Peering Down the Rabbit Hole: Living with von Hippel-Lindau Syndrome from the Young Adult Perspective

Master’s Thesis

Presented to

The Faculty of the Graduate School of Arts and Sciences
Brandeis University
Graduate Program in Genetic Counseling
Gayun Chan-Smutko, Advisor

In Partial Fulfillment
of the Requirements for the Degree

Master of Science
in
Genetic Counseling

by
Lindsay Schmidt

May 2015
Acknowledgements

I would like to extend a big thank you to my thesis advisor, Gayun Chan-Smutko, MS, CGC, for her continuous encouragement, guidance, and enthusiasm. I am very thankful that she put up with my endless questions and frequently unannounced visits to her office and that she was so gracious with her time. I could not have done this without her! I would also like to thank the other two members of my thesis committee: Theodore Cross, PhD and Suzanne Nylander, OD. Their expertise was invaluable and I very much appreciate that they volunteered their time to help a novice researcher learn the ins and outs of qualitative research.

I also owe a big thank you to the VHL Alliance for supporting my thesis project and affording me access to the study population. I would also like to thank all study participants for their valuable time, commitment to the project, and for sharing their personal stories and experiences with me.

I would like to thank Beth Sheidley, MS, CGC for providing guidance in the beginning stages of the project and Elizabeth Cross, PhD, MSW for her encouragement and valuable advice along the way as well as her assistance with methodology and analysis. I would like to thank Missy Goldberg for helping me monitor the budget and issue gift cards for participants. Thanks to Margarita Corral for imparting her knowledge of ATLAS.ti.

I would also like to express my gratitude to Judith Tsipis, PhD and Gretchen Schneider, MS, CGC as well as other members of the Brandeis Genetic Counseling program faculty for pushing me outside of my comfort zone and helping me realize what I’m capable of achieving. And, thanks to my classmates for experiencing the ups and downs of graduate school with me.

Lastly, I would like to thank my parents and my sisters for their unwavering love and support and Aaron for always believing in me, even when I didn’t believe in myself.
Abstract

Peering Down the Rabbit Hole: Living with von Hippel-Lindau Syndrome from the Young Adult Perspective

A thesis presented to the Graduate Program in Genetic Counseling

Graduate School of Arts and Sciences
Brandeis University
Waltham, Massachusetts

By Lindsay Schmidt

Von Hippel-Lindau syndrome (VHL) is a highly penetrant cancer susceptibility syndrome that requires rigorous surveillance and often involves surgery to remove VHL-related tumors throughout the body. Few studies have explored the psychosocial aspects of living with VHL and there is a lack of literature addressing the psychosocial challenges that young adults with VHL face as they encounter various transitions in their lives. To address this gap in the literature, this study focused on a cohort of ten young adults (18-26 years old) with VHL, whom all reside in the United States. All participants were recruited through the VHL Alliance. Semi-structured telephone interviews were conducted with each participant to gain an understanding of the experience of living with VHL as a young adult. The major topics that were addressed included personal and familial experiences with VHL, support systems, emotional well-being, the effect of VHL on romantic and familial relationships, and the effect of VHL on life decisions.
Thematic analysis of the interview transcripts was performed in ATLAS.ti (v.7.5.4) and five themes were identified: (1) living with uncertainty, (2) maintaining a positive attitude, (3) significant means of support, (4) polarizing effect on relationships, and (5) impact on life decisions with respect to location, career path, and childbearing. These themes indicate that living with VHL as a young adult involves a considerable psychosocial component that extends beyond the well-studied physical aspects of the syndrome. Young adults with VHL would likely benefit from establishing a long-term relationship with a genetic counselor. Genetic counselors can help manage uncertainty, connect patients with other young adults living with VHL, and provide education regarding childbearing options. Further research with this population will likely help genetic counselors and other health professionals who care for VHL patients to provide better support and services to young adults living with VHL.

*Keywords:* von Hippel-Lindau syndrome (VHL); young adults; psychosocial; uncertainty; positive attitude; support; relationships; life decisions; childbearing; genetic counseling
Table of Contents

Acknowledgements ........................................................................................................... iii
Abstract ............................................................................................................................... iv
List of Tables ...................................................................................................................... vii
Introduction ......................................................................................................................... 1
Methods ............................................................................................................................... 5
  Study Design ...................................................................................................................... 5
  Sample and Recruitment ............................................................................................... 5
  Data Collection Procedure .......................................................................................... 6
  Data Analysis .................................................................................................................. 6
Results .................................................................................................................................. 7
  Demographics .................................................................................................................. 7
  Tumor Burden .................................................................................................................. 8
  Living with Uncertainty ................................................................................................. 9
  Maintaining a Positive Attitude ..................................................................................... 10
  Significant Means of Support ....................................................................................... 12
  Polarizing Effect on Relationships ............................................................................. 13
  Impact on Life Decisions ............................................................................................... 16
    Location ......................................................................................................................... 16
    Career Path .................................................................................................................... 17
    Childbearing ................................................................................................................ 18
Discussion ......................................................................................................................... 20
Conclusion ......................................................................................................................... 27
Limitations ......................................................................................................................... 29
Future Directions ............................................................................................................. 30
Appendix A: VHL Alliance Permission Letter .................................................................. 31
Appendix B: VHL Alliance Facebook Group Recruitment Language .............................. 32
Appendix C: VHL Alliance Inspire Group Recruitment Language .................................. 33
Appendix D: VHL Alliance E-blast Recruitment Language ............................................ 34
Appendix E: Informed Consent Document .................................................................... 35
Appendix F: Interview Guide ............................................................................................ 39
References ......................................................................................................................... 45
**List of Tables**

Table 1: Demographics of participants ............................................................... 7

Table 2: VHL-related tumors and surgeries/procedures ........................................ 8
Introduction

Von Hippel-Lindau syndrome (VHL) is a cancer susceptibility syndrome that confers an increased risk of tumor development in various regions of the body over the course of one’s life (Kasparian et al., 2014). VHL is caused by germline mutations in the VHL gene, which is located at 3p25-p26 on the human chromosome (Latif et al., 1993). The condition is inherited in an autosomal dominant pattern and 97% of patients present with symptoms by the age of 60 (Maher et al., 1991). In a study of 152 VHL patients in Great Britain, Maher et al. (1990) found five major clinical findings: retinal hemangioblastoma, cerebellar hemangioblastoma, spinal cord hemangioblastoma, renal cell carcinoma, and pheochromocytoma. Several other lesions have also been associated with VHL, including brainstem hemangioblastomas, renal cysts, pancreatic cysts, pancreatic neuroendocrine tumors, endolymphatic sac tumors (ELSTs), epididymal cystadenomas, and adnexal papillary tumors of probable mesonephric origin (APMO, also referred to as broad ligament cystadenomas) (Choyke et al., 1997; Hammel et al., 2000; Maher et al., 1990; Manski, Heffner, Glenn, & et al., 1997; Zanotelli, Bruder, Wight, & Troeger, 2010).

Most component lesions associated with VHL are benign and have a low incidence of malignancy, but renal cell carcinoma and pancreatic neuroendocrine tumors are malignant (cancer-causing) (Lonser et al., 2003).

Patients with VHL have to adhere to a rather demanding screening schedule involving annual examinations, imaging, and blood work and they often have to endure surgeries to
remove VHL-related tumors (Binderup et al., 2013). Surgery is not required for every lesion identified in VHL patients, as many are benign and do not cause symptoms. Tumor growth and symptom development are monitored through recommended screening. Tumors that grow beyond a specified size or have started to cause symptoms can be removed surgically or in some instances be treated with a non-invasive technique to control tumor growth (Lonser et al., 2003). In addition to the physical challenges that accompany a VHL diagnosis, many patients also face psychosocial challenges. Despite the knowledge regarding the molecular and phenotypic aspects of von Hippel-Lindau syndrome, very few studies explore the psychosocial aspects of living with VHL. Additionally, there is a lack of literature addressing the psychosocial challenges that emerging young adults with VHL face during this very dynamic period of transition.

Arnett (2000) proposed the concept of emerging adulthood as a distinct developmental period that occurs between the ages of 18 and 25. Emerging adulthood is marked by instability and many changes, as individuals between the ages of 18 and 25 are likely to move and experience different living situations, attend college, and/or start a new job (Arnett, 2000). During this time, individuals also engage in identity exploration as they often pursue romantic relationships, explore career opportunities, and formulate personal opinions of the world (Arnett, 2000). The period of emerging adulthood, defined by Arnett (2000), is full of changes and exploration for most individuals, but adding a VHL diagnosis to the mix poses a completely new set of challenges during this time.

Individuals with von Hippel-Lindau syndrome live with a significantly increased risk of developing component tumors and/or cancer and require routine surveillance to monitor symptom development. Living with this increased risk can pose psychosocial challenges for individuals. In an effort to assess the level of distress experienced by individuals who are part of
a family that is affected by VHL, Lammens et al. (2010) administered a self-report questionnaire to 123 members of 37 families in the Netherlands. Developing another VHL tumor and needing additional surgery were concerns for 38% and 46% of the VHL carriers, respectively (Lammens et al., 2010). Experiencing the death of a close relative because of VHL during adolescence seemed to correspond with higher levels of distress (Lammens et al., 2010). Not surprisingly, 62% of study participants felt that professional psychosocial support should be offered routinely and suggested this be made available at particularly stressful times such as disclosure of genetic test results, clinical diagnoses, and surgeries related to VHL (Lammens et al., 2010).

Kasparian et al. (2014) performed a mixed methods study with 15 VHL patients and 8 carers (unaffected individuals who support someone with VHL) to explore the experiences and needs of families in Australia who are affected by VHL. Patients revealed that they often have anxiety, especially when waiting for screening results, and that they can sometimes experience symptoms of depression (Kasparian et al., 2014). Transmission guilt was a common theme and most patients wanted their children to have genetic testing for VHL (Kasparian et al., 2014). VHL patients also disclosed that partner and family support is helpful (Kasparian et al., 2014).

In addition to the limited literature on VHL, there is relevant research that explores the psychosocial aspects of living with other autosomal dominantly inherited cancer susceptibility syndromes, which are similar to VHL. In a descriptive phenomenological study, Petersen, Nilbert, Bernstein, and Carlsson (2014) interviewed 12 healthy adult Lynch syndrome carriers from a Danish population to gain a better understanding of the phenomenon of ‘living with knowledge about risk.’ Phenomenological analysis of the interview transcripts revealed that family history and familial experiences with Lynch syndrome influence how an individual at risk interprets and feels about the disease, which in turn impacts how they approach the risk with
regard to choices such as maintaining a healthy lifestyle, family planning, or complying with screening recommendations (Petersen et al., 2014).

Lammens et al. (2011) evaluated distress in partners by performing a quantitative study with 50 partners of individuals who were either diagnosed with VHL or Li-Fraumeni syndrome (LFS) or were at 50% risk of developing VHL or LFS. Based on the survey data, 28% of the partners reported moderate-to-severe levels of distress related to VHL and LFS. The authors also found that the correlation between the distress level of the partner and the distress level of their spouse who had or was at high risk of having VHL or LFS was statistically significant. Only 14% of partners reported that VHL or LFS had a negative effect on their romantic relationship while 52% of partners reported that it had a positive effect such as increasing closeness or allowing for a greater appreciation of life (Lammens et al., 2011). This shows that living with a cancer susceptibility syndrome can affect romantic relationships.

The few VHL studies that have been conducted revealed that VHL affects romantic relationships and that many VHL patients experience clinically relevant levels of distress and could benefit from more routine professional psychosocial support (Lammens et al., 2011; Lammens et al., 2010). However, the experiences of emerging young adults with VHL have yet to be studied. The aim of this study was to address this gap in the literature by performing a qualitative study to explore the psychosocial challenges that emerging young adults (18-27 years old) with VHL encounter. The study was conducted with participants residing in the United States to address the lack of VHL research in the U.S. Based on previous research, it seemed appropriate to conduct semi-structured interviews to address the following: personal and familial experiences with VHL, support systems, emotional well-being, the effect of VHL on romantic and familial relationships, and the effect of VHL on life decisions such as having children.
Methods

Study Design

This study employed a phenomenological approach to gain an understanding of the experience of living with VHL as a young adult (Creswell, 2013). This was achieved by carrying out a qualitative study, in which the author conducted semi-structured phone interviews with ten young adults with VHL. These interviews consisted of a series of open-ended questions which invited participants to talk about their experiences with VHL. Close-ended questions were included to broadly assess tumor burden (extent of tumors detected in the body), learn which resources they utilize, and gather demographic information. This approach allowed participants to share personal stories, expand on experiences, and convey their feelings, which in turn helped us capture the essence of the phenomenon – living with VHL as a young adult. Upon expedited review, this study was approved by the Brandeis University Institutional Review Board.

Sample and Recruitment

After obtaining IRB approval, participants were recruited through the VHL Alliance [reference website: www.vhl.org] (Appendix A). The author posted recruitment notices on the VHL Alliance Facebook and Inspire group pages and an e-blast was sent to all members of the VHL Alliance on our behalf (Appendices B, C, and D). We received e-mails from 48 individuals who expressed interest in participating, 37 met eligibility criteria, and 10 eligible respondents were enrolled in the study. The following inclusion criteria were applied: participants needed to be between 18 and 27 years old, diagnosed with VHL, currently reside in the United States, and English-speaking. Written informed consent was obtained for all participants (Appendix E).
**Data Collection Procedure**

Phone interviews were conducted with all participants and were recorded using the freeconferencecalling.com service, which all participants agreed to during the informed consent process. The author conducted all interviews utilizing the same interview guide (Appendix F), which consisted of open-ended questions targeting personal and familial experiences with VHL, emotional well-being, support systems, personal relationships, and life decisions. The order and wording of the questions as well as the length of time spent on each question varied across interviews in an effort to maintain the flow of the interviews. The interviews ranged from 39 to 64 minutes in duration and each was transcribed by a transcriptionist at Mulberry Studios. All participants received a $25 Amazon.com gift card as a token of appreciation for participating. All audio recordings and interview transcripts were stored on box.com, an encrypted site hosted by Brandeis University.

**Data Analysis**

All interview transcripts were de-identified and imported into ATLAS.ti (v.7.5.4) for analysis. Thematic analysis was performed and all coding was carried out by the author. Initial analysis generated 266 codes, which were further categorized into ten major themes. These themes included living with uncertainty, frequent surveillance, VHL thoughts tied to medical management, openness about diagnosis, maintaining a positive attitude, a new perspective, significant means of support, polarizing effect on relationships, a lifelong affair, and impact on life decisions. Here, we will focus on five major themes as they are most relevant to the field of genetic counseling: (1) living with uncertainty, (2) maintaining a positive attitude, (3) significant means of support, (4) polarizing effect on relationships, and (5) impact on life decisions with respect to location, career path, and childbearing.
Results

Demographics

A total of ten participants were interviewed. This cohort consisted of five female participants and five male participants, ranging from 18 to 26 years old. Most participants were between 22 and 26 years old, with four reporting they were 26. All participants had been diagnosed with VHL; one was diagnosed prenatally, three during childhood (≤ 12 years old), and six during adolescence (≥ 13 years old). Six participants reported a family history of VHL while the remaining four explained that they are the only member of their family affected by VHL (three were known *de novo* cases). Six participants were single, four were married, and only one had a child [Table 1]. All names have been changed to protect the privacy of the participants.

Table 1: Demographics of participants

| Participants | Gender | Current Age (years) | Age at Diagnosis (years) | Marital Status |
|--------------|--------|---------------------|--------------------------|----------------|-------------------------|
| Family history |        |                     |                          |                |
| Brianna<sup>a</sup> | Female | 26                  | 10/11                    | Married        |
| Julie        | Female | 25                  | 12                       | Married        |
| Kylie        | Female | 18                  | Prenatal                 | Single         |
| Peter        | Male   | 24                  | 8                        | Single         |
| Scott        | Male   | 23                  | 13                       | Single         |
| Seth         | Male   | 22                  | 19                       | Single         |
| No family history |     |                     |                          |                |
| Dustin       | Male   | 26                  | 18                       | Married        |
| Hillary      | Female | 26                  | 13                       | Married        |
| Simon        | Male   | 26                  | 16                       | Single         |
| Sophie       | Female | 23                  | 17                       | Single         |

<sup>a</sup> Brianna is the only participant who is a parent and she has a 6-month-old son
**Tumor Burden**

Phenotypic information was collected for each participant to assess tumor burden. The severity of the VHL phenotype varied across participants in this cohort. While one participant only reported pancreatic cysts and had never had any VHL-related surgeries, most participants had acquired multiple tumors and had faced several surgeries. Over half of this cohort had cerebellar hemangioblastomas, retinal hemangioblastomas, and pancreatic cysts, either currently or in the past. Spinal cord hemangioblastomas were reported in five participants, renal cell carcinoma (RCC) was reported in four, brainstem hemangioblastomas and renal cysts were each reported in three, and pheochromocytoma, pancreatic tumor, and adnexal papillary tumor of probable mesonephric origin (APMO) were each reported once in three different participants.

The number of VHL-related surgeries/procedures were variable among this cohort ranging from 0 to 22, with most participants experiencing between one and eight invasive surgeries [Table 2].

Table 2: VHL-related tumors and surgeries/procedures

<table>
<thead>
<tr>
<th></th>
<th>Brianna</th>
<th>Julie</th>
<th>Kyle</th>
<th>Peter</th>
<th>Scott</th>
<th>Seth</th>
<th>Dustin</th>
<th>Hillary</th>
<th>Simon</th>
<th>Sophie</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cerebellar hemangioblastoma(s)</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Brainstem hemangioblastoma(s)</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Spinal cord hemangioblastoma(s)</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Retinal hemangioblastoma(s)</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Renal cell carcinoma (RCC)</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Renal cyst(s)</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pheochromocytoma</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pancreatic tumor</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pancreatic cyst(s)</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>APMO</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td># of surgeries/proceduresa</td>
<td>2</td>
<td>5b</td>
<td>0</td>
<td>3b</td>
<td>22b</td>
<td>1</td>
<td>3b</td>
<td>8b</td>
<td>3</td>
<td>4b</td>
</tr>
</tbody>
</table>

+ represents the presence of the specified tumor/cyst
- represents the absence of the specified tumor/cyst

*a Surgeries/procedures refer to various treatments that participants have had for VHL-related tumors, including invasive surgeries to remove tumors from the brain, spinal cord, retina, kidneys, and pancreas, as well as the Gamma Knife procedure for brain tumors, and radiofrequency ablation for kidney tumors.
In addition to the procedures noted above, these participants have also had many eye laser treatments for retinal hemangioblastomas, and these were not included in the table.

\(^{c}\) Adnexal papillary tumor of probable mesonephric origin, or broad ligament cystadenoma

Upon interviewing this cohort, five major themes relevant to genetic counseling emerged:

1. living with uncertainty,
2. maintaining a positive attitude,
3. significant means of support,
4. polarizing effect on relationships, and
5. impact on life decisions.

**Living with Uncertainty**

Many participants expressed living with uncertainty as one of the more challenging aspects of living with VHL. For individuals with VHL, tumors/cysts can grow in many different organs of the body, but this growth is unpredictable. There is no way to predict when or where these VHL-related tumors/cysts will appear, how rapidly they will grow, or what physical affects they will cause. Due to the unpredictability of the syndrome, frequent imaging is recommended for individuals to monitor tumor growth and assess for the necessity of surgical intervention. As Sophie pointed out, VHL is a diagnosis that leads to many ‘what-if questions’ and participants seem to struggle with if, when, and how VHL will affect them.

Two participants spoke about the anticipation of new findings during their annual screening. They worry about new tumors appearing and previously detected tumors growing to a size that requires surgical intervention. As Dustin stated:

“‘There's some very small lesions in both my brain and my spine. But they've effectively not changed at all. Which is great. But every year I’m kind of nervous that I’ll go and they’ll be like, ‘oh, this one’s a lot bigger and we have to do something.’ Or I’ve never had any abdominal trouble until two years ago. Yeah, two years ago, they were like, ‘Oh, there's a tumor in your kidney.’ And it popped up out of nowhere. So that sort of uncertainty is difficult.’”

Peter also expressed how he worries about what they will find when he goes for his screening:

“‘Well, I guess the main thing would be just worrying about the future, like what could happen. … I guess every time you go to NIH, you just never really know what you're going to get. … like what they're going to find, anything new, anything getting worse.’”
Sophie, who was diagnosed with VHL during her senior year of high school, which was an important time in her life, expressed particular concern regarding when VHL will manifest. She worries about the unpredictable timing of the disease:

“I've lost all vision in my left eye due to complications from those tumors. And so, I think when I can get really upset about something, it's the probability of losing my right eye … and I think do that, too, where I'll lose it before I'm something, like before I meet the man I'm going to marry, I'm going to lose my vision. Or something's going to happen before I want it to happen. … when you go down the rabbit hole thinking, the end of the rabbit hole, everything's going to happen and it's going to happen at the worst possible time of your life.”

As illustrated in the previous quote, participants worry about the impact that VHL will have on their lives. Kylie, who has a strong family history of VHL, but has yet to be affected herself, reflects on the uncertainty of her future:

“My life could be very short or my life could be decent and normal. I could not be able to have children … there's just a lot of what-ifs. It's just unsure of where your life will be in ten years.”

Kylie also fears that she may have a VHL experience similar to that of her grandfather’s:

“I'll probably have cancer at some point in my life. … it's a serious, like high chance. And it's like you could—my grandfather died from the cancer metastasizing. Like you just never know. I mean, I could go for a scan. I could just have cancer in my kidneys, and my sister had them. And they could just metastasize and it could be all over. … I guess there's just that high chance that things could turn around in your life really fast.”

**Maintaining a Positive Attitude**

In spite of living with uncertainty, many participants seem to stay positive. Three participants, whom all have a family history of VHL, voiced that they are thankful it had not been worse. Brianna, who has had stable tumors with minimal changes in her scans for several years, stated,

“Kind of just have to take it, you know, one day at a time and be thankful that it’s not worse. It could totally be worse.”

Peter, who lost his father to VHL when he was 12, said,

“I mean, apparently, from what I know, there are people my age who have it a lot worse than I do. People my age and younger. And so, I guess I've been pretty fortunate with that.”
Julie, whose mom lives with VHL and has acted as a role model for coping with the syndrome, said,

“Because as far as life goes this is a pretty minimal thing. There are way worse things out there.”

Julie also expressed that she is grateful that she has VHL because she believes it has made her a better person:

“Experiences that you go through, they either make you better or they make you bitter. And I wanted them to make me better. And, I think that they have. … its kind of something that I think has been a really awesome growing experience for me that I’m lucky enough to have.”

Scott, the participant who has endured the greatest number of VHL-related surgeries and gave up a childhood dream because of the syndrome, focuses on his good qualities:

“And, just because I can’t play in the NFL I still think I could be a good teacher. I still think I would be very successful at doing that. I still know I’m not a terrible friend. You know, I still have good qualities. I realize that. Those are regardless or in spite of however you want to see it of VHL.”

When discussing with participants what it’s like to live with VHL, we noted several examples of perseverance. Peter expressed that he doesn’t let VHL bring him down:

“When people go through medical stuff or anything bad in life they also say like giving up wasn't an option. And when I say it like that, it's not like I ever really even considered it bringing me down. I just kind of kept going without really thinking about it.”

Simon explained how he accepted VHL as a challenge:

“I had everything going for me at that point in time. … And then this happened and I took it in very good stride. I realized that this was just another thing to do and to do well at. … So it was trying, but more physically trying than emotionally trying.”

Scott conveyed that he is prepared to face the challenges of VHL:

“Even though I realized that I have challenges ahead, I’m still just as ready to meet them and overcome them.”

And, Seth showed perseverance when he worked really hard to recover from the surgery he had to remove a pancreatic tumor:

“And I was nervous like the week leading up and stuff, but I mean once it was over it was I was just working round the clock to get back into shape and it really wasn’t as bad as I thought it was going to be.”
Most participants within this cohort, but not all, maintain a positive attitude in spite of living with VHL. As noted above, several participants positively frame their experiences with VHL and recognize that ‘it could be worse’, while others exhibit perseverance and push through the challenges that VHL presents.

**Significant Means of Support**

This cohort reported large support systems, which often included a combination of family, romantic partners, friends, co-workers, and health care professionals. However, single participants most often reported that their mothers are their strongest confidantes for VHL-related concerns and married participants most often reported that their spouses play this role.

Here are two responses from single participants when asked who they turn to when they want to discuss VHL-related concerns:

“I know my mom is … the biggest person who helps me with those, keeping doctors straight and when appointments are and she’ll often times take me to appointments. … And so she’ll drive me there and sit and wait while I’m at the doctor’s or come in and listen. And that’s usually what helps the most.” - Scott

“It’s my mother. … it's nice because my mom fully understands it. And she even … learned all the latest research. So she actually knows more about the genetic disease than I do. But it’s just nice because since it … spans so many years, I don't have many friends who know the whole story. And so I really do count on my mom. And I mean, I talk to my dad, too, but my mom is my biggest confidante in that area.” - Sophie

Among the married participants, spouses were usually the first person they would turn to for support. However, parents were often a close second. Below are the responses for two participants, when asked who they turn to when they want to discuss VHL-related concerns.

“My wife probably first. Second, my dad. Then my mom or grandparents, probably. And then like two of my really close friends, I would say, are probably up there with my dad.” - Dustin

“Probably my husband. If it’s like something that’s happening, we talk about it. If it’s a question I have, I probably talk to my mom because she’s educated on it. I probably talk to my husband about most everything that relates to this stuff.” - Julie

Outside of family and romantic relationships, friends were almost always included in the conversation about support systems. Most participants reported that they have at least a couple of
close friends who know about their experiences with VHL, and who they feel comfortable talking with about VHL. On the other hand, siblings were rarely mentioned as someone the participants would turn to for support. Only one participant, Kylie, has a sibling with VHL, and she did mention that she confides in her sister.

Participants have many people that they rely on for support regarding concerns about VHL, but mothers and spouses were reported as the most significant means of support for single and married participants, respectively.

**Polarizing Effect on Relationships**

Participants were asked to provide examples of how having VHL affects relationships with others. The fourth theme we identified is that VHL can have a polarizing effect on relationships, increasing the closeness of some and the distance of others. Several participants conveyed how VHL has strengthened personal relationships and allowed them to grow closer to special people in their lives. Julie explained how VHL provided her and her husband with a new perspective, which strengthened their marriage.

“I have been through all of this with my husband. … And I just have to say, it put things in such a good perspective for us … So, there would be time where were looking at our friends who were at the same stage we were in marriage. And they would be fighting about these things. And we had just been back from this major brain surgery where you have to like sign your life away and who is going to make the decisions if you’re a vegetable. … Like when you have to decide, ‘Okay. It’s okay if you get married if I die on this one.’ You look at things differently than like, ‘Crap! He squeezed the toothpaste in the wrong spot.’ … And for us that was really good. I feel like we have a healthier relationship for it. … You gauge things on a scale of importance differently I think.”

Seth explained how he grew closer with his mother, who also has VHL, after learning of his diagnosis.

“I think we’re a lot closer now. … I feel like I didn’t share as much personal stuff with her before and now she is one of my best friends and I tell her like everything, so I think it just really strengthened our relationship knowing that we both have dealt with this and she has been there for me to share any feelings or thoughts about it that I’ve had.”

While Seth prepared for a surgery, he became closer with some of his friends at college as well:
“I had a couple friends … that hung out with me a lot the spring semester last year when I was getting closer and closer to my surgery, so I guess it made us closer. They knew a really intimate detail about stuff that was going on with me and they were able to help me through it and be there for that, so I guess it strengthened a friendship too.”

Many other participants shared anecdotes about how friends stepped up and friendships grew, as a result of VHL. Dustin recounted how an acquaintance became a true friend while he was recovering from his very first VHL-related surgery.

“I have a guy who's a really good friend of mine now, who was an acquaintance at the time I was diagnosed. … And he, when I came home from the initial surgery … he went out of his way to help me out. … I couldn't drive, I couldn't do a whole lot, except kind of just hang out and go to appointments with my dad, and stuff like that. And he would take lunch from work and come and take me to lunch. Or, as I was feeling better, we’d go out on the weekends and stuff when I was still kind of stuck in town. And helped me run errands and stuff like that. So we developed a really good relationship from sort of that period of time. He ended up being one of the groomsmen in my wedding. … But he was someone that probably otherwise I would never have really developed a friendship with.”

Simon had a story similar to Dustin’s, in which a friend provided support around the time of a surgery.

“One of my friends from law school I wasn't as close of a friend with as some other people I knew from law school. However, during my last surgery, he was more than supportive. And as a result, I became a much closer friend with him. That's to say, whenever I needed someone to talk to, he was always there and willing just to help out.”

Brianna explains how VHL helps her connect with some of her friends, who also live with medical conditions because they have something in common.

“I mean it’s helped me relate to some of the other problems that, because I swear, I attract people who have problems that are as bad or worse than my problem. One of my best friends, she has epilepsy. I mean it’s not bad. She has it under control. But we’ll sit there and talk about what we did as children, getting tested.”

Nine participants provided examples of how VHL has brought them closer with others, but four participants pointed out that VHL has made friends pull away or led to distance in current relationships. Dustin, who earlier described how an acquaintance became a good friend after providing support following a big surgery, recounted an occasion when he lost a friend because of VHL.

“There was someone who I was friends with most of high school, and who had also stayed in the area for college. And, I think I called, I was like, ‘Hey, I'm back in town for a while. Want to get lunch?’ or something like that. And she's like, ‘Oh, what brought you back to town?’ And I told her, and she was like
super weirded out. And then I honestly don't think I've talked to her since. And I thought that was weird, but that's only one, like one person. Other than that, I've seemed to come out ahead.”

Another participant mentioned losing friends as well. Seth, who became a lot closer with his mother following his VHL diagnosis, described how he grew apart from a group of friends because they couldn’t seem to understand what he was going through.

“When I got the news about the pancreatic tumor that needed to be removed I kind of had a lot of anxiety about it and I think a little bit of depression about it, and my current, the friends that I was hanging out with a lot back then, they were my high school friends, and they got upset with me for being kind of short with them or acting out a little bit, … it kind of affected my mood and they didn’t understand like why I was acting that way or behaving that way. And that kind of, we just grew apart and I kind of cut them out, because they really weren’t there for me like they needed to be and they kind of seemed to make it about them instead of me.”

In Kylie’s case, she has endured very few physical effects of VHL, but it has taken an emotional toll on her. When asked if she felt that VHL had a positive effect on any of her relationships, she replied with, “No. Yeah. I don't think– I mean, if it doesn't have a negative effect, it just doesn't have an effect on anybody.” She went on to explain how VHL has adversely affected her relationship with her mother, who also lives with VHL.

“She always took care of me and she always went out of her way when we were younger. And then all of a sudden, it was like, bam, like she really can't do this anymore. And then you started to have to take over and do stuff. And it starts to get frustrating when there's so much I have to do for her. I definitely took it out on her when I was younger. And kind of like, like it's her fault, like I can't do normal things or be my age or whatever it was. I was just always I guess upset by it.”

VHL can also have an impact on romantic relationships. One of the married participants, Hillary, explained how VHL and the role it plays in the decision to start a family has affected her relationship with her husband.

“As far as when it comes to children with my husband, we have definitely talked about there is that 50/50 chance or things along those lines that the kid will have it, and it has definitely caused some stress on the relationship, because I am very pro-adoption and pro-life, … he is very supportive of being pro-life and pro-adoption also, but he still wants, he’s still very persistent with wanting to have our own children, and I don’t necessarily feel that need, so that causes some stress on the relationship.”

Participants shared stories that showcase how VHL can bring them closer with some, but distance them from others. This polarizing effect was not specific to one type of relationship; it seemed to apply to different types including familial, romantic, and
friendships. Overall, this cohort provided more examples of how VHL has brought them closer with others than how VHL created distance within relationships.

**Impact on Life Decisions**

In addition to influencing personal relationships, VHL also plays a role in major life decisions that young adults often encounter. Among this cohort, VHL impacted life decisions such as relocation, career path, and childbearing. Although several participants explained that they try to live their lives as if they do not have VHL (outside of complying with the recommended screening), we found that living with VHL can impact life decisions that young adults make, in more ways than one.

**Location**

For most participants, VHL has not affected location. Many are fortunate to live near a VHL Clinical Care Center or do not mind making a commute to a center that is a little farther away. However, two circumstances were explained, in which VHL impacts location. In Dustin’s case, VHL influences where he and his wife live and work.

“My wife’s an officer in the Army, so when people move—so usually like the Army can send you anywhere that they have your job and that they need people to do your job. … I had to get all this stuff from my doctors saying that I have VHL and what it is and what I need. And, that helped make sure that we were near—we’d get stationed somewhere where there's facilities … to handle VHL.”

Kylie is finishing up her senior year of high school and plans to attend college and become a nurse. She has yet to personally be physically affected by VHL, but her mother and sister both live with VHL and have endured many surgeries, which has often required Kylie to assume a caretaker role. In her case, VHL is dictating where she will attend college because she feels a sense of responsibility to stay close to home so she can take care of her mother and sister.

“I applied to one out-of-state school, and I know I'm not going. I have stayed in the area, because I know that if anything was to happen, I would need to be around and present. I'm kind of mostly focused on my mom and my sister. I really didn't think about myself.”
While accessibility to specialty care for VHL is important to this group, it rarely solely determines where participants live. Dustin’s situation is a bit of an exception, as the U.S. Army determines where he and his wife will live based on VHL services. And, in Kylie’s case, it is her familial experiences with VHL that are influencing where she chooses to attend college, not issues relating to accessibility of care. VHL is not usually the deciding factor in the decision regarding where these participants live, work, or attend school, but it is often a consideration. In addition to impacting decisions about location, VHL experiences sometimes inform decisions about careers.

**Career Path**

Three participants described how living with VHL and having such frequent contact with health care professionals influenced their career choice. Dustin, who has earned a Bachelor’s degree and is currently working as a personal trainer has decided to pursue his doctor of physical therapy (DPT) degree.

“"I'm looking to sort of take the rest of science prereqs I need to go back and be a physical therapist. Because they had a huge impact on me, and I really liked that. … it was something I never thought about or really thought I was interested in until I … actually had to start interacting with the health care system.”

Dustin has endured several brain surgeries because of VHL, which have required working with physical therapists during the recovery process, and these experiences have directed his career path. Hillary explained that she became a registered nurse to give back and care for those in need, as she has previously been on the receiving end of such care.

“"Probably the big thing would be, it’s definitely influenced what career choice I’ve made, because I want to help others as I have been helped throughout my teenage years and even now when I have to have surgeries and things along those lines, I wanted to be someone who could care for people who were sick I guess you could say.”

As presented in the excerpts above, personal experiences with VHL and the health care system has encouraged two participants to pursue careers in the health care field.
Childbearing

When asking participants to share their thoughts about having children, many expressed reservations about having biological children because of the risk of transmitting VHL. Brianna was the only participant in the study who has a child. She has a 6-month-old baby boy, who was conceived naturally. She did not pursue prenatal testing and elected to wait until after he was born to have him tested for VHL. The author spoke with her about a week after she received the news that her son had tested negative for VHL:

“We actually got the results back about three days before Christmas. And I went, ‘That is the best Christmas present ever.’ … Because as much as I am okay with me having VHL, I don’t think I would have the same reaction to my baby having VHL. … But yes, he is healthy, and he is happy, and that is all I care about.”

Julie, who is currently considering starting a family with her husband, raised the concern of feeling a sense of responsibility as a parent, as she recalled how her parents are affected by her diagnosis.

“And probably the most real it is, is that I could give this to my kids. And I remember when my parents found, like it was a for sure that I had VHL. … it was way harder on my parents than it was for me. And I know sometimes when I go through really hard things my mom feels somewhat responsible because it came from her.”

Two of the single participants expressed that they are not at a point in their lives where they are seriously considering having children, but had a general sense of concern regarding transmission of VHL to biological offspring. Scott stated:

“I see the fun and the joy it could bring. But a 50 percent chance of passing this VHL onto any kids I have is way too high of a percentage for me to really consider that. And I’d have to find some other way, some way around that for me to really want to have kids.”

Some participants shared that they would consider alternative reproductive options so they could have children without VHL. Simon said:

“My thoughts are that at some point I would like to have them. However, I want to make sure that my VHL disease does not get passed on to them, whether that is through in vitro fertilization or simply adopting a child. But I don't want to pass this on to anybody else.”
While most participants seemed to have an understanding of recurrence risk (50%) and were knowledgeable about reproductive options, there were two participants who were not aware that in vitro fertilization (IVF) and preimplantation genetic diagnosis (PGD) existed and would be available to them. Neither of these participants have received genetic counseling. Five participants indicated that they would consider and are open to the idea of IVF and PGD, while two participants declared that they did not support assisted reproductive technology.

Uncertainty was mentioned previously as a component of living with VHL, and it emerged again when talking with individuals about having children. A few participants expressed that they were worried about how VHL would affect their children, if they were to inherit the syndrome.

“I would love to have kids. But I think it is a very hard decision to think that the struggles that I’ve gone through could be the same or worse within my biological children.” - Sophie

“It’s just it’s a scary thought to know that they could have it and that they would have to go through some of the stuff or even different things that I have not had to go through. It definitely worries me.” - Hillary

Many participants expressed that childbearing decisions are complicated by the probability of VHL transmission. Themes including transmission guilt, how VHL would manifest in their children if inherited, and assisted reproductive technology were recognized. Half of the cohort was open to utilizing IVF and PGD as a way to prevent having a child affected with VHL while two participants did not support the use of this technology.

Interviewing this cohort revealed that VHL has an impact on young adults that extends far beyond the physical manifestations, which is valuable information for genetic counselors and other health care professionals involved in the care of VHL patients.
Discussion

We interviewed ten young adults with VHL (18 to 26 years old) to gain an understanding of the phenomenon of living with VHL as a young adult. Upon analysis of interview transcripts in ATLAS.ti, five themes relevant to genetic counseling emerged: (1) living with uncertainty, (2) maintaining a positive attitude, (3) significant means of support, (4) polarizing effect on relationships, and (5) impact on life decisions with respect to location, career path, and childbearing. These themes indicate that living with VHL as a young adult involves a considerable psychosocial component that extends beyond the well-studied physical aspects of the syndrome. This cohort reports that there is more to VHL than tumor development and surgeries, as it leads to perpetual uncertainty, can affect relationships (in both positive and negative ways), and is often a consideration in major life decisions. Knowledge of these psychosocial effects will likely help health professionals, including genetic counselors, further specialize services to meet the needs of VHL patients in this age group.

Uncertainty

Living with uncertainty was noted as one of the more difficult aspects of living with VHL for this cohort. This challenge of sustained uncertainty in the lives of those with VHL has also been cited in the literature (Kasparian et al., 2014). Participants reported concerns about if, when, and how VHL would manifest. A family history of VHL may influence that concern as well as they are more aware of the broad range of experiences of the disease through family members. They worry about new tumors being identified upon screening and known tumors growing to a
size that require surgical intervention. They wonder what other aspects of their lives they will be juggling in parallel to new onset of symptoms from tumors or other effects of VHL such as timing of treatment and surgery. Consistent with findings in this study, previous research also revealed that some VHL patients worry about the development of new tumors and the possibility of needing surgery (Lammens et al., 2010). This sense of uncertainty has also been noted in women who carry BRCA1 and BRCA2 mutations and therefore live with significantly increased risks of developing breast and ovarian cancer. DiMillo et al. (2012) found that women with these mutations live in fear of receiving a cancer diagnosis and face uncertainty surrounding prophylactic surgery decisions as well as communication with and testing of their children.

It can be difficult and frustrating for young adults to manage the uncertainty that comes along with VHL, but participants seemed to engage in behaviors that are likely helping them cope. In a study performed by Petersen et al. (2014), the concept of ‘balancing life at risk’ emerged in a group of healthy individuals with Lynch syndrome. Petersen et al. (2014) found that compliance with recommended surveillance, positive thinking, and support helped these healthy Lynch carriers counteract the worry and anxiety that living with a high risk of cancer can elicit. Similar findings were noted in this VHL study. All participants seemed to assign great importance to surveillance, as they undergo screening on a regular basis, despite the personal inconvenience, except for one participant who reported non-compliance for a period because of insurance issues. It is likely that adherence to the recommended screening schedules is an attempt for VHL patients to gain some control in a situation that they ultimately have no control over. Petersen et al. (2014) found that surveillance and tumor detection increased feelings of control and safety in healthy individuals with Lynch syndrome. Furthermore, Giarelli (2006) recognized that self-surveillance behaviors performed by individuals with multiple endocrine
neoplasia type 2a (MEN2a) and familial adenomatous polyposis (FAP) (both cancer susceptibility syndromes requiring lifelong surveillance) elicited both positive and negative emotions before and after surveillance. Among a list of other emotions, participants often felt a need to control or understand prior to surveillance and generally felt in control after surveillance (Giarelli, 2006). Although surveillance can cause negative emotions to surface, it seems to provide patients with a sense of control, which likely serves as motivation for compliance.

Positive attitudes and perseverance were also noted in this cohort of VHL patients. It is possible that maintaining a positive attitude in the face of uncertainty is a coping mechanism. Kasparian et al. (2014) utilized the Brief COPE instrument on his Australian cohort of 15 VHL patients and found that positive reframing as well as acceptance were among the most highly endorsed coping strategies. The majority of participants in our cohort seemed to accept their diagnosis, but not dwell on it or let it consume their thoughts. Most participants reported that VHL-related thoughts and concerns were infrequent except for during periods of screening and/or surgeries relating to VHL. Upholding a positive attitude about living with VHL and exhibiting perseverance may in part, be achievable because of strong support systems.

**Relationships**

In this study, we found that VHL has a polarizing effect on relationships; while it strengthens some, it weakens others. We found this to be true for familial relationships, romantic relationships, and friendships. In terms of familial relationships, this polarization seemed to be tied to familial experiences with VHL. Two participants who each have family histories of VHL and mothers living with the syndrome, reported largely different relationships with their mothers as a result of VHL. While one participant reported that he grew closer with his mother after he was diagnosed and that she is now one of his best friends, another participant reported that she is
frustrated with having to assume a caretaker role for her mother and she blames her mother for not being able to do things her peers are doing. Similarly, Kasparian et al. (2014) found that among an Australian cohort, VHL strengthened family bonds in some instances and ruptured familial relationships in others. The polarizing effect that VHL has on familial relationships is likely attributed to differences in family dynamics, perceptions of disease, and presence and/or severity of disease among family members. While some parent-child relationships become stronger as a result of bonding over shared experiences or connection through emotional support, others are disrupted by feelings of guilt and blame with respect to transmission and burden.

As for romantic relationships, we heard examples of how VHL strengthened one marriage and increased the stress level in another marriage. In one participant’s case, VHL strengthened her marriage because it provided the couple with perspective about what is important in life. On the other hand, starting a family is a big decision that couples face and in another participant’s situation, having VHL has complicated this decision and has caused some stress on her marriage. She is concerned about transmitting VHL to a biological child and would not choose IVF and PGD. She is open to adoption, however her husband really wants to have biological children. Most married participants in the Kasparian et al. (2014) study reported that VHL has strengthened their marriage and provided emotional security. Lammens et al. (2011) performed a study to assess the effect of VHL and Li-Fraumeni syndrome (LFS) on romantic relationships. Among this Dutch cohort, 52% of partners reported that the disorders had a positive effect on their relationship, as VHL and LFS allowed couples to have a greater appreciation for life as well as each other and in some instances brought couples closer together (Lammens et al., 2011). Conversely, 14% of the Dutch cohort reported that the disorders had a negative effect on their relationship, as VHL and LFS-related concerns hindered communication.
and introduced stress and anxiety to the relationship (Lammens et al., 2011). These findings further support that VHL can affect romantic relationships in both positive and negative ways.

Support was noted as a way to ‘balance life at risk’ in the Petersen et al. (2014) study and most participants in this cohort reported having strong support systems that always included family and often extended to romantic partners, friends, co-workers, and health professionals. Seeking care from a therapist was only reported by three participants, one of whom did not find this helpful. Most single participants reported that the first person they turn to for support is their mother, while married participants more commonly reported that their spouse was their strongest confidante. We speculate that mothers and spouses often provide a significant source of support because they accept a caretaking role in the VHL participants’ everyday lives which is more involved than the caretaking role other family members, friends, co-workers, and health professionals assume. It is reasonable to posit that the intimacy of the relationship between a caretaker and an individual receiving care leads to stronger relationships, a sense of emotional security, and open communication.

There is limited literature that addresses how cancer susceptibility syndromes such as VHL affect friendships, but we found that while a couple of participants reported friends pulling away or not being supportive, many friendships were reportedly affected by VHL in a positive way. Several participants cited examples of how friends have shown support in both physical and emotional ways, however, a couple of participants alluded to the fact that their friends listen, but do not truly understand what they are going through. Some participants who have family members with VHL mentioned that talking with them was helpful because they have had similar experiences and also live with this uncertainty. This finding was also noted in the Kasparian et al. (2014) study, as most patients with a family history found it easier to confide in family
members with VHL about VHL-related concerns. One participant in our study, who does not have a family history of VHL, mentioned that she stays in touch with two friends who she met at a VHL conference a few years ago and who also have VHL. She explained that these friends can understand what she is going through because they experience VHL first-hand, while her family members do not. This illustrates that individuals who do not take on a direct caretaker role in a VHL patient’s life can also act as important sources of support through personal experiences with VHL. Finding opportunities for young adults with VHL to connect with each other may be beneficial, especially for those who do not have a family member with VHL to turn to. Genetic counselors could help young adults by directing them to peer support from patient groups such as the VHL Alliance and to online connections through VHL social media discussion groups.

Life Decisions

As Arnett (2000) described, emerging young adulthood is a time filled with life decisions that are accompanied by transitions. This study cohort recalled various life decisions that they have faced, including relocation, applying to colleges, choosing a major, changing career paths, accepting a job, and having children. Several participants noted that VHL influenced their decision in some way, whether it was because of personal or familial experiences with VHL.

All participants with the exception of one, who is not interested in having children, expressed concern about passing VHL on to their children. One participant voiced concern about feeling a sense of responsibility, which plays into the concept of transmission guilt. A few participants articulated that a 50% chance of transmitting VHL to a child is too high for them to consider having children naturally and that they were open to pursuing in vitro fertilization (IVF) with preimplantation genetic diagnosis (PGD) as a way to prevent transmission. Another participant who does not support PGD and stated that she would not consider pursuing it, worries
about the kind of life her child would have if the child were to inherit VHL. Some participants wondered what experiences their children would have because of VHL and would they be similar or different from their own personal experiences with the syndrome.

Perceptions of PGD varied among this cohort of young adults with five participants expressing that they would be open to pursuing PGD, two participants voicing that they do not agree with PGD and would not be open to pursuing it, and one participant who seemed uncertain. PGD was not discussed with the two remaining participants. Two of the five participants who stated that they support PGD, were not aware that the option existed until we explained it to them during the interview. Not surprisingly, neither of these participants have received genetic counseling in the past. This variation in knowledge and acceptance of PGD as a viable reproductive option to prevent having a child with a genetic syndrome has been noted in previous studies (Rich et al., 2014). In the study conducted by Kasparian et al. (2014), 71% of VHL patients viewed PGD as a favorable option to avoid transmission of VHL to children. Of the two married participants in this cohort who are against PGD, one already has a healthy child who was conceived naturally and one doesn’t agree with it for religious reasons.

**Practice Implications**

These study findings have implications for genetic counselors who serve the VHL population. Living with uncertainty, benefiting from connections with other individuals living with VHL, and needing to be informed about reproductive options are all issues that genetic counselors can assist with. If a young adult with VHL establishes care with a genetic counselor, they will likely find this beneficial because genetic counselors can help patients find ways to manage the uncertainty associated with VHL, direct patients to social support, and provide information about available reproductive options.
**Conclusion**

The phenomenological approach employed in this study revealed that young adults living with VHL face psychosocial challenges in addition to the physical challenges they endure. Living with uncertainty and worrying about if, when, and how VHL will manifest was noted as a challenge for many participants, as it is difficult to live with continual uncertainty. Staying positive, accepting the diagnosis, having perseverance, and seeking emotional support were observed among this cohort and are likely coping mechanisms to help counteract the uncertainty associated with the syndrome. Participants received emotional support from family, friends, and others in their community, however mothers and spouses were identified as the most significant sources of support. This may be attributed to the involved caretaking role that mothers and spouses naturally assume. Other individuals living with VHL were also noted as valuable sources of support, whether they were family members or peers, because they have endured similar personal experiences.

While navigating life with VHL, participants seemed to strengthen relationships with some individuals as a result of shared experiences or a sense of emotional security and distance themselves from others because of lack of understanding, disagreements, or frustration. In addition to impacting relationships, VHL can also influence various life decisions that arise during young adulthood. In this cohort, VHL was a factor in many decisions, including where to live, choosing a career path, and having children. Transmission of VHL was identified as a common concern among young adults considering childbearing. Knowledge of and attitudes regarding PGD were variable among this cohort.
These findings are valuable for health care professionals involved in the care of emerging young adults with VHL. Individuals in this age group may benefit from establishing a long-term relationship with a genetic counselor as they can help re-frame the uncertainty, direct them to VHL support groups, and keep them apprised of reproductive options, such as preimplantation genetic diagnosis. Additionally, these findings may be applicable to young adults living with other cancer susceptibility syndromes, such as Hereditary Breast and Ovarian Cancer syndrome (HBOC), Li-Fraumeni syndrome (LFS), and Lynch syndrome, which also lead to a life of continual uncertainty.
Limitations

This study has several limitations. Only ten individuals were interviewed due to time and budget constraints. Since this is a small sample size the findings are not generalizable. We recruited all participants through a single non-profit organization, the VHL Alliance, and we do not know what motivating factors drove their participation. Therefore, the potential for selection bias does exist. Although the study sample had good representation of gender, age, marital status, and family history of VHL, the sample was not very diverse with respect to number of children or tumor burden.
**Future Directions**

Additional research in this area is warranted, as young adults with VHL have received little attention up to this point. Further investigation of this population could potentially help improve health care services, especially often neglected counseling and social services needed by patients living with cancer susceptibility syndromes. We hope that this pilot study will spark the interest of researchers and serve as inspiration for larger and more focused studies of this neglected age group.

Future research investigating the experiences of young adults living with VHL could go in various directions. One possibility is to further explore the theme of living with uncertainty. Future research could explore how young adults with VHL cope with this uncertainty and if they might benefit from professional support to help them navigate this uncertainty. A second possibility would be to delve deeper into the concerns about transmitting VHL to offspring and the perceptions of PGD. It may be most informative to talk with married individuals who are in the midst of deciding if and/or how to start a family to further explore this. One participant in this study offered a unique perspective, as she has experienced VHL as both a patient and a caretaker. Therefore, a third possibility would be to examine the outlook of individuals who assume the role of patient and caretaker when it comes to VHL. Navigating both the patient and caretaker roles at the same time, and possibly for many years, is one of the unusual characteristics of VHL. Additional studies will help health care professionals gain a better understanding of the phenomenon of living with VHL as a young adult, which in turn may lead to more comprehensive care for patients.
Appendix A: VHL Alliance Permission Letter

October 3, 2014

Lindsay Schmidt  
Genetic Counseling Student  
Brandeis University  
Gayun Chan-Smutko  
Faculty Thesis Advisor  
Brandeis University  

The VHL Alliance hereby agrees to assist Lindsay Schmidt in recruiting suitable young adults with VHL for participation in her master’s thesis project. We understand that the goal is to conduct a telephone interview of 10 young adults (18 – 27 years old) who reside in the United States. The VHL Alliance does not currently have a database that includes age information, so we will send out one or more emails to recruit study participants. We will also post invitations to participate in the study in the VHLA social media groups.

The VHL Alliance does not share names and contact information of individuals without their specific permission, so potential participants will be asked to contact Lindsay Schmidt directly. In order to facilitate contact, Lindsay will need to join the VHLA social media groups as well as provide a contact email and phone number.

Recruitment efforts will be limited to a schedule acceptable to the VHLA following notice from Lindsay of IRB approval. We cannot burden our community with excessive contact attempts which conflict with fund-raising efforts at the end of the calendar year.

Sincerely,

Ilene Sussman  
Executive Director  
director@vh.org
Appendix B: VHL Alliance Facebook Group Recruitment Language

Research Volunteers Needed! If you are between the ages of 18 and 27, have VHL, reside in the U.S., and speak English I want to hear from you! I am conducting phone interviews with young adults who have VHL to explore the social and emotional experiences of this age group. If you take part in the study, you will receive a $25 Amazon.com gift card via e-mail to thank you for your time and valuable insight. I am a genetic counseling graduate student from Brandeis University and I am conducting this study as part of my master’s degree thesis project. If you are interested in participating, please contact me, Lindsay Schmidt, at lschmidt@brandeis.edu.
Appendix C: VHL Alliance Inspire Group Recruitment Language

Research Volunteers Needed!

If you are between the ages of 18 and 27, have VHL, reside in the U.S., and speak English I want to hear from you! I am conducting phone interviews with young adults who have VHL to explore the social and emotional experiences of this age group. Many transitions can happen during young adulthood and very little information is available for this specific age group. If you take part in the study you will receive a $25 Amazon.com gift card via e-mail to thank you for your time and valuable insight.

My name is Lindsay Schmidt and I am a genetic counseling graduate student from Brandeis University. I am conducting this study as part of my master’s degree thesis project. If you are interested in participating, please contact me at lschmidt@brandeis.edu.
Appendix D: VHL Alliance E-blast Recruitment Language

**Subject of E-mail:**

VHL Research Opportunity!

**Body of E-mail:**

Dear <first name>,

The VHL Alliance is assisting Lindsay Schmidt, a genetic counseling graduate student from Brandeis University, to find interested participants for her master’s thesis project. She plans to explore the emotional and social experiences of young adults with VHL by conducting phone interviews with individuals between the ages of 18 and 27. Many transitions can happen during young adulthood and very little information is available for this specific age group.

In order to participate in this study you must have VHL, be between 18 and 27 years old, currently reside in the United States, and speak English. The interviews will be conducted at a convenient time for the participants and may take up to one hour.

Participation in this research study is voluntary and the data collected during the study will be kept confidential. If you take part in this study, you will receive a $25 Amazon.com gift card from the student via e-mail to thank you for your time and valuable insight.

If you are eligible and interested in participating in this research study, please contact Lindsay Schmidt at lschmidt@brandeis.edu.
Appendix E: Informed Consent Document

BRANDEIS UNIVERSITY
DEPARTMENT OF BIOLOGY
GENETIC COUNSELING GRADUATE PROGRAM

Informed Consent to Participate in Research

Exploring Psychosocial Challenges Experienced by Emerging Young Adults with Von Hippel-Lindau Syndrome

Principal Investigator: Gayun Chan-Smutko
Student Researcher: Lindsay Schmidt

Introduction
The research team is conducting this study to explore the emotional and social experiences that young adults with von Hippel-Lindau syndrome encounter. For the purposes of this study, young adulthood is defined as 18-27 years old. This time period can be marked by instability and change. Young adults represent a unique population that has not received enough attention in the past, especially in respect to VHL. The hope is to learn how living with VHL influences emotional well-being, relationships, and decisions during this time in a person’s life.

The student researcher who is carrying out this study is a second year student in the Genetic Counseling Master’s Program at Brandeis University. The Principal Investigator is overseeing the study and is an Assistant Director of the Brandeis Genetic Counseling program. She is also a certified and licensed genetic counselor. She has provided genetic counseling services to the VHL clinic at Massachusetts General Hospital for the past 12 years.

You are being invited to participate in this study because you:
- Have been diagnosed with von Hippel-Lindau syndrome,
- Are between the ages of 18 and 27 years old,
- Currently reside in the United States, and
- Speak English

Participating in this research study is voluntary and you should not feel any pressure to take part. You can decide to withdraw from this study at any time and for any reason.

Please read the following information very carefully.

Purpose
The purpose of this study is to gain insight into how living with VHL influences a person’s life during young adulthood (between the ages of 18 and 27). We hope to learn how VHL impacts emotional well-being and affects familial and romantic relationships. We also want to learn how VHL can influence life decisions such as starting a family.
Procedures
Phone interviews will be scheduled at your convenience. All interviews will be audiotaped using www.freeconferencecalling.com and may last up to one hour. If you would prefer that the interview is not recorded, then the call will not be audiotaped and the student researcher will take detailed written notes throughout the interview. The interview will consist of a series of questions regarding the emotional and social experiences of a young adult with VHL. An additional sequence of questions will be asked at the end of the interview to gather demographic and social information.

Risks
This study poses minimal risks to you. All data obtained during this study will be kept confidential, but there is a minimal risk of breach of confidentiality and loss of privacy. The student researcher will de-identify your interview transcript by removing your name and labeling it with a unique identification number (ID #). The worksheet containing your responses to the sociodemographic questions will also be labeled with your ID #. All de-identified electronic data will be uploaded to box.com, an encrypted site hosted by Brandeis University, to keep the data secure and maintain privacy for all participants. A printed key that matches ID #s to participant’s names will be stored separately from interview transcripts in a locked container, which only the student researcher will have access to.

Findings from this study may be published in a journal, but identifying information, including names, will be omitted in order to protect the participants. After the findings have been presented and published, the data will be destroyed no later than December 31st, 2016. All printed materials relating to this study will be shredded and electronic documents stored on box.com will be destroyed.

If you have ever received services from members of the thesis committee, there is a small but not negligible chance that they may recognize some of the information that you share in your responses to the interview questions. Although the chance that they may recognize your identity through these responses is quite low, the research team would like you to know this. Gayun Chan-Smutko, a genetic counselor at Massachusetts General Hospital and Suzanne Nylander, the Director of Wellness for the VHL Alliance are both members of the thesis committee.

There is also a possibility that some of the interview questions may be uncomfortable for you to answer. You do not have to answer any questions that make you feel uncomfortable and you can stop the interview at any time and for any reason.

Benefits
You will not directly benefit from participating in this study. People often enjoy participating in interviews about their experiences and having the opportunity for their voices to be heard. Additionally, your participation in this study will likely help us gain a better understanding of the specific stresses that young adults with VHL encounter. It is our hope that information obtained from this study will serve as inspiration for conducting larger and more focused studies in the future, which may impact individuals and families affected by VHL.
**Participation**
Participation in this research study is completely voluntary. If you decide to participate in this study, you may decline to answer any question(s) and you may withdraw from the study at any time and for any reason without consequences. You may also choose not to participate in the study. Your participation in this study will not affect the availability or quality of services provided to you by the VHL Alliance or Gayun Chan-Smutko. Additionally, the services you receive will not be affected if you decline to answer interview questions or you decline to participate in the study.

**Payment**
If you choose to participate in this research study, you will receive a $25 Amazon.com gift card via e-mail to thank you for your time and valuable insight.

**Cost**
Other than the time you spend answering questions during the phone interview, there will be no cost to you to participate in this study. If you receive any long distance charges on your phone bill for the interview, the researchers will compensate you for the cost of the phone call.

**Whom to Contact**
If you have any questions about the study, please contact the student researcher, Lindsay Schmidt, by e-mail at lschmidt@brandeis.edu.

You may also contact the Principal Investigator for this study, Gayun Chan-Smutko, by e-mail at gchansmutko@brandeis.edu.

If you have questions about your rights as a research study subject, please contact the Brandeis Committee for Protection of Human Subjects by e-mail at irb@brandeis.edu or by phone at (781)-736-8133.

**Participation Agreement Form**
If you decide that you would like to participate in this study and you feel that all of your questions have been answered, then please sign and date the participation agreement form and e-mail it to lschmidt@brandeis.edu. You may also return the form by traditional postal delivery. Please inform Lindsay Schmidt if you would prefer this option and she will arrange this. You will receive a copy of this form for your records after the student researcher has reviewed and signed it.
Exploring Psychosocial Challenges Experienced by Emerging Young Adults with Von Hippel-Lindau Syndrome

Participation Agreement

I have carefully read this consent form. I have been given the chance to ask questions. I have discussed my questions about this study with Lindsay Schmidt. I understand that if I have more questions I can contact Lindsay Schmidt by e-mail at lschmidt@brandeis.edu.

I understand that participation in this research study is voluntary. I understand that I may withdraw from this study at any time and for any reason. I also understand that I have the right to decline to participate in this study.

If I have any questions concerning my rights as a research participant in this study, I may contact the Brandeis Committee for Protection of Human Subjects by email at irb@brandeis.edu or by phone at (781)-736-8133.

I understand that as a participant in this study my identity and data relating to this research study will be kept confidential.

I understand that data obtained from this study may be published in a journal and that I will remain anonymous to everyone except for the student researcher.

I have been fully informed of the study described above, including the risks and benefits. I consent to participate in this study.

Please check one:

□ Yes, I give permission for the phone interview to be audio recorded.

□ No, I do not give permission for the phone interview to be audio recorded.

Participant’s Signature: ___________________________ Date: ____________

Student Researcher’s Signature: ____________________ Date: ____________
Appendix F: Interview Guide

Exploring Psychosocial Challenges Experienced by Emerging Young Adults with Von Hippel-Lindau Syndrome

Interview Guide

Hi. This is Lindsay Schmidt calling regarding the VHL research study. Is this still a good time for you to participate in the interview? Thank you for agreeing to take part in this study. Your insight will help health professionals gain a better understanding of the social and emotional challenges that young adults with VHL experience.

I have a series of questions that I will be asking you about personal and familial experiences with VHL, emotional well-being, support systems, personal relationships, and life decisions. After addressing these topics, I have a short list of questions designed to obtain demographic and social information.

This interview may take up to one hour of your time. Our conversation is being recorded so I can capture your exact responses. This will be very helpful when I analyze the data from the study. I will be taking notes during the interview as well.

I will keep all of your responses confidential. I will not link your name or other identifying information with your responses in any reports or papers produced from this study. Additionally, your name will not appear on any publications related to this study.

I would like to remind you that participation in this study is voluntary. You may refuse to answer any questions and you may withdraw from the interview for any reason. Please let me know if you would like to withdraw from the interview at any time.

Do you have any questions before we begin? Are you ready to start the interview?

Please begin transcription.
Start Time: __________

Current Age: __________

**Personal Experience with VHL**

1. **Tell me the story of how you were diagnosed with VHL.**

   Prompts:
   - Age at diagnosis?
   - Clinical (symptomatic) vs. genetic diagnosis?
   - Genetic testing based on symptoms or family history?
   - Length of the process?
   - What was this experience like for you?
   - Who accompanied you to appointments? Who supported you during this time?
   - Which health professionals were involved?
   - Other family members with VHL? Who was diagnosed first?
   - Have any family members passed away because of having VHL?

**Emotional Well-Being**

2. **Tell me about what it is like to live with VHL as a young adult.**

   Prompts:
   - Do you live your life any differently because you have VHL?
   - What is it like to manage your VHL?
   - Has living with VHL changed your outlook on life?

3. **What is it about living with VHL that you find most difficult?**

   Prompts:
   - What do you worry about?
     - Appointments?
     - Surgery?
     - Cancer?
     - Starting a family?

4. **How often do you find yourself thinking of VHL now?**

   Prompts:
   - Do you think about it often?
   - Is it tied to your medical management?
**Relationships**

5. **Whom do you turn to when you want to discuss VHL-related concerns?**

   Prompts:
   - Family?
   - Do you turn to anybody outside of your family to talk about VHL?
   - Whom have you shared your VHL diagnosis with?

6. **How do you decide whom to share your VHL diagnosis with?**

   Prompts:
   - Friends? Romantic partners?
   - Are you currently in a relationship?
   - How much do you discuss VHL in your current romantic relationship?
   - When do you decide to tell romantic partners that you have VHL?
   - How do you go about sharing your diagnosis?
   - How have people reacted?
   - How much do you tell them about VHL?

7. **Could you please give me an example of how VHL has affected one of your current relationships?**

   Prompts:
   - Positive effects?
   - Negative effects?
   - Closer? More distant? Additional stress?

**Life Decisions**

8. **As a young adult, please give me an example of a major life decision you have made.**

   Follow-up:
   - Did VHL play a role in this decision?
   - How did it influence this life decision?

   Prompts:
   - Where you live? Stayed close to home? Moved to a location near VHL clinic?
   - Occupation? Field of work? Flexible schedule to allow time for appointments?
   - College? Location of school? Field of study?
   - Starting a family?
9a. If do not have children, then ask… What are your thought about having children?

Prompts:
- Want children?
- Don’t want children?
- Worried about passing on VHL?
- Natural conception? IVF/PGD? Sperm/egg donor?

9b. If do have children, then ask… How did VHL influence your decision to start a family?

Prompts:
- How many children? Ages? Have they been tested for VHL? VHL status?
- Did you and your partner talk about your chances of having a child with VHL before you decided to start a family?
- Did this influence any testing decisions?
- Who/where did you turn to for information about this?
- Natural conception? IVF/PGD? Sperm/egg donor?

Please end transcription.

VHL-Related Questions:

10. **Knowing that people with VHL can have a variety of symptoms, could you please list the VHL-related symptoms that you have experienced?**
- Cerebellar hemangioblastoma
- Brainstem hemangioblastoma
- Spinal cord hemangioblastoma
- Retinal hemangioblastoma
- Renal cell carcinoma or cysts
- Pheochromocytoma/Paraganglioma
- Pancreatic tumor or cyst
- Endolymphatic sac tumors
- Epididymal cystadenoma
- APMO or broad ligament cystadenoma

Follow-Up: Treatments or surgeries for symptoms?

11. **Have you used any of these following resources in the past year?**
- VHL Alliance Inspire page
- VHL Alliance Facebook page
- Local support groups
- Professional support such as therapist or social worker
- Other resources that I have not listed?
Sociodemographic Questions:

12. What gender do you identify as?
   - Male
   - Female
   - Transgender
   - Other

13. What is the highest level of education you have achieved so far?
   - General Educational Development (GED)
   - High School Diploma
   - Associate’s Degree
   - Bachelor’s Degree
   - Master’s Degree
   - Doctor of Philosophy Degree (PhD)

14. Are you currently enrolled in school?
   - Yes
   - No

15. If answered “yes” to question #14, then ask…
   - What type of school do you currently attend? ____________________________
   - What is your field of study? (if applicable) ____________________________
   - What degree are you working towards? ____________________________

16. Are you currently employed?
   - Yes
   - No

17. If answered “yes” to question #16, then ask…
   - What is your job title? ____________________________
   - How many hours do you work per week? ____________________________

18. What state do you currently live in? ____________________________

19. Do you live at home with parent(s) or legal guardian(s)?
   - Yes
   - No

20. If answered “no” to question #19, then ask…
   - Could you please explain your current living situation?
     - I live by myself
     - I live with roommate(s)
     - I live with my romantic partner/spouse
     - I live with family members other than my parent(s)/guardian(s)
     - Other (please specify): ____________________________
Thank you for answering all of those questions. We have reached the end of the interview. Is there anything else you would like to share with me that I did not address with my questions?

Thank you very much for agreeing to participate in this study. I appreciate you taking the time to talk with me and answer my questions. Your responses are very valuable. I will e-mail a $25 Amazon.com gift card to you later today, so you will be receiving that shortly.

I will be presenting this study in May of 2015 to fulfill the requirements of my master’s thesis project at Brandeis University. Would you be interested in learning about the results of this study? If so, I would be more than willing to share them with you via e-mail in May of 2015.

Thanks again for your time. Take care. Bye.

End Time: __________
References


