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Response to an Abnormal Ovarian Cancer Screening Test Result: Test of the Social Cognitive Processing and Cognitive Social Health Information Processing Models

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Abstract

All cancer screening tests produce a proportion of abnormal results requiring follow-up. Consequently, the cancer screening setting is a natural laboratory for examining psychological and behavioral response to a threatening health-related event. This study tested hypotheses derived from the Social Cognitive Processing and Cognitive-Social Health Information Processing models in trying to understand response to an abnormal ovarian cancer (OC) screening test result. Women (n=278) receiving an abnormal screening test result a mean of 7 weeks earlier were assessed prior to a repeat screening test intended to clarify their previous abnormal result. Measures of disposition (optimism, informational coping style), social environment (social support and constraint), emotional processing, distress, and benefit finding were obtained. Regression analyses indicated greater distress was associated with greater social constraint and emotional processing and a monitoring coping style in women with a family history of OC. Distress was unrelated to social support. Greater benefit finding was associated with both greater social constraint and support and greater distress. The primacy of social constraint in accounting for both benefit-finding and distress was noteworthy and warrants further research on the role of social constraint in adaptation to stressful events.

Keywords

Distress; cancer screening; adjustment; psychosocial; coping; health behavior theory

Early detection of malignancies for which effective treatment exists has the potential to extend survival and save lives. As a result, great effort has been expended to develop cost-effective screening tests and screening protocols for cancers of the breast, colon, cervix, prostate, lung, and ovary – all cancers associated with a high likelihood of treatment success when detected at an early stage. For cancers for which cost-effective screening procedures have been identified (i.e., breast, colon, cervix), emphasis then shifts to enhancing dissemination and uptake. For other cancers (e.g., prostate, lung, ovary), the search for cost-effective screening procedures remains a research priority (Kramer, Gohagan, Prorok, & Smart, 1993).

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While the potential benefits of cancer screening are well known, its potential costs are less well known. Every cancer screening test has less than 100% specificity and is associated with some proportion of inconclusive or abnormal test results that require additional follow-up or a repeat of the original screening test. Such so-called "false positive" test results can be quite distressing for some individuals and distress can persist for several months or more even after additional clinical follow-up or repeat testing indicates no malignancy is present (Andersen et al., 2007; Andrykowski, Boerner, Salsman, & Pavlik, 2004; Aro et al., 2000).

Due to the potential for false positive test results, the cancer screening setting represents an excellent "natural laboratory" for examining psychological and behavioral response to a threatening or stressful medical or health-related event – in this instance receipt of an abnormal cancer screening test result. More specifically, the cancer screening setting provides an excellent opportunity to test propositions derived from theories or models of coping and adaptation that purport to account for psychological and behavioral response to stressful or threatening events. In particular, both the Social Cognitive Processing (SCP) and Cognitive Social Health Information Processing (C-SHIP) models are potentially relevant to understanding individual differences in psychological and behavioral response to an abnormal cancer screening test result.

The SCP model posits successful psychological adaptation is fostered by adequate cognitive and emotional processing of a stressful event (Lepore, 2001). In part, cognitive and emotional processing can be fostered by a supportive social environment, one high in social support. In addition, however, a supportive social environment is one low in social constraint. Social constraints refer to unsupportive or even hostile responses from an individual's social environment (e.g., family and friends) in response to an individual's attempts to discuss their trauma-related thoughts and feelings (Lepore et al., 1996). For example, others might respond by trivializing an individual's concerns, ignoring or avoiding the individual, changing the subject, or communicating the individual needs to keep their concerns to him or herself. The likely net result is that social relationships are strained and cognitive and emotional processing of traumatic or stressful events is inhibited. Research has shown reports of high social constraints are associated with poorer psychological status (i.e., greater distress) in cancer survivors (e.g., Lepore & Helgesen, 1998; Schmidt & Andrykowski, 2004; Widows, Jacobsen, & Fields, 2000). Based on the SCP model then, one would hypothesize the magnitude of distress experienced in response to an abnormal cancer screening test would be positively associated with extent of both social support and emotional and cognitive processing of the threat posed by an abnormal result and inversely associated with the extent of any social constraint present. To date, however, no research has tested the utility of the SCP model for understanding psychological and behavioral response to an abnormal cancer screening test result.

The C-SHIP model (Miller, Shoda, & Hurley, 1996) is a broad conceptual framework for understanding response to health-threatening events. The C-SHIP model is an expansion of the earlier Monitoring Process model (MP; Miller,1995; Miller, Rodeletz, Schroeder, Mangan, & Sedlacek, 1996)). According to the MP model, individuals differ in informational coping style, that is, the extent to which they seek health-relevant information and the manner in which they respond to health-threatening events. Those characterized by a monitoring style (i.e., monitors) tend to actively scan the environment for health-relevant information and seek such information when available. Those characterized by a blunting style (i.e., blunters) tend to avoid or minimize health-relevant information. When confronted with a threatening health event, such as an abnormal cancer screening result, monitors should respond with elevated distress due to their tendency to actively seek information and amplify threat both cognitively and affectively. Consistent with the MP model, Wardle et al. (Wardle. Collins, Pernet, Whitehead, Bourne, & Campbell, 1993; Wardle, Pernet, Collins, &

Bourne, 1994) found women characterized by a monitoring coping style evidenced greater distress after receipt of an abnormal ovarian cancer screening test result. The C-SHIP model extends the MP model by positing the tendency of monitors to amplify threat can be modified by dispositional and situational characteristics. In the cancer screening setting, for example, high dispositional optimism might mitigate the "threat" experienced in the aftermath of an abnormal cancer screening test result while a relevant family history of cancer might exacerbate the degree of threat experienced. Consistent with the C-SHIP model, distress after a benign breast biopsy was highest in monitors with low dispositional optimism (Andrykowski et al., 2002) and distress after an abnormal ovarian cancer screening test result was highest in monitors with low dispositional optimism and a family history of ovarian cancer (Andrykowski et al., 2004).

Research to date has clearly demonstrated receipt of an abnormal cancer screening test result can generate considerable distress, with some individuals being more at risk for distress than others (Andersen et al., 2007; Andrykowski et al., 2004; Aro et al., 2000). On the other hand, it is becoming increasingly recognized that adaptation to a stressful event can include a variety of positive responses as well. Psychological and interpersonal "growth" is often reported in the wake of cancer diagnosis and treatment (Cordova, Cunningham, Carlson, & Andrykowski; 2001; Stanton, Bower, & Low, 2006) and cancer patients often report a variety of "benefits" from their cancer experience (Lechner, Carver, Antoni, Weaver, & Phillips, 2006; Sears, Stanton, & Danoff-Burg, 2003). Given the potentially stressful nature of an abnormal cancer screening test result, one might expect similar positive responses to occur in some individuals. While benefit finding has not been examined as yet in the conventional cancer screening setting, evidence for benefit finding in women undergoing BRCA1/2 testing and receiving positive mutation results has been found (Low, Bower, Kwan, Seldon, 2008). Similar to receipt of an abnormal cancer screening test result, receipt of a positive mutation result represents some increased potential for a future diagnosis of cancer. Thus it is not unreasonable to assume some degree of benefit finding might be present in both settings.

Which individuals are most likely to experience positive responses, such as benefit finding, in response to a "false positive" test result? First, one would expect greater distress to be associated with greater benefit finding. Second, similar to research with cancer survivors (Lechner et al., 2006), one might expect greater dispositional optimism to be associated with greater benefit-finding. Finally, while the SCP model has largely focused upon understanding distress in response to a stressful event, it does not seem unreasonable to extend the SCP model and posit positive responses, such as benefit-finding, would be associated with greater cognitive and emotional processing of the potentially distressing experience of an abnormal cancer screening test result as well as a more supportive and less constraining social environment (Cordova et al., 2001; Segerstrom, Stanton, Alden, & Shortridge, 2003; Zakowski et al., 2003).

The present study is an examination of response to receipt of an abnormal test result in the course of routine screening for ovarian cancer (OC). The present study extends earlier research on response to abnormal cancer screening test results by focusing upon a more comprehensive set of endpoints, including both distress and benefit-finding. The present study also extends previous research by testing specific hypotheses, largely derived from the SCP and C-SHIP models. In particular, it is hypothesized that greater distress following an abnormal OC screening test result will be positively associated with a less supportive social environment (i.e., less social support, more social constraint), less emotional processing of the experience of an abnormal test result, a family history of OC, and a monitoring informational coping style. Additionally, it is hypothesized that greater benefit finding will be positively associated with greater optimism, greater distress in response to an abnormal

cancer screening test result, a more supportive social environment (i.e., more social support, less social constraint) and greater cognitive and emotional processing.

Methods

Sample

All study participants were participants in a research trial of transvaginal sonography (TVS) screening for OC conducted by the University of Kentucky's Markey Cancer Center (DePriest & DeSimone, 2003; van Nagell et al., 2000). Asymptomatic women ≥ 50 years of age and asymptomatic women 25 to 50 years of age with a history of OC in ≥ 1 primary or secondary relative are eligible to participate in this screening trial. Free, annual TVS screening is provided to trial participants. Women receiving an abnormal TVS screening test result in the course of routine, annual screening are asked to return in 2–12 weeks for a repeat TVS test. Eligibility criteria for participation in this separate study of psychological and behavioral response to TVS screening were: (a) ≥ 25 years old; (b) receipt of an abnormal TVS screening test result in the course of routine screening for OC within the past 14 weeks; (c) able to read and understand English; and (d) provide of written, informed consent for participation.

Procedure

The research was carried out in accord with universal ethical principles. Study procedures were approval by the Institutional Review Board at the University of Kentucky. Study participants were recruited upon their return for a repeat TVS screening test following a recent (≤ 14 weeks) abnormal screening test result. Eligible study participants were approached by research staff in the OC screening clinic waiting area and invited to participate. Participants were given information about study procedures and written, informed consent for participation was obtained. Participants then completed a set of questionnaires and underwent their repeat TVS screening test. Information regarding TVS screening history, including number of previous routine TVS screening tests and whether a woman had ever previously received an abnormal TVS screening test result was obtained from clinic records. Using these eligibility criteria and procedures, 278 women were enrolled in the study between May, 2004 and July 2007. Less than 5% of study eligible women offered study participation declined.

Measures

At the study assessment, participants completed questionnaires assessing: (a) demographic and clinical information; (b) distress, benefit-finding, and functional status; (c) dispositional variables; and (d) social environment and emotional approach coping.

Demographic and Clinical Information—This included age, race, partner status, education, number of previous routine TVS screening tests, history of abnormal TVS screening test prior to the most recent abnormal test required for study eligibility (yes vs. no), and history of OC in first degree relatives. The latter was based on response to the question "Do you think there are cases of OC in your family?" Those who answered "yes" to this question were then asked separate questions regarding a history of OC in their mother, daughter(s), and sister(s).

Distress, Benefit-Finding, and Functional Status—OC-specific distress was assessed by the Impact of Events Scale (IES: Horowitz, Wilner, & Alvarez, 1979), a measure of avoidant and intrusive responses regarding a specific stressor – in this case "the possibility you will develop OC in your lifetime." Coefficient alpha for the IES Intrusion and Avoidance subscales was .85 and .87, respectively. Benefits were assessed by the

Benefit Finding Questionnaire BFQ; (Antoni et al., 2001) a measure of benefits derived following a specific event – in this case "my most recent experience with the University of Kentucky OC screening program." Coefficient alpha was .97 for the BFQ total score. Functional status was assessed by the Medical Outcomes Study 12-Item Short Form Health Survey (MOS-12; Ware, Kosinski, & Keller, 1996). Separate physical and mental health component scores are calculated as t-scores with a normative mean of 50 for both.

Dispositional Variables—Information coping style was measured by the Miller Behavioral Styles Scale-Short Form (MBSS-SF; Steptoe, 1989). Coefficient alpha was .60 and .37 for the MBSS Monitor and Blunter subscales, respectively. Given the poor internal consistency of the MBSS-Blunter subscale, this subscale was not used in any study analyses. Dispositional optimism was measured by the Life Orientation Test – (LOT; Scheier, Carver, & Bridges, 1994). Coefficient alpha was .80 for the LOT total score.

Social Environment and Emotional Approach Coping—Social support was assessed by the 8 item Duke-UNC Social Support Questionnaire (DUKE-SSQ; Broadhead, Gehlbach, DeGruy, & Kaplan, 1988). Coefficient alpha for the DUKE-SSQ total score was .91. Social constraint was assessed by the 15 item friends and family version of the Social Constraint Scale (SCS; Lepore & Ituarte, 1999) with items keyed to "your experience with OC screening." Coefficient alpha was .93 for the SCS total score. Emotional Approach Coping was assessed by the 8-item Coping through Emotional Approach Scale (CEAS; Stanton, Kirk, Cameron, & Danoff-Burg, 2000) with items keyed to "what you did when you were recently asked to return for a repeat OC screening test." Coefficient alpha was .86 and .91 for the Emotional Processing and Emotional Expression subscale scores, respectively.

Data Preparation and Analysis

Standard procedures were used to compute total and subscale scores for the IES, BFQ, MOS-12, MBSS-SF, LOT, DUKE-SSQ, SCS, and CEAS. To test our hypotheses regarding factors associated with psychological response to an abnormal TVS screening test result, three hierarchical regression analyses were performed. Dependent variables included IES-Intrusion, IES-Avoidance, and BFQ scores. In each hierarchical analysis, a set of predictor variables were entered in four steps with steps one through three identical for each of the three dependent variables. At step one demographic and clinical variables were entered including age, education, family history of OC in an FDR (yes vs. no), number of days between the recent abnormal TVS screening test and study participation, prior number of routine TVS screening tests, and prior history of an abnormal TVS screening test (yes vs. no). At step two, dispositional variables were entered including LOT and MBSS Monitoring scores. At step three, four social environment and emotional processing variables were entered including SCS, Duke-SSQ and CEAS Emotional Processing and Emotional Expression scores. Step Four in the regression analysis differed depending on the dependent variable. For the analyses for BFQ scores, IES Intrusion and Avoidance scores were entered at step four. For the analyses of IES-Intrusion and Avoidance scores step four involved entry of the interaction term representing the combination of family history of OC in an FDR with MBSS Monitoring (i.e., Monitoring × OC Family History). The interaction term was retained in the final regression model only if the interaction term was significant. In the two analyses involving the interaction term entered at step four, all variables were centered prior to use in the regression analyses. The nature of significant interaction effects was then determined using methods suggested by Jaccard et al. (Jaccard, Turrisi, & Wan, 1990). An alpha level of .05 was used as the criterion for statistical significance.

Results

The study sample consisted of 278 women a mean of 56.6 years of age (SD=12.0; range=27–90). Mean educational level was 14.0 years (SD=2.8; range=4–21). The sample was predominantly Caucasian (97%) and married or partnered (77%). Annual household income was: < $20,000 (14%); $20,001 – $40,000 (27%); $40,001 – $80,000 (36%); and ≥ $80,001 (22%). (1% of the sample declined to provide income information.) One in five women (18%) reported an FDR with OC. All but two of these women reported OC in a single FDR. Mean number of previous routine TVS screening tests was 3.9 (SD=4.6; range = 0–19) and one in five women (21%) had a prior history of an abnormal TVS test result. Mean MOS-12 mental and physical health component scores were 50.6 and 49.3, respectively. Mean number of days between participants' most recent abnormal TVS screening test and study participation was 49.4 days (SD=13.1; range = 14–97). Three women were missing data on one or more predictor variables and, consequently, all hierarchical regression analyses were based on 275 respondents.

Mean IES scores in the entire sample were as follows: IES-Intrusion (M=5.1; SD=6.4), IES-Avoidance (M=7.8; SD=8.7), IES-Total (M=12.9; SD=13.9). The mean BFQ score in the entire sample was 41.5 (SD=18.9).

Results of the three hierarchical regression analyses are shown in Table 1 and Table 2. The set of predictor variables accounted for a significant proportion of variance (all p's < .001) for each of the three dependent variables examined. The percentage of variance accounted for by the entire set of predictor variables was 24.0% for BFQ Benefit-Finding scores, 27.7% for IES-Avoidance scores, and 33.4% for IES-Intrusion scores.

For IES Intrusion scores, each of the four steps in the regression analysis was associated with a significant increment in variance accounted for (all p's < .05). (See Table 1.) In the final 13-variable model, higher IES Intrusion scores were associated with lower dispositional optimism (LOT) (β =−.17; p< .01), higher social constraint (SCS) (β = .32; p < .001), and greater emotional processing (CEAS) (β = . 33; p < .001). The MBSS Monitoring × OC Family History interaction was also significant (β = . 38; p < .01). This interaction, shown in Figure 1, suggests a monitoring informational coping style was associated with higher IES-Intrusion scores only in women with a family history of OC in a FDR.

For IES Avoidance scores, only steps two and three in the regression analysis were associated with a significant increment in variance accounted for (both p's < .001). (See Table 1.) Higher IES Avoidance scores in the final variable model were associated with no history of a prior abnormal TVS screening test result (β = −.15; p < .05) and greater social constraint (SCS) (β = .43; p < .001). The MBSS Monitoring × OC Family History interaction entered at step 4 of the regression analysis was not significant

Finally, for BFQ total scores only steps one, three, and four in the regression analysis were associated with a significant increment in variance accounted for (all p's < .05). (See Table 2). In the final 14 variable model, greater benefit-finding was associated with greater age (β = .15; p < . 05), less education (β =−.24; p< .001), higher social constraint (SCS) (β = .31; p < .001), greater social support (DUKE-UNC) (β = .14; p < .05), and higher IES Intrusion (β = .21; p < .05) and lower IES Avoidance (β = −.18; p < .05) scores.

Discussion

Our data provided at least partial support for several of our hypotheses. Based on the SCP model, we hypothesized distress in the aftermath of an abnormal cancer screening test result

would be associated with a less supportive social environment. Consistent with our hypothesis, OC-specific distress, as indexed by both IES-Intrusion and Avoidance scores, was greater in women with a social environment characterized by more social constraint. Contrary to our hypothesis, however, OC-specific distress was <u>not</u> associated with social support. Consistent with the SCP, a respondent's social environment was associated with distress in the aftermath of an abnormal OC screening test. However, this relationship was more strongly linked to the negative impact of social constraint rather than the potential positive impact of social support.

Based on the C-SHIP model, we hypothesized distress in the aftermath of an abnormal cancer screening test result would be associated with both a monitoring informational coping style and a family history of OC. When distress was indexed by IES-Intrusion scores, a monitoring coping style was associated with greater rumination and cognitive intrusion but only in women with a family history of OC (Table 1 and Figure 1). This replicates prior research in the breast biopsy and OC screening settings (Andrykowski et al., 2002;2004) and further illustrates the C-SHIP's tenet that the impact of a dispositional characteristic, such as a monitoring coping style, can be modified by context, in this case, an individual's family history of cancer. Here, as in previous research (Andrykowski et al., 2004), a family history of OC appeared to amplify the "threat" associated with an abnormal OC screening test result, enabling the anticipated distress-engendering impact of a monitoring coping style to be better evident. Similarly, a family history of breast cancer appeared to amplify the threat associated with a breast biopsy (Andrykowski et al., 2002), resulting in greater rumination and cognitive intrusion.

In contrast, a family history of OC did not appear to moderate the impact of a monitoring coping style when IES-Avoidance scores were considered. Rather, a main effect for a monitoring coping style was evident with women with a monitoring style reporting greater cognitive avoidance. While a positive relationship between monitoring and cognitive avoidance might seem counterintuitive, it is not unexpected. The MP model, the precursor to the C-SHIP model, posits monitors initially react to a stressor with increased approach responses (i.e, greater information seeking efforts or efforts to cognitively "process" the stressful situation). However, these approach responses are likely to result in increased distress which can then be reduced by avoidance responses (Miller, 1995; Miller et al., 1996). So the apparently counterintuitive finding of greater monitoring tendencies being associated with higher IES-Avoidance scores can be understood as a consequence of the link between monitoring tendencies and increased distress. To point, avoidance responses can be triggered by distress engendered by the monitor's efforts to seek and process information associated with a stressful event.

Based on the SCP model, we hypothesized greater distress in the aftermath of an abnormal screening test result would be associated with <u>less</u> emotional processing. However, our results suggested just the opposite: higher CEAS-Emotional Processing Scores were associated with <u>greater</u> IES-Intrusion scores and unrelated to IES-Avoidance scores (Table 1). In reflecting upon this finding, one might consider while the SCP model suggests a link between greater cognitive and emotional processing and less distress in the aftermath of a stressful event there is no reason to think this effect is instantaneous. Rather, cognitive and emotional processing of a stressful event is a gradual process that unfolds over time and may *ultimately* result in less distress and better long-term adaptation. The 7 weeks (on average) that separated receipt of an abnormal TVS test result and study participation in this study might have been insufficient to fully process this stressful event and yield the anticipated distress reduction. Furthermore, the SCP's description of this adaptation process might be most apt when a stressful event has been concluded and can be considered a past event. As the study assessment occurred prior to their repeat TVS test, women were still uncertain

about the meaning of their recent abnormal TVS test result. This continued uncertainty likely necessitated continued efforts to emotionally and cognitively "process" their abnormal TVS test result. As IES-Intrusion scores suggest the presence of rumination and cognitive processing, the positive relationship between CEAS-Emotional Processing and IES-Intrusion scores would support the view that processing of the abnormal TVS test result was still ongoing at the time of study participation.

Study results only partially supported our hypotheses regarding benefit-finding in the aftermath of an abnormal TVS test result. Consistent with SCP theory, greater benefit finding was associated with greater social support (Table 1). However, contrary to hypothesis, greater benefit finding was also associated with *greater* social constraint. In fact, inspection of the standardized beta weights and the squared semi-partial correlation coefficients (Table 2), an index of the unique relationship of a predictor variable to a dependent variable, suggests social constraint scores were the *strongest* predictor of benefit finding scores. Frankly, we were quite surprised by this finding. While, replication of this result is clearly necessary, we might speculate a social environment that discourages or even punishes discussion of a presumed stressful event may serve as an additional stressor, thus enhancing the motivation to establish the meaning of a stressful experience and ascribe benefits to this experience (Taylor, 1983). In other words, an increase in the stressfulness of an event results in an increased tendency to attribute benefits to that same event. Alternatively, social constraint might result from the expression of benefits derived from a stressful experience. When an individual talks about benefits they have derived from a stressful event, the social environment might conclude the process of adaptation to that event has been successfully concluded and subtly, or not so subtly, steer the individual away from further engagement with that stressful event. While we tend to favor the previous explanation, our data here is cross-sectional and consequently we are unable to determine the direction of effect between social constraint and benefit-finding. So the nature of any causal relationship between these two variables remains to be established.

Contrary to our hypothesis, optimism was unrelated to benefit-finding. As Lechner et al. (2006) noted a positive relationship between optimism and benefit-finding in a sample of breast cancer survivors, our failure to support our hypothesis could simply be due to differences between the cancer survivor and cancer screening contexts. In addition, we found no evidence to support our hypothesis that greater emotional processing would be associated with greater benefit-finding. However, the identification of benefits derived from the experience of a stressful event is likely part of the process of "meaning making", a critical component of the process of cognitive adaptation to a threatening event (Taylor, 1983). Thus benefit-finding might be primarily a product of cognitive, rather than emotional, processing. Consistent with this view, benefit-finding was positively associated with IES-Intrusion scores and *negatively* associated with IES-Avoidance scores. As IES scores have been used by some investigators as an index of cognitive processing (e.g., Cordova et al., 2001; Manne, Grassman, & Du Hamel, 2000; Sears et al., 2003), this pattern of results suggests greater cognitive engagement and processing is associated with greater benefit finding. On the other hand, if one views IES scores as a measure of distress, then only partial support for our hypothesis linking greater distress to greater benefit finding was obtained as only IES-Intrusion scores were positively associated with benefit-finding. In point of fact, IES scores likely index to some degree both cognitive processing and engagement as well as distress, with IES-Intrusion scores perhaps a better measure of distress than IES-Avoidance scores.

While the occurrence of benefit-finding in both cancer survivors (e.g., Antoni et al., 2001; Bellizi, Miller, Arora, & Rowland, 2007; Burris & Andrykowski, in press) and caregivers (Kim, Schulz, & Carver, 2007) is well-documented, our study adds to the small literature

suggesting benefit-finding might also occur after receipt of test results that suggest only the possibility of increased risk for a future cancer diagnosis (Low et al., 2008). However, the "threat" and consequent benefit finding evident in the context of cancer screening settings might be less than that characteristic of the cancer survivor setting. Mean IES scores (5.1 for Intrusion, 7.8 for Avoidance) in our sample were generally 1 to 4 scale points less than those reported by cancer survivors (e.g., Goodwin et al., 2004; Jim et al., 2007; Sherman et al., 2009; Steginga et al., 2004). Correspondingly, the mean benefit finding score in our sample (41.3) is 10 to 15 scale points less than that reported in studies of cancer survivors and caregivers (e.g., Antoni et al.,2001; Burris & Andrykowski, in press; Kim et al., 2007). So while the lower "threat" reported in the OC screening setting here is consistent with lower reports of benefit finding, both relative to that reported by cancer survivors, whether this means the cancer screening setting is a poorer context to test theory-driven hypotheses regarding benefit finding is unknown. At minimum though, it is important to note the cancer screening and cancer survivor contexts differ and this likely impacts perceptions of threat and the stress appraisal process, and in turn, the possibility for benefit-finding and growth. As a result, it is likely unreasonable to assume that relationships among these constructs evident in the cancer survivor setting are completely replicated in the cancer screening setting.

Several limitations of this study should be acknowledged. First, as noted, the data are cross-sectional and thus causal relationships among study variables cannot be unambiguously determined. Second, our study sample was entirely female and overwhelmingly Caucasian – thus the generalizeability of our findings to males and racial and ethnic minority individuals confronting potentially threatening medical events is limited. Finally, while cognitive processing was a key construct in our hypotheses, our ability to measure this construct was limited. No consensus measure of cognitive processing currently exists and the IES may serve as a measure of both constructs to an extent.

In conclusion, several models exist which can help account for psychological and behavioral response to a threatening and stressful event. These models can be seen as complementary, rather than competing, insofar as they emphasize different variables in the coping process. The present study suggests some utility of both the SCP and C-SHIP models for understanding response to receipt of an abnormal TVS result in the course of routine screening for OC – a potentially threatening and stressful medical event. Some support for hypotheses derived from both models was found in our data. Consistent with the C-SHIP model as well as previous research (Andrykowski et al., 2002; 2004), the impact of a monitoring informational coping style on response to an abnormal cancer screening test result was moderated by contextual factors – specifically, a woman's family history of OC. Consistent with the SCP model, the social environment was linked to both negative and positive responses to an abnormal cancer screening test result. In particular, the presence of social constraint was very strongly associated with both distress and benefit-finding in the aftermath of an abnormal cancer screening test result. In fact, social constraint was a much stronger predictor of these outcomes than social support. This primacy of social constraint in this context was frankly surprising given the importance typically ascribed to social support in understanding adaptation to stressful events. It needs to be noted, however, that the SCS is a measure of social constraint which is situation-specific. That is, respondents completed the SCS with reference to their experience with OC screening. In contrast, the Duke-SSQ, our measure of social support, is a general measure of recent social support – it does not measure social support with reference to any particular situation or event. Consequently, the situation-specific nature of the SCS could account to some degree for the apparent primacy of social constraint in accounting for distress and benefit finding in response to an abnormal OC screening test result. In any case, more research on the nature and measurement of social

constraint as well as the mechanisms underlying its impact on important adaptation outcomes is clearly warranted.

Acknowledgments

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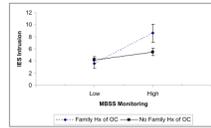
Figure 1.
Relationship of a monitoring informational coping style and a family history of OC in a FDR to IES Intrusion scores.

Table 1

Hierarchical Multiple Regression Analysis of IES-Intrusion and IES-Avoidance Scores.

Variable	IES-Intrusion			IES-Avoidance		
	ΔR^{2a}	beta ^{b}	sr^{2c}	ΔR^2	beta	sr^2
Age		.02	.000		.00	.000
Education		−.11	.011		−.03	.001
Family Hx of OC ^{d}		−.22	.007		.04	.001
Days Since Recent Abnormal Test		−.06	.003		−.09	.007
Prior Hx of Abnormal TVS Test		−.09	.006		−.15 *	.017
# Prior Routine TVS Tests	.055 *	.05	.002	.035	.09	.005
LOT Optimism	.110 ***	−.17 **	.024	.062 ***	−.07	.004
MBSS-Monitor		.11	.008		.12 *	.012
SCS-Social Constraint	.150 ***	.32 ***	.073	.180 ***	.43 ***	.130
DUKE-SSQ Social Support		.04	.001		.01	.000
CEAS Emotional Processing		.33 ***	.034		.10	.003
CEAS Emotional Expression		−.16	.008		.02	.000
Monitoring × Family Hx	.019 *	.38 **	.019	.000	--	--
Full Model Statistics						
Multiple R		.578			.526	
Multiple R²		.334			.277	
F (13, 261) ^{e}		10.07 ***			8.37 ***	

*** p ≤ .001;

** p ≤ .01;

* p ≤ .05

[a] Proportion of variance accounted for by all variables in model to that point.

[b] Standardized beta weight

[c] squared semi-partial (i.e., part) correlation coefficient

[d] coded as: 1 = no history of OC in FDR; 2 = family history of OC in FDR

[e] due to missing data, sample size for the regression analyses was n=275; df for analysis of IES-Avoidance was 12, 262

Table 2

Hierarchical Multiple Regression Analysis of BFQ Benefit Finding Scores.

| | **BFQ Benefit Finding** | | |
Variable	ΔR^{2a}	beta b	sr^{2c}
Age		.15*	.018
Education		−.24***	.052
Family Hx of OC d		.11	.009
Days Since Recent Abnormal Test		−.02	.000
Prior Hx of Abnormal TVS Test		.01	.000
# Prior Routine TVS Tests		.01	.000
	.106***		
LOT Optimism		.02	.000
MBSS-Monitor		.02	.000
	.007		
SCS-Social Constraint		.31***	.056
DUKE-SSQ Social Support		.14*	.013
CEAS Emotional Processing		.07	.002
CEAS Emotional Expression		.10	.003
	.106***		
IES-Intrusion		.21*	.019
IES-Avoidance		−.18*	.016
	.021*		
Full Model Statistics			
Multiple R		.490	
Multiple R^2		.240	
$F_{(14, 260)}$ e		5.88***	

***
  p ≤ .001;

**
  p ≤ .01;

*
 p ≤ .05

aIncrement in proportion of variance accounted for by addition of that set of variables to the model.

bStandardized beta weight

$c$squared semi-partial (i.e., part) correlation coefficient

$d$coded as: 1 = no history of OC in FDR; 2 = family history of OC in FDR

$e$due to missing data, sample size for the regression analyses was n=275