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Identity formation in adolescent and emerging adult cancer survivors:

A differentiated perspective and associations with psychosocial functioning

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Abstract

Objective. Identity formation was investigated in adolescent and emerging adult cancer survivors from a (neo-)Eriksonian perspective by comparing survivors to control participants. In survivors, associations between identity and clinical/demographical variables and general and illness-specific functioning were investigated. **Design.** Childhood cancer survivors (*n*=125; M_{age}: 19.54; 47% male) were matched on age and gender with healthy controls (2:1). **Main outcome measures.** All participants completed identity questionnaires. Survivors reported on demographics, well-being (depressive symptoms, life satisfaction, physical functioning), and illness-specific experiences (PTSS, illness centrality, cancer self-identity, benefit finding, cancer-related worries). Medical records provided clinical information. **Results.** Survivors did not differ from controls on identity synthesis or confusion or on the identity statuses resulting from cluster analysis on the identity dimensions (achievement, foreclosure, moratorium, diffusion). Identity synthesis related to better well-being and illness experiences, whereas confusion related to worse well-being and illness experiences. Youth in moratorium and diffusion reported lower well-being and more negative illness experiences. Associations between identity and demographical and clinical characteristics were inconsistent. **Conclusions.** This study revealed no significant differences in identity formation between cancer survivors and controls. However, survivors who struggle in their identity quest should be identified as they are at risk for poorer well-being and negative illness experiences.

Key words: childhood cancer survivors, adolescence, emerging adulthood, identity

Childhood cancer survivorship rates have increased up to more than 80% in the last decades (Howlader et al., 2019). As a result, the long-term development of pediatric cancer survivors has been increasingly studied. It is generally assumed that the period of childhood cancer and its treatment can be a lifechanging experience, potentially impacting survivors' life courses in the long term (Brinkman et al., 2018). During and possibly also after treatment completion, school absenteeism is common, interactions with peers and friends are limited, and, particularly for adolescents and emerging adults, the increased dependence on parents can be at odds with normative development. As a consequence, the cancer experience can affect the achievement of developmental milestones (Brinkman et al., 2018), and can have an impact on survivors' future perspective and goal constellations (Beal et al., 2018). As such, identity formation, a key developmental task for adolescents and emerging adults, needs to be studied in this population. To our knowledge, only one study has quantitatively addressed this important topic in youth who have had childhood cancer (Madan-Swain et al., 2000). Their findings suggested that childhood cancer survivors may be more reluctant in exploring different life alternatives. However, these findings need to be replicated and studied in a broader perspective, also paying attention to the ways in which identity relates to general well-being and illness-related experiences of survivors.

Identity Formation in Adolescence and Emerging adulthood

In Erikson's lifespan theory (1968), one's identity structure is characterized by a tension between confusion and synthesis that peaks during adolescence and emerging adulthood. Identity synthesis is the extent to which various aspects of one's self fit together, a sense of continuity over time and situations. Identity confusion reflects difficulties in engaging with long-term commitments and a lack of purpose in life (Schwartz et al., 2009). Individuals have to find a balance between these two constructs, preferably experiencing higher levels of identity

synthesis than confusion. It is important to note, however, that both constructs can coexist to some extent and that they relate differentially to well-being (Schwartz et al., 2009).

Marcia (1966) developed a theoretical model describing behavioral indicators of Erikson's identity structure of synthesis and confusion, which was extended by Luyckx and colleagues in their process-oriented model (2006; 2008a). This model describes five identity dimensions consisting of three exploration and two commitment dimensions. *Exploration in breadth* represents the degree to which individuals search for different alternatives when making identity-related decisions. *Commitment making* represents the degree to which individuals make actual identity choices. *Exploration in depth* entails the evaluation of how one's commitments fit in with internal standards. *Identification with commitment* represents the degree to which individuals feel certain about their commitments. Finally, the maladaptive dimension of *ruminative exploration* captures the degree to which individuals get stuck in the exploration process, keep on worrying about different alternatives and experience considerable difficulty in making firm commitments.

Individuals differ in their constellation of these five identity dimensions. To capture such individual differences, the five identity dimensions combine into different identity statuses (Luyckx et al., 2008a). First, the *achievement* status refers to making commitments after exploring various alternatives, as well as to identifying oneself with these commitments. Achieved individuals generally score low on ruminative exploration. Referring back to Erikson (1968), these individuals report the most identity synthesis (Schwartz et al., 2011). Second, individuals in the *foreclosure* status also score high on commitment dimensions, but they show less exploration. Whereas these first two statuses represent individuals with a rather strong sense of identity, the remaining statuses represent individuals with a less strong sense of identity. Individuals in the *moratorium* status score high on exploration but low on commitment. As they are exploring different alternatives, this status comes with relatively high uncertainty, and

hence, it is accompanied by elevated levels of ruminative exploration as well. Next, Luyckx et al. (2008a) identified two diffusion statuses, both characterized by low to moderate commitments and exploration in breadth and in depth. They represent individuals who have not yet decided what to do with their lives but who are not pro-actively exploring either. Whereas individuals in *carefree diffusion* report low to moderate ruminative exploration, individuals in *troubled diffusion* report high ruminative exploration. Especially individuals in troubled diffusion were found to experience the highest levels on Erikson's notion of identity confusion (Schwartz et al., 2011). Finally, an *undifferentiated* status is characterized by moderate scores on all five identity dimensions, yet this status has not always been found in former work.

Identity Formation in Childhood Cancer Survivors

As mentioned before, personal identity research in childhood cancer survivors is scarce. The only study that addressed this topic found that adolescent cancer survivors were more likely to be situated in the foreclosure status compared to a healthy control sample (Madan-Swain et al., 2000). However, this study was based on a rather small sample and did not use the fine-grained process-oriented model as described above (Luyckx et al., 2008a). Moreover, although those results align with findings of related work also showing lower exploration in youth with chronic illnesses (Luyckx et al., 2011a; Luyckx et al., 2008b), such differences between youth with and without chronic illness do not always occur. Both Luyckx et al. (2008b) and Verschueren et al. (2019) identified highly similar identity statuses in youth with and without type 1 diabetes. Likewise, in the study of Madan-Swain et al. (2000), childhood cancer survivors were situated in the achievement status as often as their peers. Hence, whereas youth who have (had) a chronic illness may show somewhat less identity exploration, the main message seems to be that they are generally competent in achieving a personal identity. We should, however, keep in mind that all of these illnesses have unique characteristics and that identity functioning may be differently affected by each illness.

Notwithstanding this general finding that having a chronic illness does not necessarily thwarts one's identity development, important individual differences are to be expected. Without making assumptions about directionality of effects, it seems plausible that differences in identity functioning would relate to differences in well-being. Experiencing identity confusion could render individuals vulnerable for poorer well-being (Luyckx et al., 2011a; Luyckx et al., 2008b). On the other hand, an impaired health status could also impact identity functioning or future perspectives (Schwartz & Drotar, 2009). As some survivors experience poorer well-being, such as depressive symptoms (Brinkman et al., 2013), low satisfaction with life (Zeltzer et al., 2009) or physical health problems (Maunsell et al., 2006), the specific role of identity functioning in this respect needs to be further clarified.

In addition to general well-being, associations between identity and illness-specific experiences could also be expected. One key variable in this respect is posttraumatic stress symptoms (PTSS). PTSS are reported by 2 to 20% of childhood cancer survivors and can persist even years after treatment completion (Taïeb et al., 2003). Madan-Swain et al. (2000) hypothesized that PTSS could hinder survivors in establishing a firm identity, but this remains to be systematically tested. Further, cancer-related worries may be quite prevalent in childhood cancer survivors and relate to poorer well-being (Cho & Park, 2017). Such worries could alter their life perspective (Zebrack & Chesler, 2001), and, as such, could also hinder them in exploring life alternatives and the choices they make. On the other hand, positive consequences of the illness, such as benefit finding, are also frequently reported (Barakat et al., 2006). They possibly can attenuate the effects of negative illness experiences (Cho & Park, 2017) and they could relate to identity formation as well, as individuals who experience benefit finding could have more energy to explore identity alternatives (Luyckx et al., 2016).

Lastly, the way in which one defines oneself with respect to the past cancer experience and how this relates to general identity functioning, also remains an understudied issue. Illness

centrality, or the extent to which the cancer experience is central in one's self-definition, has been associated with poorer well-being (Park et al., 2011). Integrating the illness into one's self-concept is adaptive to some extent, but when one's self-concept is fully defined in terms of the illness, this can put patients at-risk for poorer well-being (Oris et al., 2016). Relatedly, Park et al. (2009) found that people who have had cancer can identify with different cancer-identities: survivor[1], victim, patient, and a person who has had cancer. Most people identify with multiple labels and the survivor-label seems to be most frequently adopted. Whereas this survivor-label relates to better well-being, the victim-label, relates to poorer well-being (Park et al., 2009). Particularly for youth in adolescence and emerging adulthood, studying these illness-related self-experiences together with their personal identity formation may prove informative for our understanding of their long-term development and well-being (Luyckx et al., 2008a).

The Present Study [2]

Objective 1: Comparing cancer survivors and control participants on identity functioning. Adolescent and emerging adult survivors were compared to a control sample matched on age and gender. We expected to identify five to six clusters representing different identity statuses: achievement, foreclosure, moratorium, carefree diffusion, troubled diffusion, and/or an undifferentiated status. Survivors and controls would be equally distributed across these statuses, yet small differences could occur in statuses with high versus low exploration. If so, we expected survivors to be more often situated in low-exploration statuses, and mainly foreclosure (Luyckx et al., 2011a; Luyckx et al., 2008b; Madan-Swain et al., 2000; Verschueren et al., 2019). Based on aforementioned research, no substantial differences were anticipated for identity synthesis and confusion.

[1] For reasons of clarity and to be consistent with a large amount of former studies, we will use the term 'survivors' throughout the current manuscript to refer to youth who have had cancer.

[2] In the preregistration of this manuscript, hypotheses concerning individual identity dimensions were also formulated. Based on a suggestion by a reviewer, we have now only focused on identity confusion/synthesis and on the identity statuses (which are constellations of scores on the different identity dimensions).

Objective 2: Associations with demographic and clinical characteristics in survivors. We hypothesized that girls would score higher on identity confusion and lower on synthesis (Bogaerts et al., 2019). Although research in chronic illness did not point to consistent gender differences for the statuses (Luyckx et al., 2011a; Verschueren et al., 2019), a large-scale community study indicated that boys were more likely to be in foreclosure and carefree diffusion, whereas girls were more likely to be in moratorium (Verschueren et al., 2017). Based on identity maturation theorizing, age was expected to be positively related to identity synthesis, but expectations were less clear for identity confusion (Palmeroni et al., 2020; Verschueren et al., 2017). Identity diffusion statuses would be more prevalent at younger ages, whereas high commitment statuses would be more prevalent at older ages (Verschueren et al., 2017). Finally, with respect to the clinical characteristics of our sample of cancer survivors (i.e., time since diagnosis, age at diagnosis, the type of cancer diagnosis, the intensity of treatment, potential relapse), no firm hypotheses could be forwarded due to a lack of systematic research.

Objective 3: Associations with general well-being and illness-specific functioning in survivors. For general well-being (depressive symptoms, satisfaction with life, and physical functioning), we expected that identity synthesis would positively relate to satisfaction with life and negatively to depressive symptoms; a reverse pattern was expected for identity confusion. Concerning the statuses, achievement and foreclosure would score higher on satisfaction with life compared to moratorium and troubled diffusion as these latter statuses are characterized by more ruminative exploration; the reverse pattern was expected for depressive symptoms (e.g., Luyckx et al., 2011b). No expectations were forwarded for physical functioning due to a lack of previous research.

For illness-specific functioning (i.e., PTSS, benefit finding, illness centrality, cancer-related worries, and cancer self-identity), identity synthesis would be positively related to cancer self-identity of being a survivor, and negatively to maladaptive functioning indicators

such as PTSS, illness centrality, cancer-related worries, and cancer self-identity of being a victim; the reverse pattern was expected for identity confusion. For the statuses, we expected that, because of the higher commitment, achievement and (possibly to a lesser extent) foreclosure would score lower on PTSS, illness centrality, and cancer-related worries as compared to moratorium and troubled diffusion; we would also expect higher scores on the cancer self-identity of being a survivor in achievement and foreclosure, and lower scores on the self-identity of being a victim. Finally, achievement and moratorium would score highest on benefit finding as both score high on indices of pro-active exploration (Luyckx et al., 2008a; Verschueren et al., 2019).

Methods

Participants and Procedure

The current study used baseline data of the LInC-study: Longitudinal Identity Study of Childhood Cancer Survivors. Dutch-speaking childhood cancer survivors between 14 and 25 years who were treated at the pediatric oncology department of the University Hospitals Leuven (Belgium) could participate. At the time of data collection, 435 survivors were eligible as they had completed their treatment. A total of 213 consented to receive our questionnaires by post, of which 125 survivors effectively participated by completing questionnaires and signing an informed consent form. For minors, parents gave consent as well. The study was approved by the Medical Ethics Committee of KU Leuven / University Hospitals Leuven and data were collected from October 2018 to April 2019. To address Objective 1, these survivors were 2:1 matched on age and gender with a healthy control sample.

Survivors' mean age was 19.54 (*SD*=2.71) and 47% was male. The majority were students (83%) and lived with (one of) their parents (97%). Mean time since diagnosis was 11.13 years (*SD*=5.44) and mean age at diagnosis was 8.37 (*SD*=5.57). Survivors were subdivided into different cancer types: leukemia (30%), bone and soft tissue tumor (16%), brain

tumor (19%), lymphoma (14%), and other types of cancer (20%). A minority did not have any treatment (2%) or had a short-term treatment, such as surgery (11%). About half of the survivors had a long-term treatment, such as chemotherapy, radiotherapy, or stem cell transplantation (49%) and the remainder completed a combined treatment with at least one long-term treatment (38%). A total of 15 survivors (12%) had been treated for relapse.

Measures

Identity synthesis and confusion. The identity subscale from the Erikson Psychosocial Stage Inventory (Rosenthal et al., 1981) was used. Identity synthesis and confusion were measured by six items each with a response scale ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*); higher scores represented more synthesis or confusion. Sample items read: "I know what kind of person I am" (synthesis), and "I feel mixed up" (confusion). Cronbach's alphas for synthesis and confusion were .76 and .71 in survivors and .70 and .64 in controls.

Identity dimensions. The Dimensions of Identity Development Scale (Luyckx et al., 2008a) was used. Each dimension was measured by five items rated on a 5-point rating scale from 1 (*Completely disagree*) to 5 (*Completely agree*). Sample items read: "I have decided on the direction I want to follow in my life" (commitment making), "I sense that the direction I want to take in my life will really suit me" (identification with commitment), "I regularly think over a number of different plans for the future" (exploration in breadth), "I regularly talk with other people about the plans for the future I have made for myself" (exploration in depth), and "It is hard for me to stop thinking about the direction I want to follow in my life" (ruminative exploration). Cronbach's alphas ranged between .83 and .91 in survivors and between .80 and .92 in control participants.

Depressive symptoms. Depressive symptoms were measured using a brief 12-item version of the Center for Epidemiologic Studies Depression Scale (Roberts & Sobhan, 1992). Items were rated on a 4-point rating scale, ranging from 0 (*Seldom*) to 3 (*Most of the time or*

always). Each item asks participants how often they had experienced symptoms of depression during the week prior to assessment. After reversing 3 items, higher total scores represented more depressive symptoms. Cronbach's alpha in survivors was .86.

Satisfaction with life. The 5-item Satisfaction with Life Scale was used (Diener et al., 1985). Items were answered on a 7-point rating scale ranging from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*), with higher scores representing more satisfaction with life. Cronbach's alpha in survivors was .85.

Physical functioning. The 10-item physical functioning subscale of the Dutch language version of the Short Form Health Survey SF-36 (Aaronson et al., 1998) was used. Items were answered on a 3-point rating scale ranging from 1 (*No, not limited at all*) to 3 (*Yes, limited a lot*), which were then reversed and summed so that higher scores indicated better physical functioning. Participants reported if they felt limited in doing certain activities on a typical day. Cronbach's alpha in survivors was .87.

PTSS. The Children's Revised Impact of Event Scale (Perrin et al., 2005) was used. Items were answered on a 4-point rating scale from 0 (*Not at all*) to 3 (*Often*), with higher scores representing more PTSS. Participants were instructed to complete the questionnaire with keeping their cancer experience in mind. Cronbach's alpha in survivors was .87.

Cancer-related worries. Cancer-related worries were assessed with 4 items developed by Kypriotakis et al. (2016). The items were answered on a 5-point rating scale from 1 (*Completely disagree*) to 5 (*Completely agree*) and read: "I worry about my cancer coming back", "I am sometimes concerned that symptoms I experience may indicate the recurrence of cancer.", "I worry about future diagnostic tests", and "I worry about another type of cancer". Higher mean scores indicated more worries. Cronbach's alpha in survivors was .88.

Benefit finding. The 10-item Benefit scale of the Benefit and Burden Scale for Children (Currier et al., 2009) was used. Items were answered on a 5-point rating scale from 1 (*Not at*

all) to 5 (*A lot*), with higher mean scores representing more benefit finding. Participants were instructed to complete the questionnaire with keeping their cancer experience in mind, for example "… has helped me become a stronger person". Cronbach's alpha in survivors was .86.

Cancer centrality. The degree to which participants' identity was centered around their cancer experience was assessed using a single item developed by Park et al. (2011): "To what degree is your cancer experience a central part of your identity or self-concept?". The item was answered on a 5-point rating scale ranging from 0 (*Not at all*) to 4 (*Completely*).

Self-identity after cancer. Four items developed by Park et al. (2009) were used to assess participants' self-identity after cancer. Using a 5-point rating scale ranging from 1 (*Not at all*) to 5 (*Completely*), participants were asked, "When you think about yourself in relation to your cancer, how much does each of these phrases describe you?": (1) a victim of cancer, (2) a cancer patient, (3) a person who has had cancer, and (4) a survivor.

Medical information. Survivors' medical records provided information on cancer type, treatment intensity, time since diagnosis, age at diagnosis and potential relapse.

Plan of Analyses[3]

IBM Statistics SPSS (version 26) was used and the study was preregistered at https://osf.io/utvfe. For Objective 1, a multivariate analyses of variance (MANOVA) was conducted to compare survivors and control participants on identity synthesis/confusion. To identify identity statuses in the combined sample of survivors and control participants, we used a two-step clustering procedure (Gore, 2000). Prior to conducting this cluster procedure, univariate (values more than 3 *SD*s below or above the mean) and multivariate outliers (with high Mahalanobis distance values) were removed. First, hierarchical cluster analysis was conducted using Ward's method based on squared Euclidian distances. These initial cluster

[3] For all Objectives, analyses on the separate identity dimensions were also preregistered and conducted. Those results can be found in footnotes and/or supplementary material.

centers were then used as starting values in iterative k-means clustering. Three- to six-cluster solutions were evaluated in terms of interpretability, parsimony, and explanatory power (the cluster solution had to explain 50% of the variance in the different identity dimensions). χ^2 analyses were used to investigate whether survivors and control participants were equally distributed among the clusters. Finally, based on the final cluster centers in the combined sample, clusters were extracted in the survivors sample for Objectives 2 and 3 (using the Classify option in *k*-means clustering).

For Objective 2, Pearson correlations were used to relate age, age at diagnosis, and time since diagnosis to identity synthesis/confusion. MANOVAs were used to link gender (0=men; 1=women), cancer diagnosis (1=leukemia; 2=lymphoma, 3=brain tumor; 4=bone and soft tissue tumor; 5=other), relapse (0=no relapse; 1=relapse), and treatment intensity (1=no treatment; 2=single, short-term treatment, such as surgery; 3= single, long term treatment, such as chemotherapy, radiotherapy, or stem cell transplantation; 4=combined treatment with at least one long-term treatment) to the identity variables. As the first category of treatment intensity only consisted of 2 individuals, these analyses were performed using only the remaining three categories. For the identity statuses, a MANOVA was used to link identity statuses to age, age at diagnosis, and time since diagnosis. χ^2 analyses were used for gender, cancer diagnosis, relapse, and treatment intensity.

For Objective 3, Expectation-Maximization was used to estimate occasional missing values on well-being and cancer-specific variables (i.e., depressive symptoms, satisfaction with life, physical functioning, PTSS, cancer-related worries, benefit finding, cancer centrality, cancers self-identity; a total of 2.91% of data were missing). A non-significant Little's missing-completely-at-random test indicated that missing values could be reliably estimated [$\chi^2(66)=70.27$, $p=.34$]. Pearson correlations linked these variables to identity

synthesis/confusion; MANOVAs examined mean differences on the variables among the identity statuses.

Results

Objective 1: Comparison with Control Participants

Identity synthesis/confusion. A MANOVA compared identity synthesis/confusion between survivors and controls. The multivariate effect was non-significant [Wilks' Lambda=1.00; $F(2, 372)=0.73$, $p=.481$, $\eta^2=.00$]. Hence, no mean differences between survivors and controls were found (see Table 1).

Identity statuses. Seven outliers were removed, reducing our combined sample to 123 cancer survivors and 245 control participants. Four clusters were retained, explaining between 49% and 59% of the variance in identity processes. Figure 1 graphically depicts this four-cluster solution. The Y-axis represents *z*-scores; Analogous to Cohen's *d*, 0.2 *SD* is interpreted as a small effect, 0.5 *SD* as a medium or moderate effect, and 0.8 *SD* as a large effect (Cohen, 1988).

Cluster 1 was labeled moratorium (30%) and consisted of individuals scoring moderately low on the commitment dimensions and high on the exploration dimensions. Cluster 2 was labeled foreclosure (27%) and consisted of individuals scoring moderately high on the commitment dimensions and low on the exploration dimensions. Cluster 3 was labeled diffusion (16%) and consisted of individuals scoring low on all dimensions except for a moderately high score on ruminative exploration. Given the fact that the ruminative exploration-score was not that pronounced in either direction, an additional label of carefree or troubled diffusion could not be assigned. Cluster 4 was labeled achievement (27%) and consisted of individuals scoring high on all dimensions except for ruminative exploration. Cancer survivors and control participants were equally distributed across these clusters [$\chi^2(3)=2.20$, $p=.532$] [4].

[4] Differences between survivors and controls were non-significant on the individual identity dimensions as well.

Objective 2: Associations with Demographic and Clinical Characteristics in Survivors

Identity synthesis/confusion. We found a multivariate effect for gender [Wilks' Lambda=.93; $F(2, 118)=4.31$, $p=.016$, $\eta^2=.07$]. Follow-up univariate analyses indicated that boys ($M=3.95$, $SD=0.62$) scored higher than girls ($M=3.66$, $SD=0.63$) on identity synthesis [$F(1, 119)=6.59$, $p=.012$, $\eta^2=.05$]. Time since diagnosis related negatively to identity confusion ($r=-.18$; $p=.044$) and no other significant correlations were found with age and age at diagnosis. There were no differences for cancer diagnosis [Wilks' Lambda=.92; $F(8, 238)=1.33$, $p=.227$, $\eta^2=.04$], relapse [Wilks' Lambda=.97; $F(2, 122)=1.84$, $p=.164$, $\eta^2=.03$], and treatment intensity [Wilks' Lambda=.97; $F(4, 234)=0.93$, $p=.449$, $\eta^2=.02$].

Identity statuses. The same clusters emerged in survivors as in the combined sample: moratorium (33%), foreclosure (25%), diffusion (13%), and achievement (28%). This cluster-solution explained between 54% and 57% of the variance in the identity dimensions. χ^2 analyses indicated equal distributions for gender [$\chi^2(3)=2.41$, $p=.492$], relapse ($\chi^2(3)=1.63$, $p=.652$], and cancer diagnoses [$\chi^2(12)=10.75$, $p=.551$]. Treatment intensity differed between clusters [$\chi^2(6)=14.73$, $p=.022$]. Individuals who received the least intense treatment regimen were relatively overrepresented in the achievement status (see Table 2). Further, a MANOVA showed multivariate differences for age, age at diagnosis, and time since diagnosis [Wilks' lambda=.77; $F(9, 282.46)=3.57$, $p<.001$, $\eta^2=.08$]. Follow-up univariate analyses indicated that individuals in diffusion were younger than in moratorium and achievement and that individuals in diffusion also had a younger age at diagnosis as compared to moratorium (See Table 3) [5].

Objective 3: Associations with well-being and illness experiences

Identity synthesis/confusion. Identity synthesis related negatively to depressive symptoms ($r=-.67$; $p<.001$), PTSS ($r=-.40$; $p<.001$), cancer-related worries ($r=-.20$; $p=.023$), and

[5] For the identity dimensions, the multivariate effect for gender was significant, yet univariate analyses were non-significant. No differences for cancer diagnosis, relapse, and treatment intensity occurred. Age related positively to exploration in depth ($r=.18$; $p=.044$) and age at diagnosis related positively exploration in breadth ($r=.18$; $p=.040$). Correlations with time since diagnosis were non-significant.

cancer centrality (r=-.20; p=.025). Identity synthesis related positively to satisfaction with life (r=.63; p<.001), physical functioning (r=.19; p=.034), and benefit finding (r=.19; p=.033). Identity confusion, on the other hand, related positively to depressive symptoms (r=-.66; p<.001), PTSS (r=.52; p<.001), cancer-related worries (r=.33; p<.001), and cancer centrality (r=.38; p<.001), and negatively to satisfaction with life (r=-.56; p<.001).

Identity statuses. With respect to depressive symptoms, satisfaction with life, and physical functioning, the multivariate effect of the MANOVA was significant [Wilks' Lambda=.69; $F(9, 284.90)=5.26$, $p<.001$, $\eta^2=.12$]. Follow-up univariate analyses revealed significant cluster differences for depressive symptoms and satisfaction with life (See Table 3). For depressive symptoms, individuals in achievement and foreclosure scored lowest, whereas those in moratorium and diffusion scored highest (with foreclosure and diffusion not differing significantly from one another). For satisfaction with life, the reverse pattern emerged: individuals in achievement and foreclosure scored highest, whereas individuals in moratorium and diffusion scored lowest (with foreclosure and diffusion again not differing significantly from one another). Finally, concerning cancer experiences, the multivariate effect of the MANOVA was significant [Wilks' Lambda=.73; $F(24, 325.44)=1.57$, p=.046, $\eta^2=.10$]. Follow-up univariate analyses revealed significant cluster differences for PTSS, cancer-related worries, and cancer centrality (See Table 3). For PTSS, individuals in moratorium scored significantly higher than those in foreclosure and achievement. For cancer-related worries and cancer centrality, individuals in moratorium scored significantly higher than those in foreclosure. Correlations with the individual identity dimensions can be found in Supplementary Table 1.

Discussion

The present study examined identity formation in a sample of adolescent and emerging adult cancer survivors guided by the seminal Eriksonian thinking about personal identity. We focused on levels of identity synthesis and confusion, as well as on behavioral identity processes

of exploration and commitment which combined into different identity statuses. Our analyses converged on the finding that cancer survivors were generally as competent as their agemates in navigating the challenging identity quest that characterizes adolescence and emerging adulthood. Important individual differences were observed as well. The way in which childhood cancer survivors navigated their identity quest was substantially related to their general well-being and illness-specific experiences.

Comparing Cancer Survivors and Control Participants on Identity Formation

Across the different identity variables assessed, a clear picture emerged in the present study. No differences between cancer survivors and control participants were found on the variables capturing individuals' general identity structure (i.e., identity synthesis or confusion) or on the behavioral processes of exploration and commitment and how these processes combine into identity statuses. Hence, across all conceptualizations of identity formation, a rather optimistic picture emerged as having lived through a cancer experience did not seem to substantially impact the identity formation process of survivors as compared to their agemates. However, much in the same vein as for their agemates, this does not mean that the identity formation process runs smoothly for all survivors as important individual differences occurred.

Linking Identity to Clinical and Demographic Characteristics

The role of demographical and clinical characteristics for identity development seemed rather small as findings were diverse and inconsistent. Girls reported lower levels of identity synthesis than boys (Bogaerts et al., 2019), yet no other gender differences occurred. Concerning age, age at diagnosis, and time since diagnosis, youth in diffusion were significantly younger, as expected (Verschueren et al., 2017). Youth in diffusion also were younger at diagnosis. Similar to findings of Langeveld et al. (2003) describing that youth who were younger at diagnosis also showed delays in certain developmental domains (e.g., living independently), this may also reflect a similar developmental delay. Although this could be an

important clinical finding, replication is needed along with investigating potential mechanisms such as cognitive functioning. Youth in moratorium, on the other hand, had the oldest age at diagnosis. For those who are older at diagnosis, making actual life choices could thus be challenging, possibly because they have not yet come to terms with the illness. Concerning cancer diagnosis and treatment, youth who had a less intense treatment were more likely to be situated in the achievement status. It could be that the more intense treatments may have a more profound and long-lasting impact on youth (such as higher school absenteeism), which could hinder them in establishing a firm identity, but this needs to be further clarified.

General and Illness-Specific Functioning

Substantial individual differences in identity formation were associated with differences in psychological well-being and illness experiences. Whereas youth in achievement (28%) and foreclosure (25%) showed the most optimal well-being and illness experiences, a substantial part of the survivors were situated in moratorium (33%) or diffusion (13%). With relatively high scores on ruminative exploration and low scores on commitment, youth in diffusion and particularly those in moratorium, reported higher levels of depressive symptoms and lower levels of satisfaction with life. These results are in line with findings in youth with type 1 diabetes (Luyckx et al., 2008b; Verschueren et al., 2019) and congenital heart disease (Luyckx et al., 2011a). The vulnerability of individuals in moratorium was even more pronounced in their illness experiences as reflected in high levels of cancer centrality, PTSS, and cancer-related worries. High levels of ruminative exploration seem to be of key importance. Similar to former work pointing out its distressing nature putting youth at-risk for poorer functioning (Luyckx et al., 2008a), the current findings suggest that ruminative exploration could also hinder them in coming to terms with their illness. Conversely, for youth who have more difficulties in dealing with their cancer experience, establishing a firm identity may be more

challenging as well. Addressing these issues in longitudinal research is needed to increase our insight in the directionality of effects.

Contrary to our expectations, results for cancer self-identity were largely non-significant. We expected that associations with identity would occur as these labels could reflect the potential struggle survivors experience when (re)defining themselves after their cancer experience (Jones et al., 2011). To better understand the current findings, future work should focus on the content of identity commitments or exploration efforts as well. We would encourage the use of a narrative approach to identify different themes (Adler et al., 2015). Redemption, for example, is a narrative reflected in stories of recovery and growth which has been related to better psychological well-being in adult cancer survivors (Benish-Weisman et al., 2014). Contamination, on the other hand, captures the degree to which individuals feel overwhelmed by the cancer experience. We would expect that such narratives would not only relate to self-labels and/or psychological well-being, but also to one's sense of identity synthesis or confusion and the related identity processes of exploration and commitment.

Clinical Implications

Clinicians should be encouraged to take notice of the normative developmental challenge of establishing a personal identity (Luyckx et al., 2011a; Verschueren et al., 2019). In general, the current findings are rather optimistic as no differences in identity functioning were detected between childhood cancer survivors and controls. At the same time, however, an important subgroup of survivors was situated in the identity statuses of moratorium and diffusion. Particularly those in moratorium also experienced lower general well-being and more negative illness-related experiences (e.g., more cancer-related worries). Hence, identifying survivors at risk with respect to their identity quest can be of crucial importance to provide them with extra support and to assist them in adequately exploring different life options. This

increased support may then also help them to overcome distress related to their past cancer experience.

Limitations and Suggestions for Future Research

The present study has several limitations that provide avenues for future research. First, the cross-sectional design of the study did not allow us to answer questions about developmental patterns over time and about directionality of effects. Indeed, identity functioning could be predictive of well-being over time, and vice versa. Concerning developmental pathways, a longitudinal within-person perspective would be most suited to investigate how survivors develop their identity to see if, for example, youth in moratorium would change to more adaptive identity statuses over time. Given that the present study constituted the baseline assessment of a longitudinal project, we hope to answer such questions in the future. Second, our response rate was fairly low and our sample only included Dutch-speaking youth treated at the University Hospitals Leuven, implying that our sample may not be representative for all youth who survived childhood cancer. Third, the study used a quantitative approach and all variables were assessed using self-report questionnaires, except for medical information. Qualitative work, for example using narrative approaches, is needed to fine-tune our understanding of the exact role identity formation may play. Fourth, time since diagnosis varied considerably among participants as some of them had cancer at a very young age. Consequently, a subgroup of participants had (almost) no conscious memories of the treatment period (21%) and this issue needs to be further explored in future work.

To conclude, the current study revealed some important implications identity formation may have for survivors' functioning by bridging developmental and psycho-oncology research. In general, our results convey a rather optimistic message as childhood cancer survivors functioned similarly as healthy controls with respect to identity formation. However, some

survivors reported more identity struggles. Identifying these youth is clinically important as such struggles relate to poorer well-being and negative illness-experiences.

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Table 1

Mean-Level Differences on Identity Synthesis/Confusion Between Cancer Survivors and Control Participants

	Total sample	Survivors	Controls	*F*-value	η^2
Identity synthesis	3.84 (0.55)	3.79 (0.63)	3.86 (0.51)	1.40	.00
Identity confusion	2.45 (0.62)	2.49 (0.67)	2.42 (0.59)	0.94	.00

Note. η^2 = eta squared. Standard deviations in parentheses.

Table 2

Cross-tabulation Linking Identity Clusters to Intensity of Treatment

	Moratorium	Foreclosure	Diffusion	Achievement	*Total N*
Single, short-term treatment					
Count	2 (-1.2)	2 (-0.8)	2 (0.1)	**8 (2.1)**	14
Expected count	4.7	3.5	1.9	**3.9**	
Single, long-term treatment					
Count	19 (-0.2)	21 (1.6)	5 (-1.0)	14 (-0.6)	59
Expected count	19.8	14.9	7.9	16.4	
Combined treatment					
Count	19 (0.9)	7 (-1.3)	9 (1.1)	11 (-0.5)	46
Expected count	15.5	11.6	6.2	12.8	
Total N	40	30	16	33	119

Note. Standardized residuals between parentheses. Cells in bold have standardized residuals equalling or exceeding |2.0|.

Table 3

Univariate ANOVA's and Post-hoc Cluster Comparisons Based Upon Tukey HSD Tests for the Four Clusters in the Survivor Sample

	Total sample	Cluster				*F*-value	η^2
		Moratorium (33%)	Foreclosure (25%)	Diffusion (13%)	Achievement (28%)		
Age	19.56 (2.66)	19.90 (2.39)^{b}	19.32 (2.64)	17.56 (2.48)^{a}	20.29 (2.69)^{b}	4.53**	.10
Age at diagnosis	8.45 (5.57)	10.15 (5.46)^{b}	8.45 (5.73)	4.63 (5.03)^{a}	8.26 (5.09)	4.05**	.09
Time since diagnosis	11.12 (5.44)	9.75 (4.87)	10.87 (5.31)	13.06 (5.45)	12.03 (5.93)	1.92	.05
Depressive symptoms	0.64 (0.50)	0.99 (0.54)^{c}	0.47 (0.42)^{ab}	0.69 (0.37)^{bc}	0.36 (0.29)^{a}	15.74***	.28
Satisfaction with life	4.95 (1.07)	4.38 (1.00)^{a}	5.24 (1.14)^{bc}	4.63 (1.02)^{ab}	5.52 (0.71)^{c}	10.39***	.21
Physical functioning	2.77 (0.35)	2.72 (0.38)	2.82 (0.34)	2.74 (0.34)	2.81 (0.33)	0.75	.02
PTSS	0.99 (0.63)	1.25 (0.71)^{a}	0.78 (0.50)^{b}	1.12 (0.70)	0.83 (0.50)^{b}	4.84**	.11
Cancer-related worries	2.27 (1.09)	2.67 (1.17)^{a}	1.90 (0.89)^{b}	2.08 (1.08)	2.21 (1.04)	3.48*	.08
Benefit finding	3.10 (0.83)	3.22 (0.88)	2.97 (0.83)	2.71 (0.63)	3.25 (0.80)	2.22	.05
Cancer centrality	1.76 (1.07)	2.13 (1.09)^{a}	1.45 (1.00)^{b}	1.41 (1.11)	1.77 (1.00)	3.22*	.08
Victim	2.33 (1.33)	2.44 (1.42)	2.26 (1.41)	2.00 (0.97)	2.40 (1.33)	0.47	.01
Patient	2.13 (1.25)	2.10 (1.39)	2.32 (1.14)	1.94 (1.29)	2.09 (1.17)	0.39	.01
Someone with cancer	4.37 (1.04)	4.59 (0.67)	4.13 (1.36)	4.31 (0.95)	4.34 (1.11)	1.16	.03
Survivor	3.33 (1.54)	3.41 (1.50)	2.87 (1.59)	3.25 (1.44)	3.69 (1.55)	1.62	.04

Note. η^2 = eta squared. PTSS = posttraumatic stress symptoms. Cluster means differ if they have different superscripts. A mean without a superscript is not significantly different from any other mean. Standard deviations in parentheses.

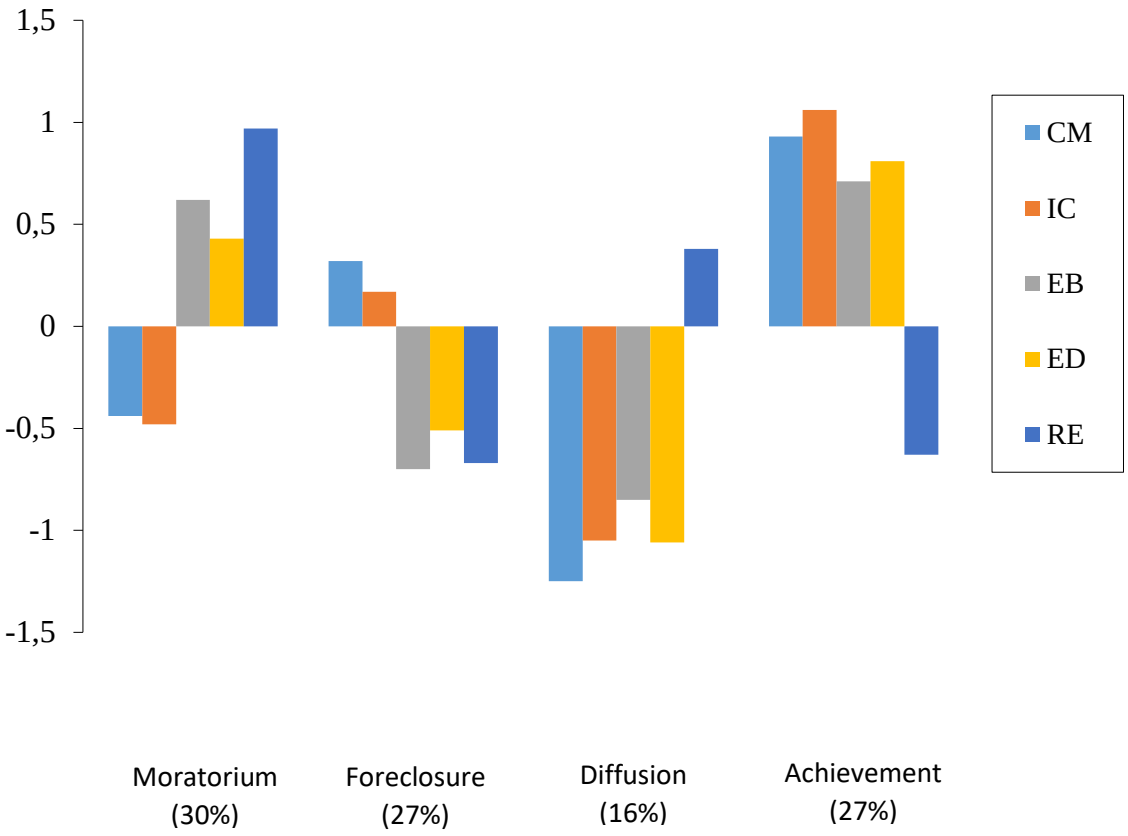

Figure 1. Final four-cluster solution in the combined sample. CM = Commitment making. IC = Identification with commitment. EB = Exploration in breadth. ED = Exploration in depth. RE = Ruminative exploration.

Supplementary Table 1

Correlations Among the Identity Dimensions and General and Illness-Specific Functioning

	CM	IC	EB	ED	RE
Depressive symptoms	-.32***	-.48***	.05	.03	.60***
Satisfaction with life	.28**	.46***	.12	.06	-.49***
Physical functioning	.07	.18	.07	-.02	-.14
PTSS	-.19*	-.30**	.05	.02	.45***
Cancer-related worries	-.01	-.16	.21*	.25**	.28**
Benefit finding	.09	.17	.29**	.19*	.05
Cancer centrality	.01	-.07	.05	.13	.31***
Victim	-.03	.06	.07	-.03	.05
Patient	.03	.05	-.03	-.01	.01
Someone with cancer	-.01	.01	.16	.18	.14
Survivor	.08	.11	.18*	.08	.06

Note. CM = commitment making; IC = identification with commitment; EB = exploration in breadth; ED = exploration in depth; RE = ruminative exploration; PTSS = posttraumatic stress symptoms.

* $p < .05$. ** $p < .01$. *** $p < .00$