

2009

Genetic Testing in the Employment Application Process

Kim Hill

Follow this and additional works at: <http://commons.emich.edu/honors>

Recommended Citation

Hill, Kim, "Genetic Testing in the Employment Application Process" (2009). *Senior Honors Theses*. 125.
<http://commons.emich.edu/honors/125>

This Open Access Senior Honors Thesis is brought to you for free and open access by the Honors College at DigitalCommons@EMU. It has been accepted for inclusion in Senior Honors Theses by an authorized administrator of DigitalCommons@EMU. For more information, please contact lib-ir@emich.edu.

Genetic Testing in the Employment Application Process

Abstract

Genetic testing is a way in which mutations can be detected in DNA, proteins, and other parts of the human chromosome. By testing for these mutations, it may be possible to identify a predisposition for various forms of cancer, sickle cell anemia, and theoretically, any other hereditary disease. In the employment setting, the ability to forecast possible illnesses is accompanied by temptation for employers to make hiring decisions based on this information. Health insurance companies can also use the information for underwriting purposes.

In order to take preemptive action against the use of employee, or applicant information in this manner, the U.S. Government passed the Genetic Information Non-Discrimination Act (GINA). The act places restrictions on companies requiring genetic tests as a basis for employment, and prohibits any form of discrimination based upon information gathered from genetic tests. It also serves to protect those being considered for health care coverage from having their information used as a basis for increased health care premiums.

This paper will discuss some of the history of genetic testing and its use in employment decisions. The various possible dangers that arise in terms of race specific genetic disorders and the possibility for both disparate treatment and adverse impact will be investigated. Also, discussed in this paper are the opinions of prospective employees and their willingness to be subject to genetic testing for employment purposes, or even to apply for a job requiring these tests.

Degree Type

Open Access Senior Honors Thesis

Department

Management

Keywords

Genetic screening, Employment tests United States, Discrimination in employment United States

GENETIC TESTING
IN THE
EMPLOYMENT APPLICATION PROCESS

By

Kim Hill Jr.

A Senior Thesis Submitted to the

Eastern Michigan University

Honors College

In Partial Fulfillment of the Requirements for Graduation

with Honors in Business Management

Approved at Ypsilanti, Michigan on this date

Supervising Instructor

Honors Advisor

Department Head

Honors Director

Table of Contents

Abstract	1
Part I. Information on Genetic Testing	2
Genes and Genetic Testing	2
Genes and Ethnic Differences	3
Health Insurance Companies and Their Underwriters	4
Genetic Information Non-Discrimination Act	9
Part II. Applicants Opinions of Genetic Testing	12
Method	12
Subjects	12
Questions Regarding Genetic Testing	14
Genetic Testing and Applicants Grade Point Average	15
Genetic Testing and Applicants Family Medical History	15
Results	16
Discussion	21
Part III. Conclusion	22
Appendix	24

Abstract

Genetic testing is a way in which mutations can be detected in DNA, proteins, and other parts of the human chromosome. By testing for these mutations, it may be possible to identify a predisposition for various forms of cancer, sickle cell anemia, and theoretically, any other hereditary disease. In the employment setting, the ability to forecast possible illnesses is accompanied by temptation for employers to make hiring decisions based on this information. Health insurance companies can also use the information for underwriting purposes.

In order to take preemptive action against the use of employee, or applicant information in this manner, the U.S. Government passed the Genetic Information Non-Discrimination Act (GINA). The act places restrictions on companies requiring genetic tests as a basis for employment, and prohibits any form of discrimination based upon information gathered from genetic tests. It also serves to protect those being considered for health care coverage from having their information used as a basis for increased health care premiums.

This paper will discuss some of the history of genetic testing and its use in employment decisions. The various possible dangers that arise in terms of race specific genetic disorders and the possibility for both disparate treatment and adverse impact will be investigated. Also, discussed in this paper are the opinions of prospective employees and their willingness to be subject to genetic testing for employment purposes, or even to apply for a job requiring these tests.

Part I. Information on Genetic Testing

Genes and Genetic Testing

Genes are the basic physical constructs of all living things. They are the essential element of building proteins and are transferred through heredity. This means that all cells and proteins are made-up from some combination of those of the parents.

Approximately 99% of all genes are the same in every human being. The remaining 1% comprises what is seen as differences in physical traits, in health, and in physiological make-up, among other things. It is through these variations in the small percentage of genes where many hereditary diseases and disabilities arise. Many of the mutations that occur do not result in adverse health effects, and those that are extremely severe often result in death before birth. Since most of the severe mutations result in death before birth, those defects are never passed to the next generation. On occasion however, mutations in single genes (Mendellion disorders), multiple genes (multigenetic disorders), as well as environmental factors (multifactoral disorders), can lead to many serious health problems (Zilinskas and Balint, 2001, p. 13).

Genetic testing can be beneficial if used to discover diseases before symptoms begin. They can also be used to screen children for hereditary diseases, or even screen embryos for disease before children are born. This can be a great benefit to those families who are aware of hereditary health issues. It gives them the opportunity to screen offspring very early, to detect whether or not those issues were passed on, and to begin treatments as early as possible.

Some of the most common disorders related to genetic mutations are various forms of cancer, Sickle Cell Anemia, and Tay-Sachs Disease (Bellenir, 2004, p.44) to name a few. Other issues that cell mutations play a part in are Diabetes, various neurological disorders, and they can be a factor in obesity. Genetic testing can be a very useful tool in catching these problems early in life. Without question, the earlier one is made aware of a problem and can begin treatment, the better chance they have for survival and recovery. However, the discovery of mutations and the potential for serious disease could allow health insurance companies and their underwriter's an opportunity to deny benefits for those who they deem to be too costly to cover. Furthermore, an individual's predisposition for a debilitating disease could expose employees to claims of unlawful discrimination under the Americans with Disabilities Act (ADA) of 1990.

Genes and Ethnic Differences

There is a myriad of genetic mutations that are more prevalent in minority populations. These mutations are remnants of, what were once, essential evolutionary changes. Some of these mutations made it easier for those races to survive in their environment. For example, Sickle Cell Anemia, which has characteristics indicating that it helped prevent the growth and development of malaria (Okam, 2004, par. 1). Not surprisingly, Sickle Cell Anemia is found largely in those races whose ancestors originated in regions where malaria is endemic, which includes certain parts of Africa.

Another disease that genetic mutations attribute to is prostate cancer. Men whose fathers or brothers suffered from prostate cancer were twice as likely to develop it than other men. Adding to this, African American males are 85% more likely to have prostate

cancer than other males. They are also 114% more likely to die from it if contracted than white males (Zilinskas and Balint, 2001, p. 16).

Health Insurance Companies and Underwriters

It is becoming increasingly common for Health Insurance companies to require a physical examination as a requirement for accepting new customers. This examination gives the underwriters a baseline in order to set monthly health care premiums, which is the amount each member has to pay in order to be insured.

One of the main concerns when it comes to genetic testing is the possibility that, if the health insurance company requires a genetic test, they will have information on illnesses that may develop in the future. This then leads to the concern that if it is discovered that a prospective customer has a predisposition for various genetic diseases, the insurer will either increase premiums or deny coverage.

In a study titled *Genetic Tests and Health Insurance: Results of a Survey*, administered by the Congress of the United States Office of Technology Assessment, under the direction of John H. Gibbons, health insurance companies were surveyed concerning how they have used, or how they plan to use genetic information. Although this study was conducted in 1992, it is a good example of some of the intended uses of genetic information in the underwriting and determination of prospective customers.

Below is a summary of the responses when asked which factors were most important for determining insurability.

Individual Policies

Genetic predisposition to significant conditions

Commercial		
Very Important		14%
Important		21%
HMOs		
Very Important		0%
Important		27%
BC/BS plans-U		
Very Important		4%
Important		8%
BC/BS plans-M		
Very Important		0%
Important		17%

Carrier risk for genetic disease

Commercial		
Very Important		7%
Important		17%
HMOs		
Very Important		0%
Important		18%
BC/BS plans-U		
Very Important		0%
Important		8%
BC/BS plans-M		
Very Important		0%
Important		17%

Medically underwritten group policies

Genetic predisposition to significant conditions

Commercial		
Very Important		0%
Important		32%
HMOs		

	Very Important	0%
	Important	15%
BC/BS plans-U		
	Very Important	5%
	Important	5%
BC/BS plans-M		
	Very Important	0%
	Important	20%

Carrier risk for genetic disease

Commercial		
	Very Important	3%
	Important	24%
HMOs		
	Very Important	0%
	Important	15%
BC/BS plans-U		
	Very Important	5%
	Important	0%
BC/BS plans-M		
	Very Important	0%
	Important	20%

U.S. Congress, Genetic Tests and Health Insurance: Results of a Survey, 1992, pg. 12-13

In 1992 genetic testing was a relatively new concept. With this in mind, insurance companies already understood how genetic testing could be used to determine the eligibility of prospective customers.

Another question posed to these insurance companies in relation to how they would handle test results. Table 1 shows the results of a U.S. Congress survey on Health Insurance companies' opinions on how they would handle various results of a genetic test.

Table 1. U.S. Congress, Genetic Tests and Health Insurance: Results of a Survey, 1992, pg. 17

	Respondent	Accepted with standard rates	Accepted with exclusion waiver at standard rates	Accepted with exclusion waiver at rated premium	Accepted without exclusion waiver at rated premium	Declined	No response
Individual policies							
Presymptomatic testing reveals the likelihood of a serious chronic future disease	Commercials	28%	4%	0%	0%	59%	8%
	HMOs	18%	0%	0%	0%	36%	46%
Risk oriented testing reveals that an individual carries markers associated with a serious, chronic future disease	Commercials	41%	7%	7%	17%	17%	10%
	HMOs	36%	0%	9%	0%	9%	46%
Carrier testing reveals the possibility that offspring may have a serious, chronic condition or disease	Commercials	55%	10%	4%	0%	21%	10%
	HMOs	55%	0%	9%	0%	0%	36%
Prenatal diagnosis reveals fetus affected with a serious, chronic condition or disease	Commercials	21%	7%	0%	0%	65%	7%
	HMOs	9%	0%	0%	0%	36%	55%

**Medically
underwritten
group policies**

Presymptomatic testing reveals the likelihood of a serious chronic future disease	Commercials	27%	8%	0%	3%	40%	22%
	HMOs	30%	0%	5%	5%	25%	35%
Risk oriented testing reveals that an individual carries markers associated with a serious, chronic future disease	Commercials	57%	8%	0%	5%	11%	19%
	HMOs	50%	0%	5%	0%	15%	30%
Carrier testing reveals the possibility that offspring may have a serious, chronic condition or disease	Commercials	59%	8%	0%	0%	11%	22%
	HMOs	45%	0%	10%	5%	15%	25%
Prenatal diagnosis reveals fetus affected with a serious, chronic condition or disease	Commercials	16%	3%	0%	3%	65%	13%
	HMOs	20%	0%	0%	0%	40%	40%

As can be seen in the study above, many insurance companies felt, even as far back as 1992, that they could, and should, use genetic information to determine if people would be covered, and the level of cost for that coverage. This prompted the United

States Government to begin work on legislation to stop employers and Health Insurance companies from using genetic testing and genetic information to make employment and coverage decisions.

Genetic Information Non-Discrimination Act

The use of genetic testing in the workplace has long been an issue in the United States. There have been numerous attempts by Congress to enact protections for workers against genetic testing in regards to hiring, promotions, or any other employment decisions. There were attempts in 1998, 2001, 2005, and 2007 to enact protective legislation in regard to genetic information. They were not successful, however, until 2008 with the passage of H.R. 493, also known as the Genetic Information Non-Discrimination Act (GINA).

The importance of Congressional action could be seen in the gradual increase in the number of cases against employers using genetic testing without employees knowledge. One such case, *Norman-Bloodsaw v. Lawrence Berkley Laboratory*, occurred in 1998. In this case, employees of Lawrence Berkley Laboratory claimed African American employees were selected for testing for Sickle Cell Anemia. It was also claimed that women working at the laboratory were subject to pre-employment pregnancy testing (*Norman-Bloodshaw v. Lawrence Barkley Laboratory*, 1998).

At the time this case was brought before the court, the guidelines on which it was decided were from the Americans with Disabilities Act and Title VII of the Civil Rights Act of 1964 which prohibits discrimination based on race, color, religion, sex, or national origin.

Although the employees did not claim they were subject to any adverse impact from the tests, the employees won the case on the claim that their privacy was violated, as well as the guidelines of Title VII.

Another issue that occurred regarding genetic testing of employees took place in 2001 at Burlington Northern Santa Fe Railway in Seattle, WA. The company was secretly testing any employee who filed a claim of being injured on the job if that claim was because of Carpal Tunnel Syndrome. Burlington Northern would have employee's DNA tested for a genetic basis for the problem without the employee's knowledge or consent. This also led to the termination of at least one employee for refusing to submit blood to be tested by the company (*Sheila White v. Burlington Northern & Santa Fe Railway Co.*, 2004).

This action prompted the Equal Employment Opportunity Commission to develop additional rules for Burlington Northern Santa Fe in regard to genetic testing. This was before the passage of GINA.

- “ * BNSF shall not directly or indirectly require its employees to submit blood for genetic tests;
- * BNSF shall not analyze any blood previously obtained;
- * BNSF shall not evaluate, analyze or consider any gene test analysis previously performed on any of its employees; and
- * BNSF shall not retaliate or threaten to take any adverse action against any person who opposed the genetic testing or who participated in EEOC's proceedings.” (EEOC, 2004)

With the passage of GINA many of the problems, examined in the previous two cases, will be avoided. Health Insurance companies and their underwriters will not be allowed to require, request, or otherwise obtain genetic information of any person attempting to gain coverage. They are also prohibited from requesting or requiring genetic tests of any person or family member.

The passage of this act also puts a number of restrictions on employers. Companies are not allowed to refuse to hire, discharge, or otherwise discriminate based on genetic information. Employers are also prohibited from requesting, requiring, or purchasing the genetic information of their employees.

There are, however, a few exceptions to these restrictions. For both health insurance companies and employers, genetic information that is inadvertently obtained through acquisition of other information is not a violation of GINA. Employers are also allowed to offer genetic testing to their employees as part of a wellness program. The employee must provide prior, knowing, voluntary, and written approval for the test and the results cannot be known to the employer.

There is also the possibility for this act to raise some issues with employers who have not intentionally acted unethically. For example, GINA creates strict guidelines for how to handle information on an employee's family history, now considered genetic information under GINA.

To date it was not uncommon for employers to have brief family histories on file for various reasons related to health insurance issuance. If those records are not handled in a manner that is within compliance of GINA, that employer will be in danger of legal action. In another scenario, if an employee is fired and takes legal action against an

employer for an unrelated matter, and their family medical history is discovered being handled improperly, it poses serious risks for that employer (Leonard, 2008).

Part II. Applicants Opinions of Genetic Testing

Method

To gather information on potential applicants opinions of genetic testing, a survey was conducted over a one month period, during March of 2009. The survey was created using SurveyMonkey.com and consisted of 14 questions; six of which focused on demographic information with the remaining eight pertaining to opinions of genetic testing and other related items.

Subjects were (a) given a consent form stating the purpose and procedures for completing the survey, (b) asked to confirm their understanding that the survey was voluntary and could be aborted at any time, (c) asked to complete a questionnaire gathering both demographic information and opinions on genetic testing in the application process, (d) given the option to comment on their main concerns with the use of genetic testing in the application process.

Subjects

The survey developed was sent to all students of Senior standing (86 credit hours or more) enrolled in the College of Business at Eastern Michigan University. In the 31 days that the survey was available, the total number of respondents was 111. From those students sampled, the demographic information is as follows;

Gender:	Male	57	51.4%
	Female	54	48.6%

Age:	20-25	74	66.7%
	26-30	19	17.1%
	31-35	10	9.0%
	36-40	6	5.4%
	40 and above	2	1.8%

Race:	Caucasian	84	75.7%
	Black	9	8.1%
	Hispanic	3	2.7%
	Asian	11	9.9%
	Multiracial	4	3.6%

Grade Point Average:

Below 2.0	0	0.0%
2.0-2.2	1	0.9%
2.3-2.5	3	2.7%
2.6-2.8	18	16.8%
2.9-3.1	32	28.8%
3.2-3.5	31	27.0%
3.6-3.8	22	19.8%
3.9-4.0	4	3.6%

Semester of Graduation 2009

April	36	32.4%
June	17	15.3%
August	6	5.4%
December	52	46.8%

Major:	Accounting	9	8.1%
	Accounting Information Systems	0	0.0%
	AAC/MSA 150 Hour Program	9	8.1%
	AIS/MSA 150 Hour Program	1	0.9%
	Computer Information Systems	3	2.7%
	Economics	0	0.0%
	Entrepreneurship	8	7.2%
	Finance	9	8.1%
	General Business	9	8.1%
	International Business	7	6.3%
	Management	40	36.0%
	Marketing	13	11.7%
	Supply Chain Management	3	2.7%

Questions Regarding Genetic Testing

As stated previously, all subjects were given a number of questions regarding genetic testing in the application process. Of these questions, there were two direct questions asked about genetic testing, each concerned with a different issue. The first question was concerned with respondents willingness to apply for a job if they knew the company required a genetic test as part of the application process. The second question was concerned with respondents willingness to undergo genetic testing after they were extended a job offer. Table 2 has the total responses of the potential applicants willingness apply for a job requiring a genetic test, and accepting a job offer with a company requiring a genetic test.

Table 2

	Very Unlikely	Somewhat Unlikely	Somewhat Likely	Very Likely	Undecided
How likely would you be to apply for a job with a company requiring a genetic test during the hiring process?	27.0% (30)	27.0% (30)	22.5% (25)	12.6% (14)	10.8% (12)
If offered a position, how likely would you be to take a genetic test as part of an employer's application process	21.1% (23)	22.9% (25)	27.5% (30)	18.3% (20)	10.1% (11)

Genetic Testing and Applicants Grade Point Average

When companies do recruiting through Universities, Grade Point Average (GPA) is one of the most common units of measure used to determine a candidates hireability. In a 2007 Job Outlook Survey, the National Association of Colleges and Employers found that 66% of employers screen by GPA, and 58% said they would be less likely to hire someone with a GPA below 3.0 (Koeppel, par. 7)

Through the preliminary research and development of the survey, hypotheses were developed involving the GPA of the applicant and their willingness to take a genetic test in the application process. This study tested the following hypotheses relating to the above two questions on genetic testing in the application process and respondents GPA.

Hypothesis 1a: Graduating seniors with an overall GPA greater than 3.5 will be more likely to not apply for a job that requires genetic testing

Hypothesis 1b: Graduating seniors with an overall GPA greater than 3.5 will be more likely to not accept a job offer with an organization that requires a genetic test.

Genetic Testing and Applicants Family Medical History

When determining an applicants willingness to take a genetic test as part of the application process, it is important to take into consideration their family medical history.

Any serious illness within ones family may play a role in thier being unwilling to take a genetic test as part of the application process.

This study tested the following hypotheses relating to the above two questions on genetic testing in the application process and respondents family medical history.

Hypothesis 2a: Graduating seniors who have knowledge of common health issues in their family will be more likely not to apply for a job that requires genetic testing.

Hypothesis 2b: Graduating seniors who have knowledge of common health issues in their family will be more likely not to accept a job offer with an organization that requires a genetic test.

Results

Grade Point Average

When testing both Hypothesis 1a and 1b, no concrete conclusion can be drawn since only four respondents out of the 111 total had a Grade Point Average falling in what is considered to be low (2.5 and below). Of those four respondents, 75% of them stated they would be either somewhat likely or very likely to both apply for a job requiring a genetic test. The same percentage of respondents would be somewhat likely or very likely to accept a job offer with an organization requiring a genetic test.

There were 26 students who had a high Grade Point Average (3.5 and above). Of these students, only four responded that they would be either somewhat likely or very likely to apply for a job, or accept a job offer, with a company who required a genetic test. Tables 3-6 show the data regarding the above two hypotheses.

What is your Grade Point Average?		
Answer Options	Response Frequency	Response Count
3.6-3.8	84.6%	22
3.9-4.0	15.4%	4
answered questions		26

Table 3. High grade point average (over 3.5).

Answer Options	Genetic Testing					Response Count
	Very Unlikely	Somewhat Unlikely	Somewhat Likely	Very Likely	Undecided	
How likely would you be to apply for a job with a company requiring a genetic test during the hiring process?	11	5	6	2	2	26
If offered a position, how likely would you be to take a genetic test as part of an employer's application process?	7	8	7	2	2	26

Table 4. High grade point average (over 3.5) reactions to genetic testing.

What is your Grade Point Average?		
Answer Options	Response Frequency	Response Count
Below 2.0	0.0%	0
2.0-2.2	25.0%	1
2.3-2.5	75.0%	3
answered questions		4

Table 5. Low grade point average (2.5 and below).

Genetic Testing						
Answer Options	Very Unlikely	Somewhat Unlikely	Somewhat Likely	Very Likely	Undecided	Response Count
How likely would you be to apply for a job with a company requiring a genetic test during the hiring process?	0	1	1	2	0	46
If offered a position, how likely would you be to take a genetic test as part of an employer's application process?	0	1	1	2	0	46

Table 6. Low grade point average (2,5 and below) reactions to genetic testing.

A bivariate correlation was also done to analyze the data for the students with a GPA above 3.5. Using SPSS 17.0, the data was analyzed looking for Pearson Correlation and the level of Significance between high GPA and an applicants willness to take a genetic test. Table 7 details the results of this analysis.

		What is your Grade Point Average?
What is your Grade Point Average?	Pearson Correlation	1
	Sig. (2-tailed)	
	N	26
How likely would you be to apply for a job with a company requiring a genetic test during the hiring process?	Pearson Correlation	-.022
	Sig. (2-tailed)	.914
	N	26
If offered a position, how likely would you be to take a genetic test as part of an employer's application process?	Pearson Correlation	-.099
	Sig. (2-tailed)	.630
	N	26

Table 7. Bivariate correlation for GPA and willingness to take genetic test.

History of Family Illness.

There were 54 respondents who had knowledge of common health issues in their family, and of those respondents, 39 were aware that the health issues common to their families were potentially life endangering. There were 47 respondents who were not aware of any common health issues in their families

In regards to Hypotheses 2a and 2b, the numbers did not indicate there being a greater likelihood for applicants with a knowledge of family history of medical issues to not apply or not accept a job offer with an organization who required genetic testing.

Tables 8, 9, and 10 give the data relating to Hypothesis 2a and 2b.

To your knowledge, are there any common health issues in your family history?		
Answer Options	Response Frequency	Response Count
Yes	53.5%	54
No	46.5%	47
answered questions		101

Table 8. Respondents knowledge of common family health issues.

Genetic Testing						
Answer Options	Very Unlikely	Somewhat Unlikely	Somewhat Likely	Very Likely	Undecided	Response Count
How likely would you be to apply for a job with a company requiring a genetic test during the hiring process?	17	16	9	8	4	54
If offered a position, how likely would you be to take a genetic test as part of an employer's application process?	13	13	14	7	6	53

Table 9. "Yes" respondents reactions to Genetic Testing

Genetic Testing						
Answer Options	Very Unlikely	Somewhat Unlikely	Somewhat Likely	Very Likely	Undecided	Response Count
How likely would you be to apply for a job with a company requiring a genetic test during the hiring process?	12	12	13	5	5	47
If offered a position, how likely would you be to take a genetic test as part of an employer's application process?	9	10	12	12	4	47

Table 10. "No" respondents reactions to Genetic Testing

Discussion

The results of this survey do not show any conclusive evidence that applicant's willingness to take a genetic test is linked to their Grade Point Average or their knowledge of common health issues in their family. Overall, it seems that all applicants are dissuaded from applying for a position if the organization requires a genetic test at any point in the hiring process.

After testing the hypotheses, the data for other demographics such as age, sex, race, etc., were analyzed for the possibility of other significant data that were not considered at the start of the study. All areas tested had similar results to the hypotheses. Either the sample size was too small to make a determination, or there were no significant correlations between the variables.

As part of the survey, respondents were given the opportunity to discuss some of the concerns they had with using genetic testing in the application process, if there were any. The most common responses had to do with questioning how genetic testing can determine one's ability to do their job. Other concerns had to do with privacy, inability to obtain health insurance, and the fear of discrimination.

It is also important to disclose that there were a large amount of responses from those graduating in the Management discipline. The research supervisor for this study is employed in the Management Department at Eastern Michigan University. Therefore, many of the students who responded were made aware of the study through the Management Department.

Part III. Conclusion

Although the data collected did not show conclusive evidence of any correlation between Grade Point Average or knowledge of common family illness and willingness to take a genetic test, it is clear that the students sampled do not support the use of genetic testing in the application process. They feel it is intrusive and is not a valid way of testing for job performance ability.

One of the largest issues that would be present with the use of genetic testing in employment processes is unlawful discrimination. As discussed previously, there are a number of illnesses that are prevalent in different ethnicities and if people were not hired based on the results of a genetic test, employers would be risking lawsuits as a result.

While the Genetic Information Non-Discrimination Act prohibits the use of genetic testing, additional research might be warranted to gather a greater number of minority opinions than was gathered in this study. If a larger sample size of minorities were used, there is the possibility that there would be a larger number of respondents who would not desire to take a genetic test in the job application process.

Another study that might be of interest would be to gather a larger number of students with, what in this study was considered a low GPA, and compare their responses to those with a high GPA. The small sample of students with a low GPA who took part in this study seemed to have fewer reservations about taking a genetic test, however, a larger sample would be needed to make a clear determination.

The final question of this survey asked respondents whether or not the current economic environment had any effect on their answers. 82.9% of the respondents stated that the current economy did not have an effect on their answers to the survey. The State

of Michigan Labor Market Information places the unemployment rate at 12.0% as of February 2009. It was expected that more of the respondent's opinions would have been affected by the dismal job prospects. Future studies might survey students in other geographical regions that are less affected by the recession. This would allow for a more broad range of respondents and their perceptions of genetic testing.

Appendix

Genetic Testing in Employment

1. Informed Consent - Genetic Testing in Employment

The 'Genetic Testing in Employment' survey is designed to gauge applicants' perceptions of the use of genetic testing in the hiring process. This survey is intended to gather information from graduating students on their perception of an organizations use of genetic tests as a part of the pre-employment requirement process. The survey takes approximately 5-7 minutes to complete. Upon completion all participants will be placed in a drawing for a \$20.00 gift from a local, Ypsilanti restaurant. Responses will be tracked solely by the user ID and 4 digit password given, in the final question, by the responder. All answers are confidential and only the primary researcher and the supervising Professor will have access to the information. All responses will be aggregated to ensure confidentiality. Your privacy will be protected and your name will not be known as a participant in this project. Refusal to participate will result in no penalty, and the survey can be discontinued at any time. For questions regarding survey procedures, or other issues, please contact the Principle Researcher, Kim Hill, Jr (khiljr@emich.edu).

This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Subjects Review Committee for use from March 1,2009 to March 30,2009. If you have questions about the approval process, please contact Dr. Deb de Laski-Smith (734.487.0042, Interim Dean of the Graduate School and Administrative Co-chair of UHSRC, human.subjects@emich.edu).

If you agree to take this survey, and understand that it is voluntary, please click 'Next' to continue.

Genetic Testing in Employment

2. Default Section

*** 1. What is your gender?**

- Male
- Female

*** 2. What is your age?**

- 20-25
- 26-30
- 31-35
- 36-40
- 40 and above

*** 3. What race do you consider yourself a member of?**

- Caucasian
- Black
- Hispanic
- Asian
- Multiracial

Other (please specify)

*** 4. What is your Grade Point Average?**

- Below 2.0
- 2.0-2.2
- 2.3-2.5
- 2.6-2.8
- 2.9-3.1
- 3.2-3.5
- 3.6-3.8
- 3.9-4.0

*** 5. Which semester do you expect to graduate?**

- April 2009
- June 2009
- August 2009
- December 2009

Genetic Testing in Employment

* 6. What is your major area of study?

- Accounting
- Accounting Information Systems
- AAC/MSA 150 Hour Program
- AIS/MSA 150 Hour Program
- Computer Information Systems
- Economics
- Entrepreneurship
- Finance
- General Business
- International Business
- Management
- Marketing
- Supply Chain Management

* 7. Drug Testing

	Not needed	Only under limited circumstances	Have reservations but should be done	Necessary	No Opinion
Which of the following comes closest to your opinion of employer administered drug testing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

* 8. To your knowledge, is it legal for companies to require a genetic test as a basis for employment?

- Yes
- No
- Do not know

* 9. Genetic Testing

	Very Unlikely	Somewhat Unlikely	Somewhat Likely	Very Likely	Undecided
How likely would you be to apply for a job with a company requiring a genetic test during the hiring process?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
If offered a position, how likely would you be to take a genetic test as part of an employer's application process	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Genetic Testing in Employment

*** 10. To your knowledge, are there any common health issues in your family history?**

- Yes
- No
- Do not know

11. If you responded "yes" on item number 10, are the health issues in your family potentially life endangering?

- Yes
- No
- Do not know

12. Genetic Testing

	Not at all interested	Somewhat uninterested	Somewhat interested	Very interested	Undecided
Are you interested, or would you be willing to hear the results of genetic tests that your employer required you to take?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

13. What would be your major concern about employer required genetic testing?

14. Has the current economic environment had an impact on your responses to the above survey questions?

- Yes
- No
- No opinion

15. Please provide a user ID and 4 digit password number in order to be considered for the gift.

Works Cited

Zilinskas, R. A., & Balint, P. J. (Eds.). (2001). *The Human Genome Project and Minority Communities*. Westport, CT: Praeger Publishers.

Bellenir, K. (Ed.). (2004). *Genetic Disorders Sourcebook* (3rd ed.). Detroit: Omnigraphics.

Malaria and the Red Cell (2002, April 2). Retrieved February 3, 2009, from http://sickle.bwh.harvard.edu/malaria_sickle.html

U.S. Congress, Office of Technology Assessment, *Genetic Tests and Health Insurance: Results of a Survey – Background Paper*, OTA-BP-BA-98 (Washington, DC: U.S. Government Printing Office, October 1992).

Sheila White v. Burlington Northern & Santa Fe Railway Co. United State Court of Appeals 2004 FED App. 0102P (6th Cir.)

EEOC SETTLES ADA SUIT AGAINST BNSF FOR GENETIC BIAS (2001, April 18). Retrieved February 9, 2009, from <http://www.eeoc.gov/press/4-18-01.html>

Norman-Bloodsaw v. Lawrence Berkeley Laboratory United States Court of Appeals, Ninth Circuit Decided February 3, 1998 No. 96-16526

Genetic Discrimination Non-Discrimination Act, Senate and House of Representatives of The United States of America, 2008

Leonard, B. (2008). *The Stealth Statute* [Electronic version]. HRMagazine, 53(12), 47-49. from ABI/Inform Global.

Koepfel, D. (2006, December 31). Those Low Grades in College May Haunt Your Job Search. The New York Times. Retrieved April 6, 2009, http://www.nytimes.com/2006/12/31/jobs/31gpa.html?pagewanted=1&_r=1

Labor Market Information (2009, February). Retrieved April 9, 2009, <http://www.milmi.org/>

Genetic Non-Discrimination: Examining the Implications for Workers and Employers. (2004). Washington D.C: Committee on Education and the Workforce