

Understanding emotional responses to breast/ovarian cancer genetic risk assessment: An applied test of a cognitive theory of emotion

Ceri Phelps^{a*}, Paul Bennett^b and Kate Brain^a

^a*Institute of Medical Genetics, Cardiff University, School of Medicine, Cardiff CF14 4XN, UK;*

^b*Nursing, Health and Social Care Research Centre, Cardiff University, Cardiff CF24 0AB, UK*

(Received 5 January 2007; accepted 24 October 2007)

This study explored whether Smith and Lazarus' (1990, 1993) cognitive theory of emotion could predict emotional responses to an emotionally ambiguous real-life situation. Questionnaire data were collected from 145 women upon referral for cancer genetic risk assessment. These indicated a mixed emotional reaction of both positive and negative emotions to the assessment. Hierarchical regression analyses revealed that the hypothesised models explained between 20% and 33% of the variance of anxiety, hope and gratitude scores, but only 10% of the variance for challenge scores. For the previously unmodelled emotion of relief, 31% of the variance was explained by appraisals and core relational themes. The findings help explain why emotional responses to cancer genetic risk assessment vary and suggest that improving the accuracy of individuals' beliefs and expectations about the assessment process may help subsequent adaptation to risk information.

Keywords: cognitive appraisal; emotions; cancer genetics; risk

Introduction

Emotions have an adaptive function, similar to reflexes and physiological drives, which evolved to help us respond to environmental demands (Scherer, 1984; Smith & Lazarus, 1990). In any situation, the specific emotion experienced depends on the meaning of the encounter for the individual, with each emotion having a specific adaptive function (Smith & Lazarus, 1993). Negative emotions motivate the individual to engage in behaviour that will remove the source of harm from the environment, or adapt to the harm if it cannot be avoided or eliminated; positive emotions help sustain an individual's attempts to cope with a stressful situation (Smith, 1991).

There is growing evidence that undergoing genetic risk assessment can evoke a range of emotional responses, including anxiety and distress (Cull et al., 1999; Hopwood et al., 1998), relief (Lynch et al., 1997), happiness (Dorval et al., 2000), sadness and anger (Bonadona et al., 2002). Moreover, emotional reactions appear to be complex, as both positive and negative emotions may co-exist. The receipt of a low risk or negative predictive genetic test result, for example, may lead not only to positive emotions such as relief, but also to anxiety and frustration as a consequence of losing access to screening or specialist advice (Brain et al., 2002; Holloway et al., 2004). Similarly, individuals may

*Corresponding author. Email: ceri.phelps@cardiffandvale.wales.nhs.uk

express relief after referral into specialist genetics services while simultaneously reporting anxieties regarding their ability to cope with the potential implications of the assessment (Phelps, Bennett, Iredale, Anstey, & Gray, 2005).

Although specialist cancer genetics services provide many benefits, a small but significant percentage of individuals experience psychological distress when undergoing cancer genetic risk assessment (Cull et al., 1999; Fry et al., 2003). High levels of distress are not only inherently undesirable but may also influence outcomes and decisions related to surveillance and other clinical options (Bennett, Lowe, & Honey, 2007; Meiser et al., 2002; van Dijk et al., 2003). A number of studies have examined factors that predict distress at or around the time of receipt of genetic risk information. These factors include anticipating future problems after an unfavourable test outcome, being pessimistic, unexpressive of emotions, having a large number of relatives with breast or ovarian cancer, and being relatively young (Collins, Halliday, Warren, & Williamson, 2000; Watson et al., 2004; Lodder et al., 1999). This work has provided important data, but has been largely atheoretical. This has led to a somewhat piecemeal understanding of the issues relevant to distress following genetic risk assessment and one without a coherent set of predictor variables. It has also ignored patients' cognitive responses to the assessment process: a factor generally considered central in determining the emotional response to environmental events. This study focuses on these cognitive processes and takes a more theoretical stance than previous research. It used Smith and Lazarus's (1990, 1993) cognitive theory of emotion to investigate the emotional impact of referral into a cancer genetics service for assessment of familial cancer risk and to identify key cognitive precursors to these emotions. In doing so, it represents the first applied test of this theory amongst individuals faced with a real and ongoing life event.

Smith and Lazarus's theory (1990, 1993) identified two types of cognitive processes associated with an emotional response. The first involves a process of *primary* and *secondary appraisal* through which the individual evaluates the nature of the situation in which they are involved. Two primary appraisals, *motivational relevance* and *motivational congruence*, relate to the significance of an encounter for well-being. Motivational relevance refers to the degree to which the situation is important to the individual in terms of their personal goals, while motivational congruence refers to whether or not the situation is likely to impede or facilitate the achievement of those personal goals. If a situation is construed as motivationally relevant, appraisal of the situation as being motivationally congruent or incongruent will determine the overall valence of the emotion experienced. One of four secondary appraisals determine the specific emotion experienced: *accountability* considers how much an individual may consider either themselves or another person as either to blame or to credit for the situation; *problem-focused coping potential* refers to the degree to which an individual believes they can change the situation in order to make it more congruent with their goals; *emotion-focused coping potential* relates to how well the individual believes they can adjust psychologically to the situation; *future expectancy* refers to the degree to which they believe that the situation may improve in the future.

Each emotion is also linked to a *core relational theme*. This is a form of heuristic that rapidly identifies the central meaning of the situation being assessed. This heuristic speeds information processing by synthesizing the set of appraisals relevant for appropriate responding (Lazarus, 1999, p. 94). Accordingly, understanding emotional responses to an event such as undergoing cancer genetic risk assessment not only requires knowing the relevant pattern of appraisals, but also the significance of the emotion for the person in that situation – its core relational theme. Table 1 outlines a number of appraisal-core relational theme combinations and the emotions associated with them.

Table 1. Appraisal components, core relational theme and the proposed adaptive function of the four previously modelled emotions.

Emotion	Appraisal	Core relational theme	Proposed adaptive function
Anxiety	● Motivational relevance ● Motivational incongruence ● Low emotion-focused coping potential	Ambiguous danger/threat	Avoid potential harm
Hope	● Motivational relevance ● Motivational congruence ● High future expectancy	Possibility of success	Sustain coping efforts
Challenge	● Motivational relevance ● Motivational incongruence ● High problem-focused coping potential ● High future expectancy	Effortful Optimism	Motivate striving towards mastery or gain
Gratitude	● Motivational relevance ● Motivational congruence ● Other accountability	Other credit	Reinforce pro-social behaviour in others

This study tested Smith and Lazarus' theory in the context of genetic risk assessment. It has three important strengths over previous studies. First, in contrast to the previous empirical tests which have focused exclusively on a small range of negative emotions (e.g. Bennett et al., 2003; Smith & Lazarus, 1993), this article reports on a range of positive and negative emotions. Second, it reports data measuring participants' appraisals and emotional responses to a real, current and pertinent life event. Previous studies have been of questionable ecological validity, involving either retrospective reconstructions of a stressful event (Lowe & Bennett, 2003; Smith, Haynes, Lazarus, & Pope, 1993; study one) or a "vignette" methodology (e.g. Smith & Lazarus, 1993; Smith et al., 1993; study two). The only study to examine cognitive appraisals relating to a real-life stressor (attending colposcopy following an abnormal cervical smear result) only investigated the role of individual appraisals, not core relational themes, and thus did not represent a complete test of the theory (Orbell, Hagger, Brown, & Tidy, 2004). Finally, the study evaluates cognitive and emotional reactions to an emotionally ambiguous situation allowing for more variance in the primary appraisals of motivational relevance and congruence than in previous studies (Bennett et al., 2003; Smith & Lazarus, 1993).

The specific objective of the study was to examine the degree to which appraisals and core relational themes were associated with women's varying emotional responses following referral for cancer genetic risk assessment, prior to receiving any personal risk information. The emotions and related cognitions studied were anxiety, hope, challenge and gratitude (all of which have been previously modelled by Smith & Lazarus, 1990, 1993), and the unmodelled emotion of relief. These were the strongest emotions reported by participants in the study, and therefore deemed the most relevant to this stage within the process of cancer genetic risk assessment. The hypothesised appraisal-core relational theme-emotion linkages are outlined in Table 1.

Method

Recruitment

Data were collected as part of a randomised controlled trial evaluating the psychological impact of a self-help coping intervention amongst women undergoing cancer genetic risk

assessment (Bennett et al., 2007). The data reported here were collected at baseline, prior to the intervention. Potential participants were women referred into one area of the Cancer Genetic Service for Wales (CGSW) between February and December 2003 as a consequence of a family history of breast and/or ovarian cancer. Study information including the consent form and questionnaire was distributed alongside the initial information sent to new CGSW referrals.

Participants

In total, 268 women entered the programme, of whom 162 returned their questionnaires (a response rate of 60%). No data was collected from those who declined to participate in the study or who did not enter the genetics service. Data from five individuals were excluded from the analysis because they received their risk assessment result by the time their questionnaire was returned. A further 12 participants (8%) had a current or past personal diagnosis of cancer and were also excluded from the analysis. The final analysis therefore involved 145 women with no current or previous personal diagnosis of cancer. The majority of participants (52%) were aged between 41 and 60 years, with a further 36% aged between 26 and 40 years. Most participants (72%) were married or cohabiting, educated at least to secondary school standard (77%) and had at least one child (75%).

Measures

The measure of appraisals, core relational themes and emotions was adapted from a questionnaire used by Smith and Lazarus (1993), found to have good test–retest reliability by Bennett et al. (2003).

Emotions

Emotions were measured using single scales through which participants indicated how well each of a series of 15 adjective clusters, each capturing one emotion, characterised their emotions at the time of the event. The emotion of anxiety, for example, was described as: Nervous/Anxious/Tense. For each cluster, participants assigned a single score between 1 and 9 (“Did not characterise my feelings at all” – “Characterised my feelings extremely well”) indicating the extent to which the adjectives characterised “*how you are feeling now about undergoing cancer genetic risk assessment*”. The emotions represented by each cluster are outlined in Table 3.

Appraisal components

Appraisal components were measured using a 14-item questionnaire measuring motivational relevance, motivational (in)congruence, self-accountability, other-accountability, problem-focused coping potential, emotion-focused coping potential and future expectancy. Each item score was measured by a 9-point scale (not at all–extremely) anchored to “*how you are feeling now about undergoing cancer genetic risk assessment*”. The total score for each scale was divided by two, to give a potential score for each appraisal of 1 to 9. Table 2 reports the component items of each appraisal and their internal reliabilities. A large number of missing responses to one of the items comprising the motivational incongruence scale resulted in a scale with an unacceptably low Cronbach’s alpha. Accordingly, a single item measure of motivational incongruence (“*To what extent are*

Table 2. Item statements and internal reliability estimates of primary and secondary appraisal components.

Appraisal component (2 items)	Cronbach's alpha
Motivational relevance	0.73
• How important is this situation to you? • How much do you care about what is happening in this situation?	
Motivational incongruence	0.03
• To what extent are there negative aspects to the situation – i.e., things you do not want or are unhappy about? • How consistent is what happened, with what you wanted to happen?	
Self-accountability	0.78
• To what extent do you consider yourself to be responsible for this situation? • To what extent do you consider yourself to be accountable for this situation?	
Other-accountability	0.79
• To what extent do you consider someone or something else to be responsible for this situation? • To what extent do you consider someone or something else to be accountable for this situation?	
Problem-focused coping potential	0.83
• How certain are you that you will be able to do something to make (or keep) the situation how you want it to be? • How much do you think you will be able to do something to make things better (or keep them good)?	
Emotion-focused coping potential	0.86
• How certain are you that you will be able to deal emotionally with what happens? • How well do you think you will be able to accept things and adjust to the situation, no matter how it turns out?	
Future expectancy	0.36
• Think about how you want this situation to turn out. To what extent do you think it will turn out this way? • How do you expect this situation to change?	

there negative aspects to the situation i.e. things you do not want or are unhappy about?”) was used in the subsequent analysis.

Core relational themes

These were measured using single scales through which participants responded to clusters of between three and four sentences, each with a common theme. The core relational theme of “removal of harm”, for example, was characterised by the following cluster of sentences: *A burden has been lifted from my mind/A threat or harm has been removed from this situation/Things are working out after all*. Participants were asked to rate the extent to which each cluster of statements characterised “*your current thoughts about undergoing cancer genetic risk assessment*” on a single scale of 1 to 9 (“Did not characterise my thoughts at all” – “Characterised my thoughts extremely well”). The 15 core relational themes are detailed in Table 3.

Table 3. Means (and standard deviations) of emotion, appraisal and core relational theme scores upon referral for cancer genetic risk assessment.

Variable (score range 1–9)	Mean (SD)		Mean (SD)
PRIMARY APPRAISALS		SECONDARY APPRAISALS	
Motivational relevance	8.1 (1.3)	Emotion-focused coping potential	6.1 (2.2)
Motivational incongruence	6.1 (2.7)	Problem-focused coping potential	6.0 (2.2)
Self accountability	2.9 (2.6)	Future expectancy	5.9 (1.7)
		Other accountability	2.5 (2.3)
EMOTION		CORRESPONDING CORE RELATIONAL THEME	
Hope	5.7 (2.6)	Possibility of success	3.8 (3.0)
Gratitude	5.7 (3.0)	Other credit	4.4 (3.0)
Relief	4.7 (2.8)	Removal of harm	4.3 (3.0)
Anxiety	4.7 (2.8)	Threat	2.8 (2.4)
Challenge	4.3 (2.9)	Effortful Optimism	6.6 (2.3)
Tranquility	3.6 (2.5)	Lack of concern	4.7 (3.0)
Happiness	2.7 (2.3)	Success	3.1 (3.0)
Surprise	2.1 (1.9)	Unexpectedness	3.2 (2.7)
Boredom	1.4 (1.2)	Irrelevance	1.7 (1.7)
Sadness	2.8 (2.6)	Irrevocable loss	1.6 (1.5)
Pride	2.4 (2.3)	Self-credit	2.8 (2.5)
Frustration	2.4 (2.4)	Confusion	2.0 (2.0)
Anger	2.3 (2.3)	Other blame	1.3 (1.2)
Hope	5.7 (2.6)	Possibility of success	3.8 (3.0)
Gratitude	5.7 (3.0)	Other credit	4.4 (3.0)

Data analysis

Analyses were conducted on the five most highly rated emotions (see Table 3). Bivariate associations between appraisals, core relational themes and these emotions were explored using Pearson's correlations. Hierarchical multiple regression analyses were then conducted to assess the independent contribution of the hypothesised appraisals and core relational themes to the explained variance of each emotion score, based upon the Smith and Lazarus (1990, 1993) model. A three-step entry process was used for each regression analysis. As core relational themes are considered to be better predictors of emotional responses than individual appraisal components, hypothesised appraisals were entered into step one and hypothesised core relational themes into step two. This allowed us to test whether the core relational themes explained variance in emotion scores additional to that explained by the appraisals. Finally, additional appraisals and core relational themes that were significantly correlated with each emotion score were entered into the regression at step three, to provide a measure of the exclusivity of the models. For the emotion of relief, for which there was no existing hypothesised model, all appraisals and core relational theme scores correlated with the emotion scale scores were entered into step one and step two, respectively.

Results

Table 3 reports participants' appraisal, core relational theme and emotion scores. The five strongest emotions reported were the previously modelled emotions of anxiety, hope, gratitude, challenge and the previously unmodelled emotion of relief. The relatively high mean scores for the appraisals of motivational relevance, motivational incongruence,

future expectancy, problem-focused coping potential and emotion-focused coping potential indicate their relevance to the situation. The most relevant core relational themes were optimism, lack of concern, other credit and removal of harm.

Table 4 reports the correlations between the various appraisals, core relational themes and five emotional responses to cancer genetic risk assessment. With the exception of anxiety, all of the emotions were significantly correlated with each other. The primary appraisals of motivational congruence and motivational relevance were significantly correlated in the expected directions with the emotions of anxiety, gratitude and relief. However, motivational relevance was not correlated with hope, and motivational congruence was not associated with challenge. The hypothesised secondary appraisals of emotion-focused coping potential and future expectancy were correlated in the expected

Table 4. Pearson's correlations between emotions, appraisals and core relational themes upon referral for cancer genetic risk assessment ($n = 145$).

	Emotion				
	Anxiety	Hope	Gratitude	Challenge	Relief
Emotions					
Anxiety	1				
Hope	-0.099	1			
Gratitude	-0.007	0.427*	1		
Challenge	0.119	0.304*	0.397*	1	
Relief	-0.121	0.422*	0.682*	0.332*	1
Appraisal					
Motivational relevance	0.293*	0.136	0.176**	0.262*	0.178**
Motivational congruence	-0.379*	0.195**	0.173**	0.009	0.250*
Self accountability	0.018	0.089	0.084	0.095	0.159
Other accountability	0.203**	0.105	0.132	0.100	0.192**
Future expectancy	-0.106	0.363*	0.394*	0.092	0.340*
Problem-focused coping potential	-0.219*	0.314*	0.291*	0.247*	0.316*
Emotion-focused coping potential	-0.378*	0.184**	0.225*	0.061	0.274*
Core relational theme					
Removal of harm	0.119	0.340*	0.419*	0.435*	0.380*
Threat	0.598*	-0.109	-0.100	0.161	-0.173**
Effortful optimism	-0.085	0.427*	0.265*	0.082	0.298*
Surprise	0.303*	0.041	0.014	0.134	-0.031
Hopelessness	0.335*	0.002	-0.001	0.052	-0.102
Possibility of success	0.095	0.452*	0.431*	0.204**	0.271*
Confusion	0.329*	-0.009	0.016	0.236*	-0.133
Other credit	0.057	0.268*	0.538*	0.267*	0.412*
Irrelevance	0.114	0.080	0.170**	0.171**	-0.023
Self-blame	0.256*	0.137	0.128	0.187**	0.027
Lack of concern	-0.188*	0.306*	0.326*	0.005	0.334*
Other blame	0.155	0.053	0.044	0.118	-0.013
Self credit	0.075	0.181**	0.342**	0.259*	0.174**
Regret	0.220*	0.049	0.063	0.186**	-0.002

A full correlation table is available from the authors upon request.

* $p < 0.01$.

** $p < 0.05$.

*** $p < 0.001$.

direction with anxiety and hope, respectively. However, while problem-focused coping potential was correlated with challenge, future expectancy was not. Other accountability was not correlated with gratitude. Finally, the hypothesised core relational themes were correlated with the emotions of anxiety, hope and gratitude, but not challenge. With the exception of self accountability, all secondary appraisals were correlated with relief.

Table 5 reports the results of the hierarchical multiple regression analyses. Only those variables making a significant contribution to the model in step 3 are displayed in the table (the full models are available from the authors). For anxiety, the appraisals entered in step one accounted for 25% of the variance in anxiety scores; the core relational theme of threat explained a further 8%. No other variables added to the explained variance. The appraisals entered in step one accounted for 15% of the variance in "hope" scores, and the core relational theme of "possibility of success" added 5% to the explained variance. A further 3% of the variance in hope scores was explained by the non-hypothesised core relational theme of lack of concern. Seven percent of the variance in gratitude scores was accounted for by the appraisals entered in step one. The core relational theme of other credit explained a further 20% of the variance, while the non-hypothesised core relational theme of irrelevance explained an additional 2% of the variance. The hypothesised appraisals accounted for 10% of the variance in challenge scores. However, against our predictions, the core relational theme of effortful optimism did not significantly add to the explained variance. The total variance explained by the Lazarus & Smith model was therefore only 10%. By contrast, the core relational theme of removal of harm added an additional 16% to the explained variance in challenge scores.

The emotion of relief has not been modelled previously by Smith and Lazarus (1993). Accordingly, all appraisals correlated with relief were entered into step one and all correlated core relational themes were entered into step two. At step one, the appraisals of motivational congruence, other accountability and future expectancy made a significant contribution to the variance in relief scores, accounting for 20% of the variance in relief scores. At step two, the core relational themes of success and lack of concern accounted for an additional 11% of the variance. In total, 31% of the variance in scores for relief was explained by these variables.

Discussion

The study provides further evidence that emotional responses to the receipt of genetic risk information can be both positive and negative (Bonadona et al., 2002; Dorval et al., 2000; Lynch et al., 1997). There is a need therefore to move away from the past tendency to view the risk assessment process from a pathological perspective, focusing purely on anxiety and depression. We found that the early stage of the assessment process engenders a number of positive emotions, including hope, relief, even gratitude. The study also explored the degree to which the cognitive model of emotion developed by Smith and Lazarus (1990, 1993) was associated with emotional responses to a real and emotionally ambiguous life event. The implications of these findings are discussed in terms of theory and the context of cancer genetic risk assessment.

Overall, although most of the findings were consistent with Smith and Lazarus' model, the explained variance in emotion scores was modest and inconsistent. The model accounted for 33% of the variance in anxiety scores, 20% of hope scores and even less of the variance in challenge scores. Despite the modest explanatory power of the model, the study found a more consistent relationship between primary appraisals and each of

Table 5. Results of hierarchical regression analyses with each emotion forming the dependent variable and correlated appraisals and core relational themes as independent variables ($n = 145$).

	R^2 increase	Final beta	T value	Semi partial correlations	F change
Anxiety					
Step one					
Motivational relevance	0.25	.22	2.86*	0.22	15.68
Motivational incongruence		.25	3.08*	0.23	
Emotion-focused coping potential		-0.29	-3.64*	-0.27	
Step Two					
Ambiguous danger/threat	0.08	0.34	4.20*	0.34	17.60
Hope					
Step one					
Motivational relevance	0.15	0.12	1.35	0.11	8.07
Motivational incongruence		-0.17	-2.03**	-0.17	
Future expectancy		0.32	3.73*	0.31	
Step two					
Possibility of success	0.05	0.27	3.04*	0.27	9.25
Step three					
Lack of concern	0.03	0.21	2.13**	0.19	1.68
Gratitude					
Step one					
Motivational relevance	0.07	0.20	2.33**	0.20	4.42
Motivational Incongruence		-0.23	-2.70*	-0.23	
Other accountability		0.14	1.57	0.13	
Step two					
Other credit	0.20	0.47	5.92*	0.47	35.00
Step three					
Irrelevance	0.02	0.19	2.07**	0.19	1.32
Challenge					
Step one					
Motivational relevance	0.10	0.26	2.92*	0.25	4.33
Motivational incongruence		-0.01	-0.12	-0.01	
High future expectancy		-0.06	-0.58	-0.05	
High problem-focused coping potential		0.25	2.66*	0.23	
Step two					
Effortful optimism	-0.01	-0.03	-0.35	-0.03	0.13
Step three					
Removal of harm	0.16	0.38	3.65*	0.31	3.84
Relief					
Step one					
Motivational relevance	0.20	0.16	1.93	0.15	6.23
Motivational incongruence		-0.24	-2.73*	-0.22	
Other accountability		0.17	2.00**	0.16	
Future expectancy		0.21	2.30**	0.02	
Step two					
Possibility of success	0.11	-0.33	-2.60**	-0.22	3.97
Lack of concern		0.36	3.62*	0.31	

* $p < 0.01$; ** $p < 0.05$.

the emotions than previous studies (Bennett et al., 2003; Smith & Lazarus, 1993) although measures of both relevance and congruence contributed to the explained variance of only two of the five emotions: anxiety and gratitude. This greater consistency may reflect the more mixed emotional response to cancer genetic risk assessment than in previous studies, which involved recall of an identified “stressful event” which by definition will be relevant and incongruent (Bennett et al., 2003; Lowe & Bennett, 2003). The study also found some support for role of secondary appraisals in determining specific emotions, although again the data lacked consistency. The hypothesised secondary appraisals of emotion focused coping potential and future expectancy contributed significantly to the variance in anxiety and hope scores, but not the gratitude or challenge scores. In addition, while the hypothesised core relational themes contributed significantly to the variance in all the emotions bar challenge, a number of non-hypothesised core relational themes also contributed to the variance in scores for hope (lack of concern), gratitude (irrelevance) and challenge (removal of harm), suggesting that Smith and Lazarus’ model may not distinguish between emotions as robustly as hypothesised.

A number of specific findings are worthy of note. Women experiencing gratitude considered the referral to be relevant and consistent with their goals, and believed that other people had been helpful. Although the hypothesised secondary appraisal of other-accountability was not significantly associated with this emotion, the core relational theme of other-credit was. This positive attribution, in the context of a positive emotion, may be a more appropriate core relational theme than other accountability which implies some degree of negativity and blame. Challenge was poorly predicted by the hypothesised appraisals and core relational themes, suggesting that the model for this emotion needs further development. According to Smith (1991), the adaptational function of challenge is to motivate problem-focused coping which leads to mastery or gain over the situation. However, in contrast to the predictions made by Smith (1991), the core relational theme of effortful optimism was not associated with the emotion of challenge, while the non-hypothesised core relational theme of removal of harm was.

Finally, the emotion of relief, not previously modelled by Smith and colleagues, was most strongly associated with motivational relevance and congruence, a belief that someone else was responsible for the situation, and an expectancy that the situation would change for the better. While these findings support Lazarus’ (1991) claim that relief is characterised by a change from motivational incongruence to congruence, they do not support his further claim that secondary appraisals are not a necessary component of relief. The current findings are more consistent with other theories, such as Roseman (1991) who suggested that relief may be associated with appraisals linked to motivational congruence (or “motive consistency”) and appraisals of other-accountability (or “other agency”).

This theory-driven research has shed important light on the reasons why individuals may report a range of emotions in response to various elements of genetic risk assessment and testing. The most commonly reported emotions upon referral for cancer genetic risk assessment were gratitude, hope, anxiety, relief, challenge, fear and tranquility. According to Smith (1991), these emotions have a variety of adaptive functions, suggesting that undergoing cancer genetic risk assessment has different implications for individuals. Appraisals reported as being particularly relevant upon referral for cancer genetic risk assessment were motivational relevance, high future expectancy, problem-focused coping potential, emotion-focused coping potential and, to a lesser degree, motivational

incongruence. Appraisals of self and other accountability (and the corresponding core relational themes) do not appear to be relevant to cancer genetic risk assessment, echoing findings of Lowe et al. (2003) in the context of a one-stop clinic for breast disease diagnosis. The most relevant core relational themes were relevance, effortful optimism, removal of harm, lack of concern and other-credit. Combined with the reported high levels of positive emotions, these results support previous findings (Phelps et al., 2005) that many individuals consider referral for cancer genetic risk assessment to be a positive step, with expectations of benefit. They also support other findings suggesting a complex interplay of emotional responses in response to genetic risk assessment or testing (Dorval et al., 2000; Lynch et al., 1997; Phelps et al., 2005; Reeve et al., 2000).

The predominance of optimistic expectations of the outcome of assessment echoes previous findings that many individuals believe that learning their risk will enable them to reduce their chances of developing cancer through appropriate risk reducing behaviours and screening (e.g. Collins et al., 2000; Fraser et al., 2003). Such optimism may be unfounded, however, and inappropriately high levels of optimism at the beginning of the risk assessment process may increase the risk of high levels of distress if individuals are subsequently found to be at high risk of cancer (Dorval et al., 2000). Accordingly, it remains important for clinicians to encourage realistic appraisals and expectations of the assessment process to help individuals prepare and adjust to their risk. Anxiety was associated with the belief that the individual would be unable cope emotionally with undergoing cancer genetic risk assessment and any adverse health information. Such negative beliefs may reduce the strength of intentions to engage in the risk assessment process (Berkenstadt, Shiloh, Barkai, Bat-Miriam Katznelson, & Goldman, 1999; Codori et al., 1999; Vernon et al., 1999). Risk assessment programmes would benefit from providing both emotional support to those who need it, and teaching coping skills where appropriate.

The study has a number of limitations. First, the cross-sectional nature of the study means that it is plausible that emotions may have led to cognitions. However, as cognitions are thought to immediately precede emotions, or form the cognitive element of the emotion, the two processes occur virtually simultaneously. Accordingly, longitudinal studies are of limited value as they cannot determine direction of causality. The emotional and cognitive responses to being referred for cancer genetic risk assessment reported in this study are only representative of those individuals who chose to proceed with the referral and to undergo risk assessment. The psychological impact upon those who were referred but who declined to enter the service is not known, although there is evidence to suggest that such individuals may have higher levels of distress than those who proceeded with the assessment (Geer, Ropka, Cohn, Jones, & Miesfeldt, 2001). The reported analysis also only contained women without a current or past personal diagnosis of cancer. It is possible that women without a personal diagnosis of cancer may hold different appraisals about genetic risk assessment than women who have currently or previously suffered from cancer, although some studies suggest little difference in their psychological responses to cancer genetic risk assessment (Bish et al., 2002; Coyne, Gaba, Benazon, Calzone, & Weber, 2000).

As found previously (Lowe et al., 2003) some of the items developed by Smith & Lazarus appear to lack face and content validity, suggesting a need to explore how well individuals understand these items. The current phrasing of the questions does not ask whether the individual actually considered the issue raised in each item, but asks them to make a judgement about aspects of the situation (e.g. "To what extent are there negative aspects to the situation/things you do not want or are unhappy about?") which they may

or may not actually be considering. Thus, the questionnaire may encourage individuals to construct a view of the situation rather than reporting their spontaneously occurring appraisal of it. Future development of these measures should seek to capture data on whether individuals actually considered each issue.

Finally, although the aim of this article was to specifically test the Smith & Lazarus model, other measures of cognitive appraisal such as the Cognitive Appraisal of Health Scale (Kessler, 1998) or the Stress Appraisal Measure (Peacock & Wong, 1990) may also be appropriate for exploring the process of cancer genetic risk assessment. However, while these health specific models may prove useful in this context, a generic model linking cognitive processes and emotions should also be able to capture relevant cognitive content and its relationship to emotions in health contexts. Indeed, if the development of psychological theory is not to become splintered and lacking a clear theoretical focus, domain specific measures and models of appraisal/emotions should correspond with more generic models.

Conclusion

This study sheds important new light on how both positive and negative emotions to a real-life event can be explained by the cognitive theory of emotion developed by Smith (1991) and Smith and Lazarus (1990, 1993). The model explains some of the variance in each of the emotions explored, but emotions are rarely uniquely explained by the theory and the variance explained is limited. The model clearly needs further development and investigation. Nevertheless, these results have shown that identifying relevant components of cognitive appraisal can increase our understanding of why emotional responses to potentially stressful health-related events such as cancer genetic risk assessment differ amongst individuals, and how we may attempt to improve outcomes following genetic risk assessment by ensuring appraisals are based on accurate beliefs and expectations.

Acknowledgements

This study was approved by the South East Wales Local Research Ethics Committee and formed part of a PhD Studentship for Ceri Phelps, funded by the Wales Office for Research & Development (WORD). We thank all the women who took part in this study.

References

- Bennet, P., Lowe, R., & Honey, K. (2003). Appraisals and emotions: a test of the consistency of reporting and their associations. *Cognition and Emotion*, 17, 511–520.
- Berkenstadt, M., Shiloh, S., Barkai, G., Bat-Miriam, Katznelson M., & Goldman, B. (1999). Perceived Personal Control (PPC): a new concept in measuring outcome of genetic counseling. *American Journal of Medical Genetics*, 82, 53–59.
- Bish, A., Sutton, S., Jacobs, C., Levene, S., Ramirez, A., & Hodgson, S. (2002). Changes in psychological distress after cancer genetic counselling: a comparison of affected and unaffected women. *British Journal of Cancer*, 86(1), 43–50.
- Bonadona, V., Saltel, P., Desseigne, F., Mignotte, H., Saurin, J.-C., Wang, Q., Sinilnikova, O., Giraud, S., Freyer, G., Plauchu, H., Puisieux, A., & Lasset, C. (2002). Cancer patients who experienced diagnostic testing for cancer susceptibility: reactions and behaviour after the disclosure of a positive test result. *Cancer Epidemiology, Biomarkers and Prevention*, 11, 97–104.
- Brain, K., Norman, P., Gray, J., Mansel, R., Rogers, C., & Harper, P. (2002). A randomised trial of specialist genetic assessment: psychological impact on women at different levels of familial breast cancer risk. *British Journal of Cancer*, 86(2), 233–238.

- Codori, A., Peterson, G.M., Miglioretti, D.L., Larkin, E.K., Bushey, M.T., Young, C., Brensinger, J.D., Johnson, K., Bacon, J.A., & Booker, S.V. (1999). Attitudes towards colon cancer gene testing: factors predicting test uptake. *Cancer Epidemiology, Biomarkers and Prevention*, 8, 345–351.
- Collins, V., Halliday, J., Warren, R., & Williamson, R. (2000). Assessment of education and counseling offered by a familial colorectal cancer clinic. *Clinical Genetics*, 57, 48–55.
- Coyne, J.C., Gaba, C.G., Benazon, N.R., Calzone, K., & Weber, B.L. (2000). Distress and psychiatric morbidity among women from high risk breast and ovarian cancer families. *Journal of Consulting and Clinical Psychology*, 68(5), 864–874.
- Cull, A., Anderson, E., Campbell, S., Mackay, J., Smythe, E., & Steel, M. (1999). The impact of genetic counselling about breast cancer risk on women's risk perceptions and levels of distress. *British Journal of Cancer*, 79(3/4), 501–508.
- Dorval, M., Patenaude, A.F., Schneider, K.A., Kieffer, S.A., DiGianni, L., Kalkbrenner, K.J., Bromberg, J.I., Basili, L.A., Calzone, K., Stopfer, J., Weber, B.L., & Garber, J.E. (2000). Anticipated versus actual emotional reactions to disclosure of results of genetic tests for cancer susceptibility: findings from p53 and BRCA1 testing programs. *Journal of Clinical Oncology*, 18(10), 2135–2142.
- Fraser, L., Bramald, S., Chapman, C., Chu, C., Cornelius, V., Douglas, F., Lucassen, A., Nehammer, A., Sutton, S., Trivella, M., & Hodgson, S. (2003). What motivates interest in attending a familial cancer genetics clinic? *Familial Cancer*, 2(3–4), 159–168.
- Frederickson, B.L., Mancuso, R.A., Branigan, C., & Tugade, M.M. (2000). The undoing effect of positive emotions. *Motivation and Emotion*, 24(4), 237–258.
- Fry, A., Cull, A., Appleton, S., Rush, R., Holloway, S., Gorman, D., Cetnarskyj, R., Thomas, R., Campbell, J., Anderson, E., Steel, M., Porteous, M., & Campbell, H. (2003). A randomised controlled trial of breast cancer genetics services in South East Scotland: psychological impact. *British Journal of Cancer*, 89, 653–659.
- Geer, K.P., Ropka, M.E., Cohn, W.F., Jones, S.M., & Miesfeldt, S. (2001). Factors influencing patients' decisions to decline cancer genetics counseling services. *Journal of Genetic Counseling*, 10(1), 25–40.
- Holloway, S., Porteous, M., Cetnarskyj, R., Anderson, E., Rush, R., Fry, A., Gorman, D., Steel, M., & Campbell, H. (2004). Patient satisfaction with two different models of cancer genetic services in south-east Scotland. *British Journal of Cancer*, 90, 582–589.
- Hopwood, P., Keeling, F., Long, A., Pool, C., Evans, G., & Howell, A. (1998). Psychological support needs for women at high genetic risk of breast cancer: some preliminary findings. *Psycho-Oncology*, 7, 402–412.
- Kessler, T.A. (1998). The Cognitive Appraisal of Health Scale: development and psychometric evaluation. *Research in Nursing and Health*, 21, 73–82.
- Lazarus, R.S. (1991). *Emotion and adaptation*. New York: Oxford University Press.
- Lodder, L.N., Frets, P.G., Trijsburg, R.W., Meijers-Heijboer, E.J., Klijn, J.G., Duivendoorn, H.J., Tibben, A., Wagner, A., van der Meer, C.A., Devilee, P., Cornelisse, C.J., & Niermeijer, M.F. (1999). Presymptomatic testing for BRCA1 and BRCA2: How distressing are the pre-test weeks? *Journal of Medical Genetics*, 36, 906–913.
- Lowe, R., & Bennett, P. (2003). Exploring coping reactions to work-stress: application of an appraisal theory. *Journal of Occupational and Organizational Psychology*, 76, 393–400.
- Lowe, R., Vedhara, K., Bennett, P., Brookes, E., Gale, L., Munnoch, K., Schreiber-Kounine, C., Fowler, C., Rayter, Z., Sammon, A., & Farndon, J. (2003). Emotion-related primary and secondary appraisals, adjustment and coping: associations in women awaiting breast disease diagnosis. *British Journal of Health Psychology*, 8, 377–391.
- Lynch, H.T., Lemon, S.J., Durham, C., Tinley, S.T., Connolly Lynch, J.F., Surdam, J., Orinion, E., Slominski-Caster, S., Watson, P., Lerman, C., Tonin, P., Lenoir, G., Serova, O., & Narod, S. (1997). A descriptive study of BRCA1 testing and reactions to disclosure of test results. *Cancer*, 79(11), 2219–2228.
- Meiser, B., Butow, P., Friedlander, M., Barratt, M., Schnieden, V., Watson, M., Brown, J., & Tucker, K. (2003). Psychological impact of genetic testing in women from high-risk breast cancer families. *European Journal of Cancer*, 38, 2025–2031.
- Orbell, S., Hagger, M., Brown, V., & Tidy, J. (2004). Appraisal theory and emotional sequelae of first visit to colposcopy following an abnormal cervical screening result. *British Journal of Health Psychology*, 9, 533–555.

- Peacock, E.J., & Wong, P.T.P. (1990). The Stress Appraisal Measure (SAM): a multidimensional approach to cognitive appraisal. *Stress Medicine*, 6, 227–236.
- Phelps, C., Bennett, P., Iredale, R., Anstey, S., & Gray, J. (2005). The development of a distraction-based coping intervention for women waiting for genetic risk information: a phase 1 qualitative study. *Psycho-Oncology*, 15(2), 169–173.
- Reeve, J., Owens, R.G., & Winship, I.M. (2000). Psychological impact of predictive testing for colonic cancer. *Journal of Health Psychology*, 5(1), 99–108.
- Roseman, I. (1991). Appraisal determinants of discrete emotions. *Cognition and Emotion*, 5(3), 161–200.
- Scherer, K. (1984). On the nature and function of emotion: a component process approach. In K. Scherer & P. Ekman (Eds.), *Approaches to emotion* (pp. 665–681). Chichester: Wiley.
- Smith, C.A. (1991). The self, appraisal, and coping. In C. Snyder & D. Forsyth (Eds.), *Handbook of social and clinical psychology: the health perspective* (pp. 116–137). New York: Pergamon.
- Smith, C.A., & Lazarus, R.S. (1990). Emotion and adaptation. In L.A. Pervin (Ed.), *Handbook of personality: theory and research* (pp. 609–637). New York: Guildford press.
- Smith, C.A., & Lazarus, R.S. (1993). Appraisal components, core relational themes, and the emotions. *Cognition and Emotion*, 7(3/4), 233–269.
- Smith, C.A., Haynes, K., Lazarus, R.S., & Pope, L.K. (1993). In search of the ‘hot’ cognitions: attributions, appraisals, and their relation to emotion. *Journal of Personality and Social Psychology*, 65(5), 916–929.
- van Dijk, S., Otten, W., Zoetewij, M.W., Timmermans, D.R.M., van Asperen, C.J., Breuning, M.H., Tollenaar, R.A.E.M., & Kievit, J. (2003). Genetic counselling and the intention to undergo prophylactic mastectomy: effects of a breast cancer risk assessment. *British Journal of Cancer*, 88, 1675–1681.
- Vernon, S.W., Gritz, E.R., Peterson, G.M., Perz, C.A., Marani, S., Amos, C.F., & Baile, W.F. (1999). Intention to learn results of genetic testing for hereditary colon cancer. *Cancer Epidemiology, Biomarkers and Prevention*, 8, 353–360.
- Watson, M., Foster, C., Eeles, R., Eccles, D., Ashley, S., Davidson, R., Mackay, J., Morrison, P.J., Hopwood, P., Evans, D.G., & Psychosocial Study Collaborators. (2004). Psychosocial impact of breast/ovarian (BRCA 1/2) cancer-predictive genetic testing in a UK multi-centre clinical cohort. *British Journal of Cancer*, 91, 1787–1794.

Copyright of *Psychology, Health & Medicine* is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.