



Published in final edited form as:

*Pediatr Blood Cancer*. 2019 January ; 66(1): e27485. doi:10.1002/pbc.27485.

## Hope and benefit finding: results from the PRISM randomized controlled trial

Abby R. Rosenberg, MD, MS, MA<sup>1,2,3,4</sup>, Miranda C. Bradford, MS<sup>1</sup>, Krysta S. Barton, PhD<sup>1,2</sup>, Nicole Etsekson, MPH<sup>1</sup>, Elizabeth McCauley, PhD<sup>5,6</sup>, J. Randall Curtis, MD, MPH<sup>7,8,9</sup>, Joanne Wolfe, MD, MPH<sup>10,11,12</sup>, K. Scott Baker, MD, MS<sup>3,4,13</sup>, and Joyce Yi-Frazier, PhD<sup>1</sup>

<sup>1</sup>Seattle Children's Research Institute; Center for Clinical and Translational Research; Seattle, WA

<sup>2</sup>Seattle Children's Research Institute; Treuman Katz Center for Pediatric Bioethics; Seattle, WA

<sup>3</sup>Seattle Children's Hospital; Center for Cancer and Blood Disorders Center; Seattle, WA

<sup>4</sup>University of Washington School of Medicine; Department of Pediatrics; Seattle, WA

<sup>5</sup>Seattle Children's Research Institute; Center for Child Health, Behavior, and Development; Seattle, WA

<sup>6</sup>University of Washington School of Medicine; Department of Psychiatry and Behavioral Sciences; Seattle, WA

<sup>7</sup>Harborview Medical Center, Division of Pulmonary, Critical Care, and Sleep Medicine; Seattle, WA

<sup>8</sup>Cambia Palliative Care Center of Excellence, University of Washington, Seattle, WA

<sup>9</sup>University of Washington School of Medicine, Department of Medicine; Seattle, WA

<sup>10</sup>Dana-Farber Cancer Institute, Department of Psychosocial Oncology and Palliative Care; Boston, MA

<sup>11</sup>Boston Children's Hospital, Department of Medicine; Boston, MA

<sup>12</sup>Harvard Medical School; Boston, MA

<sup>13</sup>Fred Hutchinson Cancer Research Center, Clinical Research Division; Seattle, WA

### Abstract

**Corresponding Author:** Abby R. Rosenberg, MD, MS, MA, Seattle Children's Research Institute, 1900 9<sup>th</sup> Ave, MS JMB 9-C, Seattle, WA 98101, Tel: 206-987-2106, Fax: 206-987-3946, abby.rosenberg@seattlechildrens.org.

**Contributors' Statement:**

Dr. Rosenberg conceptualized and designed the study, designed data collection instruments, coordinated and supervised data collection, directed statistical analyses, drafted the initial manuscript, reviewed and revised the manuscript, and provided administrative and financial support for the study.

Ms. Bradford, Dr. Barton, and Ms. Etsekson conducted the statistical analyses, critically reviewed and revised the manuscript, and provided approval of the submitted product.

Drs. McCauley, Curtis, Wolfe, Baker, and Yi-Frazier contributed to the study conception and design and data interpretation, critically reviewed and revised the manuscript, and provided approval of the submitted product.

**DISCLOSURES AND CONFLICTS OF INTEREST**

The authors have no financial relationships or other conflicts of interest relevant to this article to disclose

**Background:** Adolescents and Young Adults (AYAs) with cancer are at risk for poor psychosocial outcomes, perhaps because they have not acquired skills to navigate adversities of illness. In a recent phase II randomized controlled trial (RCT), the “Promoting Resilience in Stress Management” (PRISM) intervention was associated with improved patient-reported resilience, quality of life and distress. In this planned analysis of secondary aims, we hypothesized PRISM would also improve targeted coping skills of hopeful thinking, benefit-finding, and goal-setting.

**Methods:** We conducted this parallel RCT at Seattle Children’s Hospital from Jan/2015-Oct/2016. English-speaking AYAs (13–25 years-old) with cancer were randomized one-to-one to PRISM or usual care (UC). PRISM teaches stress-management, goal-setting, cognitive-reframing, and meaning-making skills in four sessions delivered in-person every other week. Participants completed surveys at enrollment and 6-months later. Mixed effects linear regression models evaluated associations between PRISM and benefit-finding (Benefit-Finding Scale for Children), hopeful thinking (Hope Scale), and an exploratory outcome of goal-setting (queried with open-ended items about participant’s goals, measured qualitatively by 3 blinded reviewers).

**Results:** Of N=92 AYAs (48 PRISM, 44 UC), 73% were 13–17 years-old, 43% female, and 62% diagnosed with leukemia or lymphoma. PRISM was associated with improved benefit-finding and hope with moderate-to-large effect sizes: Benefit-finding: +3.1 points, 95% CI 0.0,6.2,  $d=0.4$ ,  $p=0.05$ ; Hope: +3.6 points, 95% CI 0.7,6.4,  $d=0.6$ ,  $p=0.01$ . We did not detect changes in goal-setting (–0.5 points, 95% CI –1.2,0.3,  $d=-0.3$ ,  $p=0.23$ ).

**Conclusions:** PRISM was associated with improvements in benefit-finding and hopeful thinking, two adaptive coping skills which may mitigate long-term psychosocial risk.

### Keywords

Resilience; Adolescent/Young Adult; Cancer; Palliative Care; Quality of Life; Health Services; Patient-Reported Outcomes; Positive Psychology; Intervention; RCT

## INTRODUCTION

Cancer among adolescents and young adults (ages 13–25) may disrupt normal developmental experiences like the establishment of independence, identification of personal, social, and sexual identities, completion of education, and pursuit of vocational goals.<sup>1–5</sup> As a result, patients diagnosed as AYAs report ongoing impaired physical, social, and emotional health after treatment,<sup>6,7</sup> translating to high risks of psychological distress and workplace productivity losses.<sup>6,8–10</sup>

A potential area of intervention is the recognition that AYAs may lack skills and psychological resources to navigate the adversities of cancer treatment and survivorship.<sup>6,9,11,12</sup> Indeed, several personal resources have been shown to mitigate negative and/or promote positive psychosocial outcomes among older patients with cancer and AYA cancer survivors.<sup>13–15</sup> These include individual skills in stress-management, goal-setting, cognitive re-framing (the ability to re-appraise negative self-talk), and benefit-finding (the ability to find meaning or benefit from difficult situations). We term these skills “resilience resources.”<sup>16</sup> Together, resilience resources may enhance hopeful patterns of thought because they promote self-efficacy and outcome-expectancy. In other words, they facilitate

perceptions that goals can be met. Finally, bio-behavioral models suggest that resilience resources relate to long-term quality of life, health behaviors, immune function, and overall health and well-being.<sup>17</sup> Hence, skills-based interventions bolstering resilience resources may improve both psychosocial and biological disease outcomes.<sup>17</sup>

For these reasons, we designed a novel, developmentally-appropriate, brief, skills-based psychosocial intervention targeting resilience resources: Promoting Resilience in Stress Management (PRISM).<sup>15,18</sup> We previously reported the primary outcome results of a phase II randomized controlled trial (RCT) testing PRISM's efficacy compared to psychosocial Usual Care (UC).<sup>19</sup> Briefly, PRISM was associated with improved AYA patient-reported resilience and cancer-specific quality of life, as well as reduced psychological distress. Here, we report results of *a priori* planned analyses of secondary outcomes. Specifically, we aimed to determine if and how PRISM impacted targeted coping skills and positive psychological resources embedded within the intervention. We hypothesized that PRISM would be associated with improved patient-reported hopeful thinking, benefit-finding, and goal-setting skills.

## METHODS

### Design, Setting, and Participants

Eligible participants for this phase II, parallel, 1:1 RCT were enrolled at Seattle Children's Hospital (SCH) between Jan/2015 and Oct/2016. They were: (a) 13–25 years-old; (b) fluent in English; and, (c) diagnosed with cancer between 1- and 10-weeks prior to enrollment, *or*, ever diagnosed with progressive, recurrent or refractory cancer, *and* receiving systemic chemotherapy. Patients with pre-existing or cancer-associated cognitive disabilities (e.g., altered mental status due to resection of central-nervous system tumors) were excluded. The SCH Institutional Review Board approved the study.

### Recruitment and Randomization

Potential participants were identified through clinic rosters and approached in outpatient clinics or inpatient wards. Following discussion about the study objectives and design, young adults (18–25 years-old) provided written consent, and adolescents (13–17 years-old) provided written assent while their parents provided written consent. If a patient's parents preferred a language other than English, the discussion was held with a certified medical interpreter and documents translated into the parents' native language following enrollment.

Consecutive patients were enrolled until we reached our target enrollment of n=100 (Figure 1). Upon enrollment, they were assigned 1:1 to Usual Care (UC) alone or UC-plus-PRISM. A study statistician constructed the randomization algorithm using permuted blocks of varying sizes, stratified by age (13–17 versus 18–25 years-old). Study staff were blinded to the randomization assignment until after enrollment; staff collecting outcome data remained blinded to assignment.

## Psychosocial Usual Care

All participants received psychosocial Usual Care (UC), including an assigned social worker who maintained a relationship with the patient and his or her family throughout the study. At our site, social workers routinely conduct a comprehensive psychosocial assessment at the time of diagnosis, and then continue to provide services ranging from behavioral health support to financial, housing, and assistance with other social needs assistance. In addition, participants had access to multidisciplinary AYA and psychosocial teams, including referral-based services from psychology, psychiatry, pain-medicine (including acupuncture), child-life, chaplaincy, palliative care, school, physical/occupational therapy, and art/music therapy.

## The Promoting Resilience in Stress Management (PRISM) intervention

We designed PRISM based on theories of resilience and stress and coping, as well as successful interventions described in other populations of patients in the literature.<sup>18</sup> PRISM has been standardized via comprehensive protocols outlining training, delivery, and fidelity.<sup>20</sup> The initial design was iteratively refined with detailed feedback from AYA patients and families. Prior work has included demonstration of its feasibility, acceptability, and efficacy.<sup>18,19</sup>

Non-clinical college graduates delivered the PRISM intervention in four, 30–50 minute, 1-on-1 sessions approximately every other week.<sup>18,19</sup> As described previously, all received manualized (protocol-derived) training for a minimum of 8 hours, including extensive practice with session scripts and role-play scenarios. PRISM targets skills in stress-management (breathing, relaxation, and awareness of stressors), goal-setting (identifying specific, measurable, and actionable goals with corresponding steps towards their achievement and preparation for inevitable pitfalls along the way), cognitive-restructuring (identifying “negative self-talk” and reframing it realistically and/or optimistically), and benefit-finding (finding meaning or benefit from difficult situations, including cancer). In each session, interventionists solicit patient perspectives and leverage them as examples to apply the targeted skill. For example, in the goal-setting session, interventionists brainstorm with patients to identify a goal, and then help patients transform it into something specific, measurable, actionable, realistic, and time-dependent while planning for roadblocks and alternative pathways. In the benefit-finding session, interventionists simply ask, “can you think of any good things that have come from having cancer?” An optional fifth session consists of a facilitated family meeting where participants share learned skills with family and friends. Between sessions, participants receive worksheets to practice skills, such as diaries for tracking steps towards completion of a goal or recording daily gratitudes. Following completion of all four main sessions, participants receive invitations once-monthly to practice select skills with a short “booster.”

## Procedures

Immediately following enrollment and randomization, staff reconvened with participants to share the randomization assignment, deliver the baseline survey, and (where applicable) create a calendar of PRISM sessions.<sup>19</sup> The latter were scheduled in tandem with planned clinic visits or hospital-admissions. All participants (regardless of randomization) received check-in visits and abbreviated surveys measuring only the primary endpoint (patient-

reported resilience) 2- and 4-months post-enrollment. The final and comprehensive survey was delivered 6-months post-enrollment. All participants received a \$25 gift-card upon completion of baseline, and a \$50 card upon completion of 6-month surveys.

### Study Instruments

Demographic variables including age, sex, race/ethnicity, and first-language were requested in surveys and collected from the medical record if missing. Additional medical record data included cancer-type and any history of recurrent, refractory or progressive disease.

The comprehensive patient-reported outcomes survey was administered at baseline and 6-months. It consisted of AYA age-validated instruments, including the Benefit Finding Scale for Children and the Hope Scale. The Benefit Finding Scale for Children<sup>21</sup> was adapted by pediatric psychosocial clinicians from the Benefit Finding Scales used among adult patients with cancer.<sup>22–24</sup> Ten items depict a potential benefit of illness, and ten depict potential burdens. All are answered on a 5-point Likert scale and higher scores indicate higher benefit-finding. Cronbach's alpha for the scale is 0.83. The reported mean score among pediatric and AYA cancer patients is 37 (SD 7.8, range 12–50), suggesting a Minimal Clinically Important Difference (MCID, conceptualized as the smallest change a patient or clinician would find important and generally estimated as half the standard deviation of population mean scores) of 3.9.<sup>25</sup>

The Hope Scale measures hopeful patterns of thought as conceptualized by Snyder, et al. to be “the overall perception that one's goals can be met.”<sup>26</sup> Eight items distinguish between an individual's perceived ability to generate a route to his or her goals (termed “pathway” thoughts) and perceived ability to initiate and maintain the actions necessary to reach a goal (termed “agency” thoughts). It is scored on an 8-point Likert scale, and higher scores imply greater levels of hopeful thought patterns. Cronbach's alphas range from 0.74 to 0.84. The mean total score among well college students is 25 (SD 3.0, range 12–48), suggesting a MCID of 1.5.<sup>25</sup>

In addition, the survey included open-ended questions about participants' goals, with space for written responses: (1) A. *Please give an example of a goal you hope to accomplish over the next month?* B. *How do you plan to accomplish this goal?* (2) A. *Please give an example of a goal you hope to accomplish over the next year?* B. *How do you plan to accomplish this goal?*

### Outcomes

The primary outcome of the overall study was patient-reported resilience at 6-months and was reported previously.<sup>19</sup> This *a priori* planned analysis reports secondary outcomes of benefit-finding and hope, and the exploratory outcome of goal-setting skills.

### Statistical Analyses

The study was designed to provide 80% power with two-sided alpha=0.05 to detect the MCID in the primary study outcome (patient-reported resilience). The target sample size of 90 AYAs provided 80% power with two-sided alpha of 0.05 to detect a 4.7-point change in

the secondary outcome of benefit-finding. A priori power calculations were not conducted for the secondary outcome of hope or the exploratory outcome of goal-setting.

Written responses to goals questions were transcribed verbatim, de-identified, blinded of randomization assignment, randomly re-sequenced, and entered into a new database for coding. Three study team members trained in qualitative methods (A.R.R., N.E., and K.S.B.) scored each of the two patient-reported entries. The original analysis plan proposed a 4-point scale to measure goals that were concrete, actionable, described with steps/pathways to completion, and described with possible pitfalls and alternatives. Following the first pass of coding, however, it became clear that this schema was too crude to capture the full variability of responses. Hence, we expanded our coding to a more comprehensive 10-point scale, where 1 point was assigned for goals that were: (i) specific; (ii) measurable; (iii) realistic; (iv) controllable; plans that included: (v) 1 step; (vi) >1 step; (vii) anticipated pitfalls, and, plans that were (viii) specific; (ix) measurable; (x) organized in a step-wise fashion. Scores for the two goals were then averaged to create a single score (range 0–10 points) for each patient. At least two independent coders scored each participant's goals; inter-rater reliability was >90%.

Benefit-finding, hope, and goals scores were summarized descriptively and effect sizes of score-changes evaluated with Cohen's  $d$  statistics, where  $d > 0.5$  is considered a moderate and  $d > 0.8$  a large effect size).<sup>27</sup> Associations between PRISM and 6-month outcomes (instrument and goals scores) were estimated using unadjusted linear mixed-effects regression modeling with patient-level random intercepts. Sensitivity analyses including adjustments for patient sex, race/ethnicity, primary language, and history of advanced cancer at the time of enrollment suggested that estimates were unchanged; hence, unadjusted models are reported here. All testing was two-sided and conducted at the 0.05 level of significance without correction for multiple comparisons. Statistical analyses were performed using Stata version 14 (StataCorp., College Station, TX).

## RESULTS

Enrollment rates and participant characteristics have been presented previously.<sup>19</sup> Briefly, of 483 patients with cancer screened for eligibility, 130 met inclusion/exclusion criteria and 100 of these (76%) enrolled (Figure 1). Demographic characteristics of the 30 who declined participation were similar to the 100 who enrolled. Fifty AYAs were randomized to UC and 50 to PRISM; however, immediately following randomization, one of the PRISM participants disclosed that he was not fluent in written English. He was withdrawn before receiving the baseline survey instrument. Of the remaining 99 participants, 6 UC participants (12%) and 1 PRISM participant (2%) did not complete the baseline survey.

Of the 92 AYAs who completed baseline surveys, 43% were female, 73% 12–17 years-old, 27% were non-White race, 12% spoke English as a second language, and 26% had advanced cancer at the time of enrollment (Table 1). Demographic characteristics and baseline instrument scores of UC versus PRISM participants were similar except that UC participants were more commonly female or spoke English as a second language.

At 6-months, PRISM was associated with greater improvement in patient-reported benefit-finding and hope with moderate-to-large effect sizes. Specifically, PRISM participants' benefit-finding scores went up by an estimated 3.1 points more than UC participants (95% CI 0.0, 6.2;  $p=0.05$ ; effect size  $d=0.4$ , Table 2). Furthermore, the distribution of score changes was different for each group, with 42% of UC group experiencing a negative score change compared to 23% among the PRISM group (Figure 2).

Similarly, compared to UC score-change, PRISM participants' hope scores improved. Total hope scores went up by an estimated additional 3.6 points (95% CI 0.7, 6.4,  $p=0.01$ ,  $d=0.6$ ), while agency and pathway subscales went up by an additional 1.8 points (agency: 95% CI 0.1, 3.5,  $p=0.04$ ,  $d=0.5$ ; pathway 95% CI 0.2, 3.4,  $p=0.02$ ,  $d=0.5$ , Table 2). Again, the distribution of hope score changes was more favorable in the PRISM group; only 25% of PRISM participants reported negative total score changes compared to 50% of UC participants (Figure 2).

Patient's written goals varied in their level of detail and corresponding scores. For example, regarding (a) a goal for the next month; and, (b) a plan to accomplish it, "(a) *Get out of the hospital. (b) I plan to eat and exercise a lot*" received 1 point, whereas "(a) *I hope to take advantage of the Christmas break from college my friends will have, and to meet up at least once with every single close friend who comes back to the Seattle area temporarily. (b) I plan to accomplish this goal by texting each friend that comes home to WA for the holidays and asking when they are free to meet up. When we set a date to hang out, I will write it down on my calendar so that I do not forget*" received 9 points. We did not detect changes in endorsed qualitative goals in either group (estimated difference for PRISM participant score-change compared to UC participants =  $-0.5$  points, 95% CI  $-1.2, 0.3$ ,  $d=-0.3$ ,  $p=0.23$ ), nor were their appreciable differences in score distributions (Table 2, Figure 2).

## DISCUSSION

We conducted this phase II RCT to test the efficacy of a novel, skills-based intervention designed to promote AYA resilience resources (PRISM). In this planned analysis of our secondary and exploratory outcomes, we aimed to determine if PRISM changed measurable markers of those resilience resources, namely targeted coping skills of benefit-finding, hopeful patterns of thought, and goal-setting. We found that receiving PRISM was associated with improved benefit-finding and hope with clinically meaningful effect sizes when compared to usual care. These findings are promising because meta-analyses suggest even small effect sizes of positive psychology interventions are associated with sustained recipient well-being.<sup>28</sup>

A challenge with the pooled positive psychology literature described in these meta-analyses, however, is that described interventions are highly variable with respect to targeted constructs and populations.<sup>28</sup> Clinicians may wonder which intervention might be most effective for their particular patient-population. PRISM's design was informed not only by positive psychology theory and literature, but also by AYA's themselves; as such, it targets key AYA patient-endorsed resilience resources of benefit-finding and goal-oriented thinking.<sup>15,18,29</sup>

PRISM teaches benefit-finding (the process of identifying positive changes as a result of challenging life events) by helping AYAs “identify silver linings” through deliberate self-reflection, journaling, and/or a log of “daily gratitudes.”<sup>18</sup> Benefit-finding has been associated with improved quality of life among older adults with cancer,<sup>30</sup> and with reduced distress among well middle school-aged youth.<sup>31</sup> AYAs with cancer are not only at high risk of distress and poor quality of life, but also have great capacity for benefit-finding.<sup>29,32,33</sup> Hence, benefit-finding is a promising mechanism towards buffering the impact of cancer and other serious illnesses.

The construct of “hope” is not as consistently defined in the literature, in part because it is commonly conflated with “false optimism”, such as “hope for cure” when cure is not possible.<sup>34</sup> We prefer the positive psychology conceptualization of hope, which goes beyond simple desires to a holistic perception that one’s goals can be met.<sup>26</sup> With this framework, hope may be operationalized into two, interrelated domains of agency (a sense of successful determination in meeting past, present, and future goals, akin to self-efficacy), and pathway (a sense of being able to generate successful plans to meet those goals, akin to outcome-expectancy).

PRISM targets both agency and pathway processes through exercises in stress-management and mindfulness (e.g., quieting the mind in order to identify priorities), cognitive reframing (e.g., re-identification of known strengths and accomplishments), and goal-setting exercises (e.g., mapping our specific pathways towards goal achievement). Although prior studies have suggested this construct of hope is relatively stable over time, the present and our prior studies suggest it changes during the cancer experience.<sup>26,35</sup> Furthermore, hope may be an important factor of patient-centered outcomes; high-hope young adult women report more positive cancer-coping skills than low-hope women, and hope scores predict academic success, mental health outcomes, and optimistic appraisals of adversity.<sup>26,36–38</sup> Hence, like benefit-finding, hope is an important target for intervention.

While our findings suggest that PRISM is associated with goal-oriented hopeful patterns of thought, in effect suggesting that PRISM promotes confidence that one’s goals can be met, we did not detect specific changes in goal-setting skills with our qualitative analyses. PRISM teaches goal-setting through a detailed exercise where an AYA identifies a goal, and the goal is refined iteratively until it is specific, realistic, measurable, actionable, and mapped both with clear steps and anticipated pitfalls. Reasons for the discrepancy between improved hope scores and the lack of improvement in goal-setting skills are unclear, although two explanations are likely. One is that PRISM did not teach the skill sufficiently. The other is that our methods were not sensitive enough to capture a change. Indeed, we relied on written qualitative responses rather than witnessed skills. Participants may not have wanted to hand-write extensive details in their surveys, and our a priori coding schema may have missed subtle nuances in goal quality and content. Future studies will incorporate methods to more directly track goal-setting practices and, perhaps more importantly, whether or not they are successful in helping AYAs achieve their stated goals.

Additional limitations of this analysis of secondary aims include the fact that our analyses may have been underpowered. *A priori* power calculations confirmed we lacked power to



detect the MCID of benefit-finding, and we did not conduct such advanced calculations for hope or goal-setting. Although sensitivity analyses suggested demographic features such as English-as-a-second language were not associated with PRISM's efficacy, the limited power may also have precluded the detection of subtle biases. As such, we are reliant on the promising effect sizes to generate hypotheses about PRISM's larger clinical impact. Similarly, we did not correct for multiple comparisons in this analysis; it is possible that some of our findings are falsely positive. Also, generalizability of our results is limited because the study was conducted at a large academic medical center, among mostly White, English-speaking AYAs. We cannot confirm that the same positive results would be observed as a smaller medical center, or among racial, ethnic, or other culturally diverse populations. We also did not systematically track utilization of health services including human resources in social work and psychology. We therefore cannot determine if PRISM was associated with greater or lesser utilization of available support services. Lastly, we cannot determine how durable PRISM's effects may be. Although hospital-based positive psychology interventions like PRISM tend to be more lasting than non-hospital based programs, PRISM's brevity may make it harder for participants to retain learned skills.<sup>28</sup> Future studies will address these limitations with larger sample sizes and projects conducted in more diverse settings with longer and more detailed follow-up.

In summary, this study suggests important clinical and investigative opportunities. First, it replicates findings from adult populations suggesting positive psychology interventions are associated with improved AYA patient-centered outcomes.<sup>28</sup> Second, it suggests that specific skills like benefit-finding and hopeful thinking are targetable and teachable. This is important because each has been associated with longer-term patient physical, emotional, and social health.<sup>13,14,17,39,40</sup> That PRISM may be delivered by trained, non-clinical staff using a standardized script also has implications for its dissemination and implementation. It may be integrated into early clinical care as an inexpensive, preventative, stepped-care model which provides a scaffold for later patient-level coping support and/or where scarce professional level psychosocial services are reserved for patients and families in crisis. Taken together, our findings reflect a promising new approach to improving the outcomes of AYAs with cancer.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## ACKNOWLEDGEMENTS

We thank the patients and families for their willingness to participate in this study. We also thank Michele Shaffer for her contribution to the statistical design of this study, and Claire Wharton, Lauren Eaton, Victoria Klein, Samantha Scott, Stacy Garcia, and Katy Fladeboe for their work on enrollment, data collection and management, intervention administration, and administrative support.

### Clinical Trial Registration:

[clinicaltrials.gov](https://clinicaltrials.gov) NCT02340884

Funding Source:

This study was funded part through grants from the National Center for Advancing Translational Sciences of the National Institutes of Health (KL2TR000421) and Cure Search for Children's Cancer. The content is solely the responsibility of the authors and does not necessarily represent the official views of the funding organizations.

## Abbreviations:

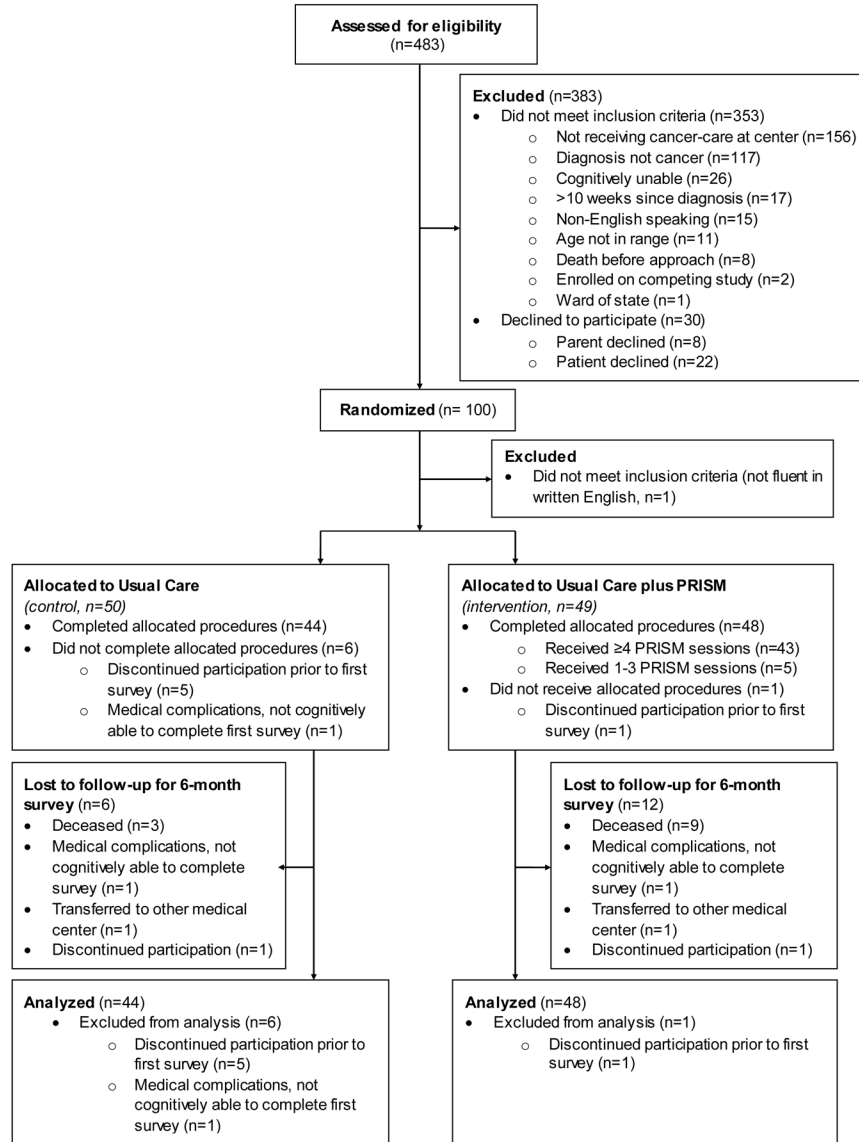
<b>RCT</b>	Randomized Controlled Trial
<b>AYA</b>	Adolescent and Young Adult
<b>PRISM</b>	Promoting Resilience in Stress Management
<b>UC</b>	Usual Care
<b>MCID</b>	Minimal Clinically Important Difference

## REFERENCES

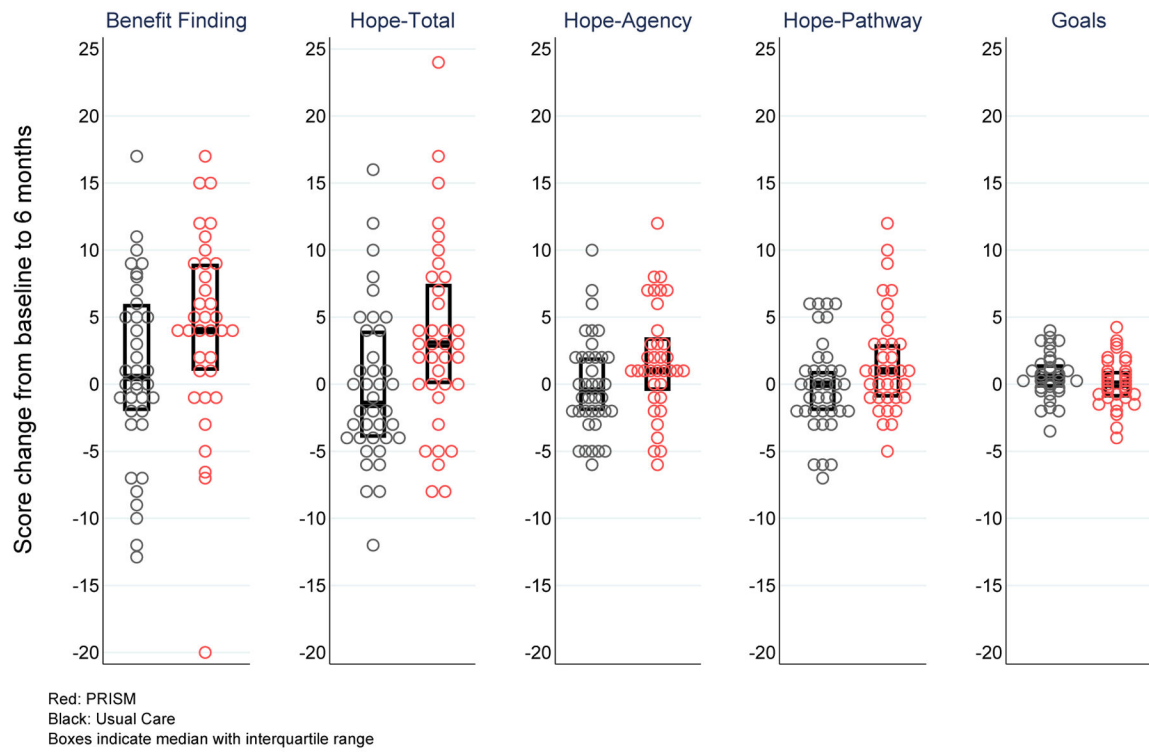
1. Bleyer A The adolescent and young adult gap in cancer care and outcome. *Curr Probl Pediatr Adolesc Health Care*. 2005;35(5):182–217. [PubMed: 15841070]
2. Zebrack BJ. Psychological, social, and behavioral issues for young adults with cancer. *Cancer*. 2011;117(10 Suppl):2289–2294. [PubMed: 21523748]
3. Thomas DM, Albritton KH, Ferrari A. Adolescent and young adult oncology: an emerging field. *J Clin Oncol*. 2010;28(32):4781–4782. [PubMed: 20733122]
4. Zebrack B, Isaacson S. Psychosocial care of adolescent and young adult patients with cancer and survivors. *J Clin Oncol*. 2012;30(11):1221–1226. [PubMed: 22412147]
5. Nass SJ, Beaupin LK, Demark-Wahnefried W, et al. Identifying and addressing the needs of adolescents and young adults with cancer: summary of an Institute of Medicine workshop. *Oncologist*. 2015;20(2):186–195. [PubMed: 25568146]
6. Pendley JS, Dahlquist LM, Dreyer Z. Body image and psychosocial adjustment in adolescent cancer survivors. *J Pediatr Psychol*. 1997;22(1):29–43. [PubMed: 9019046]
7. Richardson RC, Nelson MB, Meeske K. Young adult survivors of childhood cancer: attending to emerging medical and psychosocial needs. *J Pediatr Oncol Nurs*. 1999;16(3):136–144. [PubMed: 10444941]
8. Kazak AE, Derosa BW, Schwartz LA, et al. Psychological outcomes and health beliefs in adolescent and young adult survivors of childhood cancer and controls. *J Clin Oncol*. 2010;28(12):2002–2007. [PubMed: 20231679]
9. Phillips-Salimi CR, Lommel K, Andrykowski MA. Physical and mental health status and health behaviors of childhood cancer survivors: findings from the 2009 BRFSS survey. *Pediatr Blood Cancer*. 2012;58(6):964–970. [PubMed: 22012636]
10. Guy GP, Jr., Yabroff KR, Ekwueme DU, et al. Estimating the health and economic burden of cancer among those diagnosed as adolescents and young adults. *Health Aff (Millwood)*. 2014;33(6):1024–1031. [PubMed: 24889952]
11. Information Zebrack B. and service needs for young adult cancer patients. *Support Care Cancer*. 2008;16(12):1353–1360. [PubMed: 18386075]
12. Krull KR, Huang S, Gurney JG, et al. Adolescent behavior and adult health status in childhood cancer survivors. *J Cancer Surviv*. 2010;4(3):210–217. [PubMed: 20383785]
13. Miller KA, Wojcik KY, Ramirez CN, et al. Supporting long-term follow-up of young adult survivors of childhood cancer: Correlates of healthcare self-efficacy. *Pediatr Blood Cancer*. 2016.
14. Molina Y, Yi JC, Martinez-Gutierrez J, Reding KW, Yi-Frazier JP, Rosenberg AR. Resilience among patients across the cancer continuum: diverse perspectives. *Clin J Oncol Nurs*. 2014;18(1):93–101. [PubMed: 24476731]

15. Rosenberg AR, Yi-Frazier JP, Wharton C, Gordon K, Jones B. Contributors and Inhibitors of Resilience Among Adolescents and Young Adults with Cancer. *J Adolesc Young Adult Oncol*. 2014;3(4):185–193. [PubMed: 25969794]
16. Rosenberg AR, Yi-Frazier JP. Commentary: Resilience Defined: An Alternative Perspective. *J Pediatr Psychol*. 2016;41(5):506–509. [PubMed: 27013701]
17. Andersen BL, Thornton LM, Shapiro CL, et al. Biobehavioral, immune, and health benefits following recurrence for psychological intervention participants. *Clin Cancer Res*. 2010;16(12):3270–3278. [PubMed: 20530702]
18. Rosenberg AR, Yi-Frazier JP, Eaton L, et al. Promoting Resilience in Stress Management: A Pilot Study of a Novel Resilience-Promoting Intervention for Adolescents and Young Adults With Serious Illness. *J Pediatr Psychol*. 2015;40(9):992–999. [PubMed: 25678533]
19. Rosenberg AR, Bradford M, McCauley E, Curtis JR, Wolfe J, Yi-Frazier J. Promoting Resilience in Adolescents and Young Adults with Cancer: results from the PRISM randomized controlled trial. *Cancer*. *In Press*.
20. Bellg AJ, Borrelli B, Resnick B, et al. Enhancing treatment fidelity in health behavior change studies: best practices and recommendations from the NIH Behavior Change Consortium. *Health Psychol*. 2004;23(5):443–451. [PubMed: 15367063]
21. Phipps S, Long AM, Ogden J. Benefit Finding Scale for Children: preliminary findings from a childhood cancer population. *J Pediatr Psychol*. 2007;32(10):1264–1271. [PubMed: 17210581]
22. Tomich PL, Helgeson VS. Five years later: a cross-sectional comparison of breast cancer survivors with healthy women. *Psychooncology*. 2002;11(2):154–169. [PubMed: 11921331]
23. Tomich PL, Helgeson VS, Nowak Vache EJ. Perceived growth and decline following breast cancer: a comparison to age-matched controls 5-years later. *Psychooncology*. 2005;14(12):1018–1029. [PubMed: 15744778]
24. Tomich PL, Helgeson VS. Is finding something good in the bad always good? Benefit finding among women with breast cancer. *Health Psychol*. 2004;23(1):16–23. [PubMed: 14756599]
25. Norman GR, Sloan JA, Wyrwich KW. Interpretation of changes in health-related quality of life: the remarkable universality of half a standard deviation. *Med Care*. 2003;41(5):582–592. [PubMed: 12719681]
26. Snyder CR, Harris C, Anderson JR, et al. The will and the ways: development and validation of an individual-differences measure of hope. *J Pers Soc Psychol*. 1991;60(4):570–585. [PubMed: 2037968]
27. Cohen J *Statistical Power Analysis for the Behavioral Sciences*. 2 ed. Hillsdale NJ: Erlbaum; 1988.
28. Bolier L, Haverman M, Westerhof GJ, Riper H, Smit F, Bohlmeijer E. Positive psychology interventions: a meta-analysis of randomized controlled studies. *BMC Public Health*. 2013;13:119. [PubMed: 23390882]
29. Straehla JP, Barton KS, Yi-Frazier JP, et al. The Benefits and Burdens of Cancer: A Prospective Longitudinal Cohort Study of Adolescents and Young Adults. *J Palliat Med*. 2017;20(5):494–501. [PubMed: 28051888]
30. Henry M, Cohen SR, Lee V, et al. The Meaning-Making intervention (MMi) appears to increase meaning in life in advanced ovarian cancer: a randomized controlled pilot study. *Psychooncology*. 2010;19(12):1340–1347. [PubMed: 20878857]
31. McCarty CA, Violette HD, McCauley E. Feasibility of the positive thoughts and actions prevention program for middle schoolers at risk for depression. *Depress Res Treat*. 2011;2011:241386. [PubMed: 21152188]
32. Zebrack BJ, Stuber ML, Meeske KA, et al. Perceived positive impact of cancer among long-term survivors of childhood cancer: a report from the childhood cancer survivor study. *Psychooncology*. 2012;21(6):630–639. [PubMed: 21425388]
33. Barakat LP, Alderfer MA, Kazak AE. Posttraumatic growth in adolescent survivors of cancer and their mothers and fathers. *J Pediatr Psychol*. 2006;31(4):413–419. [PubMed: 16093518]
34. Sisk BA, Malone JR. Hope, Optimism, and Compassionate Communication. *JAMA Pediatr*. 2018.
35. Rosenberg AR, Bradford MC, Bona K, et al. Hope, distress, and later quality of life among adolescent and young adults with cancer. *J Psychosoc Oncol*. 2018;36(2):137–144. [PubMed: 28934026]

36. Irving LM, Snyder CR, Crowson JJ, Jr. Hope and coping with cancer by college women. *J Pers.* 1998;66(2):195–214. [PubMed: 9529663]
37. Snyder CR, Hoza B, Pelham WE, et al. The development and validation of the Children's Hope Scale. *J Pediatr Psychol.* 1997;22(3):399–421. [PubMed: 9212556]
38. Curry LA, Snyder CR, Cook DL, Ruby BC, Rehm M. Role of hope in academic and sport achievement. *J Pers Soc Psychol.* 1997;73(6):1257–1267. [PubMed: 9418279]
39. Andersen BL, Yang HC, Farrar WB, et al. Psychologic intervention improves survival for breast cancer patients: a randomized clinical trial. *Cancer.* 2008;113(12):3450–3458. [PubMed: 19016270]
40. Andersen BL, Goyal NG, Westbrook TD, Bishop B, Carson WE, 3rd. Trajectories of Stress, Depressive Symptoms, and Immunity in Cancer Survivors: Diagnosis to 5 Years. *Clin Cancer Res.* 2017;23(1):52–61. [PubMed: 27407091]



**Figure 1.** The Promoting Resilience in Stress Management (PRISM) randomized trial Consort (flow) diagram at 6-months of follow-up



**Figure 2.** Distribution of changes in participant-reported outcome scores between baseline and 6-months, by randomization assignment

Table 1.

Participant characteristics and instrument scores at time of enrollment

Characteristic	Usual Care [N=44]		PRISM [N=48]		All [N=92]	
	(n, %)	(n, %)	(n, %)	(n, %)	(n, %)	(n, %)
Female	24 (55)	16 (33)	40 (43)			
12–17 years-old at enrollment	32 (73)	35 (73)	67 (73)			
18–25 years-old at enrollment	12 (27)	13 (27)	25 (27)			
Non-White Race	19 (43)	15 (31)	33 (36)			
First language other than English	10 (23)	1 (2)	11 (12)			
Leukemia/Lymphoma	27 (61)	30 (63)	57 (62)			
Central Nervous System (CNS)	3 (7)	3 (7)	6 (7)			
Non-CNS Solid Tumor	14 (32)	15 (31)	29 (32)			
Advanced Cancer at Enrollment	14 (32)	10 (21)	24 (26)			
<b>Instrument Scores</b>	<b>Mean (SD)</b>	<b>Mean (SD)</b>	<b>Mean (SD)</b>			
Benefit Finding (Benefit-Finding Scale for Cancer)	37 (8.2)	34 (9.5)	35 (9.0)			
Hope - Total (Hope Scale)	51 (8.1)	49 (8.4)	50 (8.3)			
Hope - Agency	25 (5.0)	24 (5.0)	25 (5.0)			
Hope - Pathway	26 (3.7)	25 (4.1)	25 (3.9)			
Goal Setting (qualitatively scored on 10-point scale)	5 (1.3)	5 (1.4)	5 (1.3)			

**Table 2.****PRISM versus control effect estimates measured at 6-months**

Estimated change in total instrument scores associated with PRISM compared to Usual Care (linear mixed models) \*

Outcome (instrument)	Beta* (95% CI)	Cohen's <i>d</i> Effect Size
Benefit Finding (Benefit Finding Scale for Children)	+3.1 (0.0, 6.2)	0.6
Hope - Total (Hope Scale)	+3.6 (0.7, 6.4)	0.4
Hope - Agency	+1.8 (0.1, 3.5)	0.5
Hope - Pathway	+1.8 (0.2, 3.4)	0.5
Goals (qualitatively scored based on 10-point scale)	-0.5 (-1.2, 0.3)	-0.3

\* Linear models based on n=92 participants who completed baseline data