–35	28.24 (3.87)	16.29 (4.46)	28.15 (4.57)	31.79 (3.12)
<i>n</i> (%) in (slightly) dissatisfied with life range		1 (1%)	17 (71%)	0 (0%)	0 (0%)
Correlates of class membership					
Child age		12.13 (3.05)	13.75 (3.08)	11.45 (3.50)	9.42 (2.24)
Traumatic stress symptoms parent with cancer		14.68 (9.32)	13.32 (7.47)	21.25 (9.35)	15.89 (9.00)
Traumatic stress symptoms healthy parent		12.48 (11.13)	18.24 (10.37)	10.63 (7.05)	11.93 (12.54)
Warmth parent with cancer		4.07 (.62)	3.54 (.88)	4.15 (.70)	4.48 (.47)
Warmth healthy parent		3.67 (.91)	3.46 (.84)	3.86 (.83)	4.29 (.86)

Note. PTSD = posttraumatic stress disorder; HRQoL = health-related quality of life.

* Mean level is significantly different from the Dutch reference population ($M = 54.10$) at $p < .05$.

Table 4
Univariate Associations With Class Membership

Correlates of class membership	High stress, below-average HRQoL and satisfaction (2)			High stress, below-average HRQoL, average satisfaction (3)			High functioning across domains class (4)			High stress, below-average HRQoL, average satisfaction (3)			High functioning across domains class (4)			High functioning across domains class (4)			Versus high stress, below-average HRQoL, average satisfaction (3)					
	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p	B	SE	p			
Child gender (0 = boy, 1 = girl), N = 174	0.78	0.52	.133	1.11	0.69	.110	0.00	0.60	.997	0.33	0.87	.706	-0.78	0.73	.283	-1.11	0.84	.187						
Age, N = 175	0.19*	0.09	.036	-0.13	0.17	.422	-0.47*	0.16	.003	-0.32	0.20	.097	-0.66*	0.18	<.001	-0.33	0.21	.106						
Which parent has cancer (0 = father, 1 = mother), N = 175	-0.69	0.55	.205	2.82	4.44	.526	0.24	0.91	.789	3.51	4.34	.419	0.93	1.09	.394	-2.57	4.48	.566						
Illness phase (0 = crisis phase, 1 = chronic/adaptation phase), N = 173	0.14	0.54	.796	-1.16	0.65	.076	-0.10	0.65	.874	-1.30	0.80	.106	-0.24	0.82	.770	1.06	0.89	.234						
Traumatic stress symptoms parent with cancer, N = 171	-0.02	0.02	.438	0.08*	0.03	.001	0.02	0.03	.563	0.11*	0.04	.002	0.04	0.04	.339	-0.07	0.04	.113						
Traumatic stress symptoms healthy parent, N = 139	0.04*	0.02	.006	-0.02	0.03	.481	-0.01	0.04	.885	-0.06*	0.03	.016	-0.05	0.05	.306	0.01	0.05	.787						
Warmth parent with cancer, N = 172	-1.17*	0.43	.006	0.52	0.72	.469	1.86	0.99	.062	1.70	0.87	.050	3.03*	1.06	.004	1.33	1.17	.255						
Warmth healthy parent, N = 168	-0.23	0.24	.350	0.41	0.43	.346	2.54*	0.79	.001	0.63	0.48	.182	2.77*	0.82	.001	2.14*	1.87	.014						

Note. HRQoL = health-related quality of life; SE = standard error. Parameters comprise associations with the respective class (second row) in comparison to the reference class (first row).
* Statistically significant difference between classes at $p < .05$.

HRQoL and satisfaction class (Class 2; versus the average functioning [Class 1] and high functioning across domains class [Class 4]). Last, higher child-perceived warmth from the healthy parent was associated with membership of the high functioning across domains class (Class 4), compared to all other classes.

Discussion

This study aimed to obtain a comprehensive picture of child adjustment in families coping with parental cancer. Profiles based on positive and negative indicators of adjustment were examined. Four meaningful classes could be distinguished based on levels of child traumatic stress symptoms, HRQoL, and satisfaction with life. Moreover, child age, parental traumatic stress symptoms, and child-perceived parental warmth were associated with class membership. These results may contribute to the identification of children in need of psychosocial support and to distinguish them from children showing healthy patterns of adjustment.

In the total sample, the number of children reporting clinically relevant traumatic stress symptoms (27%) was comparable to rates reported by *Huizinga et al. (2005)*; i.e., 21% of sons and 35% of daughters) but somewhat lower than the prevalence reported for adolescent children of early breast cancer patients (i.e., 33% of sons and 45% of daughters) studied by *Edwards et al. (2008)*. The latter may be explained by a difference in average time since diagnosis, in which the acute emotional impact may be reflected in the higher levels of stress reported by *Edward et al.*

Shifting toward a person-centered perspective, results showed that the largest group of children (64%) fell into the average functioning across domains class (Class 1), characterized by relatively low levels of traumatic stress and average HRQoL and satisfaction. Another group of children (11%), classified as the high functioning across domains class (Class 4), also reported low traumatic stress, combined with high HRQoL and life satisfaction. These results indicate that the majority of children confronted with parental cancer adjust well despite the challenges they face. This is in line with evidence that resilience is most often found after stressful events (*Bonanno & Diminich, 2013; Galatzer-Levy et al., 2018*). Resilience encompasses more than the absence of psychopathology, but rather a person's ability to maintain relatively stable and healthy levels of functioning in the context of adversity (*Bonanno, 2004*). Overall, the current results do not imply that children are not impacted by their parent's illness; rather, by including both positive and negative indicators of adjustment, the study showed that most children display healthy levels of psychological, physical, and social functioning.

Nevertheless, a quarter of the children belonged to one of two distinct classes characterized by worse adjustment (11% and 14%), including high levels of traumatic stress and a below-average HRQoL. This supports a previous study in which low HRQoL was associated with current child distress (*Bultmann et al., 2014*). The classes did, however, differ in terms of life satisfaction. The distinction between the two groups suggests that high traumatic stress symptoms and below-average HRQoL do not automatically correspond to low life satisfaction. This is in line with research suggesting that children may experience negative and positive feelings simultaneously (*Gilman & Huebner, 2003*). Potentially, a subgroup of children is able to maintain life satisfaction despite

distress because they draw upon other sources of life satisfaction, such as school (Veronese & Pepe, 2020). This is supported by qualitative research showing that children of parents with cancer experienced a sense of normalcy outside the home as well as positive emotions at school or with friends (Helseth & Ulfsaet, 2003). At the same time, the presence of a group with low life satisfaction indicates that a subgroup of children experiences adjustment problems across various dimensions.

Results further pointed to the role of parents' traumatic stress symptoms and warmth in relation to the adjustment profiles. Traumatic stress symptoms of both parents were associated with class membership, albeit in a different manner. Higher traumatic stress symptoms of the parent with cancer increased their children's probability of being in the class characterized by high stress, below-average HRQoL, and average satisfaction (Class 3), whereas elevated traumatic stress symptoms of the healthy parent were associated with membership of the class characterized by low life satisfaction (Class 2). This aligns with earlier findings that higher parental traumatic stress (Huizinga et al., 2011) and depressive symptoms (Thastum et al., 2009; Watson et al., 2006) were related to higher levels of child traumatic stress and internalizing problems, respectively. Up to now, research has mainly focused on parents' depressive symptoms, whereas traumatic stress symptoms have received minimal attention (Huizinga et al., 2011). The associations between parents' traumatic stress symptoms and the high stress classes reported in the current study, as well as the substantial group of parents experiencing clinically relevant symptoms (i.e., 22% of parents with cancer and 16% of healthy parents), underlines the importance of these symptoms in understanding children's adjustment. An explanation for the differential role of parental traumatic stress in relation to the two classes remains speculative. Higher traumatic stress symptoms in the healthy parent may result in lower emotional availability, which may be an additional stressor for the child besides the other parent's illness. As such, the potential protective role of a positive relationship with the other parent observed in previous research (Lewis & Darby, 2004) may be compromised by these traumatic stress symptoms. However, this explanation requires further investigation.

Regarding parental warmth, children in the average and high functioning across domains classes (Classes 1 and 4) reported more warmth from the parent with cancer than children in the high stress, below-average HRQoL and satisfaction class (Class 2). Perceived warmth from the healthy parent was higher for children in the high functioning across domains class (Class 4) compared to all other classes, whereas no other differences between classes were observed. Research on parental warmth in the context of parental cancer is scarce. One study showed that higher warmth and acceptance by both mothers and fathers was associated with fewer internalizing problems in children of mothers with breast cancer (Vannatta et al., 2010). Relatedly, a positive relationship with at least one parent was related to better outcomes in children confronted with parental cancer, compared to children having a poor relationship with both parents (Lewis & Darby, 2004). Similarly, a study in adolescents with chronically ill parents (including cancer) showed that the quality of communication with the healthy (but not the ill) parent was related to adolescent psychological functioning (Houck et al., 2007). Although more research into within-family mechanisms is necessary, together with earlier studies, the

current results provide tentative support that warm parenting may play a protective role in the adjustment of children confronted with parental cancer.

Regarding sociodemographic and illness-related factors, only child age was significantly associated with the adjustment profiles. Younger children had a higher chance of being in the high functioning across domains class (Class 4), compared to two of the other classes. In turn, older age was associated with membership of the high stress, below-average HRQoL and satisfaction class (Class 2), compared to the average functioning across domains class (Class 1). In previous studies, inconsistent results have been reported regarding the role of child age. A review of Krattenmacher et al. (2012) did not show that age predicted psychosocial adjustment when taking into account the methodological quality of studies. The current results, however, suggest a pattern of worse adjustment for older children, which supports research of Bultmann et al. (2014), who only examined adjustment in terms of child HRQoL. The authors explain this finding by pointing to the better cognitive development of older children and their ability to comprehend the serious impact of cancer on the family. In the current study, class membership also did not vary as a function of child gender. This accords with the review of Krattenmacher et al. (2012) reporting no sufficient support for female gender as a risk factor. In addition, which parent was diagnosed with cancer was not associated with class membership; that contrasts with prior research showing lower HRQoL for children with a mother with cancer (Bultmann et al., 2014). Notably, one key characteristic of the parent's illness, namely illness phase, was also not related to the adjustment profiles. This is similar to prior work showing that illness-related factors do not play a major role in child adjustment (Bultmann et al., 2014; Krattenmacher et al., 2012; Osborn, 2007). However, it must be noted that the current study might have been unable to detect relevant differences because of the sample's composition regarding illness and the limited illness-related information that was included in the analysis. Most ill parents were mothers, and there was a wide variety in illness phases, which limited the ability to make valid comparisons.

Strengths of the present study include the use of data from both children and parents, the inclusion of negative and positive indicators of adjustment, and the use of a person-centered approach. However, the findings should be interpreted in light of the study's limitations. First, the use of a convenience sample and the overrepresentation of mothers with cancer limits the generalizability of the findings. Replication of the findings regarding in other samples is therefore needed. Second, there was a large variety in illness phases in the current sample, and only little information regarding illness-related factors could be included in the analysis. Although the role of these factors in child adjustment appears small (Krattenmacher et al., 2012), qualitative research suggests that child HRQoL might be especially vulnerable at the time of the cancer diagnosis and during times of change in the illness situation (Helseth & Ulfsaet, 2003). Third, the cross-sectional design of the study does not allow conclusions on causal relationships between the correlates and adjustment profiles. Future longitudinal studies are needed to study whether parent traumatic stress symptoms and parental warmth predict child adjustment, or vice versa, and to examine the individual and combined contribution of the parent with cancer and their healthy partner. Last, because of missing data on the level of healthy parents, correlates of class membership were only examined

univariately. Thus, no conclusions can be drawn about the interplay of these correlates in relation to child adjustment.

To our knowledge, this is the first study that examined profiles of adjustment in children confronted with parental cancer. The results highlight the need to pay attention to both negative and positive indicators of adjustment, both in research and clinical practice. Meaningful subgroups of children could be distinguished, demonstrating that most children adjust well in the context of parental cancer. However, a considerable number of children show suboptimal adjustment with high traumatic stress symptoms and below-average HRQoL, in some cases combined with dissatisfaction with life. The results provide support for the importance of parents' mental health and parenting in child adjustment, relative to illness-related and demographic factors (Krattenmacher et al., 2012; Osborn, 2007). Traumatic stress symptoms of the healthy parent and a lack of warmth in the parent with cancer might be risk factors for low life satisfaction, but determinants of life satisfaction in the context of traumatic stress and impaired HRQoL warrant further investigation.

Clinically, the findings suggest that assessment and screening should not solely focus on child psychological problems but on multiple domains of child adjustment, including satisfaction with life. Psychosocial support may be helpful for children with suboptimal adjustment, as seen in Classes 2 and 3. Whether these two groups of children have differing support needs, resulting from differences in satisfaction with life, requires more investigation. Overall, potential targets for intervention include the reduction of traumatic stress symptoms, facilitation of ventilating emotions, as well as strengthening resilience. Additionally, including parents in this type of support might be beneficial—for example, through targeting parental traumatic stress symptoms and the promotion of supportive parenting (Lewis et al., 2015). Among children with low satisfaction with life, interventions may also seek to strengthen function in life domains outside the family. Eventually, these interventions may contribute to a positive adjustment of the entire family.

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