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Original article

Relationship between artworks and depression

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Abstract

Background: Artwork creativity has been associated with mental health issues, but most previous studies have not directly addressed the relationship between art characteristics and depression in quantitative research, especially in Thailand.

Objectives: This study aimed to investigate a link between depression and artworks, which would characterize the sign of depression in the physical characteristics of the artwork.

Methods: A cross-sectional descriptive research design to recruit and evaluate 89 students from a faculty of arts of a university in Thailand who had produced painting artworks. Using the three following questionnaires: a personal information questionnaire, a 9-question Patient Health Questionnaire (PHQ-9) and student's artworks were collected in digital files and evaluated using the Rating Instrument for Two-dimensional Pictorial Work (RizbA). Statistics used to analyze the data were descriptive statistics, Chi-square, Mann-Whitney U test, and multiple regression.

Results: The depressive prediction between personal factors and artistic characteristics, were considered effective at predicting depression (area under the curve = 0.742), and were in the expression of 6 dimensions of art, as follows: the graphic representation, the less vibrant coloring, the less organic shape and curved lines, the large unworked space, the vertical composition, and the inaccurate expression.

Conclusion: The accuracy of predicting depression using artistic characteristics was considered acceptable. Physical characteristic of artwork could objectively useful in mental health treatment. However, the performance of the prediction could be improved by inputting more data, in term of the subject of the artwork and number of subjects in future research.

Keywords: Artworks, art characteristics, depression.

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Artworks are intimately connected to the artist's mental health. The relationship between mood and artwork has been analyzed in a variety of approaches to examine the link between mental illness and art symbolic.[1] If the artist's mood is unstable, such as melancholy, empty, irritable, depressed, or anxious, these mood states will interfere with their capacity to create and have an impact on their mental health, including the physical appearance of the artwork, which is prevalent with depression.[2] There was a study of the mental disorder sample that is relevant to the artwork. The artwork in the major depressive disorder sample had a lot of space, a lack of detail, and limited color, whereas the painting in the bipolar disorder sample was normal and a lot more creative than the other groups. In addition, there was research on art instruments that assisted in specifying the physical appearance of the artwork, including clinical diagnostic information.[3] Furthermore, art has been recognized in mental health treatment as it has assisted clients in expressing emotions, complex feelings, and increasing mental flexibility.[4] Therefore, assessing depression through art may facilitate artists to recognize their emotional and mental state before it develops into a mental illness because artists utilize art to communicate their thoughts. At the same time, the artist's thoughts are revealed through the art.

Most previous studies have not directly addressed the measurement of the relationship between art characteristics and depression in quantitative research[4 - 6], especially in the Thai content. The context of the artist and the creator's emotional condition are given greater attention than the physical appearance of the artwork. This mostly appeared in qualitative research analyses that used the interview as the main research instrument. This study aimed to investigate a link between depression and artworks, which would characterize the sign of depression in the physical appearance of the artwork and, in turn, lead to future guidelines for mental health care among art workers.

Materials and methods

A cross-sectional descriptive research design was utilized to recruit 89 Thai art university students capable of painting. All subjects consented to completing the assessment by self-reporting via Google Forms using the following questionnaires: 1) Personal information questionnaire; 2) the Thai version of the 9-question Patient Health Questionnaire (PHQ-9) developed by Manote L, *et al*. for depression will be considered with a cut-off score of 9 or higher.[7] The painting subject "Self-portrait" was given to the subjects to create freestyle painting and drawing techniques, which has no size limit in order to finish in 3 hours. The artworks were collected in digital files and evaluated using the Rating Instrument for Two-dimensional Pictorial Work (RizbA), developed by Kerstin S, and consisted of 26 items with the ability for differentiation between pictorial works ranging between 0.897 (T1) and 0.766 (T2).[8] This assessment was collaborative with two researchers with experience in art (PP and WT). This study has been approved by the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University (IRB no. 498/64)

Statistics analysis

The SPSS program version 23.0 was used to analyze the data. Personal information, depression, and pictorial artwork data were reported using descriptive statistics such as frequency, percentage, mean, and standard deviation (SD). Chi – square and Mann – Whitney U test was utilized to analyze the correlations between depression-related factors. Multiple regression analysis with elastic net was used to predict the relationships between artwork characteristics and related variables. Statistical significance was defined as a P - value > 0.05.

Results

Of a total of 89 subjects, who were 60 females (67.4%) and 29 males (32.6%). The age range is 18 - 26 years, with a mean of 20.0. There are 0 -15 years of work or art experience. The average amount of experience is 5.31 years. In the previous week, 12 (13.5%) of the art students had substances used. Psychiatric disorders were discovered in 12 (13.5%) of the subjects (Table 1).

The relationship between related factors and depression was analyzed by the Pearson Chi-Square and the Man-Whitney U test. Age and substance used were found to be significantly associated with depression (P - value = 0.38 and 0.023, respectively). The number of art students with depression between the ages of 19 and 23 was higher than the non-depressed group. In addition, the group with depression had five times more substances used than the non-depressive group (Table 1).

Table 1. The correlation between related factors and depression by using Pearson Chi-Square and Mann-Whitney U test.

Characteristics	Depression				*P* - value
	Depressed (n = 47)		Non-depressed (n = 42)		
	n	%	n	%	
Gender					
Male	14	29.8	15	35.7	0.551
Female	33	70.2	27	64.3	
Age = 20.0 ± 1.2 (years)					
18	1	2.1	7	16.7	0.038*
19	9	19.2	8	19.1	
20	20	42.6	18	42.9	
21	13	27.7	8	19.1	
22	2	4.3	0	0.0	
23	2	4.3	0	0.0	
26	0	0.0	1	2.4	
Art/ work experience (years) = 5.3 ± 3.8					
0 - 3	18	38.3	17	40.5	0.881
4 - 7	19	40.4	13	31.0	
8 - 11	5	10.6	7	16.7	
12 - 15	5	10.6	5	11.9	
Substance used in last week					
Yes	10	21.3	2	4.8	0.023*
No	37	78.7	40	95.2	
Mental disorders					
Yes	8	17.0	4	9.5	0.301
No	39	83.0	38	90.5	

The relationship between the characteristics of art elements in the depressed and non-depressed groups was analyzed by the Man-Whitney U test. Content 14, content 20 and content 25 were significant differences between the depression groups and the non-depressed group (*P* - value = 0.015, 0.038, and 0.022, respectively). There were pictorial expressions in the depressed group in content 14, which has a blank space that has not been drawn in the picture; content 20, which is the overall composition of the picture, that is arranged vertically rather than horizontally and diagonally in the non-depressive group; and content 25, which is less accurate than the non-depressed group (Table 2).

Table 2. A comparison of various characteristics of art in the depressed and non-depressed groups.

Content	Depression				*P* - value
	Depressed (n = 47)		Non-Depressed (n = 42)		
	X	SD	X	SD	
Representation					
1. The picture includes graphic elements	0.979	1.189	1.571	1.484	0.075
2. The picture includes pictorial elements	4.319	0.629	4.262	0.627	0.658
3. The manner of representation is concrete	4.043	0.932	4.143	0.608	0.946
4. The manner of representation is abstract	1.447	1.364	1.643	1.078	0.318

Table 2. (Con) A comparison of various characteristics of art in the depressed and non-depressed groups.

Content	Depression				*P*-value
	Depressed (n = 47)		Non-Depressed (n = 42)		
	X	SD	X	SD	
Color					
5. The color application is pastose	1.426	1.098	1.524	0.89	0.545
6. The predominant coloring is vibrant	2.021	1.113	2.429	1.129	0.063
7. In the picture primary colors are prevalent	2.170	1.324	2.238	1.100	0.868
8. In the picture mixed colors (secondary colors) are prevalent	2.383	1.376	2.857	1.095	0.114
9. In the picture there are following color contrasts: complementary contrast	1.426	1.298	1.714	1.274	0.286
Shapes					
10. In the picture organic shapes are prevalent	4.191	0.576	4.262	0.497	0.609
11. In the picture geometric shapes are prevalent	0.872	1.154	1.119	1.173	0.227
12. The layout of the line is predominantly curved	3.511	0.547	3.738	0.497	0.056
13. The layout of the line is predominantly angled	1.404	0.970	1.381	1.058	0.898
Space					
14. The picture includes unworked area	2.255	0.943	1.690	1.093	0.015*
15. The picture appears to be deep	2.766	1.047	2.857	1.026	0.624
16. The picture is perspectival	2.851	0.722	2.810	0.969	0.922
17. The picture is without perspective (aperspectival)	2.170	0.761	2.167	1.010	0.967
Motion					
18. The picture is restless	1.936	1.241	1.714	1.111	0.395
19. The picture is wild	1.149	1.302	0.738	1.037	0.132
Composition					
20. The global composition is laid out vertically	4.617	0.822	4.119	1.435	0.038*
21. The global composition is laid out horizontally	0.170	0.789	0.476	1.486	0.543
22. The global composition is laid out diagonally	0.830	0.963	1.167	1.102	0.140
23. The global composition is laid out area-wide without a main subject (All-Over-Structure)	0.000	0.000	0.048	0.309	0
Expression					
24. The picture appears to be diffuse	0.872	1.296	1.238	1.543	0.360
25. The picture appears to be precise, accurate	3.489	0.930	3.952	0.764	0.022*
26. The picture appears to be harmonic	3.064	0.604	3.167	0.881	0.520

A multiple linear regression using the elastic net for variable selection was used to examine the predictability of variation in depression (PHQ-9 score) between personal factors and the characteristics of art. The variables that were selected are: gender, age, substance used, content 1, content 6, content 10, content 12, content 14, content 19, content 22, content 24, content 25, and content 26, which are associated with the variation of depression scores by 25.6%. The gender variable being male was associated with a reduction of the PHQ-9 score, while higher age and substance use were related to an increasing score. Furthermore, content 14 (The picture includes unworked area) and content 19 (The picture is wild) increased the PHQ-9 score. However, increased scores of content 1 (The picture includes graphic elements), content 6 (The predominant coloring is vibrant), content 10 (In the picture organic shapes are prevalent), content 12 (The layout of the line is predominantly curved), content 22 (The global composition is laid out diagonally), content 25 (The picture appears to be precise, accurate), and content 26 (The picture appears to be harmonic) relate decreasing the PHQ-9 score.

Moreover, a multiple logistic regression using the elastic net for variable selection was used to examine the predictability of depression between personal factors and the characteristics of art. The variables that were selected are: substance used, content 1, content 6, content 12, content 14, content 20 and content 25, which are effective at predicting depression is considered acceptable (area under the curve = 0.742). Using substance, content 14 (The picture includes unworked area) and content 20 (The global composition is laid out vertically) increase the probability of depression. While increased scores of content 1 (The picture includes graphic elements), content 6 (The predominant coloring is vibrant), content 12 (The layout of the line is predominantly curved), and content 25 (The picture appears to be precise, accurate) were associated with the probability of lower depression).

A scatter diagram plot of multiple linear regression with an elastic net for variable selection and depression score (PHQ-9 score). The plot represents the predicted and observed PHQ-9 score which is show linear relationship with moderate correlation (Figure 1).

A calibration curve plot of multiple logistic regression with an elastic net for variable selection was used to show the predictability of depression in a range of probability**.** The model predicted that the lower observed probability is overestimated (observed 0.2; expected 0.4) while the higher observed probability is underestimated (observed 0.8; expected 0.6), which means there was some error in estimation in the extreme ends. The model predicted well in the middle part (observed 0.5, expected 0.5) which showed 34 the predictability of depression in moderate (Figure 2).

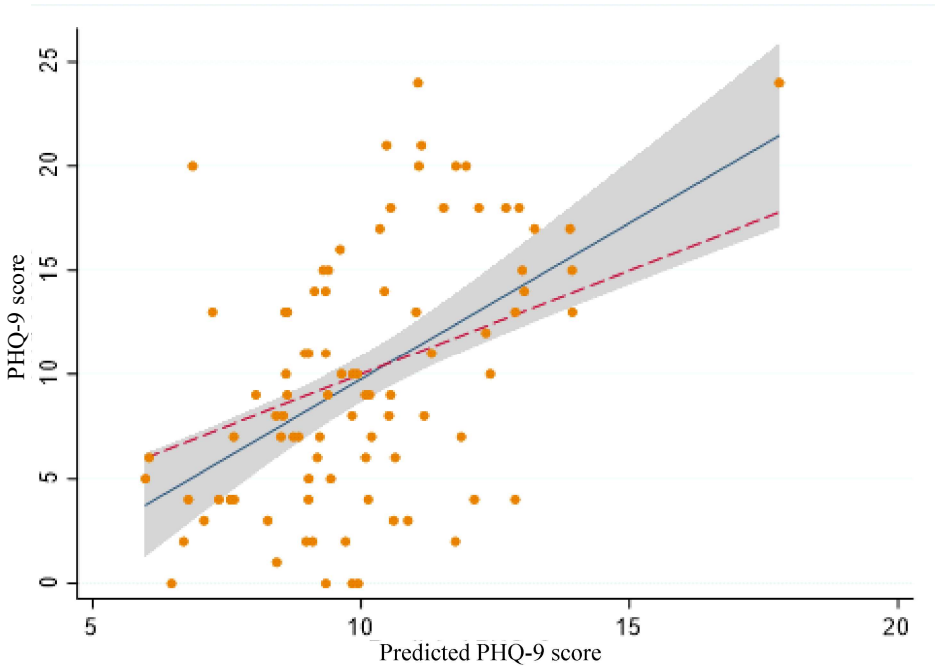

Figure 1. A scatter diagram plot for multiple linear regression with an elastic net for variable selection and depression score (PHQ-9 score).

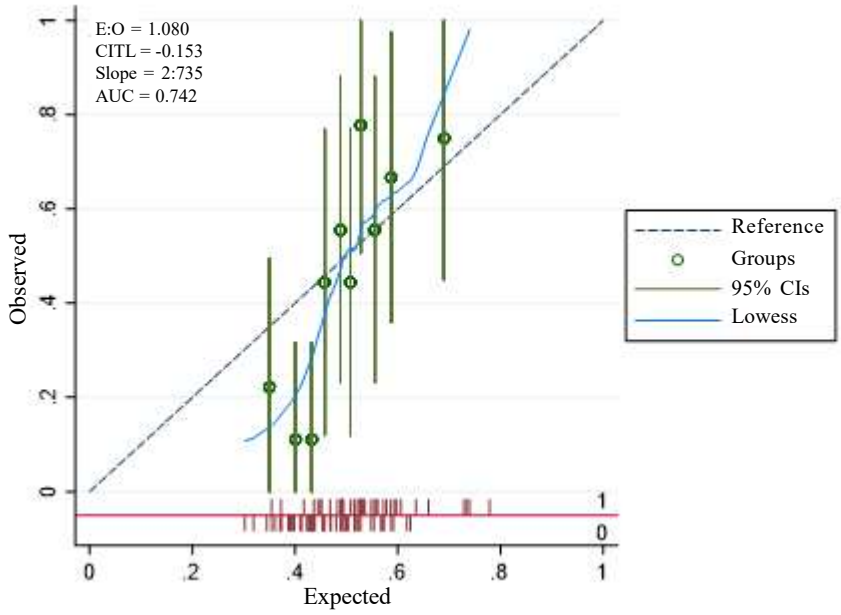

Figure 2. A calibration curve plot for predicting depression by using an elastic net for variable selection.

Discussion

The physical appearance of artworks and depression

The evaluation of the art characteristics in 89 art students on the subject "Self-portrait" was analyzed for its relationship with depression. There were expressions of all 3 dimensions of pictorial art: 1) The spatiality demonstrated in the picture includes an unworked area. This means that depressed Individuals were unable to process ideas and concentrate[3], resulting in less drawing space being used and most of the blank space being out of proportion to the size of the image; 2) The composition: It was discovered that the depressed group had a large portion of the overall vertical composition when compared to the non-depressive group. Previous studies have not found a link between depression and vertical composition, but there have been studies in the sample without depression about the positive mood, which is essential in creativity and found to be more effective in art creativity than the sample with the negative mood.[9 - 11] According to the outcomes of previous studies, which may support the results of this research, art students without depression were more creative than art students with depression and were able to compose compositions in a variety of ways, such as diagonal - vertical composition or diagonal - horizontal composition. 3) The expression and image are precise and accurate, indicating that the portrait was confidently painted or drawn with lines and brush strokes. The structure, the use of paint, light and shade are clear and drawn with precision. The artworks of depressed art students appeared less precise and accurate, indicating that art students without depression have more confidence, which impacts the artwork more precisely than art students with depression, possibly due to other factors affecting creativity.[9]

Analysis of the physical appearance of art to predict depression

According to the results of this study, the best group variables for predicting the variance of the depression score (PHQ-9 score) were present in the expression of all 7 dimensions of art, as follows: 1) Representation: graphic elements with sharp lines or that appear cartoonish rather than realistic are used in the image's representation. Previous studies have not provided solid data on graphic representation and its relationship with depression, but Biyun Z, *et al*.[12] found the characteristics of creativity related to depression, which appeared to be a lot of line strokes that showed hesitation, anxiety, and lack of concentration, which all affected the ability to create artworks. The results of this study support the idea that the majority of graphic elements shown on artworks created by depressed art students will reflect the mediocre ability of their drawing or painting skills

because, using the subject "self-portrait," most of the painting class will guide their creativity in the form of realistic painting. However, this remains inconclusive because the presentation's graphic elements may indicate creativity in a unique way that goes beyond the original conceptual framework; 2) Coloring: the predominant coloring is vibrant. Previous studies[3] discovered that the use of less or dark colors was associated with depression, which indicates that the appearance of less vibrant colors was associated with depression, whereas the appearance of predominant vibrant colors is related to non-depressed art students; 3) Shape: the organic shapes predominate in the image, and the layout of the line is predominantly curved, indicating that non-depressed art students were not hesitant, were confident, and creative, as the usage of curved lines is compatible with organic forms. If curved lines were rarely used, the appearance of angled lines would be more prominent. It's possible that depressed art students are anxious and often use harsh line strokes or discrete lines, whereas non-depressed students utilize smoother, more continuous lines[12]; 4) Spatiality: The picture includes unworked areas. A wide unused space in an artwork was linked to a higher level of depression[3], whereas an appropriately used space was linked to a lower level of depression; 5) Motion: The image is wild, with the use of visual art elements through brush or line strokes, colors, shapes, textures, light and shade to create feelings of firmness, fierceness, and rawness in the viewer. A higher level of depression was related to wild motion[12], whereas a lower level of depression or none was connected with less wild motion or no use of wild motion; 6) Composition: The global composition is laid out diagonally. According to the previous results, the co-composition with diagonal and vertical showed an ability to create and compositional flexibility in non-depressed art students, while depressed art students were associated with less diagonal composition; 7) Expression: The picture appears to be less diffuse, precise, accurate, and harmonic, which were related to a high level of depression due to the "self-portrait" subject. A creative style has been suggested, namely portrait painting, which impacts creative conditions in which diffused compositions are limited. The results indicate that more diffuse compositions were derived from non-depressed art students, and less diffuse compositions appeared to be connected with depressed art students because depression affects the ability to resolve and feel positive moods that are related to creativity, and lack of concentration was related to imprecise painting.[3, 12]

The research results indicated depressive prediction between personal factors and artistic characteristics, which are effective at predicting depression and are considered acceptable in the expression of 6 dimensions of art, as follows: 1) Representation: Graphic elements appear to be used in the representation. The appearance of more graphic patterns is linked to depression; 2) Coloring: The picture's predominant color tones appear to be vibrant tones. The utilization of less vibrant tones has been related to depression; 3) Shape: The outline of the curve appears to be used. Depression is associated with fewer curved lines; 4) Spatiality: There appear to be unworked areas in the image. A wide unworked area is linked to depression; 5) Composition: The composition is laid out vertically. The appearance of a predominantly vertical composition alone was related to depression; and 6) The Expression: The image appears imprecise and inaccurate, which is correlated with depression.

There were a few limitations of the current study. First, art students might not fully express themselves in painting because the self-portrait subject tends to be a realistic painting style in class, despite the fact that there were no limits to the techniques in this subject. Second, most of art students participated in this research are in their second year of university, which may have an impact on their painting skills due to their lack of art experience. As a result, it would be difficult to generalize the skills of all Thai art students. However, the selection of art students could not represent all art students in Thailand because most of the art universities that participated are in Bangkok, which means it is unable to generalize that most of the art students in Thailand are depressed. Besides, collecting data during COVID-19 may be one factor contributing to depression in art students.

Additionally, the "self-portrait" subject is related to the expression of variables such as shape, space, motion, and composition, which are partially limited in the scope of creativity. For example, most of the concepts for drawing portraits are based on the idea that curves should be used in drawing because the shape of a portrait is classified as a natural shape, or that diffuse compositions cannot be drawn because a portrait drawing would be more appropriate vertically. Therefore, the subject of the artwork should be

modified to include more independent subjects in order to expand the range of data as well as to increase the number of participants in order to increase the efficiency and accuracy of statistical calculations in future research. Furthermore, a newer statistical method, such as machine learning, could be used to draw association between physical appearance and painter's mood state. Thus, providing an unbiased point-of-view to understand this association.

Conclusions

The current study found that depression was associated with gender, age, substance use, and artistic characteristics such as lack of color vibrancy, few curved lines and less natural shapes, large unworked space, vertical composition with no flexibility, less diffuse elements, lack of accuracy, and expression devoid of harmony. Additionally, most of the art students participated in this study had moderate depression.

However, the result of this study could be supplemental information that art workers or therapists could analyze, observe, and screen for depression in art students, which artists can also use to observe themselves initially. Furthermore, the faculty should be encouraged to pay more attention to the mental health issues among art students, as well as provide their professional counseling to students that they could easily access.

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Conflict of interest statement

Each of the authors has completed an ICMJE disclosure form. None of the authors declare any potential or actual relationship, activity, or interest related to the content of this article.

Data sharing statement

The present review is based on the reference cited. Further details, opinions, and interpretation are available from the corresponding authors on reasonable request.

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