Published in final edited form as:

Support Care Cancer. 2013 June ; 21(6): 1597–1604. doi:10.1007/s00520-012-1701-7.

Physical and Mental Health Status of Female Adolescent/Young Adult Survivors of Breast and Gynecological Cancer: A National, Population-Based, Case-Control Study

Celeste R. Phillips-Salimi [Post Doctoral Fellow] and

Indiana University, School of Nursing, Indianapolis, IN

Michael A. Andrykowski [Professor]

University of Kentucky, Department of Behavioral Medicine, Lexington, KY

Abstract

Purpose—Each year nearly 21,000 adolescents and young adults (AYA) ages 15 to 29 years are diagnosed with cancer. Breast and gynecological cancers account for 25% of the cancers seen in AYA females. The purpose of this study was to compare the current physical and mental health status of female AYA cancer survivors with non-cancer female controls.

Methods—Using data from the population-based 2009 National Health Interview Survey, 100 cases of female AYA survivors of breast and gynecological cancers were identified (FCS group). FCS cases were matched with 300 female respondents without a history of cancer on age, education, marital status, and minority status (NCC group). The FCS and NCC groups were compared on a range of physical and mental health status indices using analysis of covariance and binary logistic regression.

Results—FCS group reported significantly poorer physical and mental health status than the matched controls. Relative to the NCC group, FCS survivors had significantly poorer scores on 7 of 8 mental health outcomes and were more likely to meet criteria for serious psychological distress (OR = 4.23, $p = 0.001$). FCS group also reported greater lifetime and current prevalence of various medical conditions; more health-related disabilities; and greater functional limitations than the NCC group.

Conclusion—Diagnosis of breast and gynecological cancer during adolescence and young adulthood is associated with clinically important deficits in physical and mental health status. Given the young age of this cancer survivor cohort, increased attention should be devoted to minimizing these deficits.

Keywords

cancer; adolescent/young adult; survivorship; breast; gynecological

INTRODUCTION

Nearly 21,000 adolescents and young adults (AYA) between the ages of 15 and 29 are diagnosed with cancer annually in the United States [1]. This is 2.7 times greater than the number of annual pediatric cancer cases [1]. The 5-year survival rate of AYA has seen little

Corresponding Author: Celeste R. Phillips-Salimi, Ph.D., R.N. Indiana University School of Nursing, 1111 Middle Drive, Indianapolis, IN 46202; cephilli@iupui.edu; phone: 317-442-2973; fax: 317-278-2021.

Conflicts of Interest

The authors have no conflicts of interest to disclose.

improvement over the past 25 years compared to younger or older cancer patients [1]. The National Cancer Institute (NCI) and LIVESTRONG Foundation have recently placed special emphasis on identifying the long-term survival needs of AYA cancer survivors [2].

Breast and gynecological cancers account for 25% of the cancers most commonly seen in AYA females [1]. A cancer diagnosis during adolescence and young adulthood can have a significant impact on the social and emotional development of AYA, leading to disruptions in the achievement of normal developmental milestones [3]. Issues AYA commonly face during cancer treatment include: increased dependence on parents; disruptions in school and/or work; alternations in body-image; and concerns about interpersonal relationships [4–6]. Additional concerns, especially for young survivors of breast and gynecological cancers, include sexual and reproductive dysfunction [7–9]. Difficulties in coping with these issues could negatively impact the quality of life (QOL) of female AYA cancer survivors.

Despite the growing research on female survivors of breast and gynecological cancers [10–13], few studies have focused on females diagnosed with these types of cancers during adolescence or young adulthood. Previous research has either lumped this group of female cancer survivors in with women diagnosed with cancer in middle to late adulthood or excluded them if their diagnosis was before the age of 18 [12, 14, 15]. Some research has claimed to focus on “young” cancer survivors; however, the upper age criterion extends into middle adulthood (age 50) [13]. In fact, no studies reported in the literature have examined the physical or mental health outcomes specifically of females diagnosed with breast or gynecological cancers during adolescence and young adulthood.

The Institute of Medicine [16] has recommended researchers use population-based, national health surveys to help identify the health outcomes of understudied cancer survivors, such as female AYA cancer survivors. The present study embraces this recommendation. We used data from the population-based, 2009 National Health Interview Survey (NHIS) to identify the current physical and mental health status of female AYA survivors of breast and gynecological cancers. Female AYA cancer survivors are compared with female control respondents without a history of cancer, matched on age, education, minority status, and marital status.

METHODS

National Health Interview Survey

The NHIS is an annual, national survey, sponsored by the National Center for Health Statistics and Centers for Disease Control and Prevention, used to monitor health trends [17]. The NHIS uses a multi-stage sampling design, with oversampling of Black, Hispanic, and Asian individuals. Data are collected through in-person household interviews. The NHIS consists of four core components: Household, Family, Sample Adult, and Sample Child. Data from the Sample Adult questionnaire were used for this study. A total of 27,383 adults (≥ 18 years) completed the 2009 NHIS interview. The response rate was 80.1% for those who completed the adult interview [17]. Since NHIS data are in the public domain, approval by a local institutional review board was not required.

The 2009 NHIS included specific questions related to cancer survivorship. First, respondents were asked “Have you ever been told by a doctor or other health professional that you had cancer or a malignancy of any kind?” If “yes”, respondents were then asked “What kind of cancer was it?” and “How old were you when this cancer was first diagnosed?” Respondents were also asked to report the type and age of diagnosis for up to two additional lifetime cancer diagnoses. Time since initial cancer diagnosis was calculated as the difference between age at initial cancer diagnosis and age at survey participation. A full description of

the 2009 NHIS questions and response alternatives can be found at www.cdc.gov/nchs/nhis/nhis_questionnaires.htm. Response alternatives such as ‘refused’ and ‘don’t know’ were coded as missing.

Measures

Demographics—Information regarding age, sex, race, ethnicity, marital status, and education was obtained. Information regarding race and ethnicity was used to categorize respondents as either “non-minority” (white, non-hispanic) or “minority” (all others). Marital status information was used to categorize respondents as either “married/partnered” or “not married/partnered”.

Mental Health—Mental health was assessed by 8 items. The NHIS survey included the K6 scale, a 6-item screening tool designed to measure psychological distress [18, 19]. Respondents were asked how frequently they may have experienced six different feelings during the last 30 days (i.e., sad, nervous, restless/fidgety, hopeless, everything was an effort, or worthless). Responses were recorded on a 5-point scale ranging from 0 = “none of the time” to 4 = “all of the time.” These 6 items were then summed to create a Total Distress Index (range 0–24) (item 7), with higher scores indicating greater psychological distress (Cronbach’s alpha = 0.88 for the current study). Kessler et al. [18] suggests a score of 13 is an indicator of serious psychological distress; thus, this score was used as a cut-off to classify respondents as meeting criteria for serious psychological distress (yes vs. no). Lastly, respondents who indicated they experienced 1 of the six feelings at least “a little of the time” were then asked “How much did these feelings interfere with your life or activities?” (0 = “not at all” to 3 = “a lot”) (item 8).

Physical Health—Lifetime history of 9 medical conditions was assessed by asking respondents “Have you EVER been told by a doctor or other health professional that you had _____?” (yes vs. no). Specific medical conditions inquired were: hypertension, coronary heart disease, heart attack, stroke, emphysema, asthma, ulcer, diabetes, and arthritis.

More recent and current history of various medical conditions was also assessed. Two questions asked respondents whether they had been told by a doctor or health professional in the past 12 months if they had weak/failing kidneys or a liver condition (yes vs. no). Four questions assessed the presence of pain (yes vs. no) during the past 3 months lasting 1 day. Types of pain inquired included: neck, low back, face/jaw, and severe migraine/headache. Two questions asked respondents whether they had experienced a head or chest cold; or a stomach or intestinal illness with vomiting or diarrhea within the past 2 weeks (yes vs. no). Two questions asked respondents whether they currently had trouble seeing (even with glasses or contact lenses) or if they had any health problems requiring special equipment (e.g., a cane, wheelchair, special bed, or special telephone) (yes vs. no). Respondents were asked if they were currently pregnant (yes vs. no). Finally, respondents were asked whether they had experienced symptoms of pain, aching, or stiffness in/around a joint (other than back or neck) within the past 30 days (yes vs. no). Those who responded “yes” were asked to indicate whether their current usual activities were limited because of arthritis or joint symptoms (yes vs. no).

Other questions regarding current physical health status were also assessed. Respondents were asked to compare their current health to their health one year ago, using a 3-point scale (0–2) (higher scores indicating better health). Respondents reported the number of work days lost during the past year due to illness or injury (excluding maternity leave) and the number of days during the past year illness/injury kept them in bed more than half the day.

Average hours of sleep were assessed by asking respondents how many hours of sleep they get in a 24-hour period. Body mass index (BMI) was calculated using current height and weight. Respondents who responded “yes” to experiencing joint pain in the past 30 days were asked to rate the severity of the pain, using an 11-point scale (0–10) (higher scores indicating greater joint pain severity).

Functional limitations were also assessed. Respondents were asked “By yourself, and without using any special equipment, how difficult is it for you to _____?” (0 = “can’t do at all” to 4 = “not at all difficult”). Specific functional activities queried included: walk a quarter of a mile; stand or be on feet for about 2 hours; sit for about 2 hours; stoop, bend, or kneel; reach up over your head; use your fingers to grasp or handle small objects; lift or carry something heavy as 10 pounds; push or pull large objects; got out to things like shopping, movies, or sporting events; participate in social activities such as visiting friends or attending clubs or meetings; and doing things to relax at home or for leisure such as reading, watching TV, or listening to music.

Identification of Female AYA Cancer Survivor Cases and Non-Cancer Controls

In the 2009 NHIS, 2,227 respondents indicated they had been told by a doctor or health professional they had cancer. Further eligibility criteria for the Female AYA Cancer Survivor (FCS) group included: (1) report of a single lifetime cancer diagnosis of either breast, cervical, ovarian, or uterine cancer; (2) diagnosed between ages 15 and 29; (3) currently 59 years old; and (4) time since diagnosis 1 year. Using these criteria, 100 respondents constituted the FCS group. The 10,302 female, adult NHIS respondents who indicated they had never been told by a health professional they had cancer were considered for the inclusion in the non-cancer control (NCC) group. To be considered for inclusion in the NCC group, a respondent had to be matched with a FCS case with regard to: (a) current age; (b) minority status (white, non-hispanic vs. all others); (c) marital status (married/partnered vs. not married/non-partnered); and (d) education (high school grad or less vs. some college or more). Matching on current age was done within four age deciles (i.e., 18–29 years, 30–39 years, 40–49 years, and 50–59 years). For each FCS case, 3 matched controls were randomly selected from the pool of potential matches among the non-cancer female respondents. The NCC group consisted of 300 respondents. A 3:1 ratio was chosen to detect an effect size of .33 (small to moderate effect) [20] and achieve a statistical power of .80 for an independent samples t-test (2-sided), given $\alpha = .05$.

Statistical Analyses

Prior to performing primary study analyses, the FCS and NCC groups were compared with regard to age, minority status, marital status, and education, using chi-square and independent t-test analyses. A significant difference was found between the two groups with regard to education (i.e., the six-category variable) and was used as covariate in the primary study analyses. Analysis of covariance (ANCOVA) was used to compare groups on continuous outcome variables. Effect sizes (ES) were calculated as the difference between the two means divided by the pooled standard deviation (Cohen’s d) [20]. Binary logistic regression was used to examine group differences among categorical outcome variables controlling for education. For all comparisons, the NCC group was used as the reference group. The criterion for statistical significance was $p = .05$.

RESULTS

Demographics

A comparison of the FCS and NCC groups with regard to demographic variables are presented in Table 1. Women in the FCS and NCC groups had a mean age of 39 and were

primarily white, non-hispanic (64%). The mean time-since-diagnosis for the FCS group was 16.7 years (SD = 10.0 years, range 1 to 41). The number of cases per cancer diagnoses was: breast (n = 10), cervical (n = 69), ovarian (n = 11), and uterine (n = 10). Their marital status was equally distributed between single and married/partnered. Most of the women in both groups had completed some college or more (63%).

Mental Health Status

Table 2 displays the comparison of the FCS and NCC groups on mental health status. The FCS group reported significantly poorer scores than the NCC group on 7 of 8 mental health indices. There were no differences between the groups on whether or not the presence of feelings of distress interfered with life or activities ($p = 0.41$). Effect sizes for which significant group differences were found ranged from 0.29 (hopeless) to 0.63 (restless/fidgety). With regard to the K6 cut-off score, the FCS group (19 of 98 survivors, 19.4%) was significantly more likely than the NCC group (16 of 298 controls, 5.4%) to meet the criteria for serious psychological distress (OR = 4.23; 95% CI, 2.08 to 8.62; $p = 0.001$) (result not shown).

Physical Health Status

Lifetime history of various medical conditions—Table 3 reveals the comparison of the FCS and NCC groups with regard to lifetime history of various medical conditions. Odd ratios for 8 of 9 medical conditions exceeded 1.0 indicating greater probability in the FCS group ($p = 0.04$, binominal test, 2-tailed). The FCS group reported significantly greater lifetime prevalence of hypertension (OR = 2.14), ulcer (OR = 3.69); and arthritis (OR = 2.62).

Current medical conditions—Table 4 reports the comparison of the FCS and NCC groups with regard to current medical conditions. The FCS group reported a greater probability (OR > 1.0) for 11 of 13 conditions ($p = 0.006$; binomial test, 2-tailed). The FCS group reported a significantly greater prevalence for 8 of 13 conditions. Odd ratios for the 8 medical conditions for which significant group differences were found ranged from 2.42 (severe migraine/headache) to 8.72 (health problems requiring special equipment).

Disability—Table 5 displays the comparison of the FCS and NCC groups with regard to continuous physical health and disability variables. The FCS group reported significantly poorer health status for 4 of 6 indices: poorer general health than 1 year ago ($p = 0.003$), more health-related lost work days in the past year ($p = 0.018$), more days of health-related bed days in the past year ($p = 0.001$), and less hours of sleep in a 24 hour period ($p = 0.027$). Effect sizes ranged from 0.24 (number of lost work days and average hours of sleep) to 0.33 (number of days in bed because of illness/injury).

Functional Limitations—Table 6 shows the comparison of the FCS and NCC groups with regard to functional limitation variables. The FCS group reported significantly poorer functioning on all 11 indices than the NCC group ($p < 0.001$; binomial test; 2-tailed). Effect sizes ranged from 0.26 (do things to relax at home/for leisure) to 0.56 (sit for about 2 hours).

DISCUSSION

The results of this study clearly indicate female AYA survivors of breast and gynecological cancers report poorer physical and mental health status than females without a history of cancer. Relative to the NCC group, the FCS group reported consistently poorer mental health outcomes; greater lifetime, recent, and current prevalence of variety of medical conditions; more health-related disability; and greater functional limitations. More

importantly, the FCS group was four times more likely to meet the criteria for serious psychological distress than the NCC group. Given the matched case-control design of this study, it is reasonable to infer these observed differences in the physical and mental health status reflect the significant impact breast and gynecological cancer can have females when they occur during adolescence and young adulthood.

Two additional things are important to note. First, the differences found between the two groups on mental health and functional limitations appear to be both clinically and statistically important. Effect sizes for which significant group differences were found in Tables 2 and 6 ranged from 0.26 to 0.63. Effect sizes in the range 0.30–0.50 can be interpreted as clinically important [21, 22]. Likewise, the odd ratios for all but two differences reported in Tables 3 and 4 were > 1.0 . Second, the mean time-since-diagnosis in the FCS group was 17 years and their mean current age was 39 years. Thus, the negative impact cancer has on the physical and mental health status of female AYA cancer survivors may be long-standing. A longitudinal study would be needed to determine this possibility.

Although the use of national health care surveys, such as the NHIS, can be helpful in providing information about the health status of cancer survivors, this approach has limitations. First, as is the case in large population-based surveys [23, 24], personal cancer history was assessed by self-report rather than from medical records. While the accuracy of self-reports of a cancer diagnosis is generally high [25, 26], some degree of misclassification in our study groups is possible. Second, the NHIS does not obtain clinical information regarding cancer treatment and disease staging; thus, we are unable to draw conclusions regarding how these factors might be associated with better or poorer physical and mental health status among our group female AYA cancer survivors. Lastly, the cross-sectional design of this study makes it impossible to determine to what extent the physical and mental health outcomes of female AYA cancer survivors change over time.

In conclusion, our results suggest the diagnosis of breast and gynecological cancers during adolescence and young adulthood is associated with clinically significant deficits in physical and mental health status later in life. This is the first study to examine the health status of females diagnosed with cancer during adolescence and young adulthood and addresses a priority area of the NCI and LIVESTRONG Foundation [2]. The fact little attention has been given to the needs of female AYA cancer survivors is alarming; particularly since they have poorer physical and mental health outcomes than women who did not have cancer. Future research should focus on obtaining a more detailed picture of the physical and mental health deficits experienced by female AYA cancer survivors. Conducting a longitudinal study would also help clarify the trajectory of the impact of these deficits and help identify the most appropriate time to intervene. This information can then be used to develop and test interventions to help improve the survivorship outcomes of this underserved cancer population.

Acknowledgments

Dr. Celeste Phillips-Salimi is a Post Doctoral Fellow and received support from T32 Research Training Program in Behavioral Nursing funded by the National Institute of Nursing Research (2T32 NR007066) at Indiana University.

References

1. Bleyer A, Viny A, Barr R. Cancer in 15- to 29-year-olds by primary site. *The Oncologist*. 2006; 11:590–601.10.1634/theoncologist.11-6-590 [PubMed: 16794238]
2. National Cancer Institute & LIVESTRONG Young Adult Alliance. National Institutes of Health Publication No 06-6067. 2006. Closing the gap: research and care imperatives for adolescents and young adults with cancer.

3. Abrams AN, Hazen EP, Penson RT. Psychosocial issues in adolescents with cancer. *Cancer Treat Rev.* 2007; 33:622–630.10.1016/j.ctrv.2006.12.006 [PubMed: 17434265]
4. Evan EE, Zeltzer LK. Psychosocial dimensions of cancer in adolescents and young adults. *Cancer.* 2006; 107:1663–1671.10.1002/cncr.22107 [PubMed: 16921479]
5. Hedstrom M, Ljungman G, von Essen L. Perceptions of distress among adolescents recently diagnosed with cancer. *J Pediatr Hematol Oncol.* 2005; 27:15–22. [PubMed: 15654273]
6. Mattsson E, Ringner A, Ljungman G, et al. Positive and negative consequences with regard to cancer during adolescence. Experiences two years after diagnosis. *Psycho-oncology.* 2007; 16:1003–1009.10.1002/pon.1162 [PubMed: 17266181]
7. Canada AL, Schover LR. The psychosocial impact of interrupted childbearing in long-term female cancer survivors. *Psycho-oncology.* 2012; 21:134–143.10.1002/pon.1875 [PubMed: 22271533]
8. Gorman JR, Malcarne VL, Roesch SC, et al. Depressive symptoms among young breast cancer survivors: the importance of reproductive concerns. *Breast Cancer Res Tr.* 2010; 123:477–485.10.1007/s10549-010-0768-4
9. Ruddy KJ, Gelber S, Ginsburg ES, et al. Menopausal symptoms and fertility concerns in premenopausal breast cancer survivors: a comparison to age- and gravidity-matched controls. *Menopause.* 2011; 18:105–108.10.1097/gme.0b013e3181ef39f8 [PubMed: 21243735]
10. Abbott-Anderson K, Kwekkeboom KL. A systematic review of sexual concerns reported by gynecological cancer survivors. *Gynecol Oncol.* 2012; 124:477–489.10.1016/j.ygyno.2011.11.030 [PubMed: 22134375]
11. Goncalves V. Long-term quality of life in gynecological cancer survivors. *Curr Opin Obstet Gynecol.* 2010; 22:30–35.10.1097/GCO.0b013e328332e626 [PubMed: 19809316]
12. Grover S, Hill-Kayser CE, Vachani C, et al. Patient reported late effects of gynecological cancer treatment. *Gynecol Oncol.* 2012; 124:399–403.10.1016/j.ygyno.2011.11.034 [PubMed: 22119992]
13. Howard-Anderson J, Ganz PA, Bower JE, et al. Quality of life, fertility concerns, and behavioral health outcomes in younger breast cancer survivors: a systematic review. *J Natl Cancer Inst.* 2012; 104:386–405. doi: djr5410.1093/jnci/djr541. [PubMed: 22271773]
14. Ashing-Giwa KT, Lim JW. Examining the impact of socioeconomic status and socioecologic stress on physical and mental health quality of life among breast cancer survivors. *Oncol Nurs Forum.* 2009; 36:79–88.10.1188/09.ONF.79-88 [PubMed: 19136341]
15. Saquib N, Pierce JP, Saquib J, et al. Poor physical health predicts time to additional breast cancer events and mortality in breast cancer survivors. *Psycho-oncology.* 2011; 20:252–259.10.1002/pon.1742 [PubMed: 20878837]
16. Institute of Medicine. From cancer patient to cancer survivor: lost in transition. The National Academies Press; Washington DC: 2006.
17. National Center for Health Statistics. [accessed on August 1, 2011] 2009 National Health Interview Survey (NHIS) Public Use Data Release. NIH Survey Description. 2010. Available at: www.cds.gov/nchs/nhis
18. Kessler RC, Barker PR, Colpe LJ, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatr.* 2003; 60:184–189.10.1001/archpsyc.60.2.184 [PubMed: 12578436]
19. Kessler RC, Green JG, Gruber MJ, et al. Screening for serious mental illness in the general population with the K6 screening scale: results from the WHO World Mental Health (WMH) survey initiative. *Int J Method Psych.* 2010; 19:4–22.10.1002/mpr.310
20. Cohen, J. Statistical power analysis for the behavioral sciences. 2. Lawrence Erlbaum Associates; New Jersey: 1988.
21. Hays RD, Woolley JM. The concept of clinically meaningful difference in health-related quality-of-life research. How meaningful is it? *Pharmacoeconomics.* 2000; 18:419–423. [PubMed: 11151395]
22. 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; 41:582–592.10.1097/01.MLR.0000062554.74615.4C [PubMed: 12719681]

23. Coups EJ, Ostroff JS. A population-based estimate of the prevalence of behavioral risk factors among adult cancer survivors and noncancer controls. *Prev Med.* 2005; 40:702–711. doi: S0091-7435(04)00462-110.1016/j.ypmed.2004.09.011. [PubMed: 15850868]
24. Hewitt M, Rowland JH. Mental health service use among adult cancer survivors: analyses of the National Health Interview Survey. *J Clin Oncol.* 2002; 20:4581–4590.10.1200/JCO.2002.03.077 [PubMed: 12454116]
25. Abraham L, Geller BM, Yankaskas BC, et al. Accuracy of self-reported breast cancer among women undergoing mammography. *Breast Cancer Res Treat.* 2009; 118:583–592.10.1007/s10549-009-0375-4 [PubMed: 19301119]
26. Bergmann MM, Calle EE, Mervis CA, et al. Validity of self-reported cancers in a prospective cohort study in comparison with data from state cancer registries. *Am J Epidemiol.* 1998; 147:556–562. [PubMed: 9521182]

Table 1

Comparison of FCS and NCC Groups with Regard to Demographic Variables

Variable	FCS n = 100	NCC n = 300	p-value
Current age	<u>M</u> = 39.48 yrs SD = 10.79 yrs	<u>M</u> = 39.06 yrs SD = 11.47 yrs	.750
Age Decile			1.000
18 to 29 years	n = 24; 24%	n = 72; 24%	
30 to 39 years	n = 27; 27%	n = 81; 27%	
40 to 49 years	n = 27; 27%	n = 81; 27%	
50 to 59 years	n = 22; 22%	n = 66; 22%	
Race/Ethnicity			1.000
(n, % White, non-hispanic)	(n = 64; 64%)	(n = 192; 64%)	
Marital Status			1.000
(n, % Not married or partnered)	(n = 51; 51%)	(n = 153; 51%)	
Education			.037
8 th grade or less	n = 0; 0%	n = 11; 3.7%	
Some high school	n = 14; 14%	n = 24; 8.0%	
High school grad	n = 23; 23%	n = 76; 25.3%	
Some college or associate degree	n = 44; 44%	n = 106; 35.3%	
College grad	n = 10; 10%	n = 57; 19.0%	
Post-bac study or degree	n = 9; 9%	n = 26; 8.7%	
Education Dichotomy			1.000
(n, % Some college or more)	(n = 63; 63%)	(n = 189; 63%)	

Abbreviations: FCS, female cancer survivors. NCC, non-cancer controls. M, mean. SD, standard deviation.

Table 2

Comparison of Mental Health Status for FCS and NCC Groups.

Outcome	FCS n = 100		NCC n = 300		F-value	p-value	Effect Size ^d
	n ²	M (SD)	n ²	M (SD)			
Nervous ³	100	1.39 (1.39)	298	0.72 (1.01)	26.46	<.001	0.55
Sad ³	100	1.02 (1.21)	298	0.54 (0.89)	17.92	<.001	0.45
Restless/Fidgety ³	99	1.47 (1.38)	298	0.69 (1.08)	33.58	<.001	0.63
Hopeless ³	100	0.66 (1.15)	298	0.37 (0.83)	7.38	.007	0.29
Everything an Effort ³	99	1.16 (1.34)	298	0.66 (1.06)	14.25	<.001	0.42
Worthless ³	99	0.67 (1.08)	298	0.29 (0.73)	15.16	<.001	0.41
Total Distress Index	98	6.35 (5.80)	298	3.27 (4.51)	29.82	<.001	0.59
Feeling Interfere with Activities ⁴	66	1.43 (1.15)	110	1.29 (1.06)	0.67	.415	0.13

Abbreviations: FCS, female cancer survivors; NCC, non-cancer controls; M, adjusted mean; SD, standard deviation.

Note: All analyses control for education

¹ Cohen's *d*

² Number of participants answering each outcome question

³ Higher scores indicate poorer status

⁴ Asked of respondents acknowledging 1 feelings in the past 30 days

Table 3

Lifetime History of Medical Conditions for FCS and NCC Groups.

Outcome	FCS n = 100			NCC n = 300			Odds Ratio ⁴	95% CI	p-value
	n ¹	n ²	(%) ³	n ¹	n ²	(%) ³			
Hypertension	100	31	(31.0)	300	52	(17.3)	2.14	1.28 – 3.60	.004
Coronary Heart Disease	100	2	(2.0)	300	4	(1.3)	1.50	0.27 – 8.31	.645
Heart Attack	98	1	(1.0)	300	4	(1.3)	0.75	0.08 – 6.78	.797
Stroke	100	3	(3.0)	300	4	(1.3)	2.32	0.51 – 10.56	.277
Emphysema	100	3	(3.0)	300	8	(2.7)	1.14	0.29 – 4.41	.853
Asthma	100	22	(22.0)	300	48	(16.0)	1.47	0.84 – 2.59	.180
Ulcer	100	18	(18.0)	300	17	(5.7)	3.69	1.82 – 7.49	<.001
Diabetes	96	7	(7.3)	298	17	(5.7)	1.28	0.52 – 3.20	.592
Arthritis	100	32	(32.0)	300	46	(15.3)	2.62	1.55 – 4.44	<.001

Abbreviations: FCS, female cancer survivors; NCC, non-cancer controls; OR, odds ratio; CI, confidence interval.

Note: All analyses control for education

¹ Number of participants answering each outcome question² Number of participants who responded "yes"³ Percentage is based upon available data for each outcome⁴ Reference group is Control group

Table 4

Prevalence of Current Medical Conditions for FCS and NCC Groups.

Outcome	FCS n = 100			NCC n = 300			Odds Ratio ⁴	95% CI	p-value
	n ¹	n ²	(%) ³	n ¹	n ²	(%) ³			
Weak/Failing Kidneys, Past 12 months	100	7	(7.0)	298	3	(1.0)	7.37	1.87 – 29.09	.004
Liver Condition, Past 12 months	100	0	(0.0)	298	4	(1.3)	.5	.5	.997
Neck Pain, Past 3 months	100	37	(37.0)	299	49	(16.4)	3.00	1.80 – 4.98	<.001
Low Back Pain, Past 3 months	100	52	(52.0)	299	80	(26.8)	2.96	1.85 – 4.73	<.001
Face/Jaw Pain, Past 3 months	100	18	(18.0)	299	22	(7.4)	2.78	1.42 – 5.43	.003
Severe Migraine/ Headache, Past 3 months	100	44	(44.0)	299	73	(24.4)	2.42	1.51 – 3.90	<.001
Head/Chest Cold, Past 2 weeks	100	17	(17.0)	300	44	(14.7)	1.20	0.65 – 2.21	.560
Stomach/Intestinal Illness, Past 2 weeks	100	10	(10.0)	300	19	(6.3)	1.66	0.74 – 3.71	.216
Trouble Seeing Even With Glasses	100	22	(22.0)	299	16	(5.4)	4.97	2.49 – 9.93	<.001
Health problems requiring special equipment	99	8	(8.1)	300	3	(1.0)	8.72	2.26 – 33.55	.002
Pregnant now	77	3	(3.9)	233	9	(3.9)	1.01	0.26 – 3.84	.998
Joint Symptoms, Past 30 days	100	56	(56.0)	298	81	(27.2)	3.40	2.12 – 5.44	<.001
Limited by Joint Symptoms/Arthritis ⁶	61	23	(37.7)	95	29	(30.5)	1.37	0.70 – 2.70	.360

Abbreviations: FCS, female cancer survivors. NCC, non-cancer controls. OR, odds ratio. CI, confidence interval.

Note: All analyses control for education

¹ Number of participants answering each outcome question

² Number of participants who responded “yes”

³ Percentage is based upon available data for each variable

⁴ Reference group is Control group

⁵ Standard error was largely inflated, thus the odds ratio and confidence interval could not be estimated for this outcome.

⁶ Asked of respondents reporting joint pain/arthritis in past 30 days

Table 5

Physical Health and Disability Status for FCS and NCC Groups.

Outcome	FCS n = 100		NCC n = 300		F-value	p-value	Effect Size ^f
	n ²	M (SD)	n ²	M (SD)			
Current Health vs. Health 1 year ago ³	99	0.96 (0.74)	300	1.13 (0.53)	6.27	.013	0.27
# Health-Related Lost Work Days, Past 12 months	66	9.76 (35.37)	266	3.43 (9.70)	5.78	.017	0.24
# Health-Related Bed Days, Past 12 months	97	16.89 (44.71)	300	4.73 (25.83)	10.92	.001	0.33
Average # of hours of sleep in a 24-hour period	98	6.77 (1.76)	297	7.15 (1.37)	4.83	.029	0.24
BMI	95	27.73 (7.15)	281	27.04 (6.36)	0.79	.376	0.10
Joint Pain Severity in Past 30 Days ⁴	56	5.95 (2.03)	80	5.37 (2.24)	2.45	.120	0.27

Abbreviations: FCS, female cancer survivors. NCC, non-cancer controls. M, adjusted mean. SD, standard deviation. BMI, Body Mass Index

Note: All analyses control for education

¹ Cohen's *d*

² Number of participants answering each outcome question

³ Higher scores indicate better health than a year ago

⁴ Asked of respondents reporting joint pain in past 30 days; higher scores indicate more pain

Table 6

Functional Limitations for FCS and NCC Groups.

Outcome	FCS n = 100		NCC n = 300		F-value	p-value	Effect Size ¹
	n ²	M (SD)	n ²	M (SD)			
Walk a quarter of mile	98	3.44 (1.12)	299	3.77 (0.75)	11.10	.001	0.35
Stand or be on feet for about 2 hours	99	3.20 (1.35)	299	3.64 (0.91)	13.79	<.001	0.39
Sit for about 2 hours	99	3.29 (1.28)	298	3.84 (0.57)	35.07	<.001	0.56
Stoop, bend, or kneel	99	3.21 (1.29)	300	3.70 (0.77)	21.04	<.001	0.46
Reach above your head	99	3.66 (0.89)	300	3.88 (0.49)	9.32	.002	0.31
Use your fingers to grasp or handle small objects	99	3.69 (0.85)	300	3.89 (0.46)	9.15	.003	0.30
Lift or carry something as heavy as 10 pounds	99	3.47 (1.21)	296	3.79 (0.70)	10.56	.001	0.33
Push or pull large objects	98	3.28 (1.31)	298	3.75 (0.75)	19.47	<.001	0.45
Go out to things like shopping, movies, or sporting events	96	3.62 (0.91)	297	3.84 (0.61)	7.70	.006	0.29
Participate in social activities	98	3.57 (0.96)	298	3.86 (0.60)	12.02	.001	0.36
Do things to relax at home or for leisure	99	3.77 (0.68)	299	3.92 (0.46)	6.22	.013	0.26

Abbreviations: FCS, female cancer survivors. NCC, non-cancer controls. M, adjusted mean. SD, standard deviation.

Note: All analyses control for education. Higher scores indicate better functioning.

¹Cohen's *d*

²Number of participants answering each outcome question