Mental health and the factors with people in tech workspace

Shiyu Zhang*a

aSchool of Pharmaceutical Sciences, Peking University, No.38 Xueyuan Road, Haidian District, Beijing 100191, China

ABSTRACT

Mental health has become a concern for the world. As a worker in the field of science and technology who has made outstanding contributions to the changes in the world, spiritual issues are also very important. This article uses logistic regression models to analyze the data and find the performance and factors associated with mental health. Through analysis, it was found that gender [Male (β = -0.73)], family history [Yes (β = 1.57)], benefits [Yes (β = 0.52)], care options [Yes (β = 0.91)], leave [Somewhat difficult (β = 0.64), Very difficult (β = 0.77)], mental health consequence [No (β = -0.39)], coworkers [Some of them (β = 0.72), Yes (β = 1.44)], supervisor [Yes (β = -0.44)], and mental health interview [No (β =0.49)] have a greater impact on mental health. With this method, employers can have more opportunity to know the solution of their employees' mental health.

Keywords: mental health, tech workspace, logistic regression

1. INTRODUCTION

Emotional, psychological, and social wellbeing are all impacted by mental health. It has an impact on how people feel, think, and act. It also affects our ability to deal with stress, communicate with others, and implement choices [1]. In the workplace, effective high-performing teams or employees must have strong communication and inclusiveness abilities. The way a company handles mental health concerns may lead to increased absences from work, decreased output, and decreased employee engagement. Approximately 70% of adults with depression work in the United States [2]. An estimated 35 million workdays will be lost by employees with depression each year because of mental illness. Untreated depression among employees is thought to cause a 35% decline in productivity, costing employers $105 billion annually [3].

Due to an epidemic that kept people in their houses and forced them to look for companionship in a box. "The sociable animal" is a fitting description of homo sapiens. In a workplace, it carries more weight. According to a Marten Group study, employees' mental health has declined across all businesses because of hazing working hours and virtual meetings. Everyone is aware that employee mental health has the capacity to directly affect operations and earnings [4].

Because the technology field is one that evolves swiftly, those who work in it face tremendous pressure to keep up with the pace and requirements of the digital era. Long workdays, the gender wage gap, and a lack of inclusion and diversity are just a few of the problems that contribute to the poor mental health of those working in the tech sector [5]. This study explores this subject, and businesses can use this model to understand employee mental health difficulties and give benefits for the needy workers, making efficient use of the resources of their businesses. By eliminating the extra expense of giving mental health benefits to those who don't request them, this strategy can free up funds for other benefits that employees require. In the long run, this will raise employee happiness and ultimately result in higher staff retention.

2. METHODS

2.1 Study design and participants

The OSMI (Open Sourcing Mental Illness) nonprofit organization, whose goal is to improve mental health in the technology industry by raising awareness, educating the public, and providing resources, collected the data from the dataset [6] (Open Sourcing Mental Illness, 2014). Google Forms was used to collect more than 1200 responses to the survey, and as a result, the dataset received very high scores in the category of availability and accessibility. The data was gathered in

* sirius1271593495@pku.edu.cn

real time, as evidenced by the fact that 91.9% of the replies were received within a week of the survey's introduction. The survey's results may be shared and altered without restriction thanks to the dataset's availability under a Creative Commons Attribution License. The original raw data for the dataset can be easily obtained from the OSMI website thanks to its digitalized format. The study will be undertaken annually between 2014 and 2021, thus the data allows for the analysis of trends across an eight-year period.

To determine whether any factors can influence an employee's decision to receive treatment or not, this survey is being completed by respondents who work in IT businesses and have mental health illnesses (medically diagnosed or undiagnosed, even if it is only a feeling). The dataset was download from Kaggle. Some variables in this database need to be censored because of statistical problems, many logical errors, and missing values. Filtering of advanced variables. When the variable is counted, the proportion of countries from the United States is more than 60%, and some countries may have only one sample size, so the author are not talking about differences between countries here, so the author deleted the variable, and deleted the state. Similarly, some variables with too many missing values are also removed. The final number of variables is 21.

2.2 Instruments

Table 1 is the data dictionary. The questionnaire was divided into two sections, with each section focused on the mental health of the residents and the things that may affect it. The occupants' social-demographic details, including their age and gender, were polled in the first section. A series of inquiries were made in the second section to learn more about the mindset connected to mental health.

Table 1. Data dictionary (Kaggle, 2014).

Variable	Variable Type	Variable Description	Range
Age	Numeric	age	18~72
Gender	Characteristic	gender	Female; Male; Other
Self employed	Characteristic	Are you self-employed?	No; Yes
Family history	Characteristic	Do you have a family history of mental illness?	No; Yes
Treatment	Characteristic	Have you sought treatment for a mental health condition?	No; Yes
Remote work	Characteristic	Do you work remotely (outside of an office) at least 50% of the time?	No; Yes
Tech company	Characteristic	Is your employer primarily a tech company/organization?	No; Yes
Benefits	Characteristic	Does your employer provide mental health benefits?	Don't know; No; Yes
Care options	Characteristic	Do you know the options for mental health care your employer provides?	No; Not sure; Yes
Wellness program	Characteristic	Has your employer ever discussed mental health as part of an employee wellness program?	Don't know; No; Yes
Seek help	Characteristic	Does your employer provide resources to learn more about mental health issues and how to seek help?	Don't know; No; Yes
Anonymity	Characteristic	Is your anonymity protected if you choose to take advantage of mental health or substance abuse treatment resources?	Don't know; No; Yes

Table 1. (continued).

Leave	Charac teristic	How easy is it for you to take medical leave for a mental health condition?	Don't know; Somewhat difficult; Somewhat easy; Very difficult; Very easy
Mental health consequence	Charac teristic	Do you think that discussing a mental health issue with your employer would have negative consequences?	Maybe; No; Yes
Phys health consequence	Charac teristic	Do you think that discussing a physical health issue with your employer would have negative consequences?	Maybe; No; Yes
Coworkers	Charac teristic	Would you be willing to discuss a mental health issue with your coworkers?	No; Some of them; Yes
Supervisor	Charac teristic	Would you be willing to discuss a mental health issue with your direct supervisor(s)?	No; Some of them; Yes
Mental health interview	Charac teristic	Would you bring up a mental health issue with a potential employer in an interview?	Maybe; No; Yes
Phys health interview	Charac teristic	Would you bring up a physical health issue with a potential employer in an interview?	Maybe; No; Yes
Mental vs physical	Charac teristic	Do you feel that your employer takes mental health as seriously as physical health?	Don't know; No; Yes
Obs consequence	Charac teristic	Have you heard of or observed negative consequences for coworkers with mental health conditions in your workplace?	No; Yes

2.3 Statistical analysis

Using R™ for Windows (version 4.2.1), data entry and analysis were carried out (version 4.2.1). Descriptive statistics were used to determine the amount and proportion of categorical variables, as well as the mean and standard deviation of continuous variables. To evaluate the factors related to residents' status of treatment, a logistic regression (LR) analysis model was applied. Logistic Regression is a typical method for describing the connection between a discrete response variable and numerous explanatory factors known as covariates [7]. Using sequential Bonferroni correction analyses, p values were assessed. For all comparisons, a p-value of 0.05 or less was utilized to assess statistical significance.

3. RESULT

Table 2 presents the main characteristics of the survey respondents. Numerous features of the population can be discovered by analyzing survey respondents. About 78.8% of participants identified as male, while 19% of them were female, and 1.8% were other. Additionally, the mean age (SD) of the participants was 32.09 (27, 36) years, and 53.9% of them were over the age of 30. According to the data, 1226 participants received treatment for a mental health issue at a rate of 50%. Through further analysis of the survey data, the characteristics of the population and how they influenced the prevalence of mental health disorders in the tech workspace would be examined. The Figure.1 is shown to give the direct understanding of the result.

Table 2. The statistical description of categorical variables and the status of treatment, N=1226 (continue).

| Categorical Variables | N | (%) | Treatment | | | |
| | | | No | | Yes | |
			N	(%)	N	(%)
Total	1226	100	608	50	618	50
Gender						
Female	239	19	76	13	163	26
Male	966	79	526	87	440	71
Other	21	1.8	6	0.99	15	2.4
Self employed						
No	1085	88	541	89	544	88
Yes	141	12	67	11	74	12
Family history						
No	747	61	483	79	264	43
Yes	479	39	125	21	354	57
Remote work						
No	863	70	436	72	427	69
Yes	363	30	172	28	191	31
Tech company						
No	222	18	103	17	119	19
Yes	1004	82	505	83	499	81
Benefits						
Don't know	398	32	251	41	147	24
No	365	30	189	31	176	28
Yes	463	38	168	28	295	48
Care options						
No	490	40	288	47	202	33
Not sure	304	25	186	31	118	19
Yes	432	35	134	22	298	48
Wellness program						
Don't know	182	15	102	17	80	13
No	818	67	413	68	405	66
Yes	226	18	93	15	133	22
Seek help						
Don't know	354	29	191	31	163	26

Table 2. (continued).

No	627	51	316	52	311	50
Yes	245	20	101	17	144	23
Anonymity						
Don't know	797	65	437	72	360	58
No	61	5	27	4.4	34	5.5
Yes	368	50	144	24	224	36
Leave						
Don't know	551	45	301	50	250	40
Somewhat difficult	119	9.7	43	7.1	76	12
Somewhat easy	260	21	132	22	128	21
Very difficult	96	7.8	31	5.1	65	11
Very easy	200	16	101	17	99	16
Mental health consequence						
Maybe	470	38	233	38	237	38
No	473	39	168	28	305	49
Yes	283	23	117	19	166	27
Phys health consequence						
Maybe	269	22	126	21	143	23
No	901	73	457	75	444	72
Yes	56	4.6	25	4.1	31	5.0
Coworkers						
No	255	21	139	23	116	19
Some of them	759	62	379	62	380	61
Yes	212	17	90	15	122	20
Supervisor						
No	383	31	183	30	200	32
Some of them	345	28	168	28	177	29
Yes	498	41	257	42	241	39
Mental health interview						
Maybe	199	16	123	20	76	12
No	990	81	471	77	519	84
Yes	37	3.0	14	2.3	23	3.7
Phys health interview						
Maybe	543	44	287	47	256	41
No	488	40	235	39	253	41

Table 2. (continued).

Yes	195	16	86	14	109	18
Mental vs physical						
Don't know	562	46	308	51	254	41
No	329	27	136	22	193	31
Yes	335	27	164	27	171	28
Obs consequence						
No	1047	85	552	91	495	80
Yes	179	15	56	9.2	123	20
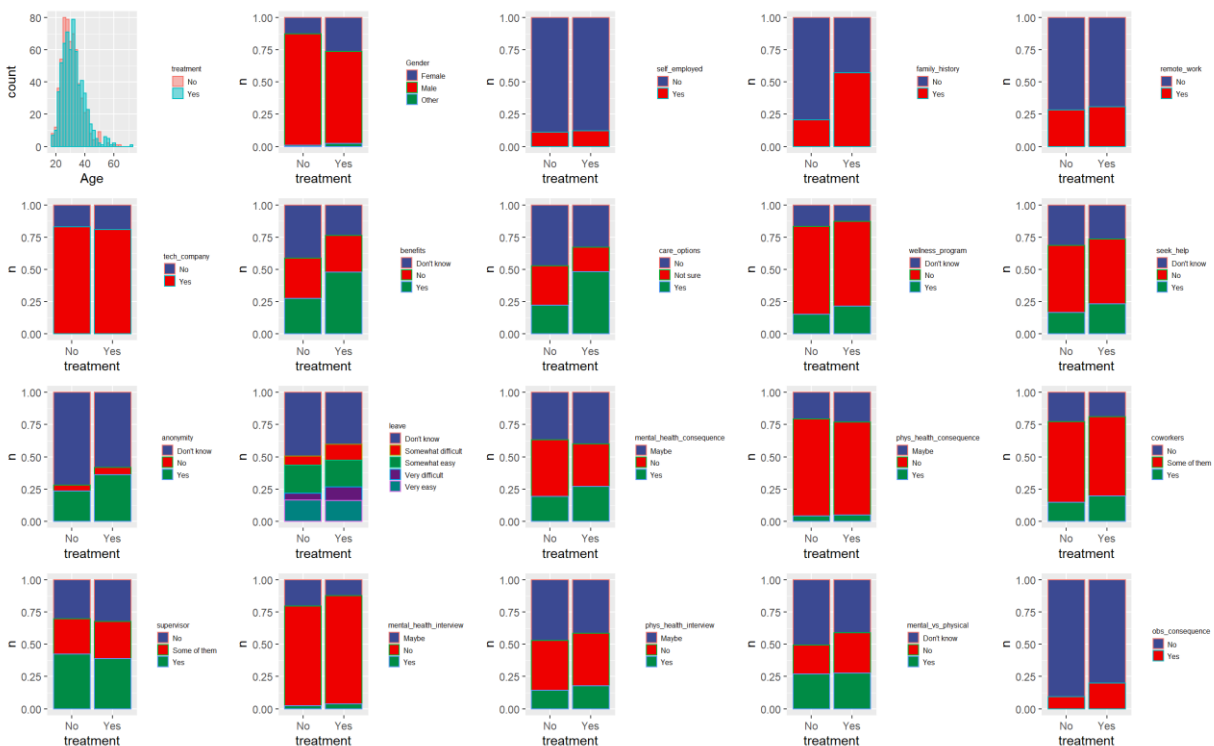
Figure 1. The variables associated with treatment.

Table 3. Logistic regression analysis of predictors of mental health illness s.

Variables	B	SE	OR	P	95% CI	
					Lower limit	Upper limit
Age	0.02	0.01	1.02	0.093	1.00	1.04
Gender (Ref: Female)						
Male	-0.73	0.18	0.48	< 0.001 ***	0.34	0.68
Other	-0.33	0.56	0.72	0.561	0.25	2.32
Self-employed (Ref: No)						

Table 3. (continued).

Yes	-0.04	0.23	0.96	0.852	0.60	1.51
Family history (Ref: No)						
Yes	1.57	0.14	4.81	< 0.001 ***	3.65	6.38
Remote work (Ref: No)						
Yes	0.04	0.16	1.04	0.793	0.76	1.42
Tech company (Ref: No)						
Yes	0.10	0.18	1.11	0.580	0.77	1.58
Benefits (Ref: Don't know)						
No	0.10	0.21	1.10	0.638	0.73	1.66
Yes	0.52	0.20	1.68	0.010 *	1.13	2.51
Care options (Ref: No)						
Not sure	-0.06	0.18	0.94	0.732	0.65	1.35
Yes	0.91	0.19	2.50	< 0.001 ***	1.74	3.60
Wellness program (Ref: Don't know)						
No	0.13	0.23	1.14	0.566	0.73	1.77
Yes	-0.02	0.28	0.98	0.939	0.57	1.68
Seek help (Ref: Don't know)						
No	-0.23	0.19	0.79	0.230	0.54	1.16
Yes	-0.43	0.25	0.65	0.087	0.40	1.06
Anonymity (Ref: Don't know)						
No	-0.12	0.34	0.89	0.721	0.45	1.73
Yes	0.28	0.18	1.33	0.113	0.94	1.88
Leave (Ref: Don't know)						
Somewhat difficult	0.64	0.25	1.89	0.012 *	1.15	3.12
Somewhat easy	0.00	0.18	1.00	0.990	0.70	1.43
Very difficult	0.77	0.29	2.16	0.009 **	1.22	3.87
Very easy	0.09	0.22	1.10	0.667	0.72	1.68
Mental health consequence (Ref: Maybe)						
No	-0.39	0.19	0.68	0.041 *	0.47	0.98
Yes	0.18	0.21	1.19	0.402	0.79	1.81
Phys health consequence (Ref: Maybe)						
No	0.09	0.18	1.10	0.609	0.77	1.58
Yes	-0.19	0.37	0.83	0.603	0.40	1.71
Coworkers (Ref: No)						
Some of them	0.72	0.20	2.05	< 0.001 ***	1.39	3.05

Table 3. (continued).

Yes	1.44	0.28	4.23	< 0.001 ***	2.46	7.34
Supervisor (Ref: No)						
Some of them	-0.27	0.20	0.77	0.177	0.52	1.13
Yes	-0.44	0.22	0.64	0.047 *	0.42	0.99
Mental health interview (Ref: Maybe)						
No	0.49	0.21	1.63	0.023 *	1.07	2.48
Yes	0.66	0.45	1.93	0.141	0.81	4.69
Phys health interview (Ref: Maybe)						
No	-0.06	0.16	0.94	0.719	0.69	1.29
Yes	0.42	0.22	1.52	0.054	0.99	2.35
Mental vs physical (Ref: Don't know)						
No	-0.04	0.18	0.96	0.824	0.67	1.37
Yes	0.01	0.19	1.01	0.950	0.70	1.46
Obs consequence (Ref: No)						
Yes	0.40	0.21	1.49	0.059	0.99	2.26

Table 3 displays the results of the logistic regression analysis performed on various model variables. By using logistic regression, it can be able to calculate all the variables' odds ratios, standard errors, and confidence intervals. The findings of the survey demonstrated relationships between the treatment and the following survey variables: gender [Male (β = -0.73)], family history [Yes (β = 1.57)], benefits [Yes (β = 0.52)], care options [Yes (β = 0.91)], leave [Somewhat difficult (β = 0.64), Very difficult (β = 0.77)], mental health consequence [No (β = -0.39)], coworkers [Some of them (β = 0.72), Yes (β = 1.44)], supervisor [Yes (β = -0.44)], and mental health interview [No (β =0.49)].

It can be concluded from this analysis that, when compared to all other variables, including age and anonymity, gender, family history, benefits, care options, leave, mental health consequences, coworkers, supervisors, and mental health interview had the high relationship with the incidence of mental health.

4. DISCUSSION

4.1 Logistic regression

It can be noted from the logistic regression results that some variables, such as self-employed and tech company, are statistically insignificant. Overfitting may result from keeping them in the model. Therefore, in later models, they ought to be eliminated to meet the objective of selecting the best model with a smaller number of variables without harming the model's accuracy. Regularization is the process of including information to prevent the model from "memorizing" the specified dataset and failing to operate with future data. This prevents the model from overfitting the data during prediction. The logistic regression is only used to examine the impact of each variable on the dependent variable "treatment," and regularization is used to fine-tune a model for better prediction accuracy, but there are no predictions to be evaluated, so the insignificant variables haven't been moved and regularization hasn't been used.

4.2 Analysis the factors relevant to treatment

An analysis of the influencing factors associated with treatment can be shown as following:

Gender: From the result, it shows that male (β = -0.73)] had a negative effect on searching treatment. Studies have shown that gender differences contribute to differences in mental illness [8], which is consistent with the prediction.

Self-employed: 88% of people are not self-employed. Even though there is a vast difference in this, people seeking treatment are the same percentage of both categories. Whether self-employed or not, does not really matter on whether the

person seeks treatment or not. The class distribution in each category is comparable despite the imbalance in the categories, therefore it's probable that the model won't be affected. In the logistic regression model, this p-value (0.852) is greater than 0.05, indicating that the self-employed do not have much of an impact on whether employees seek treatment.

Family history: Treatment is more likely to be sought after by those with a family history of mental illness. Also seeking assistance are around 35% of those without a history. Family history will be a key factor since those who have a history are more likely to seek therapy than those who don't. In previous studies, people with a history of family mental problems were more concerned about their mental health problems and more motivated to seek treatment [9]. Moreover, mental health problems are inherited along with genes [10].

Remote work: Since almost 70% of respondents do not work remotely, the workplace was cited as the main trigger for mental health disorders. On the other hand, there is a tiny difference between an employee who wants to receive treatment and one who does not. The number of people in both categories who seek treatment is more or less comparable, and thus has little bearing on our goal variable.

Tech company: Although the survey was specifically designed to be conducted in the tech field, there are close to 18% of the companies belonging to the non tech field. However, from the graph, one may be concluded that whether a person belongs to the tech field or not, mental health still becomes a big problem.

Benefits: Around 38% of the respondents said that their employer provided them mental health benefits, whereas a significant number (32 %) of them didn't even know whether they were provided this benefit. For the people who YES said to mental health benefits, around 63% of them said that they were seeking medical help and the people who said NO for the mental health benefits provided by the company, close to 45% of them who want to seek mental health treatment, so the employer resources are utilized to a larger extent. It is showed shat with higher rate to seek treatment with the employers' benefits [11].

Care options: 40% of employees are not provided any care options and 25% are not sure whether care options exist in company, and 60% of employees who work for a company without healthcare alternatives are seeking treatment. These organizations need to address this issue. People who have care options are actually seeking treatment, this can validate our claim to have care options.

Wellness program: Most respondents' companies haven't talked about employee wellness initiatives that include mental health. Of those who are ignorant of the program, about 50% are looking for help. This means that companies should list the benefits they provide for mental health.

Seek help: Of those who are ignorant of the program, about 50% are looking for help. This means that companies should list the benefits they provide for mental health.

Anonymity: Most people are unaware of their right to privacy protection when seeking medical attention. Companies should create a safe environment for people to feel safe to share their problems. It is undeniable that people are more likely to seek therapy if they believe their identity will be preserved. The result from logistic regression shows that the p-value is higher than 0.05 which is not a statistically result. However, there are findings that support anonymity as a factor for driving reporting of mental health issues [12].

Leave: Even while fewer people think it's challenging to get time off for mental health issues, more people in this category ask for help than in any other.

Mental health consequence: About 70% of people, there is either a belief or a lingering ambiguity about whether talking about mental health issues will have an effect, and out of people who think it will have a negative impact, most people seek treatment.

Phys health consequence: There is a striking difference between the responses to the same question regarding mental and physical health. More than 70% of the employees believe that their physical health does not create a negative impact on their employer and only 5% of them believes that it does. While it may be incorrect for us to draw any conclusions about whether they seek mental help based on their physical condition, because it is more or less same for all the three categories, we must keep in mind about how differently mental and physical health is treated as a whole.

Coworkers: Around 62% of the employees said that they might be comfortable discussing some type of mental problems with their coworkers, and out of them around 50% sought for medical help. 20% of the employees believed that discussing mental health with their coworkers wasn't a good option for them.

Supervisor: The outcome differs significantly from that of the coworkers. In this workplace, about 40% of the employees think that supervisors should be informed of their mental health.

Mental health interview: 80% of the respondents believe that it is a good option to discuss your mental health with the future employer while around 15% of the candidates seem confused about whether they should be discussing their mental conditions with the future employer or not, less than 5% think that it may not be a good option discussing it.

Phys health interview: While most of the people are still dubious about discussing their physical health condition with the future employer, however, close to 17% believe that there is no issue in discussing their physical health conditions. Around 50% of the people remain confused about whether it is a good option to discuss their condition or not.

Mental vs physical: Employees who think their company doesn't take mental health seriously or who are not sure, are more inclined to seek treatment than the other two categories.

Obs consequence: Nearly 85% of people claim to have never heard of or seen coworkers who were penalized for having mental health problems. Out of the remaining people, who observed negative consequences for co-workers, 10% of them are seeking help.

4.3 Strengths and limitations

In this study, the dependent variable (treatment) was examined using logistic regression, and some factors were shown to be more linked with it than others. This study, however, had several additional limitations as well. As a result of the small sample size, the study was unable to forecast and categorize regions. The huge gender disparity in this study may potentially have an impact on the accuracy of the predictions. Only utilized to investigate the relationship between other variables and treatment, the logistic regression model was not accurate and fitted. Additional research could be done to gather more suitable samples for comparing the mental health issues across areas and to develop a more useful model to forecast the mental health of workers in the technology industry.

5. CONCLUSION

According to the report, 50% of tech workers receive treatment for mental illness. The primary determinants of choice among residents were gender, family history, benefits, care alternatives, leave, mental health consequences, coworkers, supervisors, and mental health interview. Governments and medical organizations should implement focused policies to boost community support and enhance people's mental health. Companies should create a division dedicated to mental health counseling and demonstrate genuine concern for the problems affecting their employees' mental health, for instance by setting up regular sessions of psychological therapy, planning outings for the group, and providing the right perspective on mental health issues.

REFERENCES

[1] G. E. Coverdale, A. F. Long, "Emotional wellbeing and mental health: an exploration into health promotion in young people and families," *Perspect Public Health*. 2015 Jan;135(1):27-36.

[2] American Psychological Association. Stress in America: Coping with Change, Part 1. Washington, DC: American Psychological Association; 2017.

[3] S. P. Melek, D. T. Norris, J. Paulus, K. Matthews, Potential Economic Impact of Integrated Medical-Behavioral Healthcare: Updated Projections for 2017. Milliman Research Report. Seattle, WA: Milliman, Inc.; 2018.

[4] K. Danna, R. W. Griffin. "Health and well-being in the workplace: A review and synthesis of the literature," *Journal of management*, 1999, 25(3): 357-384.

[5] Patel V, Saxena S, Lund C, et al, "The Lancet Commission on global mental health and sustainable development," The lancet, 2018, 392(10157): 1553-1598.

[6] Open Sourcing Mental Illness., "Mental Health in Tech Survey," Kaggle. (2014).

[7] Wright R E. Logistic regression. 1995.

[8] Kiely K M, Brady B, Byles J. Gender, "mental health and ageing," *Maturitas*, 2019, 129: 76-84.

[9] Riggs S A, Jacobvitz D, "Expectant parents' representations of early attachment relationships: associations with mental health and family history," *Journal of Consulting and Clinical Psychology*, 2002, 70(1): 195.

[10] Cross-Disorder Group of the Psychiatric Genomics Consortium. Identification of risk loci with shared effects on five major psychiatric disorders: a genome-wide analysis. *Lancet.* 2013 Apr 20;381(9875):1371-1379.

[11] Sagui-Henson S J, Prescott M R, Corcoran J B, "Effectiveness of Evidence-Based Telecoaching Delivered Through an Employer-Sponsored Mental Health Benefits Platform," T*elemedicine and e-Health*, 2022, 28(4): 486-494.

[12] Warner CH, Appenzeller GN, Grieger T, "Importance of Anonymity to Encourage Honest Reporting in Mental Health Screening After Combat Deployment," *Arch Gen Psychiatry.* 2011;68(10):1065–1071.