VIỆN CÔNG NGHỆ THÔNG TIN ★ TRƯỜNG ĐẠI HỌC CÔNG NGHIỆP HÀ NỘI

HỘI THẢO QUỐC GIA LẦN THỨ XXV

HÀ NỘI, NGÀY 8 - 9 THÁNG 12 NĂM 2022

MỘT SỐ VẤN ĐỀ CHỌN LỌC CỦA CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

Chủ đề: Sản xuất thông minh

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NHÀ XUẤT BẢN KHOA HỌC VÀ KỸ THUẬT

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Thành viên	:	PGS. TS Nguyễn Long Giang
		TS Ngô Hải Anh

Hội thảo quốc gia lần thứ XXV

MỘT SỐ VẤN ĐỀ CHỌN LỌC CỦA

CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

Chủ đề: Sản xuất thông minh

Hà Nội, ngày 8 – 9/12/2022

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MỤC LỤC

1. A comprehensive study on water quality prediction using machine learning and deep learning
Michael Omar, Raghvendra Kumar , Tran Thi Ngan, Nguyen Long Giang, Phung The Huan 1

2. A modified version of DC Algorithm for Indefinite Quadratic Programming
Tran Hung Cuong, Dang Trong Hop 8

3. A semi-supervised fuzzy co-clustering algorithm for data classification
Dinh Sinh Mai, Trong Hop Dang, Van Nha Pham, Long Thanh Ngo 14

4. Analysis and implementation of machine learning to forecast Vietnamese students' depression levels
Nguyen Hoang Anh Tu, Pham Le Duc Thinh, Nguyen Thanh Binh, Loan T.T. Nguyen 19

5. Cải tiến chính sách lưu trữ dữ liệu trong mạng hướng nội dung
Lê Phong Dũ, Phan Thị Xuân Trang 25

6. Chẩn đoán y tế sử dụng phương pháp học chuyển giao dựa trên mạng nơron min-max mờ
Vũ Thị Dương, Nguyễn Đức Lưu, Nguyễn Thái Cường, Nguyễn Đức Toàn, Vũ Đình Minh 31

7. Combining rule-based approach and CNN-BiLSTM for normalizing numbers in Vietnamese raw text
Cuong Dang-Cao, Hoan-Duy Nguyen-Tran, Hoang Pham-Minh, Hao Do-Duc 37

8. Dùng Inception Score trong lựa chọn mẫu sinh ra từ mạng GAN để giải quyết vấn đề mất cân bằng dữ liệu
Trần Võ Khánh Ngân, Trần Cao Đệ 42

9. Dự báo trên tập dữ liệu lớn chuỗi thời gian sử dụng phương pháp giảm chiều dựa vào hàm nhân và ứng dụng
Đỗ Văn Thành, Nguyễn Minh Hải 48

10. Đề xuất ứng dụng giải pháp phân lớp nhị phân trong bài toán DGA Botnet cho phát hiện địa chỉ IP độc hại
Tống Anh Tuấn, Nguyễn Việt Anh, Nguyễn Ngọc Cương, Hoàng Việt Long 55

Analysis and implementation of machine learning to forecast Vietnamese students' depression levels

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Abstract: **The 4.0 phase is characterized by an illness called depression. Vietnam in particular and the rest of the world are experiencing a surge in depression, particularly among young people. In today's modern world, the idea of depression is no longer odd, but rather becoming more and more ubiquitous. Depression is a psychological illness that has a significant negative impact on the patient's brain but has no physical symptoms. Depression affects a person's feelings, emotions, thoughts, and behaviors in varying degrees of severity, ranging from mild to severe. Numerous recent research conducted in the United States and abroad concentrate on data regarding the prevalence of depression as well as its symptoms, risks, and treatments at each level. Most domestic and international scientific study is based on medical data. Moreover, in our report, we will use various tools to analyze and make a conclusion about depression in Vietnam, particularly from the age of 18 -22.**

Keywords: **depression level, machine learning, data analysis, depression affect.**

I. INTRODUCTION

Most people are gradually aware of the depression, thanks to the growth of the Internet and the explosion of information. In Vietnam, the number of people who voluntarily go for health and psychological check-ups is rare **[1]** since most people only tend to go to the hospital when they occur some signs of disease worsening. As a result, the disease has reached the stage where the patients may no longer be conscious that they are suffering from it and their thoughts around this time are only negative. Fortunately, there are many free websites for people who want to check if they have depression to reduce the incidence of depression and save time and money. For instance, "15minutes4me" **[2]** is a popular website recently visited by many young people to assess their level of depression. Nevertheless, not only the test of the 15minutes4me website but also the tests of other websites are almost based on various symptoms of depression. It seems to be a little general because it can use for people of any range of ages no matter their living environment. Thus, this research will determine some surrounding factors from which mine deeper into the relationship between some living environment factors and over-pressure that lead to depression. The rest of the paper is organized as follows: Part 2 presents the material and the methods used. Part 3 presents the analyzed results about some factors which have close link to severe depression level among students aged 15 to 24 in Vietnam. Part 4 presents some steps to compute the best fit model and the result of this models.

II. MATERIAL AND METHODS

Three stages make up the research process: data gathering, analysis, and machine learning algorithm application.

Table 1. The features of the collected data.

Features	Description
Method	Online via Google Form
Respondents	One thousand respondents
Age	Respondent age between 15 and 25
Job	Students in high school, university, college.
Area	Vietnam, from the North to the South
Questions	Thirty-seven questions
Sections	Three sections
Time	Start collecting from April 15th to June 15th
Section 1	Basic information (name, age, etc.)
Section 2	Set of fifteen questions
Section 3	PHQ-9

Regarding the various sets of questions concerning the causes of stress and pressure, there are actually many diverse reasons for stress, both subjective and objective. Nevertheless, the five factors that are most frequently cited as reasons why students feel under pressure are family, self, school, love, and employment, according to sources

[3][4][5][6][7][8] and a discussion with Master Nguyen Thanh Tinh, a psychologist from International University - Vietnam National University HCMC. As a result, there are five sets of 15 questions each group in the survey form based on the respondents tend, and each respondent will respond to one of the five sets of questions in accordance with the factors that they believe are exerting the most pressure on them. Although there are many different tests available to quickly assess respondents' risk of depression, the Patient Health Questionnaire (PHQ-9) which was originally designed by Drs Spitzer, Williams and Kroenke **[9]** is preferred due to its advantages. First, because depression has recently become a common topic of conversation among Vietnamese citizens. In light of this, the PHQ-9 test, which consists of just 9 questions about depression symptoms based on the nine DSM-IV criteria about the respondents' experiences from the last two weeks, is suitable due to being brief, simple to understand, and relevant to daily life. The PHQ-9 test also has benefits in terms of content and is looked into and put to the test for credibility. Validity has been evaluated in comparison to an independent, structured MHP interview. A PHQ-9 score of 10 or higher (moderate to severe levels) had an 88% specificity and sensitivity for major depression. The Patient Health Questionnaire was used in the survey forms in Vietnamese despite the fact that the test's content was written in English because the majority of students had difficulty understanding English clearly. Thus, the test was taken from the website of VinMec International Hospital **[10]**.

III. DATA ANALYSIS

A. Brief Analysis

We are now collecting more data and have prepared 1000 samples that are qualified for testing and started doing data analysis (in which freshmen: 363; sophomores: 363; juniors: 95; seniors: 89, etc.). This demonstrates that the majority of the main subjects involved in the project are students in their first and second years, and the majority of them are introverted individuals. Furthermore, we have begun to concentrate on analyzing some of the following fundamental characteristics: sense of excess (52.5 percent), low self- esteem (52.5 percent), being spoiled since childhood (78.1 percent), feeling out of place and difficult to integrate (67.8 percent), LGBT (8 percent), etc.

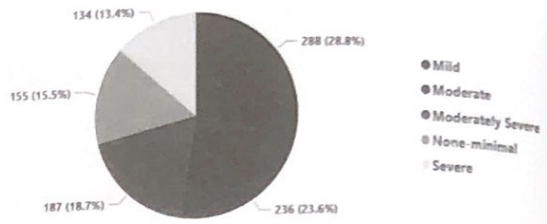

Figure 1. The pie chart shows the severity of depression.

It's surprisingly that most of surveyor state that working related problems make them feel under pressure, following which are academical problems and inner thoughts. A little group of respondents believe that the reasons make they feel under pressure most are familial and emotional issues.

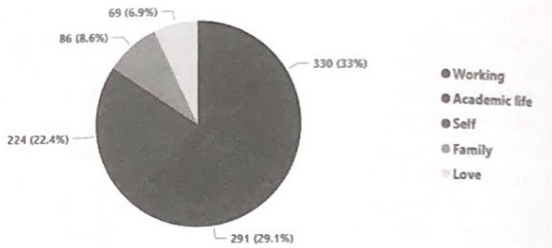

Figure 2. The pie chart shows the reasons that respondents feel under pressure.

When classify dataset into 5 sub-datasets based on the factor make them feel under pressure the most, the data shown that most of student stressed by their family have the highest chance to be depression while the opposite was true for stressed by studying and working. Although the figures of inner thoughts seem to be less serious than family, the ratio of severe depression students is still higher than the rest while the ratio of moderate severe is the highest.

Table 2. The ratio of students depression levels by the factor cause them under pressure the most.

Factors	Depression levels				
	None	Mild	Moderate	Moderate Severe	Severe
Working	16.97	34.55	19.70	16.36	12.42
Studying	17.53	30.58	25.77	16.84	9.28
Self	12.95	22.32	24.55	23.66	16.52
Family	5.81	19.77	29.07	19.77	25.58
Love	20.29	26.09	23.19	20.29	10.14

B. Work

The data surprisingly receiving a lot of attention from the youth is from the field of employment.

Since the process of society is fast-advancing, money has evolved into a potent instrument to control human behavior. The paper by Jonathan Gardner and Andrew Oswald convincingly demonstrates the effect of money on family health and the pressures of money management before and after marriage **[11]**. We research money and students' mental health to figure out their correlation. Honestly, the finding surprises our thoughts because there has been over 80 percent of teenagers consider money as a primary source of stress. Furthermore, the urgent problem here is that half of that students do think about the action of suicide at least once. Although the challenge of work has been asserted the most, a significant portion of students (34.55 percent of students) experience this problem at a modest level in comparison to other facets of life. In the moderate and severe levels, pupils assume that tasks become tougher while their effort appears to be paltry in comparison to what they accomplish. In addition, the overwhelming of stressed-out students frequently struggles with interacting with their colleagues. To prove that clause, our data evidence has roughly 73 percent of pupils across all levels have issues with co-workers, especially half of that proportion comes from the severe disorder. While the percentage of normal students who are likely to have self-deprecating is only 37.5 percent, that number of extreme disorder students is intensely high (92.68 percent). Due to low self-esteem compared to colleagues, stressed students feel redundant and inactive. Consequently, that makes their work become stagnate and inefficient.

C. Self

According to 224 respondents, the thing that stresses them out the most is themselves. Most people who are under self-imposed pressure usually have these characteristic: they feel uncertain of their place in the world and what they are supposed to be doing (58.93 percent). Additionally, the majority of them have low confidence (84.38 percent), compare themselves to others (55.8 percent), and worry about other people's opinions (69.15 percent). People who feel incompetent are also more prone to compare themselves to others and are more likely to become irate and irritated when they are unable to complete a task. Moreover, people with a high degree of depression have to put in a lot of effort in nearly any group project; they also lack confidence, are physically or verbally attacked, and are under pressure to achieve so that they can repay someone. Furthermore, those who were physically mistreated or reprimanded by their family (respondents who chose level 5 claimed that up to 69 percent experienced severe depression) and self-hatred were the leading causes of serious depression (respondents who chose level 5 reported close to 60 percent had major depression). The self-hatred and domestic violence questions received a level 5 response from respondents are linked to emotions of bewilderment, insecurity, and making it impossible for them to be themselves and accept themselves. In conclusion, the main causes of persons who have self-issues include domestic violence, a lack of confidence, self-hatred, and uncertainty.

D. Family

The fourth source of stress for students in Vietnam is family (8.6 percent). The majority of people who are under pressure from family issues consider that their parents have high expectations of them (76.74 percent); they consider that their parents cared about them in the wrong way (60.46 percent) and that their family is struggling financially (69.77 percent). Regarding people who are at risk for severe depression, the majority of them experience domestic abuse (59.09 percent), do not feel safe at home (45.46 percent), believe a parent is favoring another child (63.64 percent), and feel lost (95.45 percent), redundant (77.27 percent), and unable to explain their emotions in a way that would allow their parents to empathize (86.36 percent cannot have a conversation in common with their parents more than three years). Additionally, members of the LGBT community tend to be more depressed (all LGBT respondents have risks of depression), and their families are characterized by outdated ideas, rituals, and beliefs, which makes it common for them to consider suicide (81.82% they thought about suicide more than five times). Another intriguing truth is that depression is influenced by how children are positioned in the family. The data indicates that the oldest kids have quite high depression rates. The characteristics of the eldest child include a long period of being unable to confide in their parents, high expectations, not receiving almost they desire from an early age, feeling unnecessary, and being a burden to the family. The youngest children, however, receive more attention from young age and can talk with their parents more, making them the group with the lowest level of depression. Even though the severity is not as great, the second child group is the most at-risk group (92.3 percent of the second child group

have the risk of depression). In conclusion, the family have these characteristic will make the students in the risks of depression: outdated thoughts, over expectation on their child, miss communication between children and parents in long time, caring rightly the children from their early life.

E. Academic life

There are 291 responses from young people who stated that learning problems are the most likely to cause depression, and this problem was also the second most popular among those polled out of the five issues that were presented at the time. We can see that the academic system is not the determining factor for depression because academic performance is only used about 29 percent of the time when people are depressed. Moreover, people with major depression account for 74 percent of those who feel pressured on a daily basis, while people with mild depression account for 40 to 40 percent of those who feel pressured. One thing to keep in mind here is that those who are rated as heavy on this issue are extremely easy to bring to the table when comparing themselves to others with better abilities than themselves from which to feel themselves. Furthermore, 73.8 percent of people who frequently lose focus have low self-esteem about their ability with everyone around them, which is completely opposite to the group of people who are highly concentrated because of their ability to be confident and trusting. In their own capacity, they account for 70 percent. Another interesting fact about the group of people who can't concentrate and can't focus on studying is that the group of people who are distracted frequently have psycho-physiological problems when going through puberty accounted for 59.52 percent, while those who have the ability to concentrate highly have only 5 percent have physiological problems at the developmental stage.

F. Love

One of the biggest problems leading to stress and anxiety disorder among high school and university students is love and its effects on their relationships in daily routine. The survey only obtained 69 records of students who undergo emotional problems out of 1000 survey responses. In general, the five different types of stress were distributed evenly, with around 20 percent for each group except for the severity (10.14 percent). Because most trouble-free students have not had toxic relationships in the past, they are not emotionally affected by those relationships. Therefore, the quiz questions including the previous topic are adequate tools to classify the degree of depression. As reported by researcher Sandra Racionero - Plaza and her teams, toxic relationships, substance abuse, and mental health are tightly connected to each other **[12]**. Like that paper, this study has the same premise that a person's chance of survival was 50% better for those with healthy social connections than for those with unhealthy ones. On the other hands, most students in the major depressive disorder group (MDD) experience feelings of loneliness in their daily lives; however, the noted thing is that they are aware of their anxiety disorder diagnosis. Moreover, these students may suffer from overthinking symptoms such as dwelling on the same thought and feeling doubtful of their abilities. As a result, these pupils are not only vulnerable to little things but also lose their confidence. Next, we found that adolescents that are severely depressed used to be involved in toxic relationships in everyday routine (42.86 percent), several times a day (28.57 percent), and sometimes (14.29 percent). From the statistics, major depressive students usually feel doubtful and insecure in their relationships (85.71 percent: an extreme level) because they used to be seriously wounded by their old connections. Finally, the amazing analysis on this topic is that students from the mild to the extreme group that did think about suicide once have large proportions, with the least for the mild group (62.5 percent) and the greatest for the severe one (71.43 percent). That analysis warns us about the complexity of depression and anxiety in the youth because of the shortage gap between mild and severe depression.

IV. METHOD

After one month of data collection, there were more than a thousand responses. The first thousand data points were selected as the train data. As was already indicated, we want to use machine learning algorithms to predict depression levels using a different set of questions for each kind of stressor. The amount of data for each cause type is different. For instance, the most popular cause, working, had more than 330 replies, while sentiment received just about a fifth of those, the least popular reason.

A. Preprocessing.

Each dataset has thirty-*seven* columns, nine of which are used to record the results of the PCH-9 test, which consists of nine questions for each type of raw material and fifteen total. The subsequent

columns list responses to typical inquiries for various individuals, including name, date of birth, gender, and more. Text answers are transformed into numerical values. For instance, "Yes," "A little," and "No" are mapped to the numerals 0, 0.5, and 1, respectively. Next, based on the Weka tool's strategy for selecting attributes, we attempted to choose fifteen because when collecting the data via Google Form, most of respondent feedbacked that the number of question that they have to answer are many; besides, most free test like this just around fifteen questions, such as PHQ-9 (9 questions), Hamilton depression rating scale (17 questions), Depression test: IVAN K Goldberg (18 questions), etc. Unless the number of selected questions between 10 and around 20, this research will be useless because of the number of selected questions consists of 9 questions of the PHQ9 or the set of questions should be considered about the exist of multicollinearity. Nevertheless, Weka chose the best subfiles with between eleven and fourteen attributes. To get ready for separating the data into two training and validation files with an 80:20 ratio to find the best model, we will remove any extraneous columns from each dataset of depression causes.

B. Preparing models, ensembles, and finding the right parameters.

To test which model is the best fit to make the most accurate prediction, we chose six models: Logistic Regression, K-Nearest Neighbors, Support Vector Machine, Decision Tree, Gaussian Naive Bayers, Linear Discriminant Analysis, and four ensembles: Random Forest, Extra Trees, Ada Boost, Gradient Boosting. To split the data, the "KFold" function in the "sk.learn" library is used. Then, use the "cross_val_score" function in the "sk.learn" library to evaluate accuracy scores by cross-validation. Finally, take the average and standard deviation to assess the accuracy level. On five separate training datasets, Linear Discriminant Analysis is consistently the modelsswith the highest accuracy. The parameters of the chosen models are then searched using the "GridSearchCV" function in the "sk.learn" library for each unique dataset. The Cross-Validation method with 10 folds is used by "GridSearchCV" to evaluate the model for every combination of the variables supplied in the dictionary. As a result, after employing this function, we can determine the accuracy and loss for each set of hyperparameters and select the combination that offers the best performance.

C. Testing.

Over the following two weeks, we continued to collect another 300 data after gathering 1,000 data for the training model. Based on the source of the stress, these 300 data are divided into five distinct datasets. The data preprocessing step used for the training file of the same kind of stress cause is applied to all of these test files.

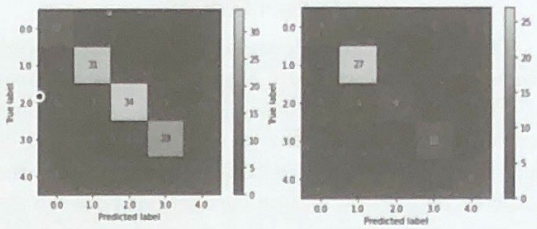

Figure 3. The confusion matrix of the working and education test files using Linear Discriminant Analysis model, respectively.

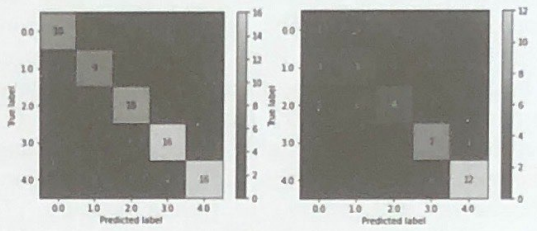

Figure 4. The confusion matrix of the inner thoughts and family test file using Linear Discriminant Analysis model, respectively.

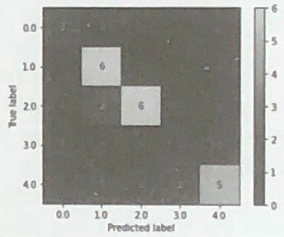

Figure 5. The confusion matrix of the love test file using Linear Discriminant Analysis model.

From these figures above, the value of TP, TN, FP, FN can be obtained and can be used to calculate the accuracy score by the following formula: Accuracy = (TP +TN) / N with N is the total number of recorded data.

Table 3. The accuracy score of linear discriminant analysis.

Linear Discriminant Analysis	Dataset		
	Train	***Validation***	***Test***
Love	98.18 %	92.85 %	86.95 %
Self	93.85 %	88.88 %	89.70 %
Family	95.58 %	100.0 %	84.37 %
Education	98.27 %	91.52 %	89.23 %
Work	96.96 %	92.42 %	91.96 %

According to these figures and table above, the mild depression level (label as 1) is the one which are predicted incorrectly the most. The gaps in accuracy score among train, validation, and test files are relatively stable except the gaps between train and test files of love sub-dataset. It might be overfitting or maybe it just because the data of this test file are too small (23 respondents).

V. CONCLUSION

Data on the prevalence of depression among young people, particularly students, across all areas of Vietnam have been collected, and their prevalence, as well as the factors that contribute to depression, have been identified. Furthermore, the gathered data reveal certain correlations between the defining characteristics of depressed individuals, illuminating the underlying issue that causes stress over time lead to depression in order to reach the source of the issue. The most important factors affecting to depression level is lack of confidence. The group of people who are severe depression have some characteristics: (1) lack of confidence, (2) self-hatred, (3) being highly expected, (4) feeling themselves as a burden, (5) usually compare themselves with others, (6) feeling insecure, (7) easy to being stressed, (8) difficult to find enjoyable in life. Beside inner problems, experiencing violence in family, bully in school, difficulty communicating and integrating into the working environment, toxic relationship also put student into the risk of depression. Furthermore, machine learning techniques were used to predict depression levels with an accuracy of more than 84 percent in all cases. The gap between the accuracy score of the train, validation, and test files is stable except for the gap between the train and test files of the love and family sub-datasets. This could be a sign of overfitting. However, the model has been verified by cross-validation, so the results have a certain reliability. Hopefully in the future we can continue to collect data and experiment with larger data because currently our team is limited by time and human resources, so the data was not collected big enough. Also, because the datasets are quite small so these results will need to be verified by psychologists or doctors; however, the selected attributes used to train the models both consist of nine questions from the Patient Health Questionnaire-9 (PHQ-9), which has an effective score of more than 88 percent. Hence, it is possible to conclude that our results are reliable and acceptable.

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REFERENCES

[1] H. B.-T. Linh, "Bệnh Tâm Thần Liên Quan đến stress, Trầm Cảm đáng báo động," 2021. [Online]. Available: https://laodong.vn/y-te/benh-tam-than-lien-quan-den-stress-tram-cam-dang-bao-dong-897233.ldo.

[2] M. Kwartier, "Self-help program heals stress, depression, anxiety, Burnout." 2022. [Online]. Available: https://www.15minutes4me.com.

[3] M. P. J. Spijkerman, W. T. M. Pots, and E. T. Bohlmeijer, "Effectiveness of online mindfulness-based interventions in improving mental health: A review and meta-analysis of randomised controlled trials," *Clinical Psychology Review*, vol. 45, pp. 102–114, 2016.

[4] V. Chotpitayasunondh and K. M. Douglas, "The effects of 'phubbing' on social interaction," *Journal of Applied Social Psychology*, vol. 48, no. 6, pp. 304–316, Jun. 2018.

[5] E. Karadağ *et al.*, "Determinants of phubbing, which is the sum of many virtual addictions: A structural equation model," *Journal of Behavioral Addictions*, vol. 4, no. 2, pp. 60–74, 2015.

[6] D. Figlio and S. Loeb, "Chapter 8 - School Accountability," vol. 3, E. A. Hanushek, S. Machin, and L. B. T.-H. of the E. of E. Woessmann, Eds. Elsevier, 2011, pp. 383–421.

[7] B. Harry and J. K. Klingner, "Discarding the Deficit Model.," *Educational Leadership*, vol. 64, pp. 16–21, 2007.

[8] L. Sax and K. J. Kautz, "Who First Suggests the Diagnosis of Attention-Deficit/Hyperactivity Disorder?," *The Annals of Family Medicine*, vol. 1, no. 3, pp. 171 LP – 174, Sep. 2003.

[9] K. Kroenke, R. L. Spitzer, and J. B. W. Williams, "The PHQ-9: Validity of a brief depression severity measure," *Journal of General Internal Medicine*, vol. 16, no. 9, pp. 606–613, 2001.

[10] VinMec, "Thang đánh giá trầm cảm ở cộng đồng (PHQ-9)", 2019. [Online]. Available: https://www.vinmec.com /vi/tin-tuc/thong-tin-suc-khoe/suc-khoe-tong-quat/thang-danh-gia - tram-cam-o-cong-dong-phq-9/

[11] J. Gardner and A. Oswald, "How is mortality affected by money, marriage, and stress?," *Journal of Health Economics*, vol. 23, no. 6, pp. 1181–1207, 2004.

[12] Ugalde, L., Racionero-Plaza, S., Munté, A., & Tellado, I. (2022). Dialogic reconstruction of memories of violent sexual-affective relationships via dialogic gatherings of "Radical Love". *Children and Youth Services Review*, 106548.