

In this issue:

- 4. Optimizing a Convolutional Neural Network Model in Amazon SageMaker for an Autism Detection Tool, EZ Autism Screener**
Catherine M. Ata, City University of Seattle
Sam Chung, City University of Seattle
Brian Maeng, City University of Seattle

- 23. Are Companies Responsible for Internet of Things (IoT) Data Privacy? A Survey of IoT User Perceptions**
Karen Pullet, Robert Morris University
Adnan A. Chawdhry, Pennsylvania Western University
Jamie Pinchot, Robert Morris University

- 33. E-Commerce Drone Delivery Acceptance: A Study of Gen Z's Switching Intention**
Jeffrey P. Kaleta, Appalachian State University
Wei Xei, Appalachian State University
Charlie Chen, Appalachian State University

- 45. The Effect of Mental Illness on Compensation for IT Developers**
Alan Peslak, Penn State University
Wendy Ceccucci, Quinnipiac University
Kiku Jones, Quinnipiac University
Lori N. K. Leonard, University of Tulsa

- 58. Measuring Learners' Cognitive Load when Engaged with an Algorithm Visualization Tool**
Razieh Fathi, Smith College
James D. Teresco, Siena College
Kenneth Regan, University of Buffalo

- 68. Virtual Reality in Special Education: An Application Review**
Yi (Joy) Li, Kennesaw State University
Zhigang Li, Kennesaw State University

The **Journal of Information Systems Applied Research** (JISAR) is a double-blind peer reviewed academic journal published by ISCAP, Information Systems and Computing Academic Professionals. Publishing frequency is three to four issues a year. The first date of publication was December 1, 2008.

JISAR is published online (<https://jisar.org>) in connection with CONISAR, the Conference on Information Systems Applied Research, which is also double-blind peer reviewed. Our sister publication, the Proceedings of CONISAR, features all papers, panels, workshops, and presentations from the conference. (<https://conisar.org>)

The journal acceptance review process involves a minimum of three double-blind peer reviews, where both the reviewer is not aware of the identities of the authors and the authors are not aware of the identities of the reviewers. The initial reviews happen before the conference. At that point papers are divided into award papers (top 15%), other journal papers (top 30%), unsettled papers, and non-journal papers. The unsettled papers are subjected to a second round of blind peer review to establish whether they will be accepted to the journal or not. Those papers that are deemed of sufficient quality are accepted for publication in the JISAR journal. Currently the acceptance rate for the journal is approximately 35%.

Questions should be addressed to the editor at editor@jisar.org or the publisher at publisher@jisar.org. Special thanks to members of ISCAP who perform the editorial and review processes for JISAR.

2023 ISCAP Board of Directors

Jeff Cummings
Univ of NC Wilmington
President

Anthony Serapiglia
Saint Vincent College
Vice President

Eric Breimer
Siena College
Past President

Jennifer Breese
Penn State University
Director

Amy Connolly
James Madison University
Director

RJ Podeschi
Millikin University
Director/Treasurer

Michael Smith
Georgia Institute of Technology
Director/Secretary

David Woods
Miami University (Ohio)
Director

Jeffry Babb
West Texas A&M University
Director/Curricular Items Chair

Tom Janicki
Univ of NC Wilmington
Director/Meeting Facilitator

Paul Witman
California Lutheran University
Director/2023 Conf Chair

Xihui "Paul" Zhang
University of North Alabama
Director/JISE Editor

Copyright © 2023 by Information Systems and Computing Academic Professionals (ISCAP). Permission to make digital or hard copies of all or part of this journal for personal or classroom use is granted without fee provided that the copies are not made or distributed for profit or commercial use. All copies must bear this notice and full citation. Permission from the Editor is required to post to servers, redistribute to lists, or utilize in a for-profit or commercial use. Permission requests should be sent to Scott Hunsinger, Editor, editor@jisar.org.

JOURNAL OF INFORMATION SYSTEMS APPLIED RESEARCH

Editors

Scott Hunsinger
Senior Editor
Appalachian State University

Thomas Janicki
Publisher
University of North Carolina Wilmington

2023 JISAR Editorial Board

Edgar Hassler
Appalachian State University

Hayden Wimmer
Georgia Southern University

Muhammed Miah
Tennessee State University

Jason Xiong
Appalachian State University

Karthikeyan Umapathy
University of North Florida

Xihui (Paul) Zhang
University of North Alabama

The Effect of Mental Illness on Compensation for IT Developers

Alan Peslak
arp14@psu.edu
Department of Information Sciences and Technology
Penn State University
Dunmore, PA 18512

Wendy Ceccucci
wendy.ceccucci@qu.edu

Kiku Jones
kiku.jones@qu.edu

Department of Computer Information Systems
Quinnipiac University
Hamden, CT 06518

Lori N. K. Leonard
lori-leonard@utulsa.edu
Department of Accounting and Computer Information Systems
The University of Tulsa
Tulsa, OK 74104

Abstract

Nearly 20% of US adults suffer from some form of mental illness. The indirect effects of the COVID-19 virus have increased this number significantly. The effect of mental illness on ability to work effectively and efficiently has been studied extensively and the consensus is that mental illness has a stigma associated with it that reduces employment opportunities for those so afflicted. Our study reviews this assumption by analyzing compensation for information technology developers who self-identify as having one of many mental illnesses. A large sample set from Stack Overflow was used to compare compensation levels based on this self-identification of one or more mental illnesses to determine if there was any significant impact. Our results found that overall mental illness does reduce compensation levels for information technology developers but less than many other variables. Other demographic factors, including a lower level of education, female gender, and younger age, are more significant factors for lower developer compensation. There is also a small effect based on ethnicity.

Keywords: Mental Illness, Compensation, Gender, Education

1. INTRODUCTION

The COVID-19 pandemic has caused a rise in the number of mental illness cases worldwide (Xie, Xu, & Al-Aly, 2022). Mental illness encompasses a wide range of conditions including depression, anxiety disorders, schizophrenia, eating disorders and addictive behaviors. It can affect a person's mood, thinking and behavior (MayoClinic, 2022a). Mental health "includes our emotional, psychological, and social well-being. It affects how we think, feel, and act. It also helps determine how we handle stress, relate to others, and make healthy choices" (Center for Disease Control, 2022). While the terms mental illness and mental health are commonly used interchangeably, they are not the same. A person may have a diagnosed mental illness, but at times be in good mental health. On the other hand, a person may be experiencing poor mental health without a diagnosed mental illness.

In 2019, just prior to the COVID-19 pandemic, 19.86% of U.S. adults experienced some form of mental illness (Mental Health America, 2022). SingleCare (2022) conducted a national survey on mental health and coronavirus and found that 59% of people in the US stated that their mental health was impacted by the COVID-19 pandemic. In addition, according to a study by the World Health Organization (2022), the COVID-19 pandemic has resulted in a 25% increase in the prevalence of anxiety and depression worldwide.

Prior research has shown that social disadvantage, especially lack of material possessions, lower income, and financial difficulties, are often associated with mental illnesses (Reading, 2000, Lewis, 1998, and Welch, 1998). In addition, women have been found to be diagnosed with a mental illness more often than men (Mayo Clinic, 2022b). During the COVID-19 pandemic, one in six women were found to have symptoms of post-traumatic stress – a rate like that of other significant disasters (Lindau, Makelarski, Boyd, Doyle, Haider, Kumar, Lee, Pinkerton, Tobin, Vu, Wroblewski, & Lengyel, 2021).

During the pandemic, many companies were required to conduct business virtually and could not operate at full capacity, which necessitated reducing their workforce (US Bureau of Labor Statistics, 2022). While the technology industry was not immune to this issue, it was in a better position overall (Hylton, Ice, & Krutsch, 2022).

The pandemic created additional responsibilities and added layers of complexity to the IT professional's workload. This added stress and pressure to many IT professionals in the field (Thompson, 2022). Prior to the pandemic, fifty-one percent of IT professionals indicated that they were already diagnosed with a mental illness (OSMI, 2016). As new positions and roles are created to meet the demands post-pandemic, it will be important to understand how mental illness impacts the IT industry.

This paper looks to answer the following research questions:

- What impact does mental illness have on compensation (i.e., income) in the IT industry?
- What is the impact of gender in the relationship between mental illness and compensation?
- What is the impact of education in the relationship between mental illness and compensation?
- Are there any variables that have more of an impact on compensation than mental illness?

The next section will provide a literature review on the effects of mental illness on, compensation, education, and gender. This is followed by the methodology, results, and conclusions.

2. LITERATURE REVIEW

Mental Illness & Compensation

A study by Kose (2020) found a causal and positive relationship between household income level and the mental health of individuals in Turkey. They also reported that Turkish females had lower mental health than Turkish males.

Gresenz, Sturm, and Tang (2001) studied the relationship between income inequality and mental disorder. They found that mental health worsens, and the probability of depression and anxiety increases as the income of the family decreases. Wildman (2003) found that one's financial status is a determinant of mental health, and one's income creates inequalities in health. Moreover, Strohschein (2005) studied school age children between the ages of four and fourteen. She found that low household income results in greater depression, with improvements or increases in household income resulting in reduced mental health issues in children.

In particular, the COVID-19 pandemic lockdown was found to affect mental health more in low-income households (Pieh, Budimir, and Probst, 2020). In Pieh, Budimir, and Probst's study they looked at residents of Austria during the first four weeks of lockdown. They determined that stress levels were higher for low-income households, adults under 35 years of age, and women. Pieh et al. (2021) also studied residents in the United Kingdom. They found that individuals from low-income households, younger than 35 years of age, and women experienced greater mental health issues. Li et al. (2020) also found similar results. They found that people who had larger income losses were at higher risk for mental health issues and required more psychological care. Historically, socially disadvantaged groups, such as those with low income, have shown more psychiatric illnesses or conditions than socially advantaged groups (Purtile, 2020).

However, another study by Araya et al. (2003) looked at adults living in Chile and found there was a strong, inverse, and independent association between education and common mental illnesses. But income was not associated with the prevalence of common mental illnesses, after adjusting for other socioeconomic variables.

Mental Illness & Gender

Prior research studies have found that women tend to experience higher instances of mental illness (Chochrane, 1981, Hankin, 2001, Macintyre 1996). The Substance Abuse and Mental Health Services Administration conducted the 2020 National Survey on Drug Use and Health and found that mental illness of any kind was higher among females (25.8%) than males (15.8%) (National Institute of Mental Health, 2022).

Seedat et al. (2009) found that gender differences in mental illness are consistently observed in various countries from different regions of the world, but they found that gender differences decline when men and women have more equal roles in the society.

Existing mental illness was appeared to be exacerbated during the pandemic. Many individuals were hospitalized for long periods of time without the ability to see their families. Prior to the pandemic, Paulo da Silva Ramos, et al. (2022) surveyed hospitalized patients using the Hospital Anxiety and Depression Scale and the Beck's Anxiety Inventory. Results showed that women had a higher level of anxiety than men. However, there was no difference in the level of depression. As previously stated, women were

found to be affected more than men by the pandemic in Austria, with higher stress levels recorded for women during the first four weeks of lockdown (Pieh, Budimir, and Probst, 2020). This was also found to be true in the United Kingdom (Pieh et al., 2021).

Prowse et al. (2021) examined the COVID-19 pandemic's effect on the stress and mental health of university students in Canada. They found female students to more negatively affected than male students in terms of academics, stress, mental health, and isolation.

Due to increasing cases of Covid-19 cases many states called for lockdowns. Adams-Prassl, et al. (2022) studied the effects of the lockdown measures on mental health. They determined that the stay-at-home orders led to an overall decrease in mental health. They found a 61% increase in the gender gap in mental health with the negative impact of the lockdown impacting women more. The authors also found a positive association with income and a university degree with mental health.

Mental Illness & Education

Previous research has shown a definitive relationship between educational outcomes and mental illness. The research suggests two main reasons for this relationship, social causation, and social selection. Social causation research suggests that the relationship is a causal one and education affects mental health (Kessler et al. 1995; Lantz et al. 2005; Mirowsky and Ross 2003; Ritsher et al. 2001; Schieman and Plickert, 2008). Whereas the research on selection suggests that preexisting mental health conditions inhibit an individuals' ability to obtain a high level of education.

The causal relationship subscribes those higher levels of education enhance people's skills, afford important structural advantages, and empower better coping mechanisms, which results in better mental health.

The social selection theory prescribes that the link between education and mental illness may stem from preexisting conditions. Those experiencing these mental health problems are more likely to experience school difficulties, including more absenteeism, higher rates of suspension and expulsion, lower grades and test scores, and greater high school dropout propensity (Bernstein, 1997, Diperna, 2002, Gutman, 2003, & Reid, 2004). Research suggests that functional impairments and/or the stigma and social exclusion that go along with mental health illness

are often the cause (McLeod, Uemura, and Rohrman 2012; Needham, Crosnoe, and Muller 2004).

Alternatively, a British study, by Lewis et al. (1993) revealed an interaction between social class and sex, and no independent association with educational achievement.

3. METHODOLOGY

To study the effects of mental illness on software developers' data from the 2021 Stack Overflow survey was used. Stack Overflow's annual Developer Survey is the largest and most comprehensive survey of people who code around the world. Each year, their survey questions cover a wide range of areas, from developers' favorite technologies to their job preferences. According to their website:

"For almost a decade, Stack Overflow's annual Developer Survey held the honor of being the largest survey of people who code around the world. This year (2020), rather than aiming to be the biggest, we set out to make our survey more representative of the diversity of programmers worldwide. That said, the survey is still big. This year's survey was taken by nearly 65,000 people." (Stack Overflow, 2020)

The use of Stack Overflow is well established as a source for peer-reviewed journals including Barua, Thomas, and Hassan (2014), Asaduzzaman, Mashiyat, Roy, and Schneider (2013), and Treude and Robillard (2016). The Stack Overflow dataset consists of dozens of demographics, descriptive, and opinion questions about the state of programming today. The results were analyzed using IBM SPSS 27. It is important to note that the responses regarding mental health were self-reported and could also include responses that were self-diagnosed.

This survey was used as the starting point for our analysis. Over 88,420 survey responses were received, but the survey included data on respondents who were just hobbyists or non-professional users. In addition, this was an international survey and to eliminate international variations in salary this research just focused on US only developers. Finally, there were anomalies in compensation with unrealistically large compensation levels. Those reporting yearly salaries over \$500,000 were excluded. To summarize, the initial data was filtered to only include the surveys from

individuals who lived in the United States, identified as a developer by profession, and whose converted compensation was less than \$500,000. All responses that were missing data or the responses were rather not say were removed from the dataset. After filtering, the dataset was still quite large with just over 7,500 responses.

SPSS 27 was used to perform a variety of statistical analyses to determine the impact of mental health and information technology compensation. The working hypothesis was that if mental health does affect employment opportunities, would this be manifested in compensation levels. The goal was also to compare the magnitude of the effect of mental health issues on compensation as compared to other demographic variables.

4. RESULTS

The survey asked the following question to ascertain the respondents' mental health:

Which of the following describe you, if any? Please check all that apply.

- I have a concentration and/or memory disorder (e.g., ADHD)
- I have a mood or emotional disorder (e.g., depression, bipolar disorder)
- I have an anxiety disorder
- I have autism / an autism spectrum disorder (e.g., Asperger's)
- None of the above
- In your own words

The results of this survey question are shown in Appendix A and Figure 1. Appendix A shows the count and average salary of all the different combinations of responses. As respondents can check more than one disorder there are many different combinations. Figure 1 on the other hand, shows the respondents' results for each of the response options. Given that respondents can check more than one disorder, the sum of the columns is larger than the total number of respondents. Approximately, 67% of the respondents indicated that they had no mental disorders, and 33% indicated that they had some type of mental disorder.

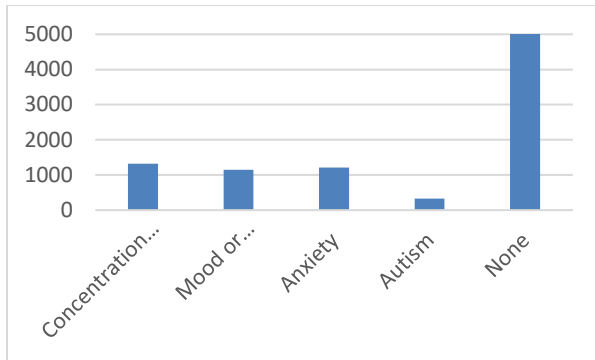


Figure 1: Count of Mental Disorder

Figure 2 shows the average salary of the respondents based on the mental disorder. The average salary of those indicating no mental disorder had the highest salary, just less than \$140,000 while those who had an anxiety disorder had the lowest average salary of approximately \$125,000.

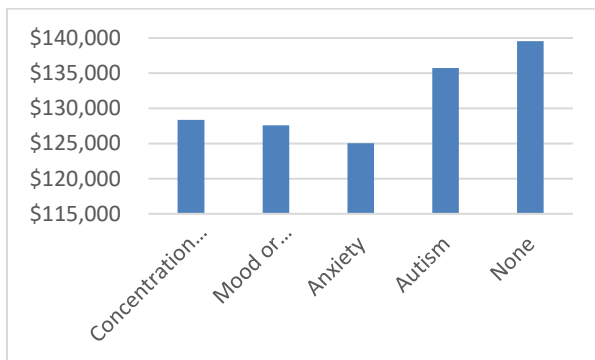


Figure 2: Average Salary by Mental Disorder

To further analyze if there was an overall difference between compensation levels for those who self-identified as having any mental illness versus those who did not, a simple binary variable was created. If the respondents indicated any type of mental disorder, the mental illness variable was a 1, otherwise it was set to zero. The results are shown in Tables 1 and 2. Overall, nearly 36% of the scrubbed dataset reported one or more mental illness. This is much higher than the estimated general population of 20%. As shown in table 2, there is more than a \$10,000 difference between the compensation for those who reported a mental illness compared to those who did not. An ANOVA test was performed. This difference was significant a $p < .001$.

	Frequency	Percentage
No Mental Illness	5,011	66.5%
Mental Illness	2,520	33.5%
Total	7,531	

Table 1: Number of Respondents

	Mean	Std. Dev.
No Mental Illness	\$139,547.99	\$70,450
Mental Illness	\$128,899.82	\$65,125
Overall	\$135,984.94	\$68,893

Table 2: Average Salary by Mental Illness

To further investigate the factors that might affect the disparity in salary, each of the four important variables were added, that in past research have shown to affect job compensation: ethnicity, gender, age, and education level were separately analyzed.

Ethnicity was the first variable analyzed. Due to the more than 25 combinations of race in the dataset, the dataset was recoded to white and non-white so that a reasonable sample size was obtained. From the results in Table 3, the ethnicity factor used resulted in a small, but significant result for compensation. An ANOVA test was performed. The p value was less than 0.095, below the .10 threshold used in many social science studies. There was a \$2000 increase in non-white versus white developers.

Ethnicity	Mean	N	Std Dev.
White	\$135,276.90	5,863	\$68,303
Non-White	\$138,473.69	1,668	\$70,895
Overall	\$135,984.94	7,531	\$68,894

Table 3: Average Salary by Ethnicity

Gender was the next variable that was independently analyzed. Those that self-reported and identified as other than solely male, or female were categorized into the other group. The results of the analysis are shown in tables 4 and 5. Women have significantly lower compensation. Their compensation was nearly \$24,000 less than men and over \$13,000 less than other gender. Women and Other also report much higher percentages of mental health issues (54% and 71%) versus men at 31%.

	Mean	N	Std Dev.
Male	\$137,793.19	6,867	69,717
Female	\$126,772.36	464	54,383
Other	\$113,194.46	200	60,043

$p < .001$

Table 4: Average Salary by Gender

	No Mental Illness	Mental Illness	Total
Male	4,742	2,125	6,867
Female	212	252	464
Other	57	143	200

Table 5: Count of Gender & Mental Illness

The third independently reviewed variable was education level. The results are shown in Tables 6 and 7. In general, the higher the education level, the higher the compensation. An ANOVA test found this significant at $p < .001$. The results in Table 7 show that the level of education was affected by the having a mental disorder. An ANOVA test was performed, and it was determined that those having a higher education level had a lower incidence of mental illness. This was statistically significant at $p < .001$

Education	Mean	N	Std Dev.
Primary	\$137,895.08	26	\$81,273
High school	125,165.05	146	82,566
Some college	129,091.27	944	66,979
Associate	109,942.66	315	50,213
Bachelors	133,780.40	4472	67,586
Masters	151,218.19	1372	71,064
Doctoral /Advanced	156,296.00	256	76,581
Overall	135,984	7,531	68,893

Table 6: Average Salary by Education Level (Scaled)

Education	No Mental Illness	Mental Illness	Total
Primary	15 (58%)	11 (42%)	26
High school	80 (55%)	66 (45%)	146
Some college	507 (54%)	437 (46%)	944
Associate	181 (57%)	134 (43%)	315
Bachelors	3,009 (67%)	1,463 (33%)	4,472
Masters	1,041 (76%)	331 (24%)	1,372
Doctoral /Advanced	178 (70%)	78 (30%)	256
Overall	5,011 (67%)	2,520 (33%)	7,531

Table 7: Mental Illness & Education Level

The last factor analyzed was age. Age also had a significant impact on compensation level as shown in Tables 8 and 9. In general, older developers, at least up to age 54, had a higher compensation level than their younger counterparts. Also, younger developers from the appear to have higher levels of mental health issues as shown in Table 9. An ANOVA test was performed. Age was determined to be a significant variable affecting compensation at $p < .001$.

Age (years)	Mean	N	Std. Dev
18-24	\$89,901.14	839	48382
25-34	130,281.01	3358	67099
35-44	153,857.37	2039	70,828
45-54	154,771.65	836	66,698
55-64	150,384.71	392	63,263
65 or older	136,370.15	67	60,518
Total	135,984.94	7,531	68,893

Table 8: Average Salary by Age

Age (years)	No Mental Illness	Mental Illness	Total
18-24	547 (65%)	292 (35%)	839
25-34	2,161 (64%)	1,197 (36%)	3,358
35-44	1,355 (66%)	684 (34%)	2,039
45-54	593 (71%)	243 (29%)	836
55-64	300 (77%)	92 (23%)	392
65 or older	55 (82%)	12 (18%)	67

Table 9: Age and Mental Health

With all these variables, different combinations will produce different results but to see an actual impact in a group, a major subset of the overall dataset was analyzed. The group consisted of only non-Women, Bachelor's degree, age 25-34, and white ethnicity. It was found that there was a \$7000 difference in compensation for those without mental illness versus those with mental illness (Table 10). An ANOVA test was performed. This difference was significant at $p < .046$.

Mental Illness	Mean	N	Std. Dev.
No Mental Illness	\$131,909.38	1,014	66,477
Mental Illness	124,982.51	543	62,625
Total	129,493.66	1,557	65,223

Table 10: Salary Differential of non-Women, Bachelor’s degree, age 25-34, and white ethnicity with Mental Health

The final step was to utilize all the significant variables in a multiple regression analysis to determine the possible significance of each variable as well as determine any possible collinearity effects. The results of this analysis are shown in Appendix B.

Before discussing the specific regression coefficients and significance levels the collinearity analysis is first addressed. “Collinearity refers to the non-independence of predictor variables, usually in a regression-type analysis. It is a common feature of any descriptive ecological data set and can be a problem for parameter estimation because it inflates the variance of regression parameters and hence potentially leads to the wrong identification of relevant predictors in a statistical model.” (Dorman, et al., 2013, p. 27) In other words, collinearity is bad and can result in improper conclusions because the variables may be non-independent and thus inaccurately predict the dependent variable.

There are multiple methods to determine collinearity and the two main methods are included in the SPSS output tables. The three key indices are Tolerance, VIF (Variance Inflation Factor) and Condition Index. The negative thresholds for these factors are less than .1 for tolerance, greater than 10 for VIF and greater than 30 for Condition index (Dorman, et al., 2013). The results show for all the variables the VIF’s are below 1.1, all tolerances greater than .9 and no dimension condition indices above 16. Therefore, we can conclude that there are no collinearity issues with the variables, and all are independent of each other.

Now that the collinearity was checked, the next step was to analyze the results. It is worth noting that all variables were scaled or were dichotomous to allow for regression analysis. For gender, two dummy variables were added to determine the effect of women versus men and other versus men.

All variables included in the regression analysis were statistically significant at $p < .002$ except for other gender. Other gender did not have an impact on compensation with a p value of .20.

Evaluating all the variables, the statistical results show:

- Age is a significant factor in determining developer compensation. The older you are up to a point, the higher your compensation.
- Gender is a significant variable but only for women, not other. Women have lower compensation than men.
- Education level is a significant factor in determining developer compensation. The more education, the higher the compensation.
- Mental health is a significant factor by itself in determining developer compensation.
- Finally, ethnicity is also significant factor in determining developer compensation.

But these variables do not equally affect compensation. A review of the standardized coefficients reveals that the most important variable is age at .22. The next most important variable is Education level at .095. The third most important variable is gender but only for women at -.075. Ethnicity also has a slightly higher impact at .036, higher than mental health which is the lowest at -.035.

This data also supports the need for transparency in salaries to help ensure pay equity across all dimensions including ethnicities. Practitioners should work towards correcting their salary disparities between ethnicities.

5. CONCLUSIONS AND LIMITATIONS

The data suggests that overall mental health issues are a significant factor in determining IT developer compensation, but not as high as other variables. Rather age and education level appear to be more important factors in contributing towards lower compensation. In addition, female gender, and ethnicity also play stronger roles. So overall, independently, mental health issues do reduce compensation, but have less effect than many other variables.

It should be noted that the data was from respondents who self-diagnosed their mental health. Additional research should be performed with medical data to further support these results.

Additionally, this study looked at variables available in the survey. It did not look at other potential mediating variables that may affect mental health. Researchers will want to conduct further research to determine if there are any other significant factors that play a role in mental health and compensation.

This data further supports the need for gender parity in compensation. Practitioners should look for ways of correcting salary disparities between genders.

6. ACKNOWLEDGEMENTS

We would like to thank and acknowledge the People's United Center for Women & Business at Quinnipiac University for helping to sponsor our efforts in this project.

7. REFERENCES

- Adams-Prassl, A., Boneva, T., Golin, M., Rauh, C., (2022). The impact of the coronavirus lockdown on mental health: evidence from the United States. *Economic Policy*, 37(109), 139-155.
- Araya R, Lewis G, Rojas G, & Fritsch R. (2003) Education and income: which is more important for mental health? *J Epidemiol Community Health*. 57(7), 501-505.
- Asaduzzaman, M., Mashiyat, A. S., Roy, C. K., & Schneider, K. A. (2013, May). Answering questions about unanswered questions of stack overflow. In 2013 10th Working Conference on Mining Software Repositories (MSR) (pp. 97-100).
- Barua, A., Thomas, S. W., & Hassan, A. E. (2014). What are developers talking about? an analysis of topics and trends in stack overflow. *Empirical Software Engineering*, 19(3), 619-654.
- Bernstein G. & Shaw K. (1997) Practice parameters for the assessment and treatment of children and adolescents with anxiety disorders. *Journal of the American Academy of Child and Adolescent Psychiatry* 36, 69S-84S.
- Center for Disease Control (2022) About Mental Illness retrieved May 21, 2022 from <https://www.cdc.gov/mentalhealth/learn/>.
- Cochrane R, Stopes-Roe M. (1981) Women, marriage, employment and mental health. *Br J Psychiatry*. 139(5), 373-81.
- Diperna J. & Elliott S. (2002) Promoting academic enablers to improve student achievement: an introduction to the mini-series. *School Psychology Review* 31, 293-297.
- Dormann, C. F., Elith, J., Bacher, S., Buchmann, C., Carl, G., Carré, G., Marquez, J., Gruber, B., Lafourcade, B., Leitaó, P., Munkemüller, T., McClean, C., Osborne, P., Reineking, B., Schroder, B., Skidmore, A., Zurell, D., & Lautenbach, S. (2013). Collinearity: a review of methods to deal with it and a simulation study evaluating their performance. *Ecography*, 36(1), 27-46.
- Gresenz, C. R., Sturm, R., and Tang, L. (2001). Income and mental health: unraveling community and individual level relationships. *The Journal of Mental Health Policy and Economics*. 4, 197-203.
- Gutman L., Sameroff A., & Cole R. (2003). Academic growth curve trajectories from 1st grade to 12th grade: effects of multiple social risk factors and preschool child factors. *Developmental Psychology*, 39, 777-790.
- Hylton, S., Ice, L., & Krutsch, E. (2022). What the long-term impacts of the COVID-19 pandemic could mean for the future of IT jobs retrieved May 30, 2022 from <https://www.bls.gov/opub/btn/volume-11/what-the-long-term-impacts-of-the-covid-19-pandemic-could-mean-for-the-future-of-it-jobs.htm>
- Kessler, R. C., Foster, C. L., Saunders, W. B., and Stang, P.E. (1995). Social Consequences of Psychiatric Disorders, I: Educational Attainment." *American Journal of Psychiatry* 152(7), 1026-1032.
- Kose, T. (2020) Gender, Income and Mental Health: The Turkish Case. *PLoS One*. 2020 Apr 29; 15(4):e0232344. doi: 10.1371/journal.pone.0232344. PMID: 32348361; PMCID: PMC7190175.
- Lantz, P., House, J., Mero, R., & Williams, D. (2005). Stress, Life Events, and Socioeconomic Disparities in Health: Results from the Americans' Changing Lives Study. *Journal of Health & Social Behavior*, 46(3), 274-288.

- Lewis G., Bebbington P., Brugha T., Farrell, M., Gill, B., Jenkins, R., Meltzer, H. (1998) Socio-economic status, standard of living and neurotic disorder. *Lancet*, 352, 605–609.
- Li, X., Lu, P., Hu, L., Huang, T., and Lu, L. (2020). Factors associated with mental health results among workers with income losses exposed to COVID-19 in China. *International Journal of Environmental Research and Public Health*. 17(15), <https://doi.org/10.3390/ijerph17155627>
- Lindau, S. T., Makelarski, J. A., Boyd, K., Doyle, K. E., Haider, S., Kumar, S., Lee, N. K., Pinkerton, E., Tobin, M., Vu, M., Wroblewski, K. E., & Lengyel, E. (2021). Change in health-related socioeconomic risk factors and mental health during the early phase of the COVID-19 pandemic: a national survey of US women. *Journal of Women's Health*, 30(4), 502-513.
- Mental Health America, Inc. (2022). The State Of Mental Health In America retrieved May 18, 2022 from <https://mhanational.org/issues/state-mental-health-america>
- Mayo Clinic (2022a). Mental Illness retrieved May 18, 2022 from <https://www.mayoclinic.org/diseases-conditions/mental-illness/symptoms-causes/syc-20374968>
- Mayo Clinic (2022b). Depression in Women: Understanding the Gender Gap retrieved May 30, 2022 from <https://www.mayoclinic.org/diseases-conditions/depression/in-depth/depression/art-20047725>
- McLeod, J., Uemura, R. & Rohrman, S. (2012). Adolescent Mental Health, Behaviour Problems, and Academic Achievement, *Journal of Health & Social Behavior*, 53(4), 482-537.
- Mirowsky, J., & Ross, C. (2003). Education, Social Status, and Health. Hawthorne, NY, Aldine de Gruyter.
- National Institute of Mental Health (2022). Mental Illness retrieved May 21, 2022 from <https://www.nimh.nih.gov/health/statistics/mental-illness>
- Needham, B., Crosnoe, R. & Müller, C. (2004). Academic Failure in Secondary School: The Inter-Related Role of Health Problems and Educational Context. *Social Problems*, 51(4), 569–586.
- OSMI (2016). OSMI Mental Health in Tech Survey 2016 retrieved May 30, 2022 from <https://osmi.typeform.com/report/Ao6BTw/U76z>
- Paula da Silva Ramos, A., Fernandes de Souza Ribeiro, J., Lima Trajano, E. T., Aurélio Dos Santos Silva, M., & Alexandra da Silva Neto Trajano, L. (2022). Hospitalized Women Have Anxiety and Worse Mental Health Scores than Men. *Psychological reports*, 332941221088967. Advance online publication. <https://doi.org/10.1177/00332941221088967>
- Pieh, C., Budimir, S., and Probst, T. (2020). The effect of age, gender, income, work, and physical activity on mental health during coronavirus disease (COVID-19) lockdown in Austria. *Journal of Psychosomatic Research*. 136, <https://doi.org/10.1016/j.jpsychores.2020.110186>
- Pieh, C., Budimir, S., Delgadillo, J., Barkham, M., Fontaine, J. R. J., and Probst, T. (2021). Mental health during COVID-19 lockdown in the United Kingdom. *Psychosomatic Medicine*. 83(4), 328-337.
- Prowse, R., Sherratt, F., Abizaid, A., Gabrys, R. L., Hellemans, K. G. C., Patterson, Z. R., and McQuaid, R. J. (2021). Coping with the COVID-19 pandemic: examining gender differences in stress and mental health among university students. *Frontiers in Psychiatry*. 12, <https://doi.org/10.3389/fpsy.2021.650759>
- Purtle, J. (2020). COVID-19 and mental health equity in the United States. *Social Psychiatry and Psychiatric Epidemiology*. 55, 969-971.
- Reid, R., Gonzalez J., Nordness P., Trout, A. and Epstein, M. (2004), A meta-analysis of the academic status of students with emotional/behavioral disturbance. *Journal of Special Education*, 38, 130–143.
- Ritsher, J., Warner, V., Johnson J., & Dohrenwend, B. (2001) Inter-Generational Longitudinal Study of Social Class and Depression: A Test of Social Causation and Social Selection Models." *British Journal of Psychiatry*, 178(40), 84-90.
- Schieman, S., & Plickert, G. (2008), How Knowledge Is Power: Education and the Sense of Control. *Social Forces*, 87(1), 153-183

- Seedat S, Scott KM, Angermeyer MC, Berglund P, Bromet EJ, Brughra TS, et al. (2009). Cross-national associations between gender and mental disorders in the World Health Organization World Mental Health Surveys. *Arch Gen Psychiatry*, 66(7), 785–795.
- Simon RW. (1995). Gender, multiple roles, role meaning, and mental health. *J Health Soc Behav*, 36(2), 182–194.
- SingleCare (2022). Mental Health Statistics 2022, America retrieved May 18, 2022 from <https://www.singlecare.com/blog/news/mental-health-statistics/>
- Stack Overflow retrieved May 18, 2022 from <https://insights.stackoverflow.com/survey/2020#overview>
- Strohschein, L. (2005). Household income histories and child mental health trajectories. *Journal of Health and Social Behavior*. 46(4), <https://doi.org/10.1177%2F002214650504600404>
- Thompson, D. (2022). Mental Health – An Important Conversation in the Tech Industry retrieved May 30, 2022 from <https://www.techtimes.com/articles/271446/20220204/mental-health-an-important-conversation-in-the-tech-industry.htm#:~:text=Bhateja%20added%2C%20%22The%20high%20stress,with%20a%20mental%20health%20condition.>
- Treude, C., & Robillard, M. P. (2016, May). Augmenting api documentation with insights from stack overflow. In 2016 *IEEE/ACM 38th International Conference on Software Engineering (ICSE)* (pp. 392-403).
- US Bureau of Labor Statistics, (2021). Unemployment rises in 2020, as the country battles the COVID-19 pandemic retrieved July 29, 2022 from <https://www.bls.gov/opub/mlr/2021/article/unemployment-rises-in-2020-as-the-country-battles-the-covid-19-pandemic.htm>
- Weich S, & Lewis G. (1998). Poverty, unemployment and the common mental disorders: a population-based cohort study. *BMJ*, 317, 115–119.
- Wildman, J. (2003). Income related inequalities in mental health in Great Britain: analyzing the causes of health inequality over time. *Journal of Health Economics*. 22(2), 295-312.
- World Health Organization (2022) COVID-19 pandemic triggers 25% increase in prevalence of anxiety and depression worldwide, retrieved May 18, 2022 from [https://www.who.int/news/item/02-03-2022-covid-19-pandemic-triggers-25-increase-in-prevalence-of-anxiety-and-depression-worldwide.](https://www.who.int/news/item/02-03-2022-covid-19-pandemic-triggers-25-increase-in-prevalence-of-anxiety-and-depression-worldwide)
- Xie, Y., Xu, E., & Al-Aly, Z. (2022). Risks of mental health outcomes in people with covid-19: cohort study. *BMJ*, 376.

Appendices

MentalHealth	Mean	N
▪ concentration and/or memory disorder (e.g. ADHD)	\$130,641	628
▪ concentration and/or memory disorder (e.g. ADHD); ▪ mood or emotional disorder (e.g. depression, bipolar disorder)	139,442	139
▪ concentration and/or memory disorder (e.g. ADHD); ▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ anxiety disorder	122,269	250
▪ concentration and/or memory disorder (e.g. ADHD); ▪ mood or emotional disorder (e.g. depression, bipolar, disorder) ▪ anxiety disorder; ▪ Autism / an autism spectrum disorder (e.g. Asperger's)	132,636	55
▪ concentration and/or memory disorder (e.g. ADHD); ▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ anxiety disorder; ▪ Autism / an autism spectrum disorder (e.g. Asperger's); ▪ Or, in your own words:	80,000	1
▪ concentration and/or memory disorder (e.g. ADHD); ▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ anxiety disorder; ▪ Or in your own words:	98,800	6
▪ concentration and/or memory disorder (e.g. ADHD); ▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ Autism / an autism spectrum disorder (e.g. Asperger's)	137,263	19
▪ concentration and/or memory disorder (e.g. ADHD); ▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ Or, in your own words:	140,333	6
▪ concentration and/or memory disorder (e.g. ADHD); ▪ anxiety disorder	115,612	129
▪ concentration and/or memory disorder (e.g. ADHD); ▪ anxiety disorder; ▪ Autism / an autism spectrum disorder (e.g. Asperger's)	125,461	21
▪ concentration and/or memory disorder (e.g. ADHD); ▪ anxiety disorder; ▪ Or, in your own words:	107,500	2
▪ concentration and/or memory disorder (e.g. ADHD); ▪ Autism / an autism spectrum disorder (e.g. Asperger's)	132,129	54
▪ concentration and/or memory disorder (e.g. ADHD); ▪ Or, in your own words:	117,133	14

▪ mood or emotional disorder (e.g. depression, bipolar disorder)	126,893	317
▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ anxiety disorder	124,327	301
▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ anxiety disorder; ▪ Autism / an autism spectrum disorder (e.g. Asperger's)	113,117	25
▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ anxiety disorder; ▪ Or, in your own words:	124,850	2
▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ Autism / an autism spectrum disorder (e.g. Asperger's)	165,600	18
▪ mood or emotional disorder (e.g. depression, bipolar disorder); ▪ Or, in your own words:	159,625	8
▪ anxiety disorder	131,383	379
▪ anxiety disorder; ▪ Autism / an autism spectrum disorder (e.g. Asperger's)	130,633	24
▪ Anxiety disorder; ▪ Autism / an autism spectrum disorder (e.g. Asperger's); ▪ Or, in your own words:	93,000	2
▪ anxiety disorder; ▪ Or, in your own words:	101,400	10
▪ Autism / an autism spectrum disorder (e.g. Asperger's)	142,353	109
▪ Autism / an autism spectrum disorder (e.g. Asperger's); ▪ Or, in your own words:	250,000	1
None of the above	139,548	5,011

Appendix B Regression and Collinearity Results

		Coefficients ^a					Collinearity Statistics	
Model		Unstandardized Coefficients		Standard. Coeff.	t	Sig.	Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	64029.663	4812.012		13.306	.000		
	Mental HealthN	-5143.495	1656.803	-.035	-3.104	.002	.960	1.042
	Ethnicity	5917.824	1861.583	.036	3.179	.001	.982	1.018
	EducN	6306.749	746.751	.095	8.446	.000	.976	1.025
	Woman	-21409.143	3217.936	-.075	-6.653	.000	.980	1.020
	OtherN	-13370.434	10438.117	-.014	-1.281	.200	.995	1.005
	AgeN	14390.041	734.509	.220	19.591	.000	.981	1.019

a. Dependent Variable: Compensation,

		Collinearity Diagnostics ^a								
Model	Dim.	Eigen Value	Condition Index	Variance Proportions						
				(Constant)	Mental HealthN	Ethnic,	EducN	Woman	OtherN	AgeN
1	1	4.245	1.000	.00	.02	.01	.00	.01	.00	.01
	2	1.002	2.059	.00	.00	.00	.00	.05	.93	.00
	3	.925	2.142	.00	.02	.00	.00	.87	.04	.00
	4	.608	2.643	.00	.90	.00	.00	.07	.02	.01
	5	.138	5.547	.00	.00	.26	.00	.01	.00	.64
	6	.065	8.095	.03	.00	.59	.28	.00	.00	.24
	7	.018	15.573	.97	.05	.14	.71	.00	.00	.11

a. Dependent Variable: Compensation