IMPROVING KNOWLEDGE, EVALUATING OPINIONS, AND ASCERTAINING THE ACCEPTANCE OF GENETIC COUNSELING FOR BIPOLAR DISORDER

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Bipolar disorder (BPD) is a serious mood disorder that affects about 1% of the population of the United States. Twin, family, and adoption studies have shown evidence for a genetic component of BPD, but monozygotic twin concordance is less than one, indicating that BPD is a mulitfactorial disorder. First-degree relatives of an individual with BPD have approximately a 3-15% risk of developing BPD because of shared genes and environment. No strong genetic susceptibility loci for BPD have been located, although some regions of interest are currently being evaluated. With increasing genetic information, it is expected that demand for genetic counseling for BPD and other psychiatric disorders will increase. This project is relevant to public health because BPD is a common disorder with a significant disease burden. Understanding the needs and concerns of the patient population can help tailor care and reduce the burden of the disease.

Using anonymous surveys and a semi-structured interview for individuals with BPD and their first-degree relatives, the knowledge, opinions, and acceptance of genetic counseling in this population have been studied. The Health Belief Model was used to assess current health beliefs relating to BPD. Additionally, using a brief educational session, the effect of education on knowledge and health beliefs was assessed.

Preliminary data show that the perceived severity of BPD, susceptibility to BPD, and perceived benefit of genetic information were high at 4.33, 4.45, and 4.36 out of 5, respectively,

while the cumulative perceived barriers to testing were moderate to high at 3.09 out of 5. Preliminary data also show that the knowledge of BPD in affected individuals is high at 7 (±1.15) out of 8.

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PREFACE

I would like to thank my thesis committee Elizabeth Gettig, MS, CGC, Robin Grubs, PhD, CGC, and Vishwajit Nimgaonkar, MD, PhD for their support and guidance throughout the past two years. This project would not have been successful without each of you. Thank you to Patrick Reitz and Sue Clifton from the University of Pittsburgh Bipolar Study for your assistance in recruitment. Finally, thank you to Triptish Bhatia for working with me to design this study. I wish you continued success in your research.

INTRODUCTION

The Masters Thesis project that follows was originally designed for fifty or more participants. To date, four participants have completed the survey and two have completed the educational session and follow-up survey. The preliminary data have been analyzed and interpreted to this point, although the strength of the interpretations will be higher when more participants are added. Within one calendar year of the date of submission, more participants will be enrolled, and the results and discussion of this Masters Thesis will be updated to reflect the original design.

1.0 SPECIFIC AIMS

1.1 SPECIFIC AIM I

Specific Aim: To determine the current health beliefs of those diagnosed with bipolar disorder (BPD) and the current health beliefs of their first degree relatives, in regard to cause, course, treatment, and genetic information.

Hypothesis: Participants will have a low level of knowledge about cause, high level of perceived severity of mental illness, and a low level of perceived susceptibility. Identifying the current status of health beliefs will determine areas of education that must be stressed in order to increase knowledge.

Plan: Utilizing anonymous surveys among those diagnosed with bipolar disorder, and their first degree relatives, the following topics were analyzed: the current state of knowledge of cause, course, treatment, and genetic information. Assessment of knowledge of psychiatric genetic risks was also studied to determine if a correlation exists with health beliefs.

1.2 SPECIFIC AIM II

Specific Aim: To assess participants' knowledge of genetic counseling, and to assess acceptance of and interest in genetic counseling services and genetic testing.

Hypothesis: Participants will have a high level of perceived benefit to testing, a low level of perceived barriers to testing, a low level of perceived impact of genetic susceptibility information, and a low level of knowledge of and interest in genetic counseling. Identifying the current status of knowledge and acceptance will determine areas of education that must be stressed in order to increase knowledge and acceptance.

Plan: Utilizing anonymous surveys among those diagnosed with bipolar disorder and their first degree relatives, the current state of knowledge of genetic testing and genetic counseling, and acceptance of genetic counseling services was ascertained.

1.3 SPECIFIC AIM III

Specific Aim: To improve the knowledge and acceptance of genetic testing and genetic counseling for psychiatric conditions through individual education sessions.

Hypothesis: The lack of interest in genetics may be due to a lack of knowledge of genetics and the risks associated with bipolar disorder. Acceptance can be improved by increasing the communities' knowledge of hereditary concepts. Acceptance of and interest in genetic counseling services may also increase.

Plan: Utilizing anonymous surveys, assessment of knowledge of bipolar disorder and acceptance of genetic testing and genetic counseling for psychiatric conditions was performed prior to and following the administration of a brief individual educational session. A didactic session included (1) taking a psychiatric family history to facilitate risk assessment when necessary, (2) discussing complex inheritance, genes, molecular testing, and the availability, risks, benefits, and limitations of genetic testing, and (3) calculating recurrence risks, if possible. The effectiveness

of the educational session was analyzed as well as the relationship of knowledge of psychiatric conditions with acceptance of genetic testing.

2.0 BACKGROUND AND SIGNIFICANCE

The overall goal of this project was to learn more about the needs of the population touched by BPD, anticipating that the demand for genetic counseling services for psychiatric disorders will grow in the future. In order to address these issues, it was necessary to review the diagnosis and features of BPD, the current understanding of genetic and environmental risk factors, the literature regarding genetic counseling for psychiatric conditions, and published studies that have examined the opinions of this population to date.

2.1 BIPOLAR DISORDER (BPD) EPIDEMIOLOGY

2.1.1 Prevalence of bipolar disorder

Estimates of the lifetime prevalence of bipolar I disorder vary from 0.3% to 1.6% of the population in the United States. (1, 2) The lifetime prevalence of bipolar II disorder is estimated at 0.5%. (3) Bipolar I disorder, bipolar II disorder, and bipolar disorder not otherwise specified are discussed as separate diagnoses only when the distinction is clear, and only in the background and significance. Otherwise in this document, bipolar disorder or BPD includes the entire bipolar spectrum. For the purpose of this study, no distinction was made between types of BPD.

There is no statistically significant difference in prevalence between different ethnic groups. (2) A number of studies have compared the prevalence between the sexes, and have found no statistically significant difference. (1, 2) However, some differences in the course of BPD exist between the sexes. For example, in males, the first episode is more likely to be a manic episode. Also, the number of manic and major depressive disorders is likely to be even, or, if a difference is observed, the number of manic episodes is likely greater. In females, the first episode is more likely to be a major depressive episode, and the number of major depressive episodes is often greater than the number of manic episodes. (2)

2.1.2 Age-at-onset

The average age-at-onset of BPD ranges from 18 years in the United States to 27 years in Puerto Rico. (1) While the first symptoms of BPD can appear at almost any age, there appears to be a peak period of onset between 15 and 19 years of age in the United States. (4) In a survey by the National Depressive and Manic-Depressive Association, 59% of respondents first experienced symptoms during childhood or adolescence. Only 16% of respondents first experienced symptoms after age 30. (5) Clinicians may mistakenly diagnose schizophrenia in some individuals with BPD, especially in some ethnic groups and in the younger population. (2)

2.2 DIAGNOSIS

2.2.1 Diagnosis of bipolar I disorder

The diagnosis of BPD is based on criteria in the Diagnostic and Statistical Manual IV (DSM-IV). Diagnosis is based solely on clinical features. There are no laboratory features diagnostic for BPD, but individuals with BPD tend to have more right-hemispheric, bilateral subcortical, and periventricular lesions on imaging studies.

Bipolar I disorder is characterized by the occurrence of one or more manic or mixed episodes. Often individuals have one or more major depressive episodes. Episodes of mood disorder due to the direct effects of a drug, medication, toxin, or a somatic treatment for depression, or those directly attributable to another medical condition, do not count toward a diagnosis of bipolar I disorder. In addition, the episodes are not better accounted for by schizoaffective disorder and cannot also apply to a diagnosis of schizophrenia, schizophreniform disorder, delusional disorder, or psychotic disorder not otherwise specified. (2, 6)

2.2.2 DSM-IV Definition: Manic episode

A manic episode is a distinct period of abnormally and persistently elevated, expansive, or irritable mood lasting at least one week, or requiring hospitalization. Diagnosis of a manic episode requires three additional symptoms (if the mood is elevated or expansive) or four additional symptoms (if the mood is irritable) from a list including: inflated self-esteem or grandiosity which may reach delusional proportions, decreased need for sleep, pressure of speech, flight of ideas, distractibility or inability to screen out irrelevant stimuli, increased

involvement in goal-directed activities or psychomotor agitation, and excessive involvement in pleasurable activities with high potential for painful consequences. (6)

Decreased need for sleep is very common. During a manic episode, individuals may go several days without sleep or regularly awaken early. Pressure of speech includes speech that is loud, rapid, and difficult to interpret. Speech may include joking, theatrics, or complaining to an unusual extent. Flight of ideas often involves thoughts coming faster than they can be articulated or disorganized speech. Excessive involvement in pleasurable activities may include buying sprees, reckless driving, foolish business investments, or unusual sexual behavior. In order to be sufficient for the diagnosis, these behaviors must cause marked impairment in social or occupational functioning, require hospitalization, or include psychotic features. Individuals often do not recognize that they are ill and resist treatment. (6)

In 1978, Krauthammer and Klerman introduced the concept of secondary mania. This is a manic episode secondary to a medical disorder or drug use. Because bipolar disorder has a high rate of comorbidity with substance abuse, it can be difficult to differentiate between secondary mania and manic episodes consistent with bipolar disorder. Some of the possible causes of secondary mania include abuse of amphetamines, caffeine, cocaine, and methylphenidate; withdrawal from ethanol, monoamine oxidase inhibitors, sympathomimetic agents, or tricyclic antidepressants; use of antidepressants and steroids; toxic metabolic states associated with hyperthyroidism or electrolyte abnormalities; central nervous system disorders including multiple sclerosis, brain tumors, sleep deprivation, damage to the right (nondominant) hemisphere, or temporal lobe seizures; and infections including encephalitis, syphilis of the central nervous system, or sepsis. (7)

2.2.3 DSM-IV Definition: Major depressive episode

The essential feature of a major depressive episode is a period of at least two weeks with a depressed mood or loss of interest or pleasure in nearly all activities. During the episode, the symptoms must be present nearly every day for most of the day. Depression may be reported by the individual or observed by others. The DSM-IV diagnosis requires at least four additional symptoms from the following list: changes in appetite, weight, sleep, or psychomotor activity; decreased energy; feelings of worthlessness or guilt; difficulty thinking, concentrating, or making decisions; or recurrent thoughts of death or suicidal ideation, plans, or attempts. (8)

The appetite is usually reduced but may be increased and include food cravings. Therefore the individual may experience loss or gain of weight. Some individuals first present because of sleep disturbances. Insomnia is more frequent than hypersomnia. Feelings of worthlessness or guilt are marked by unrealistic negative evaluations of one's worth, preoccupation with minor past failings, and/or exaggerated sense of responsibility for events. (8)

For a diagnosis of a major depressive episode, the symptoms must be new or clearly worsened compared to the previous emotional state of the affected person. The symptoms must cause distress, impairment, or markedly increased effort in social, occupational, or other important areas of functioning. In children and adolescents, depression may present as irritability rather than sadness. Some individuals report somatic complaints rather than depression. (8)

Symptoms do not count toward diagnosis of a major depressive episode if they are completely explained by another medical condition, when they are due to delusions or hallucinations, when they are the result of drug abuse, medication or treatment, or exposure to a toxin, or if they symptoms occur within two months of the loss of a loved one (unless they are

accompanied by marked functional impairment or other severe symptoms distinct from bereavement). (8)

There are no laboratory tests that may be used to diagnose a major depressive episode, but 40-60% of outpatients and up to 90% of inpatients have sleep EEG abnormalities. Additionally, there may be disregulation of neurotransmitter systems and neruopeptides, including serotonin, norepinepherine, dopamine, acetylcholine, and gamma-aminobutyric acid. (8)

2.2.4 DSM-IV Definition: Mixed episode

A mixed episode is a period of time, lasting at least one week, in which the criteria for both a major depressive episode and a manic episode are met nearly every day. The mood changes rapidly, and common features include agitation, insomnia, appetite dysregulation, psychotic features, suicidal thinking, and disorganized thinking and behavior. This may occur as a new episode or may evolve from a major depressive episode or manic episode. (9)

2.2.5 Subclassifications and specifiers for the diagnosis of bipolar disorder

The diagnosis may be subclassified based on whether the current episode is the first episode or a recurrence and based on the most recent episode type (hypomanic, manic, mixed, depressed, or unspecified). Recurrence is defined as a shift in the polarity of an episode or a two month, or more, interval between episodes. Further specifiers may be used to describe the features of the most recent episode. These include: mild, moderate, severe; without or with psychotic features; with catatonic features; with postpartum onset; in partial or full remission; chronic; with

melancholic features; with atypical features; and/or with rapid cycling. The pattern of episodes can be specified as with or without full interepisode recovery, with seasonal pattern, or with rapid cycling. (2)

When an individual has had an episode with psychotic features, they are more likely to experience psychotic features in future episodes. Rapid cycling occurs in 5-15% of affected individuals. It is characterized by four or more mood episodes within a given year. BPD with rapid cycling is associated with a poor prognosis. (2)

2.2.6 Diagnosis of bipolar II disorder

Bipolar II disorder is characterized by:

- Criterion A: one or more major depressive episodes
- Criterion B: at least one hypomanic episode
- Criterion C: absence of manic or mixed episodes
- Criterion D: symptoms are not better-explained by substance-induced mood disorder, mood disorder due to a general medical condition, schizophrenia, schizophreniform disorder, delusional disorder, or psychotic disorder not otherwise specified.
- Criterion E: symptoms cause significant distress or impairment of social, occupational, or other important areas of functioning.

Specifiers are the same as those used for bipolar I disorder. (3) The distinction between bipolar I disorder and bipolar II disorder is that manic or mixed episodes are absent in bipolar II disorder. For the diagnosis, there must have been one major depressive episode and one hypomanic episode. If an individual has a manic episode, they will have a diagnosis of bipolar I disorder.

There is evidence to support the distinction between bipolar I disorder and bipolar II disorder, but some still question the distinction and await more evidence. (10)

2.2.7 Diagnosis of bipolar disorder not otherwise specified

The diagnosis of bipolar disorder not otherwise specified (NOS) may be used when it is unclear which type of bipolar disorder is emerging or in the case of rapid alternation between manic and depressive symptoms. The alternation is so rapid that the episodes do not meet the minimal duration criteria for a manic episode or major depressive episode. (3)

2.2.8 Differential diagnosis

The differential diagnosis includes mood disorder due to a general medical condition. In this disorder, episodes are the direct physiological result of a medical condition such as multiple sclerosis, stroke, or hypothyroidism. In a substance-induced mood disorder, symptoms are associated with, and fully explained by, intoxication with or withdrawal from a drug or therapy. If the symptoms are not completely attributable to the substance, they can count toward the diagnosis of BPD. The differential diagnosis also includes major depressive disorder, dysthymic disorder, cyclothymic disorder, and psychotic disorders. Cyclothymic disorder is distinguished from BPD by the absence of manic or mixed episodes. Instead, the individual may have numerous periods of hypomanic symptoms. In psychotic disorders (schizophrenia, schizoaffective disorder, delusional disorder), psychotic symptoms occur without acute mood disorder. (3)

2.3 DESCRIPTIVE FEATURES OF BPD

Before maintenance treatment, the frequency of episodes was on average four episodes in ten years. Between acute episodes, about 60% of individuals with BPD experience interpersonal and occupational difficulties, and 20-30% of individuals with BPD experience mood swings. 10-15% of individuals with BPD commit suicide. Suicidal ideation and attempts more often occur during a depressed or mixed episode. School truancy, school failure, occupational failure, divorce, and episodic antisocial behavior are common. (2)

After one manic episode, 90% of individuals will have another episode, demonstrating the chronic nature of BPD. Child abuse, spousal abuse, and violent behavior more often occur during manic episodes or in an episode with psychotic features. (2)

BPD is associated with an increased incidence of a number of comorbid disorders. Associations are observed with anorexia nervosa, bulimia nervosa, attention-deficit/hyperactivity disorder, panic disorder, social phobia, and alcohol and other substance abuse disorders. (2) More than 60% of individuals with bipolar I disorder and more than 50% of those with bipolar II disorder report a history of substance abuse. The most commonly abused substances are alcohol and stimulants, such as amphetamines and cocaine. Almost one third of individuals with bipolar I disorder and one fifth of those with bipolar II disorder report alcohol dependence. (11) Earlier onset BPD is a predictor of the likelihood of later alcohol or substance abuse. Individuals with BPD and alcoholism and another substance abuse disorder are more likely to have increased hospitalizations and more severe illness. (2)

2.4 TREATMENT

Treatment guidelines for BPD were published in the Expert Consensus Guideline Series: Medication Treatment of Bipolar Disorder 2000. Use of a mood stabilizer is recommended in all phases of treatment. The primary mood stabilizers for acute and preventive treatment of mania are divalproex and lithium. Monotherapy should be attempted first, using divalproex or lithium, followed by combination therapy if necessary. The leading alternative mood stabilizer for mania is carbamezepine. Other new anticonvulsants are recommended only if divalproex, lithim, and carbamezepine fail or are contraindicated. (12)

Additional medication may be needed during major depressive episodes. For mild depression, the recommended mood stabilizers are lithium, divalproex, and lamotrigine. For severe depression, treatment includes one of these mood stabilizers along with an antidepressant (bupropion, serotonin reuptake inhibitor (SSRI), or venlafaxine). Antidepressants should be tapered off, if possible, two to six months after resolution of the depressive episode. (12)

For rapid cycling BPD, the recommended initial treatment for depression and mania is monotherapy with divalproex. For BPD with psychotic episodes, antipsychotics are recommended. Atypical antipyschotics like olanzapine and resperidone are preferred to conventional antipsychotics. Other treatments may include electroconvulsive therapy (ECT), clozapine, thyroid hormone, or stimulants. (12)

Unfortunately, current treatments are not effective in all individuals and have undesirable side effects in many individuals. (10) Side effects for many of the mood stabilizers include weight gain, unpleasant taste, mild fatigue, nasal congestion, increased appetite for sweets, headache, dryness of the mouth, dizziness, or decreased sweating.

2.5 RISK FACTORS

Much research has been done examining the risk factors that increase susceptibility to BPD. (2, 13, 14) Risk factors were reviewed by Tsuchiya *et al.* (15) Some risk factors have been clearly linked to BPD, while further studies are needed to examine others. It has been established that 10-15% of adolescents with recurrent major depressive episodes will develop BPD. Women have an increased susceptibility to episodes in the postpartum period (within four weeks of delivery). (2) Having a family history of affective disorder is also a major risk factor. (15)

Demographic factors as risk factors for BPD were reviewed in a 2003 study by Tsuchiya *et al.* As mentioned above, no association is suspected between male or female gender and prevalence of BPD, and studies of prevalence of BPD in different ethnic groups have had inconsistent results. (15)

Tsuchiya *et al.* also reviewed the literature relating to pregnancy and BPD. Suggestive findings have been reported for association between BPD and a history of pregnancy or birth complications, but the data are too limited to make a conclusion. No association is suspected between prenatal (second trimester) maternal influenza infection and BPD. While there is no conclusive evidence, there are suggestive findings for an association between winter-spring birth and the development of BPD. No association is suspected between urban birth and BPD or birth order and BPD. Again, there is an increased susceptibility to episodes in the immediate post-partum period. (15)

In a review of personal background factors, a number of studies exist that found no association between premorbid IQ and BPD, and handedness and BPD, although these factors have not been sufficiently evaluated. A limited number of studies found an association between

dysfunctioned premorbid adjustment and poor behavior in school with BPD, although, again, these factors have not been sufficiently evaluated. (15)

Inconsistency remains in studies of the association of BPD with some socioeconomic factors including education and occupation of the individual and of the parents. There is an apparent association between BPD and other socioeconomic factors including lower income, unemployment, single marital status, and urban residence, although these are most often considered consequences of BPD status rather than predisposing risk factors. Some studies suggest that there is an association between recent stressful life events and BPD, but further research is needed. (15)

Regarding family background, some studies have found associations between BPD and a disturbed parent-child relationship and between BPD and early parental loss, but other studies have failed to confirm this association. (15)

Finally, evidence for an increased risk of BPD for individuals with a history of another medical condition has been examined. Some suggestive findings have been reported for an association between traumatic brain injuries and BPD and multiple sclerosis and BPD. Inconsistency remains in studies of seizure disorders and the risk of developing BPD. (15) Individuals with bipolar disorder have been shown to have higher rates of positive anti-thyroid antibody titers. (13) Hypothyroidism has been shown to be associated with rapid-cycling bipolar disorder. (14)

2.6 COMPLEX GENETIC DISORDERS

BPD is a complex genetic disorder. Complex genetic disorders, or multifactorial disorders, are common in the general population. Neither the genetic nor the environmental contribution alone is sufficient to cause the disorder; therefore, the disease concordance is less than 100% in monozygotic twins. Severity varies greatly among affected individuals. The pattern observed in families and the implications for the family are different than for Mendelian disorders. The risk to second- and third-degree relatives is significantly less than the risk in Mendelian disorders. Affected individuals may be found in both the maternal and paternal lineage. There may be a number of alleles that increase susceptibility; therefore, the contribution of a single genetic variant may be quite small. This raises the concern of feasibility and value of testing for these genetic variants, once they have been identified. (16)

2.7 EVIDENCE FOR A GENETIC COMPONENT IN BPD AND EMPIRIC RISK

Family, twin, and adoption studies provide strong evidence for a heritable component to BPD. (2, 17) Family studies can determine if a disease aggregates in a family, but cannot distinguish between genetic and environmental risk factors, because families have both genetics and shared lifestyles in common. Twin and adoption studies are used to control for environment, and examine the rate of disease when environment is shared or environment is not shared.

Family studies, prior to the mid-1960s did not make a distinction between bipolar and unipolar affective disorders, but showed familial aggregation for mood disorders overall. In reviewing literature through 2006, Craddock and Forty found that the heritability of BPD is 80-

90%. (10) The monozygotic twin concordance is 45-70%. (10, 18) The dizygotic twin concordance is about 20%. (18) As mentioned above, the less-than-100% concordance rate in monozygotic twins suggests that environmental factors contribute to the disorder.

An empiric risk is the risk that a disorder will develop in an individual based on observation of past events in a number of families affected with the disorder. Craddock and Forty found that the recurrence risk in the sibling of a proband is 5-10%. (10) A review of literature in 2004 by Shih, Belmonte, and Zandi found the rate of BPD in first-degree relatives to be 3-15%. (18) The empiric risk for first-degree relative to develop bipolar II disorder is 1-5%. (2) The Psychiatric Special Interest Group of the National Society of Genetic Counselors (NSGC) reviewed empiric risk literature in 2006. (19) The results are reported in Table1.

Table 1: Empiric Risks, reviewed by the NSGC Psychiatric Special Interest Group (19)

Relationship to affected individual	Empiric Risk
Any first degree relative	5-30%
Parent	10%
Sibling	13%
Child (one parent affected)	15-30%
Child (one parent affected) AND one affected sibling	20%
Child (both parents affected)	50-60%
Second degree relative	5%

2.8 GENETICS

No major susceptibility genes have been identified by linkage or positional cloning, but there is support for several loci being associated with BPD. Studies have shown linkage to

chromosomes 4, 12, 13, 18, 21, and 22. (17) There is evidence for linkage at 6q21-q25 and 12q23-24 in several studies. The latter region is also implicated in linkage to unipolar depression. [reviewed in (10)]. In 2002, Badner and Gershon found evidence by meta-analysis for susceptibility loci at 13q and 22q. (20) In 2003, Segurado *et al* found susceptibility loci by meta-analysis at 9p22.3-21.1, 10q11.21-22.1, and 14q24.1-32.12. (21)

Medications for bipolar disorder management focus on neurotransmitter systems such as the dopamine, serotonin, and noradrenalin pathways, although the pathogenesis is not completely understood. Therefore, these pathways are being considered when looking for functional gene candidates. Polymorphisms in five genes, monoamine oxidase A (*MAOA)*, brain derived neurotrophic factor (*BDNF*) on 11p13, D-amino acid oxidase activator (*DAOA*) on 13q, catechol-O-methyl transferase (*COMT*), and serotonin transporter (*5HTT*), have shown significant effect sizes in BPD in meta-analysis. *COMT* has also been implicated in schizophrenia. (reviewed in (10))

While genetic testing for susceptibility to bipolar disorder is not yet available, researchers are hopeful that genetic testing can improve outcomes by allowing earlier detection, application of preventive strategies, and tailored treatments. Additionally, information from genetic testing can be incorporated into reproductive decision-making. As with other genetic tests, the potential negative implications must also be considered. (22) The following section includes a discussion of the positive and negative implications.

2.8.1 Genetic counseling

The most often cited definition of genetic counseling was proposed by the American Society of Human Genetics (ASHG) and adopted by the National Society of Genetic Counselors (NSGC). It states:

> "Genetic counseling is a communication process which deals with the human problems associated with the occurrence, or the risk of occurrence, of a genetic disorder in a family. This process involves an attempt by one or more appropriately trained persons to help the individual or family (1) comprehend the medical facts, including the diagnosis, the probable course of the disorder, and the available management; (2) appreciate the way heredity contributes to the disorder, and the risk of recurrence in specified relatives; (3) understand the options for dealing with the risk of recurrence; (4) choose the course of action which seems appropriate to them in view of their risk and their family goals and act in accordance with that decision; and (5) make the best possible adjustment to the disorder in an affected family member and/or to the risk of recurrence of that disorder." (23)

Another definition of genetic counseling states:

> "Genetic counseling is a dynamic psychoeducational process centered on genetic information. Within a therapeutic relationship established between providers and clients, clients are helped to personalize technical and probabilistic genetic information, to promote self-determination and to enhance their ability to adapt over time. The goal is to facilitate clients' ability to use genetic information in a personally meaningful way that minimizes psychological distress and increases personal control." (24)

Genetic counselors discuss clinical and human molecular genetics and reproductive options, and they provide compassionate therapeutic counseling for loss of personal control, bereavement,

self-esteem issues, isolation, and stigmatization. (25) A guiding principle of genetic counseling is nondirectiveness, which emphasizes patient autonomy.

Genetic counseling is commonly used in prenatal, pediatric, and cancer clinic settings. Some genetic counselors work in adult clinics. Genetic counseling for bipolar disorder and other complex genetic disorders is expected to become more common as the demand for information grows. The opportunity for a discussion of the recurrence risk exists in other settings, such as during a discussion of family history when BPD is not the primary reason for referral.

Identifying one underlying goal of genetic counseling may be unrealistic. In the past, some providers stated that the goal was to reduce the number of individuals affected with birth defects and genetic conditions. While this approach emphasized client-informed decision making, some individuals had the impression that using this information clients would have the same goals as practitioners. In reality, families affected with genetic conditions are not always interested in preventing the occurrence of the condition in the family. Another theme is helping clients cope with and adapt to genetic information, while understanding that scientific knowledge is only one way to interpret risk, and other factors affect an individual's perception of risk. Short term goals of genetic counseling are to ensure that a client is heard, encouraged, valued, supported, and attended to. Long term goals are to improve communication about genetic issues within the family, to anticipate future feelings or experiences, and to clarify values underlying decisions and attitudes. It is often more difficult to assess the success of genetic counseling in regard to the long term goals. (25)

2.8.2 Genetic counseling and testing for psychiatric disorders

Genetic counseling for psychiatric disorders may become a reality in the future because of their high prevalence, an increase in knowledge of genetic contributions to psychiatric conditions, and an increase in public awareness. (26) Genetic counseling for psychiatric disorders is similar to other types of genetic counseling in some ways, but it also faces some unique challenges. The goals of genetic counseling along with disease associated stigma, guilt, and shame and decisions regarding testing are addressed in the following sections.

Barbara Biesecker wrote that the general goals for genetic counseling for common disease and psychiatric disorders are similar; that is:

- To promote health-enhancing behaviors
- To enhance accurate and useful risk perception
- To facilitate adaptation to genetic risk
- To prevent disease. (25, 27)

Another important component of any genetic counseling session is to explore the family's motivation for seeking genetic counseling, remembering that a discussion of recurrence risk may be the primary motivation for some families, while it may create apprehension for other families. (26)

Psychiatric disorders are often associated with stigma, guilt, and shame. "Stigma can be defined as a mark or label that sets an individual apart as being different in the negative sense, making them undesirable, and precipitating social rejection and discrimination." Stigma has a strong, negative impact on self-esteem and well-being, and associative stigma also has a negative impact on unaffected family members. (26) In 1996, Smith *et al*. published a study that found

that 68% of respondents in a bipolar support group, 62% of medical students, and 47% of psychiatry residents rated BPD as highly stigmatizing. (28) Some stigma remains from the eugenics movement in the 1900s to 1940s, which resulted in euthanasia or forced sterilization of individuals with health problems including mental illness. In one study, most interviewees felt that having a genetic explanation did not affect the level of stigmatization associated with BPD. Most individuals felt that stigma is caused by the lack of awareness, understanding, and knowledge about mental illness in the community. A smaller number of individuals felt that a genetic explanation would help decrease stigmatization, and one of twenty-two individuals interviewed felt that it would increase stigmatization. (22)

Guilt associated with psychiatric disorders may be attributed to misconceptions and past theories. One theory, influenced by the work of Freud, attributes mental illness to instability in the care-giving relationship including physical distance, erratic patterns of behavior, or physical or emotional abuse. (26) Other individuals feel guilt for passing on an increased disease susceptibility to their children. These are just a few of the numerous explanations for disease-associated stigma, guilt, and shame. In a study of the implications of genetic counseling for psychiatric disorders, the majority of interviewees felt that having a genetic explanation reduced perception of control over one's symptoms and self-blame. (22)

Other considerations exist for psychiatric genetic counseling. Of course, a genetic counseling session would include a complete medical and family history, confirming psychiatric diagnoses in other family members whenever possible. (29) Because information on susceptibility genes is incomplete, testing is not yet available, and the environmental factors are not yet completely understood, recurrence risks provided to families are based on empiric risks and may represent a broad range. (26) While empiric recurrence risks are helpful in establishing

an individualized risk, they represent averages that generally do not reflect variation in risk over time or for different individuals. Empiric recurrence risks for psychiatric disorders are generally limited to include only a few first- and second-degree relatives from one side of the family. Unfortunately, in a family with more than one affected individual, empiric recurrence risks that reflect the specific family structure may not be available. (30) Additionally, empiric risks are not yet available which take into account multiple distinct psychiatric diagnoses in a family. This is, however, a common scenario for families. Genetics professionals should seek out empiric recurrence risks that most closely match the family structure for a specific case. (30) Research continues to examine how recurrence risk is influenced by characteristics of the affected individual, such as age at onset, sex, and severity of illness, characteristics of the individual seeking risk calculation, such as age, sex, and psychiatric history, and characteristics of the pattern in the family.

As mentioned above, genetic counseling may have the unintended consequence of exacerbating or creating guilt, shame, or stigma. Biological explanations may increase stigma by labeling affected individuals 'genetically different'. The multifactorial threshold model may be helpful to prevent this, by explaining that all individuals have risk factors, and some have enough risk factors that they are over the threshold; thus normalizing genetic variation.

Genetic explanations may result in a deterministic view of disease for both the individual with the diagnosis and unaffected family members, thus diminishing hope for recovery and perceived importance of lifestyle choices and environment. Thus, the importance of lifestyle choices and environment *along with* genetics must be emphasized in counseling of these patients and families. (26) A 1999 study by Senior *et al.* examined parents' responses to genetic test results for familiar hypercholesterolemia (FH) in their children. FH is a genetic condition that

greatly increases the risk of cardiovascular disease. In a qualitative analysis of the interview responses, Senior *et al.* found that when the screening test was perceived as detecting elevated cholesterol levels, it was perceived as familiar, dietary in origin, easily controlled, and minimally threatening. However, when the test was perceived as a genetic test, the condition was perceived as uncontrollable and threatening. The authors found these results to be consistent with the self-regulation model of illness which suggests that how people think about illness is based on the way it is labeled. (31)

Unlike other medical information, genetic information has implications for other family members. Information from genetic counseling or genetic testing may be helpful to other family members, but in other cases this information may be unwelcome, potentially disrupting relationships within families. (29)

If genetic testing for BPD were to become available, one of the goals of genetic counseling would be to promote an understanding of the benefits, limitations, and possible outcomes of the genetic testing and to make a decision of whether or not to have testing based on accurate information. Genetic counseling often helps clients to explore possible outcomes to allow them to be more prepared to adjust to any outcome and to consider if testing is the right decision for them. (29)

Once the family understands the risks, they can be prepared to intervene and seek professional help should an at-risk family member begin to exhibit symptoms of BPD. Unfortunately, this may also lead to anticipatory stigma, or assuming that actions and emotions are attributable to the genetic disorder when they may not be. (26) It may be helpful to include a discussion of the difficulties and benefits of this heightened awareness in the genetic counseling session; to remind family members that it can be difficult to determine if a psychiatric illness is

emerging, but they can work with their doctors in the future, and they are in a position to anticipate these events. (26) Referral to family counseling or other health care professionals may be helpful in some cases.

As mentioned above, Skirton and Eiser remind us that "The information provided during the genetic counseling process may not be novel to the client, and will be received against a background of the client's previous knowledge about the condition." (32) Individuals and families may have personal explanations for the occurrence of a psychiatric disorder, based on lifestyle, environment, and experiences. Skirton and Eiser explain that discovering the individual or family's explanation for disease creates the opportunity to address the role of environment and genetics and to fit this new information into their existing belief system. (32)

Another suggestion for genetic counseling for psychiatric disorders, but a familiar recommendation for genetic counseling in other situations, is to give individuals the opportunity to talk about their experiences as an affected individual or family member of an affected individual. This may be the first opportunity for unaffected family members to speak with a professional about the recurrence risk and their experiences. (16)

Studying the outcome of genetic counseling often involves measurement of knowledge, anxiety, depression, and health-related behaviors. Data exist for the outcome of genetic counseling and testing for hereditary cancer, Huntington's disease, myotonic dystrophy, familial hypercholesterolemia, and others, but the data are limited for psychiatric genetic counseling. (26) As principles of practice are developed for psychiatric genetic counseling, the short- and long-term outcomes must be assessed to determine if the counseling is meeting its goals.

2.8.3 Genetic counseling providers

A number of papers have been published asking the question 'who is best suited to counsel psychiatric patients on the genetics of their condition?' A 2006 article by Finn and Smoller concluded that both genetics professionals and psychiatrists would benefit from further education in psychiatric genetics as the demand increases for this type of information. (16) Ultimately a multidisciplinary approach would likely be best, as is used in the prenatal, pediatric, and cancer model, where each part of the team could provide detailed information about their area of expertise, while understanding the roles of the other providers as well.

A survey of psychiatrists, also by Finn and Smoller, published in 2005 assessed general knowledge of medical genetics, knowledge of psychiatric genetics, current practice patterns, and attitudes toward clinical and ethical dilemmas that may arise in the application of genetic knowledge in psychiatry. The median scores for general genetic knowledge and psychiatric genetic knowledge were 44 percent and 33 percent, respectively. Estimates of heritability for psychiatric disorders varied widely, suggesting that substantial difference in opinion persists on the contribution of genetics and environment to psychiatric disorders. Overall, psychiatrists tended to underestimate the contribution of genetic factors to psychiatric disorders. More than 80% of psychiatrists surveyed felt that discussing genetic information with patients and their families is part of their professional role; however, less than 25% of those surveyed felt prepared or competent to discuss this information. In many case examples, psychiatrists expressed that they would feel more comfortable referring to a genetic counselor rather than discussing the issue themselves, but more than 90% of those surveyed stated that they have referred *two or fewer* individuals for a genetic consultation in the past year. (33) Most psychiatrists' primary exposure to genetic information is in medical literature. Seventy-seven to 93 percent of

psychiatrists surveyed would be interested in additional opportunities for education including continuing medical education courses, written and Web-based materials, and multidisciplinary consultation with colleagues. (33)

2.8.4 Understanding of the genetic and environmental contributions to BPD

A study by Meiser *et al.* published in 2005 reported a consensus among affected individuals that there is a strong genetic component for BPD. Only one of twenty-two individuals interviewed felt that one could overcome the genetic predisposition to BPD. One of twenty-two individuals surveyed did not fully support a genetic model for BPD, based on personal experience. (22) Individuals who felt that the genetic contribution was large were more likely to express interest in genetic testing for susceptibility.

The majority of individuals interviewed agreed that genetic and environmental factors interact to cause BPD. Some of the risk factors described by participants included stressful life events, major life changes, childbirth, marital troubles, birth trauma and subsequent brain damage, difficult childhood, child abuse, sexual abuse, personality factors, seasonal effects, drug and alcohol abuse, and modeling behavior after an affected parent. Most individuals felt that these environmental triggers were not sufficient to cause BPD, but may serve as triggers. (22)

2.8.5 Demand for genetic counseling

A number of studies have assessed the interest in genetic counseling in individuals with BPD. Several studies have also ascertained the opinion of first-degree relatives and spouses of individuals with BPD. A 2006 literature review found that most patients, family members, and

clinicians are interested in genetic counseling for BPD. Quaid *et al.* found that 75% of individuals with BPD would have genetic counseling if it were available. (34)

2.8.6 Demand for genetic testing

A larger number of studies have ascertained opinions about confirmatory genetic testing, predictive genetic testing in children and adults, and/or prenatal genetic testing for BPD or psychiatric disorders overall. A 2006 literature review found that the majority of patients, family members, and clinicians support genetic testing for BPD, should it become available. (34) Survey questions often refer to hypothetical situations about genetic testing. The hypothetical questions may not reflect the reality of future genetic testing, and individuals may act differently when making the actual decision. Current rates of testing for Huntington's disease, a severe late-onset neurodegenerative disorder, are less than were predicted in early studies before the gene was identified. (35) Additionally, some studies have made clear the predictive value and how results would be presented in the hypothetical genetic testing situations, whereas others have not, which would likely impact response to testing.

2.8.6.1 Presymptomatic testing in adults

In a study of individuals with BPD, general practice patients without psychiatric illness, and psychiatric trainees, there was a positive response in all groups to the development and availability of presymptomatic testing for adults. 87% of individuals with BPD supported testing, along with 79% of general practice patients and 69% of psychiatry trainees. There was a statistically significant difference between BPD patients and psychiatry trainees. (36) In another study, 43% percent of psychiatrists surveyed supported presymptomatic testing in adults with a

family history of bipolar disorder given a test with greater than 95% predictive probability. (33) In a qualitative study, twenty of twenty-two (90.9%) of affected individuals reported that they would have had presymptomatic genetic testing if it had been available and if it could have provided a definite answer. The remaining two reported that they would only have had presymptomatic testing if an intervention were available to prevent the disorder. In the same study, if presymptomatic genetic testing gave a probability of developing BPD, rather than a definitive answer, the majority of affected individuals surveyed would still have had testing. Those who would not have had testing expressed concerns of worry, uncertainty, and stigmatization. (22)

2.8.6.2 Confirmatory genetic testing in adults

85.4% of affected individuals surveyed said that they would definitely have confirmatory genetic testing, and 14.6% said that they probably would. Of their unaffected spouses, 46.3% said that they would definitely have the test themselves, and 34.1% said that they probably would have the test. There was a statistically significant difference in the interest in genetic testing between patients and their spouses. (35) When psychiatrists were surveyed, 74 percent supported genetic testing to confirm a diagnosis. (33)

2.8.6.3 Presymptomatic or confirmatory testing in children

The response to testing in children varies across different studies. Some of the factors that affect the number of positive responses include who is surveyed, the nature of testing (i.e. presymptomatic or confirmatory), the presence of a positive family history, and the availability of prophylactic treatments. When asked about presymptomatic testing for children, 78% of patients were in favor along with 61% of general practice patients and only 19% of psychiatry

trainees. (36) In another study, 44% of psychiatrists supported predictive testing in presymptomatic children with a family history of the bipolar disorder, while 72% supported genetic testing to confirm a diagnosis in a child. (33) In another study, 83% of BPD support group members, 97% of medical students, and 89% of psychiatry residents would request presymptomatic testing for their children if prophylactic treatments were available. In the absence of treatment options, 56% of participants would have their children tested (most interested were support group members, with 68% interested). (28) Another study regarding presymptomatic testing of minors, 77.5% of affected individuals said that they definitely or probably should be tested, 12.5% were uncertain, and 10.0% said that they probably should not or definitely should not be tested. (35) Another study found that half of affected individuals supported presymptomatic genetic testing of adolescents. Nine percent of individuals in this study would only support testing in adolescents to confirm a diagnosis of BPD. Some of the concerns about testing adolescents included the potential to alter parents' behavior toward their children and the feeling that minors should not be tested until they have reached adulthood so that they can consent to testing themselves. (22) It is logical that individuals with different backgrounds and exposure to BPD would have differing opinions regarding testing minors. It is interesting that, overall, affected individuals are the most receptive to presymptomatic testing in the absence of treatment options, while medical professionals are more receptive to confirmatory testing or presymptomatic testing in the presence of treatment. This may be because some affected individuals are wary of the treatment options or success of treatment because of personal experience. Affected individuals may be more receptive to presymptomatic testing because of misdiagnosis in the past or because of their acceptance of the disorder.

2.8.6.4 Prenatal genetic testing

Extensive research has been done to explore opinions about prenatal genetic testing for BPD and, in some studies, pregnancy termination when the fetus has a confirmed susceptibility to BPD. While most professionals are in agreement that offering prenatal testing for genetic disorders is appropriate in the case of severe disorders such as Tay Sachs or when an intervention is available, a consensus has not been reached on offering prenatal genetic testing for other disorders or disabilities. (37)

A study by Milner *et al.*, published in 1998, found that the majority (59-77%) of young adults support prenatal genetic testing for psychiatric disorders and behavior that may result in harm to others. They were less likely to support prenatal genetic testing for personality attributes, intelligence, sexual preference, and characteristics such as height and weight. (38) A follow up study again found less support for prenatal testing for sexual preference, violent, aggressive behavior, impulsive, risk-taking behavior, and low normal intelligence. This study also found that men were significantly more likely to support prenatal genetic testing for psychiatric disorders and behavior than women, and mental health professionals were more likely to support prenatal testing for disease phenotypes or human traits when curative gene therapy was available. (39) In both the original study and the follow-up study, unilateral support for, or disagreement with, prenatal testing for any one condition did not exist. (38, 39)

In another study, however, the majority of individuals surveyed did *not* support prenatal testing for BPD, including 13% of psychiatry trainees, 29% of BPD patients, and 35% of general practice patients without a psychiatric disorder. (36) Some studies show a difference in support for prenatal testing depending on family history, although most studies did not make this distinction. In one such study, 58% of psychiatrists supported prenatal testing in affected

families, given a test with a high predictive probability (>95%). Only fourteen percent of psychiatrists surveyed supported prenatal testing in the general population. (33) When asked if they would pursue prenatal testing of a fetus, 43.9% of patients and their spouses said that they probably or definitely would, about 16% were uncertain, and about 40% said that they would probably not or definitely not. (35) In another study, however, only 13.6 percent of affected individuals surveyed supported prenatal testing. Some of the reasons given why participants opposed prenatal testing included opposition to pregnancy termination and not considering BPD severe enough to warrant pregnancy termination, especially with improving treatment options. Some individuals raised the concern that BPD could be eliminated from the population, thus depriving humanity of the positive contributions of individuals with BPD. (22)

In 1996, Smith *et al*. published a study that examined the likelihood of terminating a pregnancy if prenatal testing showed a predisposition to BPD. (28) The decisions surrounding termination seemed to be influenced by the likelihood of developing BPD, the anticipated course of illness, and projected clinical manifestations. In each of the three groups (BPD support group members, medical students, and psychiatry residents), the percentage of individuals who would terminate a pregnancy increased with the likelihood that the child would develop BPD. For each level of likelihood, the support group members were least likely to report that they would terminate the pregnancy, while the residents were most likely to report that they would terminate. When the risk for the fetus was 25% of developing BPD, less than 10% of each group reported that they would terminate. If the risk for the fetus was 100%, about 35% of support group members reported that they would terminate the pregnancy, followed by 40% of medical students, and about 55% of psychiatry residents. It is noteworthy that 82% of total respondents reported that they would terminate a pregnancy with another life threatening or severely

debilitating disorder. (28) In another study, 55.0% of individuals with bipolar disorder and 65.0% of their unaffected spouses said that they *definitely would not* choose abortion should the fetus have a known predisposition to BPD. The majority of participants would not choose abortion in a number of genetic risk circumstances. In the case of a "serious, painful, and incurable neurological disorder beginning at age 40," 22.0% of patients and 24.4% of their spouses would choose abortion. (35)

2.8.6.5 Perceived benefits and risks of genetic testing for BPD

Other studies have asked participants to consider the benefits and risks of genetic testing for BPD. In a quantitative study, individuals were asked to choose, from a list of options, the most important benefits of genetic testing. The majority of patients and their spouses (67.5%) indicated that "to obtain treatment to prevent attacks" was the most important benefit to genetic testing. The second most important reason benefit selected was "I think that I have the gene (or my spouse has the gene), and I want to be more certain of that." (35) In a qualitative study examining perceived benefits of genetic testing for BPD, benefits mentioned included the potential to prevent the onset of BPD, early intervention (particularly during adolescence), advancing research, providing a basis for pharmacogenomics (tailoring medication to a particular genotype) and thus potentially improving treatment outcomes, providing a basis for reproductive decision-making, a basis for decision to marry or not to marry an individual, increased certainty (confirmation of the diagnosis), potential for early diagnosis, and ability to avoid stressors or triggers for BPD associated episodes. (22)

In the quantitative study mentioned above, 25% of patients felt that there was no risk to genetic testing for BPD. Of those who felt that there were risks, the majority felt that the most important risk was that their insurance company may learn the results. Among spouses, the most

important risks were that the insurance company may learn the results and that a positive test may upset them because of worries about their children. The majority of patients and their spouses felt that the benefits outweighed the risks for genetic testing, 22.0% of patients and 14.6% of their spouses were uncertain. None of the participants indicated that the risks of testing outweighed the benefits. (35) In the qualitative study, risks of genetic testing mentioned included increased stigmatization, uncertainty associated with genetic test results communicated as a probability, increased worry among asymptomatic individuals carrying susceptibility genes, insurance discrimination, discrimination by employers, test results impacting reproductive decisions, lowered threshold for stress, increased vulnerability, and potential increased risk of suicide. (22) When considering genetic testing for psychiatric conditions overall, Milner *et al.*'s 1999 study elicited concerns including misuse of genetic information, employment discrimination, insurance discrimination, "eugenics", and over-interpretation of genetic information. (39)

2.8.6.6 Other feelings toward genetic testing for BPD

In the survey be Tripitelli *et al.*, 92.1% of affected individuals and 78.9% of their spouses said that they would definitely or probably have chosen to marry their current spouse even if genetic testing had detected a gene for bipolar disorder. In the same study, 55.0% of patients and 57.5% of their spouses said that positive genetic test results would definitely not or probably not have deterred them from having children. (35) In a qualitative study, affected individuals reflected upon the effect of having a family with a high density of BPD diagnoses, and how this affected their reproductive decisions. Some individuals were deterred from having children because of an increased risk of BPD, while others felt BPD was not severe enough to affect reproductive decisions. About half of individuals reported that genetic testing would impact their decision to

have or not to have children. (22) The majority of individuals surveyed (75.0% of patients and 65.0% of their spouses) *would* want their genetic test results to be shared with their doctor. While the majority of individuals surveyed (76.9% of affected individuals and 84.6% of their spouses) *would not* want the genetic test results to be available to their insurance company. (35)

Trends suggest a strong likelihood that there will be interest in genetic testing for bipolar disorder if it becomes available, including presymptomatic testing. Should genetic testing become available, it is unlikely that genetic counselors will be able to precisely predict the course of BPD and will convey the fact that it is variable. (28)

2.8.6.7 Health beliefs and BPD

The Health Belief Model is a psychological model that attempts to use individuals' beliefs to explain and predict their health-related behaviors. The variables used in the Health Belief Model are summarized in Table 2.

Table 2: Variables Used in the Health Belief Model

Variable	Description
Perceived threat	
Perceived severity	Feelings concerning the seriousness of developing a condition or leaving it untreated (medical and social consequences)
Perceived susceptibility	Subjective perception of risk
Perceived benefits	The believed effectiveness of strategies used to reduce the burden of disease
Perceived barriers	Negative consequences that may occur if a particular health action is taken (physical, psychological, or financial)
Cues to action	Bodily or environmental events that motivate an individual to take action
Other variables	Indirect effects of sociopsychological, demographic, and structural factors
Self-efficacy	The individual's belief that they can successfully execute the behavior

A 2007 study by Powell *et al.* examined the relationship between health literacy, diabetes knowledge, and patients' readiness to take health action among individuals with type II diabetes. Low health literacy is associated with poor disease-related knowledge, poor self-management, poor adherence to treatment, worse self-reported health status, 30-50% increased risk of hospitalization, and higher annual health care costs. The study found no association between health literacy level and diabetes health belief model score. That is, regardless of health literacy level, individuals with type II diabetes were still willing to take action to manage their diabetes. Specifically, the study found that, on average, individuals with type II diabetes believed that diabetes was severe, that therapy is beneficial, and that they can overcome barriers to care. (40) A 2007 study examined lifestyle changes and the health belief model for women with *BRCA1*

and *BRCA2* mutations. These mutations are consistent with a lifetime risk of breast cancer of up to 87 percent and a lifetime risk of ovarian cancer of up to 44 percent. This study found that most women made healthy behavior changes as a result of elevated risk awareness. (41)

Tripitelli *et al.* surveyed individuals with BPD and their spouses in a 1998 study. The questions were directed at assessing knowledge and understanding attitudes. Individuals were asked about rates of response to treatment. An estimated 60-70% of individuals with BPD have a good response to mood stabilizers such as lithium or anticonvulsants. Individuals with BPD estimated that 56.7% of individuals have a total or excellent response to medical treatment. The estimate was 52.6% among their spouses. The estimate of having a good response to treatment was 61.5% in affected individuals and 59.5% in their spouses. Individuals with BPD estimated that 25.9% of individuals have a poor response or no response to treatment, while the estimate among their spouses was 30.3%. (35) In another study, researchers assessed the perceived efficacy of lithium, one of the most common treatments for BPD. Overall, participants ranked lithium as quite helpful (4.4 on a scale of 1-5, with 1 being not helpful and 5 being very helpful). The majority of participants would use prophylactic treatment if it could reduce the severity of BPD by 50% or more. (28)

In a 2001 study, individuals with BPD were asked to describe the cause of their BPD. 74% cited genetics and/or a chemical imbalance (77%) as the causative factor, others cited stress (16%), breakup of relationships (3%), home life during childhood (3%), financial instability (3%), and lack of concern of mental health professionals (3%) as factors. Patients were asked to estimate the incidence of BPD in the general population; the mean estimated risk was 28.11%, compared to the 3-24% risk established by recent research. (2, 10, 18, 34)

Based on Mendelian inheritance, when one parent has one copy of a genetic variant, the chance that a child will inherit the variant is 50%, but it appears that BPD follows a multifactorial pattern of inheritance. When asked about the chance that a child would inherit a gene for bipolar disorder, if one parent has that gene, the mean estimate was 46.7% for patients and 41.4% for their spouses. An estimate of 30.5% was found for the likelihood that an individual could have a gene for bipolar disorder but not show symptoms. (35) In another study, affected individuals were asked about the risk to their family members on a scale from very low to very high. Most participants described their siblings' and children's risk as moderate or high. The mean quantitative risk for siblings was 35.2% and the risk for children was 44.6%. Most participants described their parents' risk as very low, with a mean quantitative risk of 20.4%. The risk to spouses was described as low to very low, with a mean quantitative risk of 12.1%. (34)

3.0 MATERIALS AND METHODS

3.1 DESIGN AND RATIONALE

This study was designed as the United States component of a study titled "Neurological Endophenotypes in Psychiatric Genetic Research in India." This larger study will test several hypotheses regarding bipolar disorder and schizophrenia. One hypothesis is that "genetic counseling will help families cope with their mental illnesses". (42) Components of this study, including the knowledge and health belief survey, will be given to the participants in India as part of the genetic counseling component. In future studies, the results of this study may be compared to the results in India to determine whether the needs and findings differ for the two patient populations.

3.2 PARTICIPANTS

Participants were recruited through two ongoing research studies (Candidate Gene Alleles and Genetic Determinants of Bipolar Disorder) through the University of Pittsburgh and Western Psychiatric Institute and Clinic (WPIC). Research participants come from a number of sources across Pennsylvania, Ohio, West Virginia, Kentucky, and Michigan including referral from clinicians and drop-in centers partnered with WPIC and flyers and brochures posted at these

sites. Additionally, researchers at WPIC present at conferences, meetings of the National Alliance on Mental Illness (NAMI), and the Pennsylvania Mental Health Consumers Association, and they recruit participants from these events. Finally, participants may also be recruited by written or electronic flyers and brochures in the community or the recruitment website maintained through the University of Pittsburgh. (43, 44) Individuals participating in the Candidate Gene Alleles or Genetic Determinants of Bipolar Disorder study were asked if they would like to hear about other studies, during the informed consent process. (44) Individuals were then given the Diagnostic Interview for Genetic Studies (DIGS), a comprehensive, semi-structured interview eliciting details on demographics, medical history and all major psychiatric disorders including mood disorders, substance abuse and dependence, psychosis, and anxiety disorders, along with standard clinical rating scales (the Mini Mental State Examination [MMSE], Scale for the Assessment of Positive Symptoms [SAPS], Scale for the Assessment of Negative Symptoms [SANS], Supports Intensity Scale [SIS], and the Global Assessment Scale [GAS]). (45) Upon completion of the diagnostic interview, subjects were given a recruitment flyer for this study.

Inclusion criteria included: (1) Age 18 years or above, (2) Self-reported diagnosis of bipolar disorder or first-degree relative of an individual with a self-reported diagnosis of bipolar disorder. The racial, ethnic, and gender characteristics of the proposed study population reflect the demographics of the regions from which participants were drawn (Pennsylvania, Ohio, West Virginia, Kentucky, and Michigan). No exclusion was made based on race, ethnicity, gender, or HIV status.

3.3 EXPERIMENTAL DESIGN

The experimental design was approved under expedited review by the University of Pittsburgh Institutional Review Board (IRB) under IRB number 0610128 in 2007 (Appendix A). An anonymous survey (Appendix B) was administered to each participant after verbal informed consent was given and documented. All contact with participants was over the telephone. The survey was designed to measure familiarity with, and interest in, genetic counseling, knowledge of bipolar disorder, and health beliefs. The survey also ascertained demographic information and a brief psychiatric history. Knowledge of BPD was assessed using eight multiple-choice questions. The knowledge survey was modeled after a survey administered to school-age children and women of childbearing age to assess knowledge of sickle cell disorder (46, 47) The health belief survey was modeled after surveys used among women to assess motivations for participation in cancer screening programs and a survey administered to women of childbearing age to assess health beliefs regarding sickle cell disease and sickle cell trait. (47-49) Both the knowledge and health belief surveys were adjusted to apply to bipolar disorder for the study "Neurological Endophenotypes in Psychiatric Genetic Research in India". (42) The health belief survey used a five-point Likert scale response system to assess perceived susceptibility, perceived seriousness, perceived benefit of action, and perceived barriers to action. A score of one corresponded to "strongly disagree" and a score of five corresponded with "strongly agree" as recommended by Champion. (50, 51) The final set of questions was a set of five open-ended questions encouraging a discussion of the causes of bipolar disorder and the likelihood that there is a genetic component.

Every other individual who completed the survey was offered participation in a brief educational session followed by an identical survey. The rationale behind this approach was that

the first data set provides information on the patient population among the general population. The second data set would allow comparative analysis of the data to see if knowledge, health beliefs, or opinions changed.

The educational session was a semi-structured discussion of genetic counseling, genetics, multifactorial inheritance, empiric risk for bipolar disorder, and general information about bipolar disorder. Participants were encouraged to ask questions, which the interviewer answered to the best of their ability, looking up the information if necessary.

Telephone interviews were selected as the sampling method because it allowed inclusion of participants who would not have otherwise been able to attend a face-to-face interview or focus group (e.g. those living in rural areas or living a great distance away). An additional benefits of this method is that some participants may perceive and greater degree of anonymity, thus increasing the validity of their responses. (22) Alternatives would include face-to-face interviews, which would have allowed for observation of non-verbal cue and responses and may have built more trust with the interviewer, or focus groups. One of the benefits of focus groups is the synergistic effect resulting in production of ideas that might not otherwise be elicited. (22) However, with focus groups, some of the anonymity is lost.

3.4 DATA ANALYSIS

Data from affected individuals and first-degree relatives was analyzed separately to determine if there was a significant difference in knowledge, health beliefs, or acceptance of genetic counseling. Answers to the knowledge questions were transformed into dichotomous variables, with correct answers coded as one and incorrect or unsure answers coded as zero. The maximum

possible score for knowledge of BPD was eight. Among individuals who participated in the educational session, the knowledge score before and after the session were compared using a paired t-test. Familiarity with genetic counseling and acceptance of genetic counseling were measured and acceptance before and after the educational session were compared. Linear regression was used to determine if demographic variables predicted level of knowledge or acceptance of genetic counseling prior to the educational session. On the five-point Likert scale, the population mean for perceived severity of BPD, susceptibility, benefits of testing, and perceived barriers to testing were calculated, including a score for each component and a cumulative score for each category. For individuals who participated in the educational session, the mean health belief scores were compared before and after the session. Each health belief was analyzed with knowledge scores for correlation, and linear regression was used to determine if demographic characteristics predicted health beliefs.

Answers to the open-ended questions and responses in the semi-structured interview were analyzed using constant comparative analysis developed for use in grounded theory methodology. (52) While not developing a grounded theory, the goal was to identify themes and differences in responses to the open ended questions. Each individual answer to a question was compared with all other answers to that question, and themes were identified and described. A pattern is defined as a common topic, vocabulary, activity, or feeling. Themes are pieced together to describe the collective experience. When themes are identified, they are compared to the current literature in order to fit into the established framework or to show differences in the opinions of the population.

4.0 RESULTS

4.1 DEMOGRAPHICS

To date, four individuals have participated in this study. The population surveyed were primarily over age 40 (100%), married (75%), and had one or more children (75%). 100% of participants were high school graduates, including 25% whose highest level of education was college and 25% who had completed masters/doctoral/professional school. To date 75% of individuals surveyed are female. To date all individuals surveyed are affected with BPD, all are being treated with medication and outpatient therapy, and 50% have at least one affected first- or second-degree relative. (See Figures 1-5.)

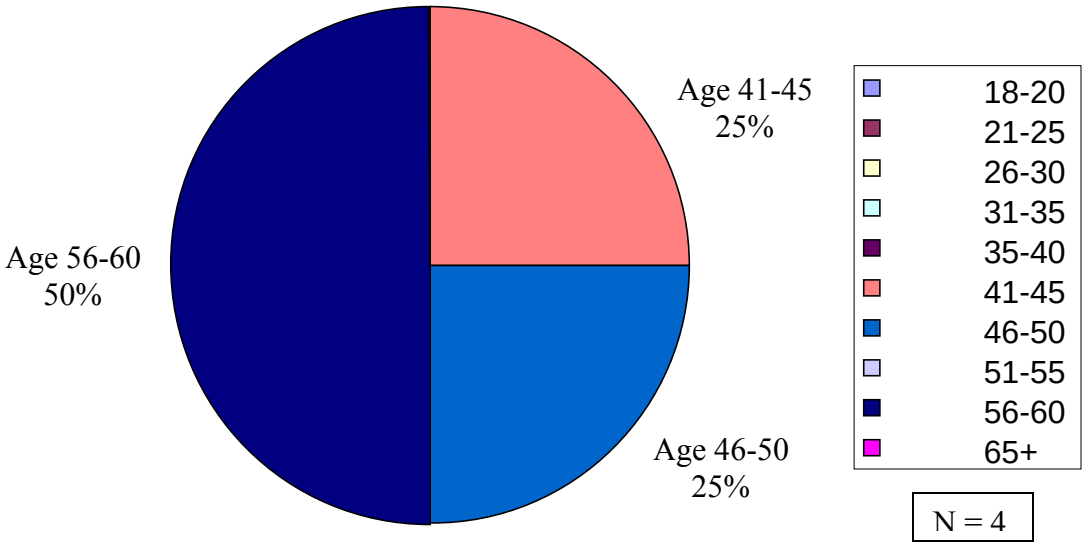

Figure 1: Age Distribution of Preliminary Survey Participants

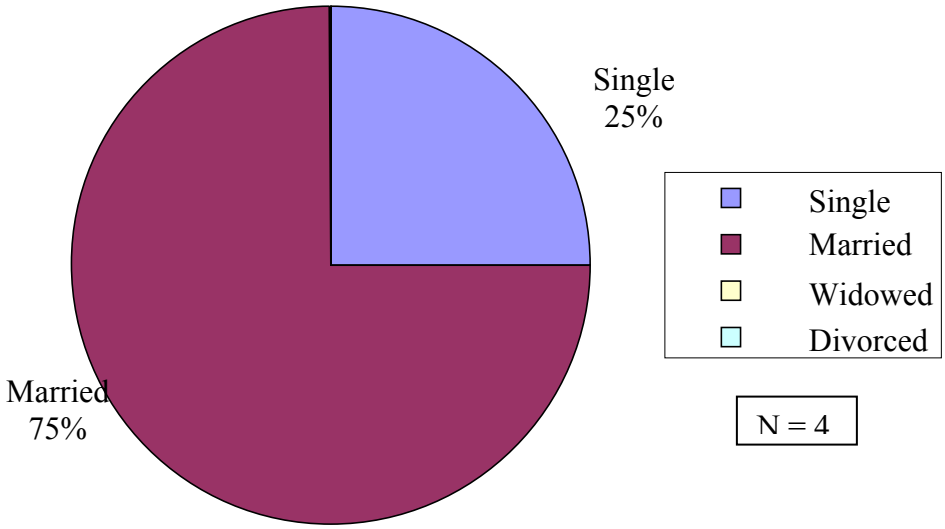

Figure 2: Marital Status of Preliminary Survey Participants

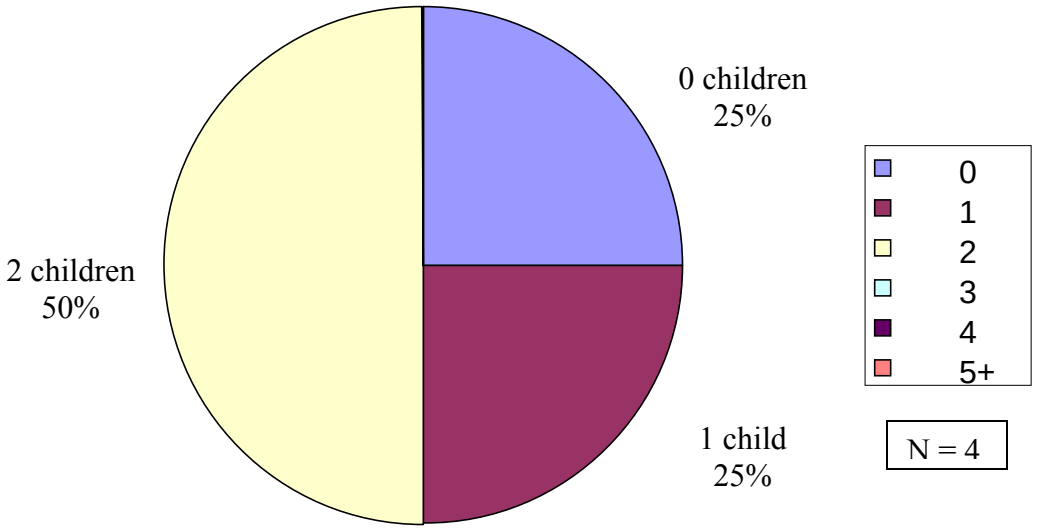

Figure 3: Number of Children for Preliminary Survey Participants

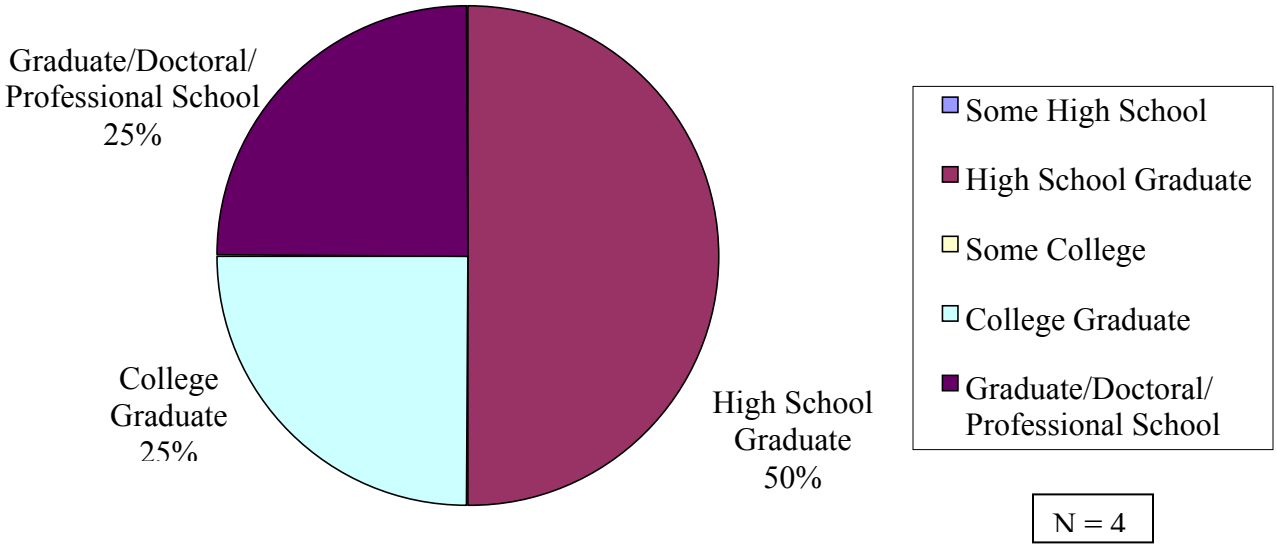

Figure 4: Highest Level of Education Completed Among Preliminary Survey Participants

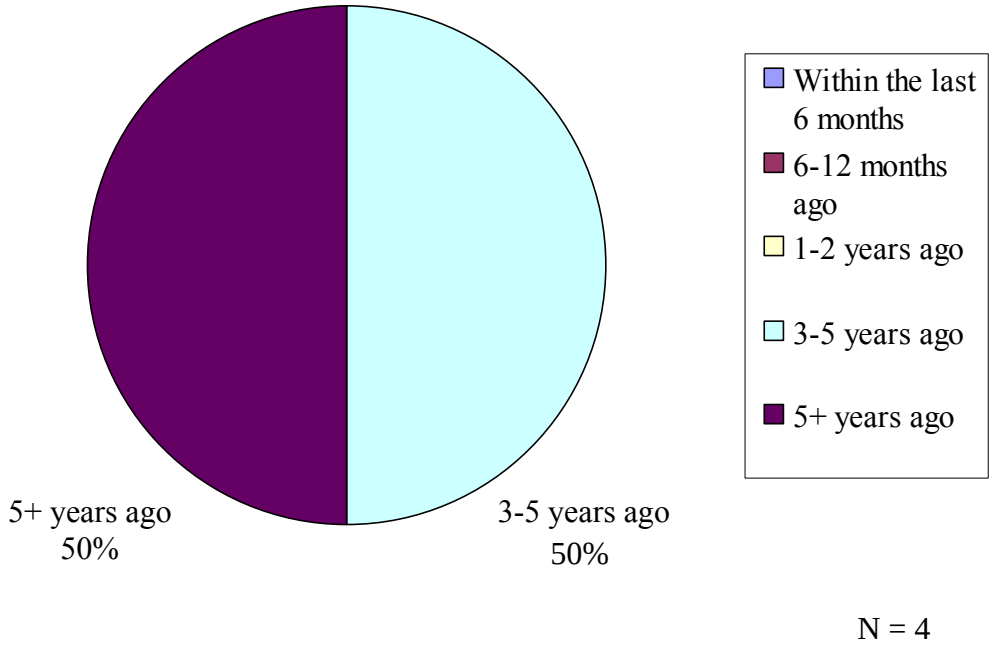

Figure 5: Time of Diagnosis for Affected Individuals Completing the Preliminary Survey

4.2 SPECIFIC AIM I

The first specific aim was to determine the current health beliefs of those diagnosed with bipolar disorder (BPD) and the current health beliefs of their first degree relatives, in regard to cause, course, treatment, and genetic information.

Four individuals diagnosed with BPD have been surveyed. The cumulative perceived severity of BPD was high at 4.33 (±1.30), the cumulative perceived susceptibility to BPD was high at 4.45 (±1.29), the cumulative perceived benefit to genetic information was high at 4.36

(±1.29), and the cumulative perceived barriers to testing were moderate to high at 3.09 (±1.81) (Table 3).

At this time the sample size does not permit correlation with demographic factors to be calculated. Additionally, data from first-degree relatives are not yet available.

Table 3: Summary of Current Health Beliefs (Affected Individuals, N=4)

Severity	Average	Standard Deviation
Bipolar disorder is a serious disease.	**5.00**	**0.00**
Having a child with bipolar disorder would be very scary.	**4.00**	**1.15**
My life would change if my child had bipolar disorder.	**4.00**	**2.00**
***Severity Cumulative**	**4.33**	**1.30**
Susceptibility		
My children are at risk for bipolar disorder.	**4.50**	**1.00**
Bipolar disorder could happen in my family.	**5.00**	**0.00**
My partner may be a carrier of genes for bipolar disorder.	**3.67**	**2.31**
***Susceptibility Cumulative**	**4.45**	**1.29**
Benefit		
It is useful to know if I have genes that make bipolar disorder more likely.	**5.00**	**0.00**
It is useful to know if my partner has genes that make bipolar disorder more likely.	**5.00**	**0.00**
Knowing the risk of having a child with Bipolar disorder would change my plans about a future pregnancy.	**3.25**	**1.71**
***Benefit Cumulative**	**4.36**	**1.29**
Barriers		
Genetic testing for Bipolar disorder is painful and difficult.	**1.50**	**1.00**
My partner would be hard to convince to have genetic testing.	**3.33**	**2.08**
I would not want to pay for genetic testing.	**4.50**	**1.00**
***Barriers Cumulative**	**3.09**	**1.81**

Qualitative analysis is severely limited by the small sample size. Preliminary analysis is striking in that 3 of 3 people who answered the first question, "when you first heard about mental illness in your family, what did you think caused it?" attributed their BPD to environmental effects (Table 4), while they also all agreed that BPD is genetic. One individual even stated, "I got this from my mother, she carried the gene, so I have it."

Table 4: Sample of Responses to Open-ended Question 1

When you first heard about mental illness in your family, what did you think caused it?
"An imbalance of chemicals in my brain."
"In my family, I would say events, life-changing events happened."
"Well, I guess I had felt that mine was related to stress and, like, maybe a predisposition to feel depressed and melancholy in certain situations. When I was under a lot of stress I began to experience more symptoms, so like, when I had some breakdowns and was hospitalized I relate them to stressful circumstances. But, I feel like I had a predisposition."

When asked how a hereditary condition might affect a family, an emerging theme, expressed by 2 of 4 interviewees is that it puts stress on the family. One individual stated,

> "We change how we do things, for example, with the medications and the mood swings, it effects your family severely. As far as them knowing how to do what they need to do and the stress it puts on your family. Embarrassment for the children. Just the whole…pressure, just a lot of stress and pressure on the family."

Another emerging theme is that the realization that BPD is hereditary may explain the behaviors of other family members. Two of four individuals surveyed expressed the belief that parents and/or grandparents had BPD but had gone undiagnosed.

4.3 SPECIFIC AIM II

To assess participants' knowledge of genetic counseling, and to assess acceptance of and interest in genetic counseling services and genetic testing.

Four individuals diagnosed with BPD have been surveyed. Preliminary data show that knowledge of genetic counseling is low, with no participants stating that they have heard of genetic counseling or know what it is, prior to the educational session. Four of four individuals stated that they did not know if genetic counseling would be useful to them.

4.4 SPECIFIC AIM III

To improve the knowledge and acceptance of genetic testing and genetic counseling for psychiatric conditions through individual education sessions.

Four individuals diagnosed with BPD have been surveyed. Preliminary data show that the knowledge of BPD in affected individuals is high, with an average score of 7 correct (±1.15) out of a possible 8. The lowest score to date is 6 correct and the highest score is 8 correct.

Data are insufficient to determine if there is a significant difference in knowledge of BPD or in acceptance of genetic counseling before and after the educational session.

At this time the sample size does not permit correlation with demographic factors to be calculated. Additionally, data from first-degree relatives are not yet available.

5.0 DISCUSSION

This study has examined the health beliefs, level of knowledge, and acceptance of genetic counseling in individuals with BPD and their first-degree relatives. This study and similar studies are useful to medical professionals in determining the needs of this patient population as the demand for genetics services grows. Additionally, the study has examined whether a brief educational session can improve knowledge or change acceptance of genetic counseling or health beliefs. This will be helpful in establishing evidence that education is a helpful intervention, as the health belief model shows that health beliefs affect the willingness to take action in one's own health care. Determining possible changes in acceptance of genetic counseling after the educational session has the potential to show that interest in genetic counseling services increases with just a brief discussion of the multifactorial inheritance pattern of BPD.

The first aim was to determine the current health beliefs of those diagnosed with bipolar disorder (BPD) and the current health beliefs of their first degree relatives, in regard to cause, course, treatment, and genetic information. The hypothesis was that participants would have a low level of knowledge about cause, high level of perceived severity of mental illness, and a low level of perceived susceptibility. Preliminary data also show that the knowledge of BPD in affected individuals is, in fact, high. Additionally, the perceived severity and level of susceptibility are high. This information will be helpful in counseling for bipolar disorder. High severity of BPD indicates that the majority of affected individuals felt that BPD is a serious

disease and having a child with BPD would have an impact on their life. High susceptibility indicates that there is a risk to other family members.

In considering bias to this data, because the individuals surveyed were recruited through another study of BPD and genetics, the population may have educated themselves or learned more about BPD through their participation in the other study. Additionally, these individuals are aware that they are in a study of genetics and BPD. This may help to explain the high level of perceived susceptibility and knowledge, as the participants have an understanding that the genetics of BPD is under investigation.

In the qualitative analysis, it is striking that three of three individuals attributed their BPD to environmental factors, yet they agreed that there was a genetic component to BPD. As more data are collected, it will be important to examine this theme. If individuals have a strong preconceived belief about the cause of their disorder, it may be a barrier to successful genetic counseling. Clients may feel that the genetic explanations and risks are reasonable, yet they do not explain what is happening in their family.

The second specific aim was to assess participants' knowledge of genetic counseling, and to assess acceptance of and interest in genetic counseling services and genetic testing. The hypothesis was that participants would have a high level of perceived benefit to testing, a low level of perceived barriers to testing, a low level of perceived impact of genetic susceptibility information, and a low level of knowledge of and interest in genetic counseling. Identifying the current status of knowledge and acceptance will determine areas of education that must be stressed in order to increase knowledge and acceptance. Preliminary data show that perceived benefit of genetic information was high, while the cumulative perceived barriers to testing were moderate to high. The high perceived benefit of genetic information indicated that most affected

individuals would find genetic risk information useful. Of note, preliminary data show that for one statement, "Knowing the risk of having a child with bipolar disorder would change my plans for a future pregnancy" the score was only 3.0 (±1.41) out of a possible 5. Therefore, it may be that the perceived benefit of genetic information is high overall, but participants are less likely to change their reproductive plans if they have the information. Another possible explanation is that individuals are less likely to agree with this statement because they may not plan to have another pregnancy for other reasons (age, marital status, socioeconomic status), thus their plans would not change. The cumulative perceived barriers to testing were moderate to high. However, on average, participants disagreed with the statement that genetic testing is painful and difficult, with a score of 1.83 (±0.98). Stronger perceived barriers involved cost and convincing their partner to have testing. As hypothesized, the knowledge of genetic counseling is low.

The third specific aim was to improve the knowledge and acceptance of genetic testing and genetic counseling for psychiatric conditions through individual education sessions. The hypothesis was that lack of interest in genetics may be due to a lack of knowledge of genetics and the risks associated with bipolar disorder. Acceptance can be improved by increasing the communities' knowledge of hereditary concepts. Acceptance of and interest in genetic counseling services may also increase. These hypotheses will be further evaluated as more participants are interviewed and participate in the educational session.

Studying the correlations between demographic factors and knowledge, health beliefs, and acceptance of genetic counseling can help medical professionals to better understand their patient population and tailor their message. It may provide a starting point for further research to determine why these correlations exist or how this information can be used in the future.

It will also be helpful to study the correlation between knowledge of BPD and health beliefs. The level of knowledge may affect the perceived severity of BPD, susceptibility to BPD, benefit of testing, and barriers to testing.

As mentioned above, one limitation of this study is that individuals were invited to participate only after enrolling in another study. Therefore, participants were all seeking medical care and/or attending meetings to seek information about BPD and psychiatric illness. This limits the generalizability of the data. The results may not reflect the knowledge, opinions, and health beliefs of individuals who are not currently seeking medical care. Also, the individuals enrolled in this study may have more information regarding the genetics of BPD because of the nature of the studies in which they are enrolled at Western Psychiatric Institute and Clinic.

As was discussed previously, there are limitations to making all contact with participants over the telephone. Briefly, it may limit trust with the interviewer thus limiting full disclosure of beliefs during the open-ended interview. While the educational session was modeled after a basic genetic counseling session, the interviewer was unable to detect non-verbal clues that the participant heard and understood the material. Also, the interviewer was unable to use visual aids during the educational session to facilitate understanding.

APPENDIX A

INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL LETTER

University of Pittsburgh

Institutional Review Board

3500 Fifth Avenue
Ground Level
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1146 (fax)

MEMORANDUM:

TO: Ms. Emily M. James

FROM: Christopher Ryan, Ph.D., Vice Chair

DATE: January 22, 2007

SUBJECT: IRB# 0610128: Improving Knowledge, Evaluating Opinions, and Ascertaining the Acceptance of Genetic Counseling for Bipolar Disorder

The above-referenced proposal has received expedited review and approval from the Institutional Review Board under 45 CFR 46.110 (7).

Please Note:

- ***The advertisement that was submitted for review has been approved as written.***
- ***The waiver for the requirement to obtain a written informed consent for telephone screening has been approved.***

If applicable, please include the following information in the upper right-hand corner of all pages of the consent form:

Approval Date: January 22, 2007
Renewal Date: January 21, 2008
University of Pittsburgh
Institutional Review Board
IRB# 0610128

Please note that it is the investigator's responsibility to report to the IRB any unanticipated problems involving risks to subjects or others [see 45 CFR 46.103(b)(5) and 21 CFR 56.108(b)]. The IRB Reference Manual (Chapter 3, Section 3.3) describes the reporting requirements for unanticipated problems which include, but are not limited to, adverse events. If you have any questions about this process, please contact the Adverse Event Coordinator at 412-383-1504.

The protocol and consent forms, along with a brief progress report must be resubmitted at least **one month prior** to the renewal date noted above as required by FWA00006790 (University of Pittsburgh), FWA00006735 (University of Pittsburgh Medical Center), FWA00000600 (Children's Hospital of Pittsburgh), FWA00003567 (Magee-Womens Health Corporation), FWA00003338 (University of Pittsburgh Medical Center Cancer Institute).

Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.

CR:kh

APPENDIX B

SURVEY

B.1 DEMOGRAPHIC AND PSYCHIATRIC HISTORY QUESTIONNAIRE

1. How old are you?

2. What is your marital status?

- □ Single
- □ Married
- □ Divorced
- □ Widowed

3. How many children do you have?

- □ 0
- □ 1
- □ 2
- □ 3
- □ 4
- □ 5+

4. Do you live with your partner?

- □ Yes
- □ No
- □ I have no partner

5. What is the highest level of education you have finished?

- □ Some High School
- □ High School Graduate
- □ Some College
- □ College Graduate
- □ Graduate/Doctoral/Professional School

6. Do you have, or have you had, bipolar disorder?

- □ Yes
- □ No

7. Do you have a relative who has been diagnosed with Bipolar disorder?

- □ Yes
- □ No

7b. If yes, which family member or family members have bipolar disorder? (all that apply)

- □ Myself
- □ Mother
- □ Father
- □ Child
- □ Adopted child
- □ Brother
- □ Sister
- □ Grandparent
- □ Aunt / Uncle (blood relation)
- □ Cousin
- □ Other (please state) _____

Follow up questions for "affected subject with no affected first-degree relatives" and "affected subject with one or more affected first-degree relatives":

1. How long ago were you diagnosed?

- □ In the last 6 months
- □ 6-12 months ago
- □ 1-2 years

□ 3-5 years
□ 5+ years
□ Other

2. When did you last actively have symptoms?

□ Currently in an active phase
□ In the last 6 months
□ 6-12 months ago
□ 1-2 years
□ 2-5 years
□ 5+ years
□ Other

3. Are you currently being treated for Bipolar disorder?

□ Yes
□ No

3b. If yes, what type of treatment? (all that apply)

□ Taking medication
□ In day therapy
□ In residential therapy (hospital)
□ Other

4. Do you have any other psychiatric diagnoses?

□ Yes
□ No
□ Do not know

4b. If yes, what is the diagnosis?

□ Personality disorder
□ Manic depression
□ Depression
□ Schizophrenia or Schizoaffective disorder
□ Other
□ Do not know

B.2 GENETIC COUNSELING QUESTIONNAIRE

13. Have you heard of genetic counseling?

- □ Yes
- □ No

14. Do you know what genetic counseling is?

- □ Yes
- □ No

15. Have you ever had genetic counseling?

- □ Yes
- □ No

16. If yes, was it due to a family or personal history of bipolar disorder?

- □ Yes
- □ No

17. Do you think genetic counseling would be useful to you?

- □ Yes
- □ No

Comments:

B.3 KNOWLEDGE QUESTIONNAIRE

Following are some questions about Bipolar disorder. I will read each question to you, along with five possible answers. Please select the one best answer for each question.

1) Bipolar disorder is caused by

a. dirty needles
b. a virus
c. inheriting genes from parents
d. the exact cause is unknown currently
e. none of the above

2) How many genes must someone inherit to have Bipolar disorder?

a. zero, it is not caused by genes
b. one from their mom
c. two, one from their mom, and one from their dad
d. the number of genes is not presently known
e. none of the above

3) Bipolar disorder can cause

a. euphoria, feeling "high"
b. racing thoughts, talkativeness
c. drug or alcohol use
d. inability to concentrate well
e. all of the above

4) Bipolar disorder is most likely caused by

a. genes
b. the environment such as a major life event
c. a combination of genes and environment such as a major life event
d. radiation
e. none of the above

5) Bipolar disorder is a serious conditions that causes shifts in

a. mood
b. energy
c. functioning
d. all of the above
e. none of the above

6) Bipolar disorder is present

a. More in poor people
b. More in rich people
c. Same across all ethnic and economic groups
d. More in some ethnic groups
e. More in some regions

7) Bipolar disorder is treated by

a. medications known as mood stabilizers
b. liver transplant
c. rest
d. blood transfusions
e. none of the above

8) How can you tell if someone carries genes for Bipolar disorder?

a. They look sick
b. They will eventually have Bipolar disorder
c. With a simple blood test
d. There is no way of knowing
e. None of the above

B.4 HEALTH BELIEF ASSESSMENT

Please rate your level of agreement with each of the following statements on a 5-point scale where 1 means “strongly disagree” and 5 means “strongly agree.”

B.4.1 Severity

1. Bipolar disorder is a serious disease.

Strongly Disagree 1 2 3 4 5 Strongly Agree

2. Having a child with bipolar disorder would be very scary.

Strongly Disagree 1 2 3 4 5 Strongly Agree

3. My life would change if my child had bipolar disorder.

Strongly Disagree 1 2 3 4 5 Strongly Agree

B.4.2 Susceptibility

4. My children are at risk for bipolar disorder.

Strongly Disagree 1 2 3 4 5 Strongly Agree

5. Bipolar disorder could happen in my family.

Strongly Disagree 1 2 3 4 5 Strongly Agree

6. My partner may be a carrier of genes for bipolar disorder.

Strongly Disagree 1 2 3 4 5 Strongly Agree

B.4.3 Benefit

7. It is useful to know if I have genes that make bipolar disorder more likely.

Strongly Disagree 1 2 3 4 5 Strongly Agree

8. It is useful to know if my partner has genes that make bipolar disorder more likely.

Strongly Disagree 1 2 3 4 5 Strongly Agree

9. Knowing the risk of having a child with Bipolar disorder would change my plans about a future pregnancy.

Strongly Disagree 1 2 3 4 5 Strongly Agree

B.4.4 Barriers

10. Genetic testing for Bipolar disorder is painful and difficult.

Strongly Disagree 1 2 3 4 5 Strongly Agree

11. My partner would be hard to convince to have genetic testing.

Strongly Disagree 1 2 3 4 5 Strongly Agree

12. I would not want to pay for genetic testing.

Strongly Disagree 1 2 3 4 5 Strongly Agree

B.4.5 Open-ended questions

13. When you first heard about mental illness in your family, what did you think caused it? How do you think it happened or occurred?

14. When we say a condition might be inherited, what does that mean to you?

15. How do you think a hereditary condition would affect your family now and in the future?

16. Do you think bipolar condition is hereditary?

    If response is Yes and you have bipolar disorder – what do you think your risk is for passing it on to a child?

    If response is Yes and you do not have bipolar disorder – what do you think your risk is for developing the condition?

17. Do you have any other comments you would like to share?

APPENDIX C

EDUCATIONAL SESSION OUTLINE

a) Contracting: In this educational session we will discuss what is known and what is not known about the genetics and effects of bipolar disorder. Please feel free to ask any questions that you may have. This will be similar to a genetic counseling session.
b) What is genetic counseling?
    i) Genetic counseling is a discussion of the genetic causes for a disorder, the chance that other family members will show signs and symptoms of the disorder, how the diagnosis may affect the family, and where people can go for more information.
c) Genetic counseling usually involves a brief discussion of genetics.
    i) Genetics is the study of DNA. You may have heard of DNA before, DNA is like an instruction manual for the body. We each have our own, unique DNA code, but we also share some of that code with our family members.
        (1) We know that changes in the DNA can put people at risk for developing certain conditions.
            (a) For bipolar disorder, the exact causes are not completely understood, but at present it seems that both genetic and environmental factors may increase the risk of BPD.
            (b) Threshold model of multifactorial inheritance.
            (c) The number and exact locations of the predisposing genes are not known.
            (d) If you have one first-degree relative with BPD, your risk is about 3-15%, although some studies say the risk is as high as 24%.

ii) At present, there is no way to tell if a person carries genes that make them more susceptible to BPD. You cannot tell by looking at someone, by a physical exam, or with genetic testing.

d) What are the effects of BPD?
   i) BPD can affect moods, energy level, and functioning.

e) Who does BPD affect?
   i) BPD affects about 1% of the population, current evidence suggests that it affects men and women equally, and the rate is equal across ethnic groups.

f) Treatment
   i) Most individuals affected with BPD are treated with mood stabilizers. Sometimes antidepressants are also prescribed. Doctors work with their patients to find the best possible management.

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