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The Emotional Effects of Genetic Diseases: Implications for Clinical Genetics

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The aim of this qualitative study was to explore the emotional effects that may be common to many genetic conditions, or risk of genetic conditions, that could be appropriately targeted by clinical genetics services. The study sample comprised 52 individuals. Seven focus groups with patients of clinical genetics services, their representatives from patient support organizations and genetics healthcare providers were conducted. Focus groups were supplemented by 19 face-to-face interviews with patients and patient group representatives. Focus groups and interviews were audio taped, transcribed in full, and analyzed using the constant comparative method. Eight emotional effects of genetic diseases were identified: anxiety, worry about risks to children, guilt, anger, uncertainty, sadness and grief, depression, and redemptive adjustment. Two factors were identified that could modify the emotional effects; these were variability of genetic diseases, and lack of diagnosis/inappropriate care. Despite many negative effects of genetic disease being identified, results also suggest that redemptive adjustment is possible where a genetic condition is present in a family. Interventions designed to (1) adjust the modifying conditions and (2) help manage the emotional effects may facilitate adjustment and improve patient outcomes. © 2007 Wiley-Liss, Inc.

Key words: clinical genetics services; emotional effects; qualitative research; focus groups; interviews

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INTRODUCTION

There is a significant body of research indicating that having a genetic condition in the family is burdensome emotionally [Benjamin et al., 1993; Chapple et al., 1995; Fanos and Johnson, 1995; McAllister et al., 1998; Fanos, 1999; Fanos and Puck, 2001; Skirton, 2001; Foster et al., 2002; Downing, 2005; Hallowell et al., 2005]. One goal of genetic counseling is helping patients to "make the best possible adjustment to the disorder in an affected family member or to the risk of recurrence of that disorder or both" [Fraser et al., 2003]. This raises the question of whether interventions offered by a clinical genetics service do provide any demonstrable emotional benefits to patients. Evaluations of clinical cancer genetics have investigated psychological impact of genetic counseling and cancer risk assessment [Meiser and Halliday, 2002; Braithwaite et al., 2004] mainly using outcome measures of anxiety, worry, and depression. These studies have shown that genetic counseling for cancer risk does not cause significantly increased distress. Some of these studies [Hopwood et al., 1998; Ritvo et al., 1999] have shown that some women do present for breast and ovarian cancer genetic counseling with significant psychological distress, but that the proportion who are distressed does not change after counseling.

Measures of anxiety and depression have also been used to investigate emotional outcomes after predictive genetic testing for Huntington disease and

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inherited cancer syndromes [Broadstock et al., 2000; Vadaparampil et al., 2005]. These studies were done primarily with the aim of establishing whether predictive testing causes significant psychological harm, and have focused on identifying changes in distress levels before and after testing. Reassuringly, such studies have shown that (a) predictive testing is unlikely to cause significant distress in the long-term and (b) most applicants for predictive testing show distress levels within the normal range [Duisterhof et al., 2001]. However, there is little evidence for any emotional benefits from predictive genetic testing with the outcome measures used. Studies looking at adjustment have tended to focus on the presence or absence of clinical anxiety and depression at a particular time, and may lack sensitivity in picking up other changes in effect such as those relating to sadness and bereavement [MacLeod, 2003]. More exploratory qualitative research is needed to (1) take account of the possibility of different types of distress as well as possible emotional benefits experienced by patients and (2) identify what emotional effects may be common across genetic conditions.

Previous work argues that clinical genetics services should be evaluated on the basis of how well they alleviate the effects of genetic conditions [McAllister et al., 2007]. There are few studies that aim to investigate what emotional effects on individuals and families may be common to many, or all, genetic conditions, with the aim of using this information to design interventions that can then be robustly evaluated. By exploring the emotional and psychosocial effects that may be common to many or all genetic conditions, it may also be possible to identify or develop measures of outcome that capture the patient benefits of using clinical genetics services, appropriate for many types of genetic conditions. This study presents data that identify and explore emotional effects that may be common to a variety of genetic conditions. The implications of these findings for clinical genetics services will be discussed.

METHODS

The primary aim of this study was to explore the emotional effects of genetic conditions, or risk of genetic conditions, that may be appropriately targeted by clinical genetics services. A secondary aim was to generate hypotheses for future research.

Qualitative research is most appropriate in areas of healthcare, which are not well understood, and the variables have not been fully identified [Strauss and Corbin, 1990; Miles and Huberman, 1994]. The first stage in this study involved seven focus groups conducted to explore the effects of genetic conditions and identify which of these effects are most appropriately targeted by clinical genetics services [McAllister et al., 2007]. The focus group participants included patients, health professionals involved in the provision of clinical genetics services in the Northwest region of England, and patient group representatives. Bringing patients into a group setting to discuss their experiences of having different genetic conditions in their families is an approach that has not been used in other research studies. Full details of the focus group design are presented elsewhere [McAllister et al., 2007]. The second stage of the study involved interviews with a new sample of 19 patients and representatives from patient support organizations. The participants in this additional sample represented different genetic conditions to those represented in the focus groups (Tables I and II). The data from the interviews and focus groups were combined to give a total sample size of 52 participants. The focus of the interviews was to obtain a critical assessment of the themes identified in the focus groups, from the perspectives of patients and patient representatives, and to clarify whether any new effects could be identified. In this way, the interviews were used to check the validity and saturation of the themes previously identified in the focus groups.

The data were analyzed using the constant comparative method [McAllister, 2001; McAllister et al., 2007]. This approach involves simultaneous data collection and analysis. The emerging analysis then informs later data collection through the process of theoretical sampling [Glaser and Strauss, 1967], ensuring validity of the emerging analysis. This approach facilitated the transition from analysis of focus group transcripts to interview transcripts, and enabled the analysis to progress smoothly into this second phase of the research. Coding began with open coding, during which pieces of text are

TABLE I. Summary of Focus Group Composition

Focus group	Types of participants	Number of participants
1	Clinicians (tertiary care)	7
2	Client representatives	5
3	Clients (cancer genetics)	5
4	Clinicians (secondary and tertiary care)	5
5	Client representatives	3
6	Clients (general genetics)	5
7	Clinicians (primary and tertiary care)	3
Total number of focus group participants		33

TABLE II. Summary of Interview Participation

Types of participants	No. participants invited	No. participants who declined	No. participants who did not respond	No. participants	Conditions represented (no. of interviews)
Patients	35	9	17	9	Marfan syndrome (1), chromosome translocations (2), Duchenne muscular dystrophy (1), fragile X syndrome (1), Huntington disease (1), Leber hereditary optic atrophy (1), multiple endocrine neoplasia (1), spinocerebellar ataxia (1),
Patient group representatives	24	2	12	10	Costello syndrome (1), hereditary ataxias (1), Hereditary multiple exostoses (1), lower limb conditions (1), mitochondrial diseases (1), multiple endocrine neoplasia (1), skeletal dysplasias (1), retinitis pigmentosa (1), Rubinstein–Taybi syndrome (1), sudden adult death syndrome (1)
Total number of interview participants:				19	

highlighted as potentially relevant to the research question, and given a conceptual label that reflects the meaning in the piece of text. "Constant comparison" refers to the practice of comparing every new instance of a specific code to every other instance of that code, resulting in further development of the textual description attached to that code. As is common with qualitative analysis, the coding system underwent a series of iterations, with some codes becoming redundant and others being merged or relabeled. The addition of the interview data resulted in substantial changes of this kind. As analysis progressed, common themes emerged across codes, resulting in the final categories presented in this article.

Some qualitative researchers do recommend the use of a second rater [e.g., Miles and Huberman, 1994] whereas others do not [e.g., Strauss and Corbin, 1990]. A second rater was not used in this study. The methodological approach used in this study was based on grounded theory, which is a tradition that proposes the use of theoretical sampling, simultaneous data collection and analysis, and testing out of developing hypotheses by collection of further data to ensure validity of the developing analysis. The strength of this approach is in its validity, rather than its reliability.

Following Local Research Ethics Committee approval, participants were identified from local clinical networks in the region (health professionals), the Northwest Regional clinical genetics service (patients) and the Genetic Interest Group membership and a wider internet search (patient group representatives). Patients and patient group representatives are together referred to as "patient groups."

Formal written consent was obtained before the focus group or interview began. Interview participants were identified and recruited by letter from the clinical team, who were asked to recruit patients who had used the service within the last year, and who represented a broad range of genetic conditions, including dominant, X-linked and recessive conditions, and chromosome abnormalities.

Focus groups, which were approximately 2 hr long, were conducted on University of Manchester premises. Interviews took place at a location chosen by the participant, which in all cases was their home. Trained and experienced facilitators were used to run the focus groups. Two researchers (M.M. and S.N.) conducted the interviews, which were on average 1 hr long. Interviews and focus groups were audio taped and transcribed verbatim.

RESULTS

The numbers of participants identified and recruited for the focus groups and interviews are shown in Tables I and II. Following the focus group analysis, a set of emotional effects were identified: anxiety, worry about risks to children, guilt, anger, uncertainty, redemptive adjustment, illness/disability, early/untimely death and bereavement, and variability [McAllister et al., 2007]. The follow-up interview data with a separate sample of participants resulted in a new analysis of the combined data from the focus groups and interviews, which is summarized in Table III and Figure 1. The follow-up interviews resulted in significant development of the theme *early/untimely death and bereavement*, which was relabeled *sadness and grief*. One additional emotional effect was identified in the interviews, which had not been discussed in the focus groups—this was *depression*. *Depression* was identified only by two individuals affected by genetic

TABLE III. Emotional Effects of Genetics Conditions on Individuals and Families

Emotional effects	
Anxiety	Uncertainty
Worry about risks to children	Early/untimely death and bereavement further developed and relabeled sadness and grief[a]
Guilt	Depression[a,b]
Anger	Redemptive adjustment
Modifying conditions	
Variability	
Lack of diagnosis/inappropriate care	

[a]Identified by interview participants, but not by focus groups participants.
[b]Identified by patient participants and not by participating health professionals.

conditions, and was not identified by any unaffected patient participants, or by any of the health professionals. Further analysis of the data resulted in the theme *illness/disability* being subsumed under *variability*. Sequential interviews allowed the themes of *variability* and the *lack of diagnosis/inappropriate care* to be explored further in terms of their effects over time. The new data from the interviews indicated that these themes needed to be reclassified as "modifying conditions" of the emotional effects of genetic conditions.

The Emotional Effects

Anxiety. Worry and anxiety were very closely, and sometimes inextricably linked for participants in this study. While anxiety was felt to be ever present, the levels and the impact were described as varying by condition, and also over the life-course. This was often linked to coping. For those at risk of late onset dominantly inherited conditions, worry can be related not only to how they are going to deal with the illness in their close family members, but also to their own risk of developing the condition.

> *"... it has a huge emotional impact because they know that not only are they facing the parent's disability and problems, but they are facing it for themselves in the future" (patient representative, FG2).*

Facing up to the genetic condition in the family by accessing and using clinical genetics services can itself contribute to feelings of anxiety.

> *"... whilst you're having the testing, before you're having it, the emotional and social effects are going to be even greater because it's going to be constantly on your mind" (patient, I2).*

There was one specific worry that emerged many times in the focus groups and interviews, and this was the worry that parents have about whether their children will inherit the family condition. This

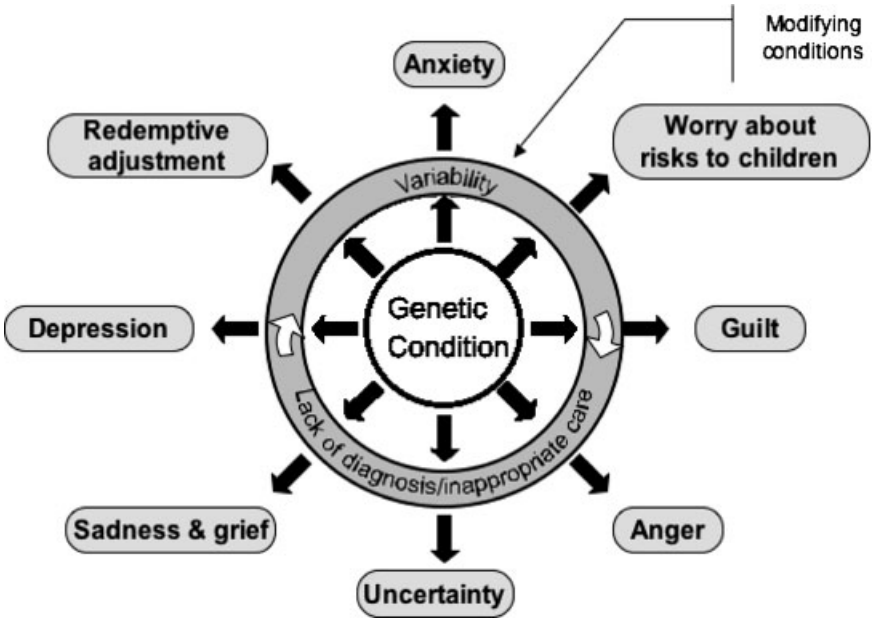

FIG. 1. The modifying conditions can influence the emotional effects of genetic conditions.

worry emerged as so significant in the focus groups and interviews, and because it seems so specific to situations of *genetic* risk, it was treated as a separate theme.

Worry about risk to children. Patients, in particular, were very focused on the risk of passing a genetic condition to their children. This was common across all the genetic conditions represented in the sample, whether the condition was chromosomal, X-linked, dominant, or mitochondrial in its mode of inheritance. In many cases, the health of future generations was more important than the present.

> *"...I mean for me the thing that differentiates this from any other kind of illness is the impact or potential impact on your children, that's what really hits you quite hard... It's a double whammy, it's bam bam ..." (patient, I9).*

Those who did not know about the risk prior to having their children wondered whether they would have made different reproductive choices had they known. Patient and patient group representatives in this study often described themselves as more worried about the risks to their children's' health, than about the risks to their own health.

Guilt. The data suggest that responses to genetic conditions in families are often characterized by feelings of guilt. Feelings of guilt were described by many participants in the focus groups and in the interviews, and seemed to be common across a wide variety of situations of genetic risk. Guilt can be experienced for having (perhaps unknowingly) passed a genetic condition or a faulty gene to children, causing them to be affected by, or at risk for developing the family condition. Guilt can be felt by unaffected family members, toward their affected siblings, or even about the suffering of previous generations.

Feelings of guilt can be brought to the surface by predictive testing, carrier testing, or chromosome analysis in a family, which clarifies, within a sibling group, who does and who does not carry the family mutation, or whose children might be at risk. It seems that genetic conditions by their nature, affecting some family members and not others, engender feelings of guilt.

One of the advantages mentioned in relation to genetic testing is the possibility that a negative genetic test will remove the worry/guilt about risks to children.

> *"Well the one thing I will be grateful for is the fact that now instead of my kids having to go through colonoscopies there is a blood test that will say whether they [will] or they won't need to do it for the rest of their natural, now that has taken a little bit of the stress from me" (patient, FG3).*

For these clients, providing some hope to their children is very important as a means of alleviating their own feelings of guilt.

Anger. Family members can respond to information about genetic conditions and genetic risk with anger. This can be anger toward the person giving the information, but it can also be anger toward someone for not telling. Clinicians also felt that anger is often directed toward someone in the family, because it is often a family member who passes on this information. This can be a cause of family conflict. At other times, the anger can be directed toward previous generations who may have withheld information about affected persons in the family.

Patient participants in many contexts of genetic risk expressed anger about the existential unfairness of nature.

> *"The fact that it had happened to us, why has it picked on our two, what have they done to harm anybody? [...] And the anger's still there. It's not a guiding force, I don't think it spoils my life in any way, but it's still there and it's still, you know, why not the man over the road, why us? But, you know, you'll never answer that question" (patient representative, I14).*

Uncertainty. Living with feelings of uncertainty emerged as a particular feature that distinguished being at risk of a genetic condition from being diagnosed with an illness. For those at risk of late onset conditions, the uncertainties are associated not just with whether the condition will develop, but also when the condition will develop. Living with this sort of uncertainty can be very difficult, and participants often used vivid metaphors in their descriptions.

> *"In fact with [genetic condition] there isn't any way of knowing, at the moment, if the person has got the gene, so people are, so it's a bit like the sword of Damocles—they fear the worst..." (patient representative, FG2).*

This leaves those at risk not knowing what the future holds, and having difficulties knowing how to move forward.

Sadness and grief. Early, untimely death and loss in the family was a recurring theme in the focus groups. Repeated early death in the family from the same cause can be what first alerts family members to the possible presence of a genetic condition in the family. Participants in the interviews talked in depth about feelings of sadness and grief about the family

condition, in contrast to participants in the focus groups. This did not seem to be a reflection of the different genetic conditions represented in the interviews, but seemed to reflect greater ease talking about difficult emotions on a one-to-one basis than in a group discussion. These feelings of sadness and grief can be part of a process that family members go through either following a genetic diagnosis in the family, or after giving birth to a baby with problems. The latter is described as a grieving process for the perfect baby that had been hoped for or expected.

> *"... we've found that when you first have a diagnosis they're grieving for the child that isn't normal and they're searching for answers [...] you grieve for the perfect person that you're supposed to have. You wait 9 months for a perfect birth and it don't happen and so you get that huge bereavement ..." (patient representative, I5).*

Feelings of grief can also be experienced in other contexts, such as after repeated miscarriages, or after the death of a child or other family member from the condition.

Depression. Depression did not emerge in any of the focus groups, and was only mentioned in two of the follow-up interviews. Both participants who talked about feelings of depression were affected quite severely themselves.

> *"I think a lot of us do get depressed at various times, well I know a lot of members do, this comes up quite often" (patient representative, I11).*

> *"... feeling that your life is over, not wanting to be here, thinking you're going to be housebound for the rest of your life, everything like that" (patient, I4).*

Feelings of depression were not mentioned by any of the participants who were unaffected but at risk of developing a genetic condition. In fact, one participant at risk for developing cancer remembered feeling rather bemused at the suggestion that she may have felt suicidal about her risk situation:

> *"Well I have filled in one or two questionnaires, they can be quite amusing—they ask things like "have you thought about making away with yourself"—well I am not quite at that stage, I am not really obsessed with the condition" (patient, FG5).*

This could also reflect adjustment to the family condition, which may have occurred over a long period of time.

Redemptive adjustment. Both patient representatives and healthcare providers talked about the fact that a genetic diagnosis in the family, although often very traumatic and not something that any family would choose, can have some positive, and even redemptive effects in the longer term. It is worth noting that healthcare providers and patient representatives were in different focus groups, so this concept emerged separately for the two groups.

> *"... from what I've noticed with my families, I mean they wouldn't necessarily say it themselves, but having this condition kind of throws their positive characteristics into being, like a lot of strength and a lot of fight that they didn't even knew they had" (patient representative, FG2).*

Family members can find unexpected fulfillment in focusing their energy in new directions such as in contributing to the work of support groups. Some patient representatives described how this had opened whole new worlds and new friendships for them.

> *"Some parents would say that there are very positive things came out of, I mean, they start off support groups and they raise huge amounts of money for you know for genetic disorders and they sort of get a new lease of life doing the very practical things as a result of the diagnosis" (clinician, FG1).*

However, this did not emerge in any of the focus groups with patients, although it was mentioned in some of the interviews with patient representatives who also had experience as patients. Redemptive adjustment may be one way of finding hope for the future, and involvement with support groups may be a strategy that works for some people in this regard.

The Modifying Conditions

During analysis of the interview data, two factors emerged as having an influence over how a genetic condition can affect people emotionally: *variability* of genetic conditions, and *lack of diagnosis/inappropriate care.* Figure 1 illustrates how these modifying factors sit between the genetic condition and the emotional effects that the condition may have.

Variability. Focus group discussions among healthcare providers indicated that genetic conditions are very variable, and not all genetic conditions have the same degree of emotional impact on affected families.

Patient representatives made a distinction between conditions that you can do something about, and conditions that you cannot do anything about,

because this can have a significant impact on adjustment and coping.

> *"I think there is a big difference in a genetic disorder that you can do something about and a genetic disorder that you can't do anything about. [. . .] is it something that is copeable with insofar as there are different strategies available?" (patient representative, FG5).*

Participants talked about how illness and disability associated with genetic conditions could have significant effects on the emotional life, not only of the affected person, but on their unaffected relatives as well. The feelings that family members have about the particular condition in the family is partly determined by how the physical manifestations of the condition play out.

> *"My husband was very badly disfigured with the condition and it puts a great emotional strain [. . .] not one of, neither he or the rest of the family had any emotional support at all" (patient representative, FG2).*

Lack of diagnosis/inappropriate care. Patient groups commented that although no one wants to have a diagnosis of a genetic condition, that an accurate diagnosis can open the door to effective and appropriate support, disease management, and treatment. Equally, the lack of diagnosis can mean that families may not get the best care.

> *". . .one of the other things about my syndrome is some (people) go to their GPs and have been prescribed treatments which are [. . .] detrimental, not actually just neutral. . . ." (patient, FG6).*

Patient representatives commented that delays in having appropriate diagnoses made, or even delays in having a wanted genetic test can be very distressing for families, and cause a lot of anger. There can be serious health implications, particular if there are delays in appropriate cancer diagnoses or treatment. There are also important psychological and social benefits to be gained by prompt diagnosis, as patients are not left "in limbo," and even bad news can remove uncertainty and enable informed choice.

> *"quite often these families are unaware of what [. . .] the condition is because they don't get access to genetic services. They're going for various treatments at different hospitals. [. . .] They know there's a problem. They have a family and then the bombshell hits, you and your children have this. So they've never had the chance to know what they're dealing with. They don't have the chance to make choices as to whether or not they have children and genetic counseling and all the rest, and that's a big frustration to many, many people, and causes lots of anger" (patient representative, FG2).*

Health service providers who refer to the genetics service also value speed of service and accurate diagnosis, which may involve genetic testing and/or extensive family studies.

DISCUSSION

In our previous study using seven focus groups [McAllister et al., 2007], we identified 10 emotional effects of genetic conditions. There was general agreement between the patient groups and healthcare provider participants in the focus groups about the emotional effects of genetic conditions on individuals and families. In the current study, we expanded and modified those findings with data from 19 interviews with additional patient participants. The follow-up interviews identified depression and feelings of sadness and grief around losses associated with the condition as further effects of having a genetic condition in the family. Importantly, the interviews with the additional sample of participants resulted in a reclassification of two themes. The new data indicated that they were in fact modifying conditions. Firstly, the impact of genetic conditions was mediated by the type of genetic condition a person has or is at risk for. The data illustrated that the emotional impact of a genetic condition on those affected and their families was influenced or mediated by the physical and other health consequences of the genetic condition. The emotional impact was also influenced by the extent to which those affected had any control over the course of the illness. Secondly, whether a person has an accurate diagnosis affects their access to effective and appropriate support, disease management, and treatment. Delays in diagnosis or access to a genetic test can be distressing for families, can have psychological and social consequences, and can have serious health implications. However, these are new findings and require further work to explore and understand how the modifying conditions identified in this study affect the impact of genetic conditions on those affected and their families. Additional research is also needed to identify other modifying conditions, and how they relate to those found here.

While the finding in the present study that anxiety is an effect of having a genetic condition in the family is in itself not new, the present study provides some further insight into the nature of the anxieties experienced. Results suggest that in situations of genetic risk, anxiety can be ever-present, but levels can change over the life-course. This finding supports the suggestion [e.g., McAllister, 2002; Van Oostrom et al., 2003] that anxiety levels in relation

to genetic conditions can fluctuate over time. It seems reasonable to suggest that anxiety may become more intense around such times as symptom development, genetic testing, a new diagnosis, or when thoughts turn to starting a family. These may also be times when families are most likely to have contact with clinical genetics services. As such, interventions designed to help manage feelings of anxiety around these stressful life events may result in improved patient outcomes.

Similarly, feelings of sadness and grief identified in the interviews may also be addressed using psychological and/or counseling interventions. It is recognized that issues of bereavement are common in the genetics clinic, and that it is important for clinicians to have some understanding of the responses to loss and to be able to identify patients who might benefit from referral to bereavement services [Weil, 2000].

Interestingly, depression was only identified as an effect of genetic conditions in the present study by two participants, both of whom were severely affected themselves. It may be that those who are, themselves, diagnosed with a life-limiting genetic condition may be at risk for depression. This suggestion is consistent with evidence that depression scores are higher among those affected with myotonic dystrophy [Antonini et al., 2006] and with findings that young women with breast cancer who are found to carry *BRCA1/2* mutations express feelings of devastation, loneliness, isolation, and ambivalence [Kenen et al., 2006]. Although participants talked about their experience of what they described as "depression," no attempts were made in this study to assess whether this would accord with a clinical definition of depression using psychiatric diagnostic criteria.

Some outcome studies in clinical genetics [Broadstock et al., 2000; Van Oostrom et al., 2003; Braithwaite et al., 2004; Vadaparampil et al., 2005] that have used measures of worry appear to be based on the assumption that people worry mainly about their own health risks. In this study, however, patients in particular talked about their worries about the risk of the family condition to their children. It is well known that wishing to clarify risks for children is a strong motive among those choosing genetic counseling and genetic testing for a variety of conditions [Tyler, 1992; Watson et al., 1995; Brain et al., 2000; Fraser et al., 2003]. One study of psychological adjustment in women having genetic risk assessment for ovarian cancer, showed an association between depression scores and concern for the risk of the condition in their daughters [Ritvo et al., 1999]. What is missing from many of these studies is any measure specific to concern for other family members. The findings in the present study add to the growing literature suggesting that worries about risk of the condition in children can be as great, if not a greater concern, than worries about one's personal health.

The results of this study suggest the hypothesis that being at risk for developing or transmitting a genetic condition, may predispose to anxiety and worry, whereas being affected by a genetic condition may predispose more to depression. Clearly, this hypothesis needs further exploration and testing in qualitative studies, and in quantitative studies in which frequencies could be reported. In particular, epidemiological studies using standardized psychiatric assessment would contribute to our knowledge of the prevalence of anxiety and depression in patients affected by or at risk for a genetic condition. More evidence is needed about the factors that may predispose to psychological morbidity as well as those factors that may be protective. This in turn could lead to more targeted counseling interventions.

Similar to previous research, this study found that feelings of guilt are associated with having a genetic condition in the family. Most often, this appears to be feelings of guilt in relation to having passed on a genetic risk or a genetic condition to children [Frets et al., 1991; Chapple et al., 1995; Faulkner and Kingston, 1998; Fanos, 1999; Bostrom and Ahlstrom, 2005]. There was also evidence in the present study that family members, particularly those who have tested negative for the family mutation, can experience "survivor guilt," which may be a cause of depression [Huggins et al., 1992; Biesecker et al., 1993; Tibben et al., 1993; Lynch et al., 1997; Wagner et al., 2000; Fanos and Puck, 2001]. This will be familiar to clinicians working in genetics, and trying to develop strategies that can address and reduce feelings of guilt [Kessler et al., 1984; Weil, 2000]. Further research is needed to clarify how interventions designed to reduce feelings of guilt can contribute to improving patient outcomes in clinical genetics.

Clinicians in the present study identified feelings of anger between family members about who is and is not affected. However in this study, patient groups did not identify these feelings. There is evidence that anger and family discord are features of coping with some genetic conditions [Dorval et al., 2000; Karetti, 2004], particularly when different members of the same family choose different ways to manage their risks [Downing, 2005]. However, this study identified anger about secrecy and communication about genetic risk. This occurred between family members and also anger aimed at previous generations. More research is needed to explore further the feelings that family members may have toward each other and toward previous generations, and to explore whether interventions offered by a clinical genetics service can improve patient outcomes in this area.

The feelings of uncertainty in the face of genetic risk or the lack of diagnosis found in this study are familiar to clinicians. Living with uncertainty can be very stressful for those at risk for a variety of genetic

conditions as well as for families coping with children who have undiagnosed disabilities. The results about uncertainty found in this study are similar to those in other literature [Lippman-Hand and Fraser, 1979; Lenhard et al., 2005; Dinc and Terzioglu, 2006; Petersen, 2006].

Uncertainties described by participants in the present study seemed to be associated with time, not knowing what the future holds, and the difficulties in knowing how to move forward. The desire to reduce uncertainty can be a motive among those seeking genetic counseling and genetic testing [Tibben et al., 1990; Tibben et al., 1993; MacLeod et al., 2003], although uncertainties still remain even for those who obtain a mutation positive result from predictive testing with regard to when they will develop the condition. Seeking and obtaining information in a genetics clinic may be a way not only of optimizing certainty, but also a way of optimizing feelings of control over the situation the client finds him/herself in, even if certainty is not achieved [MacLeod et al., 2003]. Exploring with patients the boundaries of certainty such as the limitations of genetic testing, how the early signs of a particular condition may present, could help to improve patient outcomes where absolute certainty remains elusive.

Patients and patient group representatives in this study talked about the anger and frustration that can be caused when referral to genetics services or diagnoses of rare genetic conditions are not made promptly. This supports findings in other research [Harris and Reid, 1997; Atkin and Ahmad, 1998; Petersen, 2006]. The present study provides further evidence that access may be problematic for families with rare genetic conditions, and that this can have serious health consequences as well as emotional consequences. More research is needed to understand better the nature of accessibility to clinical genetics services in the UK, as this could have implications for the education of other medical specialties and for public engagement.

It was noted in the present study that the heterogeneity of genetic conditions can be a barrier to generalizations about the emotional impact of genetic conditions in families. However, the organization and funding of clinical genetics services means that generic measures of outcome are needed. A key finding of this qualitative study is that there are common emotional effects that are shared across a range of different genetic conditions. This finding suggests the need for further research to develop generic outcome measures for clinical genetics services. What is reassuring is the finding that redemptive adjustment is possible where a genetic condition is present in a family, and so there is scope for capturing emotional benefits to families.

This study used constant comparative analysis and theoretical sampling. This approach of simultaneous data collection and analysis, allows hypotheses about the data to be generated at each stage of the analysis and then tested by collection of further data. This helps to ensure the validity of the developing analysis and means that the final analysis is more likely to be persuasive in its plausibility rather than its reliability. However, the reliability of the results can only properly be established in a later study using the statistical methods of quantitative research. The results of this qualitative study have been presented descriptively and frequencies or counts of data have not been reported. This is a thematic analysis, where the aim is to identify the range of emotional effects, rather than their frequency. Additional qualitative and survey research is needed to establish the frequency with which different themes occur and experimental methods are required to assess the relative importance of targeted interventions.

Feelings of depression, sadness, and grief may be difficult to bring up in a group setting, but easier to talk about in a one-to-one interview. We have found a combination of focus groups and interviews to be an effective approach to eliciting peoples' thoughts and feelings in this area [Bernhadt et al., 2000]. It was also clear that discussions were more animated in the focus groups where a greater range of genetic conditions were included, than in those where similar conditions (e.g., cancer genetics only) were included. This appeared to be associated with the discovery of a commonality in the experience of living with a genetic condition in the family.

This study forms part of a program of research aimed at developing a core set of outcome measures to evaluate clinical genetics services. A systematic review of validated outcome measures has recently been completed [Payne et al., 2007a]. The findings from the systematic review were used to develop a Delphi survey, which identified nine outcome domains, which are good starting points to develop a core set of outcome measures [Payne et al., 2007b]. The Delphi survey was conducted in parallel with this qualitative study, using separate patient and genetics health professional samples. Further work will triangulate the results from the three studies.

This qualitative exploratory study has added to our understanding of the emotional impact of having a genetic condition in the family, and has indicated areas for further research to support improvements to service provision. For example, the identification of conditions that can modify the emotional effects of genetic conditions may have implications for the way in which services are provided. It may not be possible to do anything to change the variability of genetic conditions, but interventions designed to maximize the possibility of early diagnosis and speed of referral to appropriate services could have important benefits for affected families. There is scope for developing intervention studies to investigate these benefits. In order to understand better how clinical genetics

services can provide emotional benefits to patients and their families, more research is needed to explore (1) differences between the emotional burden of being affected and being at risk for developing or transmitting a genetic condition, (2) the impact of the moderating effects associated with different specific genetic conditions on emotional distress in families and access to accurate diagnosis and appropriate care, (3) whether there are other modifying factors and how they influence the impact of a genetic condition, (4) the impact of psychological and counseling interventions on improvements in patient outcomes from using clinical genetics services.

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