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Extant health behaviors and uptake of standardized vs tailored health messages among cancer survivors enrolled in the FRESH START trial: a comparison of fighting-spirits vs fatalists

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Abstract

Objective—Cancer coping styles have been associated with several cancer-related outcomes. We examined whether baseline lifestyle behaviors differed between cancer survivors with fatalistic vs fighting-spirit coping styles, and whether there was differential response to two diet-exercise mailed-print interventions, one standardized and another individually tailored.

Methods—Baseline differences by coping style are presented for 628 breast and prostate cancer survivors who participated in the FRESH START trial, along with multivariable analyses on rates of uptake by coping style and arm assignment for those completing the 2-year trial.

Results—At baseline, several differences were observed between fighting-spirits and fatalists, with the former significantly more likely to be white, younger, leaner, more-educated and at risk for depression, and less likely to consume 5+ fruits and vegetables (F&V)/day (*p*-values<0.05). Improvements in physical activity were observed, with fighting-spirits exhibiting the greatest gains from baseline to Year-1, regardless of intervention type; but by Year-2, these differences diminished as fatalists gained ground. Moreover, fatalists who received standardized intervention material also charted steady improvements in F&V intake over the study period; by Year-2, 58.1% of fatalists achieved the 5-a-day goal vs 44.6% of fighting-spirits (*p*-value<0.05).

Conclusions—Lifestyle behaviors and health message uptake differs by cancer coping style. Although tailored interventions appear most effective and minimize differential uptake,

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standardized interventions also can improve behaviors, though fighting-spirits may require additional boosters to maintain change.

Keywords

coping; personality traits; diet; exercise; interventions; cancer survivors

Introduction

In 1979, Greer *et al.* reported that breast cancer patients classified as 'fighting-spirits' had significantly better disease-free survival, and speculated that coping style may modulate immune function [1]. Although the results of subsequent studies have been mixed [2,3], the value of coping style in predicting response remains an active area of study [4]. Within the field of cancer, Watson *et al.* identified five distinct coping styles, i.e. 'fighting-spirits', 'fatalists', 'cognitive-avoiders', 'anxious-preoccupiers', and the 'helpless-hopeless', based on responses to the original Mental Adjustment to Cancer (MAC) scale or subsequent versions (i.e. Mini-MAC) [5,6].

The FRESH START trial tested the efficacy of a 10-month mailed-print intervention to improve the diet and exercise behaviors of 543 early-stage breast and prostate cancer survivors and compared sequentially tailored vs standardized (attention control) materials. In designing the FRESH START intervention, coping style was selected as a key variable for tailoring, in addition to age, gender, race, self-efficacy, stage-of-readiness, barriers to change, and progress toward goal [7,8]. The FRESH START-tailored intervention was found highly effective in improving both the diet and exercise behaviors of cancer survivors; however, significant improvements (though not of the same magnitude) also were observed in the attention control arm [8].

Herein, we first describe differences in health behaviors by coping style (fatalist vs fighting-spirit) prior to randomization. Second, we examine the study performance by coping style in response to standardized print materials in the public domain (attention control) or the sequentially tailored FRESH START intervention. We hypothesized that an association of coping style with improved behavioral outcomes would be observed only in the standardized intervention arm, with fighting-spirits more apt to pursue health behavior change, since messages tailored on coping style (as in the FRESH START intervention) were likely to reduce any potential differences in performance between fatalists and fighting-spirits.

Methods

The methods and main outcomes for this trial have been reported elsewhere [7,8]. Briefly, potential study participants within 9 months of diagnosis of early-stage prostate or female breast cancer were identified through cancer registries or via self-referral with physician-verification of their diagnosis. Participants received an invitation letter, a screening survey assessing health and physical status, and study interest, and a pre-paid, preaddressed return envelope. Institutional review boards at all participating institutions approved the study, which complied with Health Insurance Portability and Accountability Act guidelines.

Participants

Throughout July 2002—August 2004, a total of 762 survivors responded with interest (42% response rate), provided written consent, and were initially screened to exclude individuals at risk for unsupervised exercise or a high fruit and vegetable (F&V) diet [7,8]. Respondents (*n*=678) still eligible underwent a two-part telephone interview and were excluded if they clearly practiced at least two of the following behaviors: (1) consumption of 5+ daily

servings of F&Vs; (2) adherence to a diet<30% of energy from fat; and/or (3) participation in 150+ min of exercise per week. After complete screening, 543 participants were deemed eligible, enrolled, and then randomized to either the FRESH START-tailored intervention (*n*=271) or the standardized intervention arm (*n*=272). The intervention arm received a tailored workbook and seven iteratively tailored newsletters at 7-week intervals, whereas the standardized intervention arm received an equivalent number of mailings comprising brochures in the public domain.

Follow-up was conducted at completion of the interventions (1 year) and after an additional year-long observation period (2 years); 224 participants in the tailored intervention arm and 228 participants in the standardized intervention arm completed the entire study. This secondary analysis provides a cross-sectional analysis of the 628 fatalists and fighting-spirits who provided complete baseline data and a longitudinal analysis that details study performance by coping style in each study arm (*N*=452). Note that we excluded individuals with other coping styles, i.e. helpless–hopeless, cognitive-avoiders, and anxious-preoccupiers, from this analysis since their representation in this sample was so low (*n*=50).

Measures

The telephone survey implemented at all three time-points assessed several factors; those relevant to this study include:

Cancer coping style—A 15-item version of the validated Mini-MAC [5,6] instrument was used to classify participants as fighting-spirits, fatalists, or other (cognitive-avoiders, anxious-preoccupiers, and helpless–hopeless). Both sub-scales examined in this report exhibit acceptable validity: Cronbach's α =0.73 and 0.66, respectively.

Physical activity—The 7-day Physical Activity Recall [9] was used to assess physical activity. This measure has validated use by phone [10], and has consistently demonstrated acceptable reliability, internal consistency, and congruent validity with objective measures, as well as sensitivity to changes in physical activity over time [11]. Accelerometry data were obtained on a 25% subsample at all three time-points and showed significant positive associations with self-reported physical activity [12].

Dietary intake—A modified version of the National Cancer Institute Diet History Questionnaire was used [7,8,13]. Alpha-carotene assays, indicative of F&V intake, were performed on plasma obtained from a 25% subsample at all three time-points and showed a significant association with F&V intake [8].

Self-efficacy—Self-efficacy is an organizing concept and mediating variable for Social Cognitive Theory [14] on which the FRESH START intervention was based [7,8]. Participants were asked their level of confidence (surety) they could meet defined goal behaviors [15].

Depression—Risk for depression was measured using the validated Center for Epidemiologic Studies of Depression Instrument (20 item, yes–no format) [16].

Weight status—Self-reported height and weight was used to generate body mass index (BMI: kg/m²) and categorized using standard criteria (http://www.nhlbisupport.com/bmi/).

Anthropometric measures were taken on a 25% subsample and showed a significant association with self-report [8].

Demographic information—Race, gender, and age were ascertained from cancer registries or physician-verified records.

Data analysis

Of the 678 individuals participating in the baseline survey, 56.6% reported a fatalistic coping style, 36.0% reported a fighting-spirit coping style, and 7.4% reported other coping styles. Chi-square tests were used to examine baseline associations between fatalistic or fighting-spirit coping style and categorical demographic/predictors and variables. Student's *t*-tests were used to examine mean differences on the continuous demographic/predictor variables by coping style.

To address associations between coping style and (a) meeting study goals and (b) improved behavioral outcomes by intervention arm, we completed χ^2 and Student's *t*-tests. To examine the relationship between coping style and goal behavior attainment, we conducted GLM-repeated measures analysis in SPSS and Friedman Tests (non-parametric version of repeated measures ANOVA). These analyses were based on fighting-spirits and fatalists who provided data at all three time-points (tailored intervention group=224 and standardized intervention group=228) and were stratified on group assignment. Chi-square tests were used to assess the inclusion and attrition by coping style for the 2-year trial.

Results

A significantly higher proportion of whites compared with minorities were identified as fighting-spirits, and fighting-spirits were more highly educated (Table 1). On average, fighting-spirits were 5 years younger than fatalists and reported higher risk for depression. Additionally, a higher proportion of fighting-spirits compared with fatalists were of normal BMI; however, fatalists were more likely to meet the F&V consumption goal. At baseline, no differences by coping style were observed in meeting exercise and fat consumption goals or in perceived self-efficacy to meet these goals.

Once enrolled and randomized no differential drop-out by coping style or coping style by group assignment was observed. Among tailored intervention participants, only one significant difference was observed: at Year-1, fighting-spirits reported more physical activity than fatalists (t=2.21; df=154.71; p<0.04) (Table 2). In contrast, several differences by coping style were observed among standardized intervention participants (Table 2). At Year-1, fatalists reported more servings of F&V/day than the fighting-spirits (t=2.50; df=225.66; p<0.01), though this difference did not result in a higher proportion achieving goal behavior. By Year-2, fatalists not only reported more F&Vs than the fighting-spirits (t=3.08; df=222.11; p<0.01), a higher proportion also met the F&V goal (χ^2 =4.03; df=1; p<0.05). In contrast, fighting-spirits reported more exercise (t=2.67; df=225.66; p<0.01), and a higher proportion met the exercise goal (χ^2 =5.10; df=1; p<0.03) at Year-1 than fatalists; however, these differences diminished by Year-2 when fatalists experienced gains. No differences were observed between fat intake or achieving the fat consumption goal and coping style among control participants throughout the study.

Finally, with regards to F&V intake and exercise, we found significant main effects for time, indicating that F&V intake and exercise levels changed over time in both the tailored and standardized groups (*p*-values<0.01). For both behaviors and regardless of group, the *F*-statistic for the linear form was higher than the quadratic form, suggesting that for both behaviors the change was linear. Although the interaction between time and coping style was not significant for either group or either behavior, we found significant main effects for coping style among participants who received the standardized intervention (*p*-values<0.05). As can be seen in Figure 1, the proportion of fatalists in the standardized intervention group

meeting the F&V and exercise goals continued to increase through Year-2, whereas the proportion of fighting-spirits meeting these goals peaked at Year-1 and then declined. With regards to fat intake, we noted a main effect for time in the tailored group only (p<0.01), but neither the main effect for coping style nor the interaction was significant in either arm, and the F-statistic for the quadratic form was greater than that for the linear form.

Discussion

This study is the first to explore associations between cancer survivors' coping style and health behaviors, as well as response to either tailored or standardized print interventions. Consistent with our hypothesis, we found few differences by coping style in the tailored intervention group, suggesting that tailoring on coping style might help to equalize uptake. Our second hypothesis—that among those receiving the standardized intervention fighting-spirits are more apt to improve health behaviors than fatalists—is only partially supported by our findings. Specifically, fighting-spirits in the standardized arm reported higher levels of physical activity at Year-1 compared with fatalists. However by Year-2, the gains made by fighting-spirits eroded while fatalists charted a continual upward trajectory for exercise. Moreover, in response to standardized materials, fatalists increased their F&V consumption continually and consistently over the study, such that by Year-2, they reported higher intakes of F&V and were more likely to achieve the F&V goal than the fighting-spirits. Thus, fatalists continued to chart improvements in both exercise and F&V consumption even after the intervention was complete. Given an entire literature on recidivism and behavior change, these findings are interesting and warrant follow-up.

At baseline compared with fatalists, the fighting-spirits in our study were significantly more likely to be younger, leaner, better-educated, and non-Hispanic white; however, they also tended to be at higher risk for depression. These findings parallel previous studies, which also found higher levels of depressive symptoms in similar populations [17], and associations between fatalism and older age and lower socioeconomic status [18]. In addition, the fatalists in this sample had significantly higher weight status than the fighting-spirits, which may offer support to recent studies that suggest an association between religiosity and obesity [19]. At baseline, FRESH START fatalists also reported higher F&V consumption, a finding consistent with that of Holt *et al.* who found that African-Americans who were classified as 'high religious' reported significantly higher self-efficacy for eating more F&Vs, held to the belief that eating F&Vs was more important, and had more interest in eating more F&Vs when compared with those classified as 'low religious [20].'

Similar to all studies, ours had some limitations. The baseline analysis was cross-sectional and accordingly, the results are associations and cannot inform causality. Further, participants were a self-selected group whose agreement to enroll either implied a desire to improve their lifestyle behaviors or to comply with a letter of invitation, which elicited their help in a national study. This may explain why our sample had such a high proportion of fighting-spirits and fatalists—a different proportion than previously reported [5,8].

Conclusions

Several differences exist between fighting-spirits and fatalists in terms of sociodemographic and behavioral characteristics. Although tailoring on cancer coping style may reduce differences in response and may enhance engagement in lifestyle interventions, as demonstrated by the superior effectiveness of the FRESH START intervention, standardized interventions also have the potential to improve lifestyle behaviors. Differences in response or performance by coping style, however may be observed. Future studies are needed to corroborate our finding that fighting-spirits chart early success but poorer maintenance, as

compared with fatalists who chart steady improvements over time, even after delivery of the intervention is complete.

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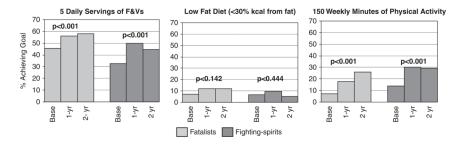


Figure 1. Percent of standardized intervention group participants (136 fatalists and 92 fighting-spirits) attaining study goals at baseline, Year-1, and Year-2 by coping style. NB: *p*-values based on Friedman Test

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Table 1

Baseline descriptive characteristics, overall and by coping style

| Gender n =628 10 Men 291 291 Women 337 281 White 525 80 Other 23 Education 23 | 46.3 53.7 83.6 11.0 | 302 66 66 71 71 71 71 71 71 71 | 49.2 50.8 82.1 17.0 | n =244 | 8.9% | 0.069 |
|---|-------------------------------------|---|------------------------------|-------------|-------------|---------|
| en 337 a 3525 b 525 aution 291 | 46.3 53.7 83.6 12.7 3.7 | 189 195 66 | 49.2 50.8 82.1 17.0 | 102 | 41.8 | 0.069 |
| 291 337 3 525 3 680 3 attion | 46.3 53.7 83.6 12.7 3.7 | 302 | 49.2 50.8 82.1 17.0 | 102 | 8.14 | |
| 525 80 23 ión | 53.7 83.6 12.7 3.7 | 195 302 66 | 50.8 82.1 17.0 | | | |
| 525 80 23 | 83.6 12.7 3.7 11.0 | 302 66 | 82.1 | 142 | 58.2 | |
| 525 80 23 | 83.6 12.7 3.7 11.0 | 302 66 | 82.1 | | | < 0.001 |
| rion | 3.7 | 99 5 | 17.0 | 223 | 94.1 | |
| tion | 3.7 | 5 | | 14 | 5.9 | |
| Education | 11.0 | 1.5 | | | | |
| | 11.0 | 7 | | | | 0.016 |
| High school or less | | 1 | 13.3 | 18 | 7.4 | |
| Some college 184 | 29.3 | 119 | 31.0 | 65 | 26.6 | |
| College or more 375 | 59.7 | 214 | 55.7 | 161 | 0.99 | |
| Age at diagnosis | | | | | | < 0.001 |
| Mean (SD) 57.9 (10.6) | (9: | 59.8 (10.4) | (4: | 55.0 (10.3) | 0.3) | |
| Range 22-85 | 10 | 22–85 | 1.0 | 22–79 | 6 | |
| Risk for Depression | | | | | | 0.011 |
| Mean (SD) 2.1 (3.2) | 2) | 1.8 (2.8) | 3 | 2.5 (3.7) | (7: | |
| Range 0–18 | | 0-17 | | 0-18 | ~ | |
| Body mass index $(kg/m^2)^b$ | | | | | | 0.003 |
| Underweight (< 18.5) | 9.0 | 4 | 1.0 | 0 | 0.0 | |
| Normal (18.5–24.9) | 36.6 | 120 | 31.3 | 110 | 45.1 | |
| Overweight (25–29.9) | 37.7 | 156 | 40.7 | 81 | 33.2 | |
| Obese (30) 156 | 24.8 | 103 | 26.9 | 53 | 21.7 | |
| Consumes 5 daily servings of fruit and vegetables (F&V) | | | | | | 0.008 |
| Yes 322 | 51.3 | 213 | 55.5 | 109 | 7.44 | |
| No 306 | 48.7 | 171 | 45.5 | 135 | 55.3 | |
| Mean daily F&V consumption (SD) 5.6 (2.9) | 6 | 5.8 (3.0) | 6 | 5.2 (2.6) | 9 | 0.010 |
| | (6 | 5.8 (3.0 | <u> </u> | 5.2 (2. | (9: | |

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| Characteristic | Overall | rall | Fata | Fatalists | Fighting | -spirits | Fighting-spirits p-Value |
|--------------------------------------|--------------|--------|------------|--------------|---------------|----------|--------------------------|
| | n = 628 | 100% | n = 384 | 61.1% | <i>n</i> =244 | 8.9% | |
| Very sure, sure | 427 | 0.89 | 261 | 68.0 | 166 | 0.89 | |
| Somewhat sure, unsure, very unsure | 201 | 32.0 | 123 | 32.0 | 78 | 32.0 | |
| Consumes low fat diet (<30% of kcal) | | | | | | | 0.084 |
| Yes | 108 | 17.2 | 74 | 19.3 | 34 | 13.9 | |
| No | 520 | 82.8 | 310 | 80.7 | 210 | 86.1 | |
| Mean % fat kcal daily (SD) | 36.4 (6.6) | (9.9) | 36.2 (6.7) | (6.7) | 36.7 (6.5) | (6.5) | 0.320 |
| Self-efficacy to meet low fat goal | | | | | | | 0.138 |
| Very sure, sure | 434 | 69.1 | 257 | 6.99 | 177 | 72.5 | |
| Somewhat sure, unsure, very unsure | 194 | 30.9 | 127 | 33.1 | <i>L</i> 9 | 27.5 | |
| Exercises 150 min/week | | | | | | | 0.432 |
| Yes | 134 | 21.3 | 78 | 20.3 | 56 | 23.0 | |
| No | 494 | 78.7 | 306 | 79.7 | 188 | 77.0 | |
| Mean no. min/week (SD) | 79.3 (140.9) | (40.9) | 76.4 | 76.4 (132.3) | 83.8 (153.6) | 53.6) | 0.518 |
| Self-efficacy to meet exercise goal | | | | | | | 0.502 |
| Very sure, sure | 409 | 65.1 | 254 | 66.1 | 155 | 63.5 | |
| Somewhat sure, unsure, very unsure | 219 | 34.9 | 130 | 33.9 | 68 | 36.5 | |
| FRESH START status | | | | | | | 0.057 |
| Ineligible | 127 | 20.2 | 87 | 22.7 | 40 | 16.4 | |
| Eligible and randomized | 501 | 79.8 | 297 | 77.3 | 204 | 83.6 | |

NB: The small number of individuals reporting other coping styles (n=50) were excluded from all analyses.

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 $^a_{m=605}$ for χ^2 .

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Number (%) of participants by study arm attaining study goals and mean (standard deviations) for study behaviors by coping style at baseline, Year-1, and Year-2

Table 2

| | | T | Tailored intervention group $(n=224)$ | ntion group $(n=$ | 224) | | Comments p-values |
|------------------------------|--------------|-----------------------|---|-------------------|----------------------------------|---------------|---|
| | | Fatalists $(n = 134)$ | 4) | Fight | Fighting-spirits (FS) $(n = 90)$ | n =90) | |
| | BL | Y1 | Y2 | BL | Y1 | Y2 | |
| F&V | | | | | | | |
| Met goal, $n(\%)$ | 59 (44.0) | 88 (65.7) | 91 (67.9) | 33 (36.7) | 53 (58.9) | 53 (58.9) | *At Y1, FS reported more exercise/week than fatalists (p <0.04). |
| No. daily, m(SD) | 5.4 (2.9) | 6.4 (2.9) | 6.1 (2.6) | 4.8 (2.5) | 6.0 (2.8) | 6.0 (2.8) | |
| Fat intake | | | | | | | |
| Met goal, $n(\%)$ | 8 (6.0) | 32 (23.9) | 25 (18.7) | 5 (5.6) | 24 (26.7) | 12 (13.3) | |
| % fat kcal, m (SD) | 37.8 (6.2) | 33.5 (6.0) | 36.2 (6.8) | 38.0 (4.9) | 33.6 (5.7) | 36.5 (6.7) | |
| Met exercise goal | | | | | | | |
| Met goal, $n(\%)$ | 14 (10.4) | 38 (28.4) | 41 (30.6) | 10 (11.1) | 31 (34.4) | 32 (35.6) | |
| Minutes of exercise per week | 48.5 (103.2) | 101.0 (111.3) | 97.2 (110.6) | 57.1 (113.8) | 139.3 (147.8)* | 138.5 (185.5) | |
| | | Star | Standardized intervention group $(n = 228)$ | ention group (| n = 228 | | |
| | | Fatalists $(n = 136)$ | (9 | Fight | Fighting-spirits (FS) $(n = 92)$ | n = 92) | |
| | BL | Y1 | Y2 | BL | Y1 | Y2 | |
| F&V | | | | | | | |
| Met goal, <i>n</i> (%) | 62 (45.6) | 76 (55.9) | 79 (58.1)+ | 30 (32.6) | 46 (50.0) | 41 (44.6) | $^+{\rm At}$ Y2, more fatalists met F&V goal ($p\!<\!0.05$) and reported more F&V/day, than FS ($p\!<\!0.01$) |
| No. daily, m (sd) | 5.1 (2.4) | 6.0 (2.8)# | 6.1 (3.2)+ | 4.7 (2.0) | 5.1 (2.0) | 5.1 (1.9) | |
| Fat intake | | | | | | | |
| Met goal, $n(\%)$ | 10 (7.4) | 16 (11.8) | 6.6) | 6 (6.5) | 6 (9.8) | 5 (5.4) | #At Y1, fatalists reported more F&V/day, than FS (ρ <0.01) |
| % fat kcal, <i>m</i> (sd) | 37.9 (5.8) | 35.6 (5.1) | 37.7 (5.5) | 37.6 (5.5) | 35.7 (4.1) | 38.3 (5.7) | |
| Met exercise goal | | | | | | | |
| Met goal, <i>n</i> (%) | 10 (7.4) | 24 (17.6) | 35 (25.7) | 13 (14.1) | 28 (30.4)* | 27 (29.3) | *At Y1, more FS met exercise goal (p <0.03) and reported more exercise per week than fatalists (p <0.02) |
| Minutes of exercise per week | 41.9 (91.6) | 66.8 (115.7) | 97.2 (147.9) | 49.3 (94.8) | 106.8 (117.2)* | 98.0 (127.3) | |

NB: BL, Baseline; Y1, Year-1; Y2, Year-2.

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