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Assessment of Anxiety, Depression and Psychological Wellbeing in Polluted Bayelsa Communities: A Case for Adequate Counseling.

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ABSTRACT: The study examined the relationship between exposure to air pollution and anxiety, depression and psychological wellbeing. The study used one hundred and fifty participants that were confirmed to be severe exposed to air pollution .The study used Hamilton Anxiety Rating Scale (Hamilton, 1959) ,Depression Screening Scale (Radolf ,1977) and General Health Questionnaire for the purpose of data collection. Using Pearson Moment Correlation Coefficient, Independent t-test and anova design result showed a positive relation between exposure to air pollution and anxiety , positive correlation between exposure to air pollution and depression , positive relationship between exposure to air pollution and psychological wellbeing . Furthermore result showed that age, and socio-economic status does not positively correlate with anxiety, depression and psychological wellbeing in population exposed to air pollution, and result further showed that depression positively correlated with psychological wellbeing, but anxiety does not positively correlate with psychological wellbeing. The study recommended that government should make legislation outlawing every form of gas flaring which was the type of air pollution used for the study , the study further suggested that oil companies must find a more healthier way of going about their activities without necessarily emitting excessive petrochemical oxidant.

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I. INTRODUCTION

Environmental health is that aspect of public health that is concerned with those forms of life substances, forces and conditions in the surroundings of man that may exert an influence on man's health and well-being, Health is a state of complete physical, mental and social well-being as well as the absence of disease or infirmity.In 2013 the World Health Organization named air pollution "the world's largest single environmental health risk," responsible for an estimated 7 million deaths per year. And gas flaring is a major source of air pollution in the world.Gas flaring is the burning of natural gas that is associated with crude oil when it is pumped up from the ground. In petroleum-producing areas where insufficient investment was made in infrastructure to utilize natural gas, flaring is employed to dispose of this associated gas (Jinn, 2010). Also chemical factories, oil refineries, oil wells, rigs and landfills, gaseous waste products and sometimes even non-waste gases produced are routed to an elevated vertical chimney called a gas flare and burnt off at its tip. This is called gas flaring. Waste gases are subjected to such a process either because the gases are waste or it is difficult to store and transport them. Non-waste gases are burnt off to protect the processing equipment when unexpected high pressure develops within them. Gas flaring in oil rigs and wells contribute significantly to greenhouse gases in our atmosphere (Ayola 2011). Nigeria is a nation that is notorious when it comes to the issues of gas flaring.Nigeria flares 17.2 billion m3 of natural gas per year in conjunction with the exploration of crude oil in the Niger Delta. This high level of gas flaring is equal to approximately one quarter of the current power consumption of the African continent.

Gas flaring contributes to climate change, which has serious implications for both Nigeria and the rest of the world. The burning of fossil fuel, mainly coal, oil and gas-greenhouse gases-has led to warming up the world and is projected to get much, worse during the course of the 21st century according to the intergovernmental panel on climate change (IPCC). This scientific body was set up in 1988 by the UN and the World Meteorological Organization to consider climate change. Climate change is particularly serious for developing countries, and Africa as a continent is regarded as highly vulnerable with limited ability to adapt.

Gas flaring contributes to climate change by emission of carbon dioxide, the main greenhouse gas. Venting of the gas without burning, a practice for which flaring seems often to be treated as a synonymy, releases methane, the second main greenhouse gas. Together and crudely, these gases make up about 80% of global warming to date.

Acid rains have been linked to the activities of gas flaring (Friends of the Earth, 2004, Medilinkzi, 2010). Corrugated roofs in the Delta region have been corroded by the composition of the rain that falls as a result of flaring. The primary causes of acid rain are emissions of sulphur dioxide (SO2) and nitrogen oxides (NO) which combine with atmospheric moisture to form sulfuric acid and nitric acid respectively. Size and environmental philosophy in the industry have very strong positive impact on the gas-flaring-related CO2 emission Hassan&Konhy(2013)

Acid rain acidifies lakes and streams and damages vegetation. In addition, acid rain accelerates the decay of building materials and paints. Prior to falling to the earth, SO2 and NO2 gases and their particulate matter derivatives, sulfates and nitrates, contribute to visibility degradation and harm public health.

The flares associated with gas flaring give rise to atmospheric contaminants. These include oxides of Nitrogen, Carbon and Sulphur (NO2, CO2, CO, SO2), particulate matter, hydrocarbons and ash, photochemical oxidants, and hydrogen sulphide (H2S) (Ohioh ,1999), Kindzierski (2000) . These contaminants acidify the soil, hence depleting soil nutrient. Previous studies have shown that the nutritional value of crops within such vicinity is reduced (Imevbore&Adeyemi (1981). In some cases, there is no vegetation in the areas surrounding the flare due partly to the tremendous heat that is produced and acid nature of soil pH (Ubani&Onyejekwe 2013).

A number of studies like that of Kim, Jung,Kang (2010), Biermanni ,Stilanakis ,Bleich (2009) have tried to establish the link between environmental pollution (like gas flaring) and mental health. A number of studies have observed a correlation between mental health outcomes, like depression and anxiety, and the presence of environmental pollutants including air pollution.Air pollution is a complex mixture that most likely affects human health through multiple pathways, and air pollution has been named by the WHO (World Health Organization) as one of the biggest health threats of our time. Oberdörster&Utell (2002) first suggested that the brain might be vulnerable to ultrafine ambient particulate matter. Recently, concern has been raised over the effect of air pollution on the central nervous system Block ,Elder ,Auten (2012). Two early studies linked ambient photochemical oxidants to anxiety symptoms (Evans,Colome& Shearer (1988) and Jacobs ,Evans & Catalano (1984) depression in humans in California. Monthly or weekly levels of air pollution were observed to be associated with anxiety symptoms in the Nurses' Health Study(Power , Kioumourtzoglou, Hart (2015) and with perceived stress in the Veterans Administration Normative Aging Study in the USA(Mehta ,Kubzansky , Coull (2015) and a number of studies have observed associations between daily fluctuations in air pollution and mental health outcomes such as depressive symptoms, suicide and emergency calls.(Briere ,Downes ,Spensley (1983) , Rottton ,Frey (1984) Strahilevitz ,Strahilevitz ,Miller (1979) ,Szyszkowicz. Willet, Grasfst`ein (2010).

Perceived environmental noise and low air quality have been linked to mental health outcomes in adults such as depression (Shiue 2007) Epidemiological studies have shown that living in areas with elevated concentration of air pollution is linked with decreased cognitive function(Chen ,Schwartz 2009) ,Power ,Weisskopf ,Alexeeff (2011) ,Wueve ,Pueff ,Schwartz (2012) , Ranft ,Schikowski ,Sugiri (2009) ,Suglia ,Gryparis ,Wright (2008) , lower neuro-behavioural testing scores in children,(Wang,Zhang,Zeng (2009) a decline in neuropsychological development in the first 4 years of life and elevated risk of autism spectrum disorders(Von Ehrenstein ,Aralis, Cockburn (2004) ,Roberts, Lyall ,Hart (2013) ,Becerra,Wilhelm ,Olsen (2013). Furthermore, children in Spain who attended schools with higher traffic-related air pollution have been observed to have a smaller improvement in cognitive development than children who attended schools with lower traffic-related air pollution (Sunyer ,Esnaola ,Alvarez –Pedrerol (2015) . In a review from 2012 on epidemiological studies on neuropsychological effects of air pollution, the authors conclude that there is evidence for air pollution to be associated with mental development and mental decline (Guxen ,Sunyer 2012).

The National Institute of Environmental Health Sciences/National Institute of Health found out that, parental mental health could influence exposure via socioeconomic status since there are often strong associations between socio-economy and air pollution levels.It has been argued that socially disadvantaged people tend to be segregated in relatively deprived areas with a worse environmental quality (Cheshire 2000), Naess,Piro , Nafstall (2007) and there are often strong socioeconomic gradients in mental health(Star field, Riley ,Witt 2002). Social characteristics may therefore modify the association between air pollution and mental health and also act as a major confounder. There is little consensus on the causal relationship between urbanization and mental health, but it seems as if urban and rural environments can have pernicious and salutary consequences on mental health.(Marsella 1998). Factors with strong urban–rural gradients related to the environment such as air pollution concentrations are often neglected as a possible cause of mental health problems. Neighbourhood poverty has, for example, been observed to affect mental health in children (Levanthal, Brooks –Gun (2003) but there were no adjustments done for neighbourhood air pollution concentrations.

OBJECTIVE OF THE STUDY/

The mental health of children and adolescence in the society deserves attention, and since some studies has found a link between air pollution and mental health, the present study will therefore attempt to study association between neighbourhood exposed to air pollution and mental health in adolescence within the locality in Bayelsa State. Mental health will be examined in terms of depression, anxiety and psychological well-being.

STUDY AREA

The study areas for this study are Gbarantouru (of the Epetiama clan) and Obuna (of the gbarainclan) towns in Yenagoa local government of Bayelsa State. Agip, Shell is some of the oil companies that operate in the locality. The communities have about 30,000 inhabitants combined, with women and children making up for at least 65 percent of the population.

PARTICIPANT

The study intends using 300 participants that will be randomly selected from both communities, 150 will be selected from Gbarantoru, while the rest 150 will be selected from Gbarain, and this will consist of 150 male adolescence and 150 female adolescence.

II. INSTRUMENT

Hamilton Anxiety Rating Scale (HAM-A)

Developed by Hamilton M (1959) the HAM-A was one of the first rating scales developed to measure the severity of anxiety symptoms, and is still widely used today in both clinical and research settings. The scale consists of 14 items, each defined by a series of symptoms, and measures both psychic anxiety (mental agitation and psychological distress) and somatic anxiety (Physical complaints related to anxiety). Although the HAM-A remains widely used as an outcome measure in clinical trials, it has been criticized for its sometime poor ability to discriminate between axiolytic and antidepressant any standardized probe questions. Despite this, the reported levels of inter-rater reliability for the scale appear to be acceptable. Each item is scored on a scale of 0 (not present0 to 4 severe), with a total score range of 0-56, where >17 indicates mild ..severity, 18-24 mild to moderate severity and 25-30 moderate to severe. Depression Screening

Center for Epidemiologic Studies Depression (CES-D)

The scale was developed by the Center for Epidemiologic studies (Radlof, 1977). The scale has been found reliable (Alpha>.85) in previous research (Hann et. al., 1999) It has twenty items in all and it has a scoring pattern in likert format ranging from strongly agree to strongly disagree.

GENERAL HEALTH QUESTIONAIRE

Developed as a screening tool to detect those likely to have or be at risk of developing psychiatric disorders, it is a measure of the common mental health problems/domains of depression, anxiety, somatic symptoms and social withdrawal.Each item is accompanied by four possible responses, typically being 'not at all', 'no more than usual', 'rather more than usual' and 'much more than usual', scoring from 0 to 3, respectively. The total possible score on the GHQ 28 ranges from 0 to 84 and allows for means and distributions to be calculated, both for the global total, as well as for the four sub-scales. Using the alternative binary scoring method (with the two least symptomatic answers scoring 0 and the two most symptomatic answers scoring 1), the 28- and 30-item versions classify any score exceeding the threshold value of 4 as achieving 'caseness'. Any score exceeding the threshold value of 4 is classed as achieving 'psychiatric caseness'. The caseness threshold is 3 for the 12-item version. Psychiatric caseness is a probabilistic term—whereby, if such respondents presented in general practice, they would be likely to receive further attention. It should be noted that the GHQ is not usually used for predictive purposes. If the GHQ score were compared with the results of independent psychiatric assessment, it would be more likely than not (0.51) to state that the individual would be assessed as being a 'case' once the threshold is exceeded.Reliability coefficients have ranged from 0.78 to 0.95 in various studies.

Statistical Analysis

The study used Independent t-test ,anova design for analysis of data collected

III. RESULTS

DATA ANALYSIS

4.1 Descriptive statistics

The table below summarizes the Frequency, Means and Standard deviations of participants in terms of their gender (males =69 (62%), females= 59 (38%)), age (M= 1.94; SD= .727), depression score (M= 2.15; SD=

.757), anxiety score (M= 1.83; SD= .392), GHQ score (M= 1.59; SD= .590). social economic status (M= 1.58; SD= .495).

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
depression score	155	1	3	2.15	.757
anxiety score	155	1	3	1.83	.392
GHQ score	155	1	4	1.59	.590
social economic status	155	1	2	1.58	.495
Age	155	1	5	1.94	.727
Total	155				

Table 4.1: Frequency, Means and Standard deviation of participants for all variables

Variables	**Groupings**	**N**	**Mean**	**SD**
Gender	Male	96		
	Female	59		
	Total	155		
Age		155	1.94	.727
Depression score		155	2.15	.757
Anxiety score		155	1.83	.392
GHQ score		155	1.59	.495

4.2 Testing of Hypothesis 1

In order to test the hypothesis which stated that there will be significant and positive effect of air pollution on depression symptoms among population, to test the hypothesis Pearson Correlation statistic was conducted. This examined the relationship the variables respectively. Pollution on depression symptoms on population (r=0.609, P<0.01). This result shows that there is a significant and positive relationship between pollution on depression symptoms among population at 0.01 level of significance. Therefore the hypothesis is confirmed.

Table 4.2: Pearson correlation table showing the relationship between pollution on depressive symptoms and population

N=155		
Variables	**Pollution on depressive symptoms**	**Population**
Pollution on depressive symptoms	1	
Population	0.609**	1

** Correlation is significant the 0.01 level (One-tailed).

4.3 Testing of Hypothesis 2

In order to test the hypothesis two which stated that there will be a significant relationship between air pollution and anxiety on population. Pearson Correlation statistic was conducted. This examined the relationship the variables respectively. Air Pollution on anxiety among population (r=0.654, P<0.05). This result shows that there is a significant and positive relationship between air pollution and anxiety on population at 0.05 level of significance. Therefore the hypothesis is confirmed.

Table 4.3: Pearson correlation table showing the relationship between pollution on anxiety and population

Variables	N	MEAN	S.D	r-cal	r-tab
Pollution on anxiety	155	1.18	0.382	0.654	0.195
Population	155	1.18	0.382		

P<0.05

4.4 Testing of Hypothesis 3

In order to test the hypothesis three which stated that air pollution on psychological wellbeing will have significant effect on population. Pearson Correlation statistic was conducted. This examined the relationship the variables respectively. Pollution on psychological wellbeing and population (r=0.654, P<0.05). This result

shows that there is a significant and positive relationship between air pollution and psychological wellbeing on population at 0.05 level of significance. Therefore the hypothesis is confirmed.

Table 4.4: Pearsons correlation table showing the relationship between pollution on psychological wellbeing and population

Variables	N	MEAN	S.D	r-cal	r-tab
Pollution on psychological wellbeing	155	1.03	0.180	0.579	0.195
Population	155	1.06	0.238		

P<0.05

4.5 Testing of Hypothesis 4

In order to test the fourth hypothesis which stated that age and social economic status as classified with (high and low) will have significant effect on depressive symptoms, anxiety and psychological well-being (using GHQ). Frequency, Percentage and Mean statistics were conducted. 42% of participants had low Age and social economic status and a Mean of 118.0430, SD of 17.4368; while 58% of them had high age and social economic status and a Mean of 159.8050, SD of 11.0799. While for depressive symptoms, anxiety and psychological well-being (GHQ) 52% of the participants had low depressive symptoms, anxiety and psychological well-being (GHQ) and a Mean of 33.3702, SD of 4.3798; while 48% had high depressive symptoms, anxiety and psychological well-being (GHQ) and a Mean of 55.1771, SD of 8.4896.

Table 4.5$_i$: Grouping of participants into low and high on age and social economic status and Depressive symptoms, anxiety and psychological well-being (GHQ)

Variables	**Grouping**	**N**	**Mean**	**SD**
Age and social economic status	Low	65 (42%)	118.0430	17.4368
	High	90 (58%)	159.8050	11.0799
Depressive symptoms, anxiety and psychological well-being (GHQ)	Low	80 (52%)	33.3702	4.3798
	High	75 (48%)	55.1771	8.4896

Note: grouping into low and high for each variable is a function of scoring below and above the mean score in each of them.

In order to help decide whether hypothesis 4 which stated that age and social economic status as classified with (high and low) will have significant effect on depressive symptoms, anxiety and psychological well-being (using GHQ) should be accepted, an Independent t-test was further conducted. The Independent t-test examined whether the difference between participants with low and high Age and social economic status and low and high depressive symptoms, anxiety and psychological well-being (GHQ) were significant by comparing the Means in the two categories on both variables respectively, the result was significant at less than 0.01 level of significance: (t= -30.131; -34.203, df= 425, p< 0.01). This result shows that the difference between participants that are low and high in age and social economic status and depressive symptoms, anxiety and psychological well-being (GHQ) respectively is significant. Therefore the hypothesis is partially confirmed because participants were low only on age and social economic status but not on depressive symptoms, anxiety and psychological well-being (GHQ).

Table 4.5 Independent t-test table comparing participants on age and social economic status and Depressive symptoms, anxiety and psychological well-being (GHQ)

Dependent Variable	**Independent variable**	**N**	**Mean**	**df**	**t**	**p**
Age and social economic status Depressive symptoms, anxiety and psychological well-being (GHQ)	Low	65	118.0430	153	-30.131	< 0.01
	High	90	159.8050			
	Low	80	33.3702		-34.203	
	High	75	55.1771			

4.6: Testing of Hypothesis 5

In order to test the fifth hypothesis which stated that there will be significant difference between depressive symptoms, anxiety and psychological wellbeing of participants respectively, One-way anova statistics was conducted. The anova statistic compared participants on depressive symptoms, anxiety and

psychological wellbeing respectively: depressive symptom (F=0.887, P>0.05), anxiety (F=1.246, P>0.05); psychological (F= 5.370, P<0.05). The result was significant at less than 0.05 and 0.01 level of significance respectively. There were no differences in depressive symptoms and anxiety while psychological is significant. Therefore the hypothesis is partially accepted because there was only significant difference in depressive symptoms and psychological wellbeing.

Table 4.4 One-way Anova summary table showing the differences in depressive symptoms, anxiety and psychological wellbeing.

Source	SS	df	ms	F
Depressive symptoms	5504.998	10	550.500	0.887
Anxiety	1937.229	10	193.723	1.246
Psychological wellbeing	6668.140	2	3334.070	5.370*[a]
Error	64380.970	150	620.813	
Total	864490.000	155	155.510	

A Significant at 0.05 level
B Significant at 0.01level

IV. DISCUSSION, CONCLUSION, RECOMMENDATION

The study examined a total of five hypotheses and the discussions were presented as follows.

Hypothesis one examined the relationship between exposure to air pollution and depression. The data was subjected to Pearson moment correlation analysis, result shows that there is a significant and positive relationship between pollution on depression symptoms among population at 0.01 level of significance. Therefore the hypothesis is confirmed. This findings corroborated the earlier research that has been executed in this line, for instance an epidemiological study by Shuie (2007) found a direct link between air pollution and depression. For the purpose of the current study, some factors could be use to explain the outcome of the result. In an environment where there is air pollution, it also comes with environmental degradation of land and water, hence making the possibility of farming and fishing slim or near impossible, when the source of livelihood of an individual is disrupted, such person is certainly predisposed to depression, this line of argument has further being confirmed by epidemiological studies done in North East Nigeria. More so, studies by Chen,Schwartz (2009) ,Power ,Weisskopf ,Alexeeff (2011) ,Wueve ,Pueff ,Schwartz (2012), further showed that air pollution positively correlated with dysfunctional cognitive function . The area used for the study was severe polluted, hence the possibility of dysfunctional cognitive function which might come in form of exhibition of some depressive symptoms. The studies of .(Briere ,Downes ,Spensley (1983) , Rottton ,Frey (1984) Strahilevitz ,Strahilevitz ,Miller (1979) ,Szyszkowicz. Willet ,Grasfstein (2010) were also in line with the findings of the study .

The second objective was aimed at examining the relationship between air pollution and anxiety on the population. Also, the Pearson moment correlation coefficient was used for the data analysis .Result shows that there is a significant and positive relationship between air pollution and anxiety on population at 0.05 level of significance. Therefore the hypothesis is confirmed. Some earlier studies in this line had earlier affirmed the findings Block ,Elder ,Auten (2012), (Evans, Colome & Shearer (1988) , they asserted that there is a link between petrochemical oxidant and anxiety symptoms , which was also obvious in the population used for the study and as earlier stated in the study of Chen,Schwartz (2009) ,Power ,Weisskopf ,Alexeeff (2011) ,Wueve ,Pueff ,Schwartz (2012), air pollution positive relates to dysfunctional cognitive function which might also come in form of anxiety.

The third objective of the study was aimed at finding out if there will be a relationship between air pollution and psychological well-being, using Pearson correlation statistics, result showed that there is a significant and positive relationship between air pollution and psychological well-being on population at 0.05 level of significance. Therefore the hypothesis is confirmed. The trend of in the initial results could be used in explaining this result , since the results has found a positive relationship between air pollution and depression and anxiety , which are all embedded or intertwined in psychological wellbeing , this explains why the present result also showed a similar trend. More so studies have showed that positive relationship between air pollution and various spectrum of psychological wellbeing has depicted by the studies of (Shiue 2007). Epidemiological studies have shown that living in areas with elevated concentration of air pollution is linked with decreased cognitive function(Chen ,Schwartz (2009) ,Power ,Weisskopf ,Alexeeff (2011) ,Wueve ,Pueff ,Schwartz (2012) , Ranft ,Schikowski ,Sugiri (2009) ,Suglia ,Gryparis ,Wright (2008) , lower neuro-behavioural testing scores in

children,(Wang,Zhang,Zeng (2009) a decline in neuropsychological development in the first 4 years of life25 and elevated risk of autism spectrum disorders(Von Ehrenstein ,Aralis ,Cockburn (2004) ,Roberts, Lyall ,Hart (2013) ,Becerra,Wilhelm ,Olsen (2013) .

The fourth objective of the study aims to examine if age and social economic status as classified with (high and low) will have significant effect on depressive symptoms, anxiety and psychological well-being on population, using Independent T test, result showed the difference between participants that are low and high in age and social economic status and depressive symptoms, anxiety and psychological well-being (GHQ) respectively is significant. Therefore the hypothesis is partially confirmed because participants were low only on age and social economic status but not on depressive symptoms, anxiety and psychological well-being. The explanation for the outcome of the result cannot be unconnected with the intensity of air pollution in the study area, which is one of the most intense in the Niger Delta region, hence, it actually had nothing to do with age and social economic status, everyone one of the study area was still predisposed to anxiety, depression since they stay in the same study area.

The fifth aim of the study was to elucidate if there will be significant difference between depressive symptoms, anxiety and psychological wellbeing of participants, using the anova design, result showed that there were no differences in depressive symptoms and anxiety while psychological wellbeing is significant. Therefore the hypothesis is partially accepted because there was only significant difference in depressive symptoms and psychological wellbeing. The reason for the outcome of the result might not be unconnected with the higher level of depressive symptoms exhibited by the participants which was quite higher as against the level of anxiety symptoms exhibited by the participants.

CONCLUSION

From the outcome of the study, the following could be affirmed.

(1) There is a positive relationship between air pollution and depressive symptoms
(2) There is a positive relationship between air pollution and anxiety
(3) There is a positive relationship between air pollution and Psychological wellbeing
(4) Age and socio-economic status does have a relationship with anxiety, depression and psychological wellbeing in areas exposed to air pollution.
(5) There is a relationship between depression and psychological wellbeing in areas exposed to air pollution.

RECOMMENDATION

Based on the dangerous effect of air pollution on mental health, the following recommendation is hereby put forward to be proactively followed by all stakeholders in other to stop the raving menace.

(1) The government should as a point of urgency make a legislation banning the oil companies from emitting dangerous petrochemical oxidant during the cause of drilling.
(2) The oil companies should find a better way of drilling which might not necessarily bring out dangerous petrochemical oxidant, because the oil companies do not do this in other countries in which they operate, but they flagrantly fail to do this in Nigeria, maybe because there is no law regulating their activities.
(3) The government should shut down or fine any company defiling the rules guiding regulation, as done by the Rivers State government in February 2017 who shut down a Chinese manufacturing petrochemical company in Port Harcourt for emitting dangerous oxidants.
(4) Compensation should also be given to the people that already had their livelihood destroyed by the air pollution
(5) All stakeholders should also make it a point of urgency in providing adequate health facilities to the community to cater for the population because they have been seriously exposed to dangerous chemicals that could harm their health
(6) Stakeholders should also provide psychotherapy for those that have issues with their mental health.

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