Short Communication

Predictors of Participation in Psychosocial Telephone Counseling following Genetic Testing for BRCA1 and BRCA2 Mutations

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Abstract

Although adjunctive educational and psychosocial programs are now being developed for BRCA1 and BRCA2 (BRCA1/2) mutation carriers, limited information is available about whether mutation carriers will want to receive such programs or about the characteristics of individuals who participate. The goals of the present study were to describe rates of completing a psychosocial telephone counseling (PTC) intervention that was offered to female BRCA1/2 mutation carriers and to identify sociodemographic and psychological factors associated with decisions to complete the intervention. Subjects were 66 BRCA1/2 mutation carriers who were randomized to receive a PTC intervention following receipt of genetic test results. Sociodemographic and psychological factors were evaluated before notification of assignment to the PTC intervention. Completion of the intervention was determined from study records. Overall, 75.8% of subjects completed the PTC intervention. Compared to unaffected subjects, those affected with breast and/or ovarian cancer were 76% less likely to complete the intervention [odds ratio (OR) = 0.24, 95% confidence interval (CI) = 0.06, 0.98, P = 0.05]. In addition, subjects with higher levels of cancer-specific distress [OR = 4.74, 95% CI = 1.02, 22.03, P = 0.05] and those with greater perceptions of social support [OR = 5.81, 95% CI = 1.29, 26.16, P = 0.02] were also most likely to complete the intervention. The results of this study suggest that while most BRCA1/2 mutation carriers are likely to complete an adjunctive psycho-educational program, personal history of cancer, cancer-specific distress, and perceptions of social support are likely to influence participation. (Cancer Epidemiol Biomarkers Prev 2004;13(5):875–81)

Introduction

Genetic testing for BRCA1 and BRCA2 (BRCA1/2) mutations is increasingly being integrated into the clinical management of individuals who have a personal or family history of disease that is suggestive of inherited cancer susceptibility. In accordance with guidelines issued by professional organizations, genetic testing should include pre-test education to facilitate informed decisions about whether or not to have testing, post-test counseling to disclose BRCA1/2 test results and provide recommendations for cancer screening and prevention, and post-disclosure follow-up to answer additional questions and provide referrals (1). The evidence as to whether genetic testing generates adverse psychological reactions is mixed, with some studies reporting no significant effects on generalized distress (2, 3) and other studies revealing specific psychological difficulties such as genetic testing specific distress and uncertainty about the clinical and familial implications of BRCA1/2 test results (4, 5). However, mutation carriers may not be equipped to handle these reactions or the responses from family members (6). Moreover, even though these issues are addressed as part of genetic counseling, there may not be sufficient time to explore these concerns during the test results disclosure session, especially as issues related to the familial impact of testing and decisions about cancer screening and prevention are likely to unfold over time. There have been some recent efforts to develop and evaluate adjunctive educational and psychosocial interventions to address concerns related to medical decision-making and familial issues...
following genetic testing for BRCA1/2 mutations (6–8). However, little is known about whether participants in genetic testing will want to receive such interventions, or about the characteristics of individuals who participate versus those who decline. This paper addresses these questions in a sample of BRCA1/2 mutation carriers.

Previous studies suggest that interest in psychoeducational programs following testing may be high among BRCA1/2 mutation carriers. For example, more than 60% of female BRCA1/2 mutation carriers reported that support groups are needed following test results disclosure (9). Similar results were obtained in a qualitative study of post-test needs among high-risk individuals; about 40% of BRCA1/2 mutation carriers reported that they would be interested in participating in a support group following disclosure of test results (10). However, high levels of interest in psychoeducational or support programs following testing may not translate into high rates of participation. Only about one-third of BRCA1/2 mutation carriers who said that support groups were needed indicated that they would participate in this type of program (9). However, data regarding participation in psychoeducational programs following disclosure of positive BRCA1/2 test results are not available.

We conducted a randomized trial to evaluate whether the psychological and behavioral outcomes of BRCA1/2 testing are improved among mutation carriers by providing a psychosocial counseling intervention in addition to standard genetic counseling (SGC). An innovative feature of this intervention was that it was delivered by telephone to increase the feasibility and acceptability to genetic testing participants. While greater convenience and anonymity may be advantages of telephone counseling (11–13), BRCA1/2 mutation carriers may still decline to participate in post-test psychosocial counseling. Therefore, the present study evaluated rates of completing the psychosocial telephone counseling (PTC) intervention that was offered following receipt of positive genetic test results. In this report, we only evaluated completion of the telephone counseling intervention because it was offered as an adjunct to SGC and required individuals to complete a series of telephone sessions over a 5-week period following receipt of their test results. We were also interested in identifying sociodemographic and baseline psychological factors having independent associations with completing the intervention. Information on the rates and determinants of completing post-test psychosocial counseling will provide important information on the need for and uptake of these types of programs among BRCA1/2 mutation carriers.

Materials and Methods

Study Population. Eligible subjects included female BRCA1/2 mutation carriers ages 18 and older who received genetic counseling and testing through research programs at the Georgetown University Medical Center in Washington, DC and the Women’s College Hospital in Toronto, Canada. Genetic counseling and testing were provided at no cost through both programs. Persons ineligible to participate in the study included BRCA1/2 mutation carriers who were in palliative care for metastatic breast cancer or recurrent ovarian cancer, males, and individuals who were not able to provide informed consent because of a psychiatric or cognitive disorder.

Procedures. This randomized trial was designed to evaluate the effects of PTC on psychological functioning and decisions about cancer screening and surveillance among BRCA1/2 mutation carriers. Following completion of test results disclosure, BRCA1/2 mutation carriers were randomized to receive SGC or SGC+PTC. Subjects provided consent to be randomized to the intervention as part of providing informed consent for pre-test education and test results disclosure. Of 143 BRCA1/2 mutation carriers who were identified, 15 were ineligible for randomization to SGC only or SGC+PTC because they had advanced stage breast or ovarian cancer and 2 refused randomization at the test results disclosure session. Subjects who refused to be randomized to the intervention were excluded from this analysis; thus, of the remaining 126 BRCA1/2 mutation carriers, 66 (52%) were randomized to SGC+PTC and 60 (48%) were randomized to SGC only. Forty-nine families were randomized to SGC and 46 families were randomized to SGC+PTC. Subjects randomized to SGC only and SGC+PTC did not differ in terms of sociodemographic characteristics. This report focuses only on participation in SGC+PTC. Detailed information on the study procedures and counseling protocols is provided below under the section on “Counseling Protocols.”

Following referral, subjects were contacted by telephone to determine eligibility using a structured baseline interview. This interview took approximately 40 min to complete and included measures of sociodemographic characteristics, personal and family history of cancer, and psychological functioning. Following completion of the baseline telephone interview, eligible subjects were invited to participate in the genetic counseling and testing programs at each center. The programs at both centers included pre-test education and test results disclosure sessions that were conducted by a genetic counselor and lasted about 60–90 min. To ensure standardization, genetic counselors at both sites used similar protocols to provide pre-test education and to disclose BRCA1/2 test results. Following disclosure of test results, eligible subjects were randomized to receive SGC only or SGC+PTC. Relatives of BRCA1/2 mutation carriers were invited to participate in the study after a risk-conferring BRCA1/2 gene alteration was identified in a family member (e.g., proband) and were randomized to the same intervention group as their relative. One month following disclosure of BRCA1/2 test results, subjects were contacted for a follow-up telephone interview to reassess psychological functioning. This interview also served as the baseline assessment for the PTC intervention. Subjects who were randomized to the SGC+PTC intervention were notified about their study assignment at the end of this interview. Subjects could decline to participate in the intervention when notified of their study assignment at the end of this interview and could also decline to participate in the intervention during the initial orientation call completed by the PTC counselor.

Counseling Protocols

SGC Only. The SGC only protocol consisted of pre-test education, test results disclosure, and post-disclosure
follow-up. During pre-test education, subjects received information about hereditary breast and ovarian cancer, gene identification and mutation testing, and the benefits, limitations, and risk of genetic testing. During the test results disclosure session, BRCA1/2 test results were disclosed along with information about the risk for developing cancer and individualized guidelines for surveillance and prevention. Supportive counseling that included an assessment of emotional responses, identification of at-risk relatives, and discussion of family communication issues, was also provided as part of this session. All subjects also received a written summary letter that included an interpretation of their BRCA1/2 test result and medical management guidelines. The test results disclosure session was audiotaped after obtaining written informed consent. Approximately 2 weeks after the disclosure session, subjects were contacted by their genetic counselor to complete a post-disclosure follow-up. The post-disclosure follow-up was completed by telephone and was designed to informally assess how subjects were coping and assimilating their test results, answer any questions about their results, and provide additional referrals if needed.

SGC+PTC. The SGC+PTC protocol consisted of the pre-test education session, test results disclosure session, and post-disclosure follow-up described above. Following the 1-month follow-up telephone interview, subjects assigned to SGC+PTC also received a PTC intervention. The PTC intervention was developed based on the Transactional Model of Stress and Coping and consisted of five semi-structured telephone counseling sessions that were delivered over a 5-week period by Master's level counselors affiliated with the Cancer Information Line of the AMC Cancer Research Center (12). Written materials, designed to accompany each thematic issue (e.g., family communication, medical decision-making, and emotional reactions) addressed during the intervention, were also mailed to subjects after completion of the 1-month follow-up telephone interview. These materials were mailed to subjects before they were contacted by the PTC counselor for the intervention. To facilitate the transfer from SGC to the PTC intervention, a transition protocol was used. This transition was completed by telephone and consisted of a case review between the genetic counselor and the PTC counselor. Before the transition call, the PTC counselor listened to the audiotape of the disclosure session and reviewed the written test results summary letter. During the transition call, the genetic counselor and PTC counselor discussed the subject’s primary issues surrounding medical decision-making, family concerns, and emotional reactions. After the transition call was completed, the PTC counselor contacted subjects for an initial orientation call. During this call, the purpose of the intervention was reviewed and the telephone counseling sessions were scheduled. Following completion of the orientation call, subjects were contacted for the first telephone counseling session.

The first telephone counseling session of the PTC intervention (session 1) consisted of a semi-structured clinical assessment interview that was designed to allow the subject to describe her experiences with and reactions to her BRCA1/2 test results. Sessions 2 through 4 were individualized to the concerns raised by subjects within the domains of making medical decisions, managing family concerns, and emotional reactions following receipt of a positive BRCA1/2 test result. The order in which the sessions were delivered was determined based on the priority areas identified by subjects during session 1. The last session of the intervention (session 5) focused on integration and closure of each issue that had been addressed during the intervention. An implementation plan was also developed during session 5 to execute the short- and long-term goals that were established during the intervention. Each telephone counseling session lasted about 60–90 min and was audiotaped after obtaining informed consent.

**Measures**

**Predictor Variables.** We selected factors that prior studies (5, 6, 14) have shown to be areas in which BRCA1/2 mutation carriers are likely to experience difficulty following test results disclosure to evaluate as predictors of completing the intervention.

**Sociodemographics.** Age, marital status, income level, education, and employment status were obtained during the baseline telephone interview.

**General and Cancer-Specific Distress.** We used the Impact of Events scale (15) to evaluate the frequency of intrusive thoughts about cancer and attempts to avoid these thoughts and feelings. The Impact of Events scale has been validated among women from hereditary breast cancer families (16) and has been used to evaluate the impact of genetic testing among high-risk individuals (17). The Impact of Events scale had excellent internal consistency in this sample (Cronbach’s $\alpha = 0.90$). We used the total score for the Impact of Events scale in this study; possible scores ranged from 0 to 72. We also measured general distress using the Hopkins Symptom Checklist-25 (18, 19). The Hopkins Symptom Checklist-25 is a 25-item Likert-style scale that evaluates the presence and severity of anxiety and depression symptoms during the previous month. The Hopkins Symptom Checklist-25 has been used in prior studies to evaluate psychological functioning among women at high risk for having a BRCA1/2 gene alteration (20) and had excellent internal consistency in this sample (Cronbach’s $\alpha = 0.90$). Possible scores for the Hopkins Symptom Checklist-25 ranged from 25 to 100.

**Social Support.** We measured social support using the appraisal sub-scale of the Interpersonal Support Evaluation List (21). The Interpersonal Support Evaluation List is a well-validated self-report measure of perceptions of social support. The appraisal sub-scale includes 10 Likert-style items that evaluate perceptions of the availability of individuals with whom important issues can be discussed. The appraisal scale had excellent internal consistency in this sample (Cronbach’s $\alpha = 0.89$) and possible scores ranged from 0 to 23. We also evaluated receipt of social support using a binary item that asked respondents to indicate if they had seen a counselor for emotional support.

**Cognitive Appraisals about Genetic Testing.** We evaluated cognitive appraisals about BRCA1/2 test results in terms of perceptions of stress and confidence using two new questionnaires that were developed based on the Transactional Model of Stress and Coping (14, 22–24). To evaluate perceptions of stress, we used five Likert-style
items to evaluate perceptions of stress regarding the risk of developing cancer, decisions about risk reduction strategies (i.e., prophylactic surgery) and screening (i.e., mammography), communicating with family members, and dealing with the familial impact of BRCA1/2 mutation carriers who were randomized to SGC+PTC, and were college graduates (77%). Ninety-seven percent of subjects were Caucasian. Of the 66 BRCA1/2 mutation carriers who were randomized to SGC+PTC, 76% were under age 50 (76%), married (74%), and were employed (74%), and were college graduates (77%).

**Results**

**Participation in PTC.** As shown in Table 1, the majority of subjects who were randomized to SGC+PTC were under age 50 (76%), married (74%), employed (74%), and were college graduates (77%). Ninety-seven percent of subjects were Caucasian. Of the 66 BRCA1/2 mutation carriers who were randomized to SGC+PTC, 75.8% completed the intervention and 16 (24.2%) did not complete the intervention. Of those who did not complete the intervention, most (n = 13) declined to participate in the intervention, could not be reached for any of the sessions, or withdrew from the intervention after completing at least one session were categorized as non-participants.

**Outcome Variable**

*Completion of the SGC+PTC Intervention.* Completion of the SGC+PTC intervention was determined from study records. Subjects who accepted the invitation and completed all five of the telephone counseling sessions were categorized as participants. Those who declined to participate in the intervention, could not be reached for any of the sessions, or withdrew from the intervention after completing at least one session were categorized as non-participants.

**Table 1. Sample characteristics and bivariate association between completion of psychosocial telephone counseling and sociodemographic factors and counseling use (n = 62)**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level</th>
<th>n (%)</th>
<th>% Participate</th>
<th>χ²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>≤50</td>
<td>47 (76%)</td>
<td>79%</td>
<td>0.90</td>
</tr>
<tr>
<td></td>
<td>&gt;50</td>
<td>15 (24%)</td>
<td>67%</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Married</td>
<td>46 (74%)</td>
<td>72%</td>
<td>1.61</td>
</tr>
<tr>
<td></td>
<td>Not married</td>
<td>16 (26%)</td>
<td>88%</td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>College graduate or higher</td>
<td>49 (79%)</td>
<td>82%</td>
<td>4.32*</td>
</tr>
<tr>
<td></td>
<td>Some college or less</td>
<td>13 (21%)</td>
<td>54%</td>
<td></td>
</tr>
<tr>
<td>Employment status</td>
<td>Employed</td>
<td>46 (74%)</td>
<td>83%</td>
<td>4.50*</td>
</tr>
<tr>
<td></td>
<td>Not employed</td>
<td>16 (26%)</td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td>Income level</td>
<td>&gt;$75,000</td>
<td>33 (55%)</td>
<td>82%</td>
<td>1.08</td>
</tr>
<tr>
<td></td>
<td>&lt;$75,000</td>
<td>27 (45%)</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>Cancer history</td>
<td>Affected</td>
<td>33 (53%)</td>
<td>64%</td>
<td>5.69*</td>
</tr>
<tr>
<td></td>
<td>Unaffected</td>
<td>29 (47%)</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Obtained counseling</td>
<td>Yes</td>
<td>11 (18%)</td>
<td>73%</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>51 (82%)</td>
<td>76%</td>
<td></td>
</tr>
</tbody>
</table>

*P < 0.05.

Two subjects were missing data for income.

Predictors of Completing the Intervention.** As shown in Table 1, cancer history, education level, and employment status were associated significantly with completing the PTC intervention. Subjects who did not report a personal history of cancer, those who were college graduates, and were employed were most likely to complete the intervention. Table 2 shows the association between psychological factors and completion of the intervention. Of these factors, greater levels of cancer specific distress, greater perceptions of appraisal support, and lower perceptions of confidence were associated significantly with completing the PTC intervention.

To identify independent predictors of completing the PTC intervention, we conducted backward stepwise logistic regression. Because multiple family members were included in the analysis, we used a Generalized Estimating Equation (GEE) approach to generate the regression model while controlling for potential intra-familial correlations. In addition, continuous psychological variables were re-coded into binary variables using the median split to facilitate the interpretation of results. On Step 1, perceived confidence was removed from the model (Likelihood Ratio Test = 0.27, P = 0.60). Employment status was removed on Step 2 (Likelihood Ratio Test = 1.17, P = 0.28). None of the remaining variables could be removed from the model; thus, the final model included education level, cancer history, cancer-specific distress, and perceptions of social support. As shown in Table 3, subjects affected with cancer were 76% less likely to complete the intervention compared to subjects without a personal history of cancer (odds ratio = 0.24, 95% confidence interval = 0.06, 0.98, P = 0.05), whereas
subjects with greater levels of cancer-specific distress were about four times more likely to complete the intervention compared to subjects with lower levels of distress (odds ratio = 4.74, 95% confidence interval = 1.02, 22.03, \( P = 0.05 \)). Subjects with greater perceptions of appraisal support were also about six times more likely to complete the intervention compared to subjects with lower perceptions of support (odds ratio = 5.81, 95% confidence interval = 1.28, 26.16, \( P = 0.02 \)).

**Discussion**

Although participation in genetic counseling and testing has been evaluated in prior reports (2, 25–27), this is the first study to evaluate completion of a PTC intervention offered to BRCA1/2 mutation carriers following receipt of genetic test results. In previous studies, about 40–60% of BRCA1/2 mutation carriers indicated that support groups were needed for mutation carriers (9, 10); however, only 27–34% of respondents said they would be interested in participating in a support group (11, 28). We found that 75.8% of BRCA1/2 mutation carriers who were randomized to receive adjunctive PTC completed the intervention. It is possible that delivery of the intervention by telephone is more acceptable to BRCA1/2 mutation carriers than traditional support groups because telephone counseling allows for greater anonymity and convenience. Furthermore, compared to support groups, telephone counseling may provide greater attention to individual concerns related to genetic test results. While it is possible that providing the PTC intervention within a short time frame following test results disclosure contributed to the completion rates observed in this study, subjects could refuse to be randomized to the intervention and could also decline participation when notified of their assignment to PTC. Despite this, the majority of subjects completed all five of the telephone counseling sessions. This finding suggests that levels of interest in post-test support may translate into similar rates of participation in adjunctive counseling programs among female BRCA1/2 mutation carriers. However, the PTC intervention was designed to enhance SGC using a format and length that would be convenient and engaging for mutation carriers; therefore, future studies are needed to evaluate participation in post-test counseling programs that are delivered in different formats (e.g., in person) and for longer periods of time.

Previous research has shown that most women would prefer to receive supportive counseling as part of receiving genetic test results for inherited cancer risk (29) and subjects in this study received comprehensive genetic counseling that included pre-test education, post-test counseling, and post-disclosure follow-up. However, the limited time frame during which the test result disclosure was completed may not have been sufficient to address reactions to receiving positive BRCA1/2 test results. Each genetic counseling session lasted about 60–90 min and during the test results disclosure session, family members at risk for having a BRCA1/2 gene alteration were identified and information about cancer screening and prevention was also discussed. It may not be logistically possible to address all issues related to receiving a positive BRCA1/2 test result during the limited time frame for the test results disclosure session. Offering post-test counseling by telephone following test results disclosure may be one strategy for expanding these services in a way that is acceptable to BRCA1/2 mutation carriers. However, not all mutation carriers may need more intensive follow-up after receiving genetic test results.

We found that subjects who did not have a personal history of cancer were significantly more likely to complete the PTC intervention compared to those who were affected with breast and/or ovarian cancer. Although our prior study did not detect differences in genetic testing distress or uncertainty between affected and unaffected women (4), it is possible women with a personal history of cancer have fewer decisions to make regarding cancer prevention and screening because of prior cancer treatment. Our prior work has also shown that affected probands communicate their results to some family members within a short time frame following the test results disclosure session (30). Thus, women affected with cancer may have fewer medical decisions and psychological issues following receipt of their BRCA1/2

<table>
<thead>
<tr>
<th>Variable</th>
<th>Participants mean (SD)</th>
<th>Non-participants mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General distress</td>
<td>36.1 (8.7)</td>
<td>33.9 (10.0)</td>
</tr>
<tr>
<td>Cancer-specific distress*</td>
<td>22.0 (10.1)</td>
<td>10.3 (11.6)</td>
</tr>
<tr>
<td>Appraisal support*</td>
<td>5.66 (5.3)</td>
<td>2.51 (2.8)</td>
</tr>
<tr>
<td>Primary appraisal</td>
<td>10.72 (3.3)</td>
<td>11.21 (3.7)</td>
</tr>
<tr>
<td>Secondary appraisal*</td>
<td>16.82 (2.7)</td>
<td>18.33 (1.8)</td>
</tr>
</tbody>
</table>

*\( P < 0.01 \).

†\( P < 0.05 \).

The PTC intervention was designed to enhance SGC using a format and length that would be convenient and engaging for mutation carriers; therefore, future studies are needed to evaluate participation in post-test counseling programs that are delivered in different formats (e.g., in person) and for longer periods of time.

### Table 3. Multivariate model predicting completion of psychosocial telephone counseling (n = 62)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Levels</th>
<th>Odds Ratio</th>
<th>95% Confidence Interval</th>
<th>( P ) value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cancer history</td>
<td>Affected</td>
<td>0.24</td>
<td>0.06, 0.98</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Unaffected (referent)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education level</td>
<td>College graduate or higher</td>
<td>4.28</td>
<td>0.94, 19.50</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Some college or less (referent)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cancer-specific distress</td>
<td>Above median*</td>
<td>4.74</td>
<td>1.02, 22.03</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>Below median (referent)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Appraisal support</td>
<td>Above median†</td>
<td>5.81</td>
<td>1.29, 26.16</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Below median (referent)</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Median value = 16.

†Median value = 4.
test results; this may explain lower rates of completing the PTC intervention among this group. We also found that subjects with greater levels of cancer-specific distress were more likely to complete the intervention compared to subjects with lower levels of distress. Thus, even though prior studies have found that distress levels in high-risk women may not be at the level at which clinical intervention is needed (20), resources that provide short-term follow-up to address specific responses to BRCA1/2 test results may be beneficial to mutation carriers. However, the results of the present study suggest that BRCA1/2 mutation carriers without a personal history of breast or ovarian cancer and those with greater levels of cancer-specific distress may be the most receptive to these services.

It is interesting to note that subjects who had greater levels of appraisal support were about six times more likely to complete the PTC intervention compared to subjects with lower levels of support. One possible explanation for this finding is that the resources that mutation carriers, especially those who are unaffected, are likely to seek for support for concerns related to their BRCA1/2 test result may not be able to address these needs sufficiently. Our prior work has shown that BRCA1/2 mutation carriers communicated their genetic test results to significantly more sisters than noncarriers expressly to obtain emotional support as well as advice about cancer screening and prevention (30). It is possible that once emotional support is engaged through family discussions, the participant is primed to further engage in a supportive intervention with greater comfort, ease, and sense of social acceptability. This might stand in contrast to those less likely to complete the intervention who perceive lower levels of appraisal support. PTC may provide an additional source of support that is acceptable to BRCA1/2 mutation carriers; however, additional research is needed to evaluate the effects of the PTC intervention on psychological functioning and medical decision-making.

In considering the results of this study, several limitations should be noted. First, the results of this study are based on a small sample of BRCA1/2 mutation carriers who were enrolled in a genetic counseling and testing research study in which these services were provided at no cost. We had approximately 70% power to detect moderate differences in completing the intervention between affected and unaffected subjects and among subjects who were above and below median levels of psychological factors; thus, additional studies are needed to evaluate completion of post-test counseling among larger samples of BRCA1/2 mutation carriers. Furthermore, our analysis was limited to completion of a PTC intervention that was offered as part of a research program. However, subjects could decline randomization to the intervention and could also decline participation in the telephone counseling sessions. An additional limitation may be that most subjects (81%) self-referred to genetic counseling and testing. However, referral mechanism was not associated significantly with completing the intervention. Thus, rates of completing the post-test counseling intervention are not likely to have been biased by study procedures.

Despite these limitations, this is the first study to evaluate completion of follow-up counseling among BRCA1/2 mutation carriers. The results of the present study suggest that most BRCA1/2 mutation carriers will elect to participate in short-term follow-up counseling, but personal experiences with cancer diagnosis, cancer distress, and perceptions of social support are likely to influence completion of these types of interventions. The results of the study also have implications for provision of genetic counseling services. Most subjects completed the intervention, which suggests that individuals are receptive to telephone counseling. While current recommendations for genetic testing for inherited cancer risk include provision of in-person genetic counseling (1), genetic counseling by telephone may also be well received among individuals considering testing.

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