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RESEARCH ARTICLE

Socio-Demographic Predictors of Depression During the First COVID-19 Lockdown

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ABSTRACT

Depression has been associated with poor health outcomes. This study sought to answer three research questions. Firstly, are there significant differences in the frequency of participants who screen positive for anxiety and depression in the population segregated by sociodemographic factors such as gender, age, living alone, and socioeconomic status (SES)? Second, what sociodemographic factors were predictors of anxiety and depression symptoms? The third research question, what extent does loneliness predict anxiety and depression symptoms when controlling for demographic measures. With regards to depression, the results of the analysis supported our hypothesis that low-income participants were more likely to screen positive for depression compared to higher income participants.

INTRODUCTION

Depression has been cited as the most common psychiatric disorder worldwide ¹ as well as the second most common chronic disorder that primary care physicians see ². Globally, 6% of the population meet the Major Depressive Disorder criteria during cross sectional data collection, and over the course of a lifetime one in six adults is affected by depression ¹. The Global Burden of Disease Project predicted that depressive disorders are to be among the top three leading causes for burden of disease in 2030 ³. It has also been noted that the rates of depressive symptoms in Israeli adults was similar to that of studies performed in Western countries ⁴. Population based data in 2003 published depressive symptoms rate of 21.5% in a sample of the adult Jewish population in Israel ⁴.

Depression has been associated with poor health outcomes. A specific study cited depression as affecting functioning and well-being at least equal to or more than chronic medical illnesses ⁵. Depression has been associated with a 60% risk of type 2 diabetes ⁶, a significant increased risk of stroke morbidity and mortality ⁷, and increased risk of mortality overall ⁸.

Similarly, anxiety is also among the most common psychiatric conditions in the Western World ⁹. The Global burden of disease projected that anxiety disorders contributed to 26.8 million disability adjusted life years in 2010 ¹⁰. Anxiety has been associated with increased risk of development of other mood disorders and substance abuse ⁹.

Prior to the COVID-19 pandemic in 2020 mental disorders were cited as the leading cause of global health related burden ¹¹; this paper aims to understand the prevalence and predictors of anxiety and depressions during the COVID-19 pandemic in Israel. In 2021 the COVID-19 Mental Disorders Collaborators concluded that throughout 2020 the COVID-19 pandemic was associated with a 27.6% increase in the number of major depressive disorders and 25.6% increase in the cases of anxiety disorders globally ¹¹.

This correlational designed study sought to answer three research questions. Firstly, are there significant differences in the frequency of participants who screen positive for anxiety and depression in the population segregated by sociodemographic factors such as gender, age, living alone, and socioeconomic status (SES)? Second, what sociodemographic factors were predictors of anxiety and depression symptoms? And finally, to what extent does loneliness predict anxiety and depression symptoms when controlling

for demographic measures. The following hypotheses guided our study:

Ha1: Females, younger participants, those living alone, and those of low-medium income will significantly more likely screen positive for anxiety and depression compared to males, older participants, those living with others, and those of higher income.

Ha2: Gender, age, living alone, and income will significantly predict frequency of anxiety and depression symptoms.

Ha3: Loneliness will predict a significant amount of the variance in anxiety and depression symptoms when controlling for gender, age, living alone, and income.

It is relevant to discuss the disparities in health outcomes and rates of depression and anxiety in Israel amongst the diverse population. Israel is composed primarily of Jews (75%) and Arabs (21%) ¹². Furthermore, within the Arab population, there are multiple subgroups among which are Christians, Bedouins and others ². Studies have reported on the differences in between Arabs and Jews for psychological conditions; it has been concluded that there are various risk factors interacting, a significant one of which is education, contributing to a disparity between the two groups ².

METHODS:

Data Collection

The study collected data via sending out the survey through the University of Barcelona system on a google survey. The survey was sent out on May 20, 2020, and available for 15 days thereafter. The languages available for the study were English, French, Spanish, and Hebrew. A total of 663 individuals were included in the study. Due to the global distribution by country of the survey, the sample size had no statistical significance.

Measures

Anxiety and depression were measured using the Patient Health Questionnaire-4 ^{13,13} The PHQ-4 consists of a 2-item Patient Health Questionnaire ^{14,14,15} which screens for depression and a 2-item Generalized Anxiety Disorder Screener ¹⁶ which screens for anxiety. The PHQ-4 begins with the stem question: "Over the last 2 weeks, how often have you been bothered by the following problems?" Response options were "not at all," "several days," "more than half the days," and "nearly every day," scored as 0, 1, 2, and 3. The PHQ-2 focuses on feeling down, depressed, hopeless, and interest/pleasure doing things,

thereby representing the DSM-IV diagnostic core criteria for depression¹⁷. The GAD-2 assesses nervousness, anxiousness, and being able to stop or control worrying thoughts¹³, representing the DSM-IV criteria for anxiety. The total summed score for the PHQ-2 and GAD-2 ranges from 0 to 6, and the composite PHQ-4 total score ranges from 0 to 12. For the PHQ-2 and the GAD-2, scale scores of ≥ 3 were set as cut-off points between the normal range and probable cases of depression or anxiety based on recommendations set during instrument validation¹⁴⁻¹⁶. It is important to note that elevated PHQ-4 scores are not used as a diagnostic tool but an indicator for further investigation to determine if further clinical treatment is needed^{13(p619)}. Anxiety scores were calculated by summing the scores from the two items on the PHQ-4 that assessed anxiety. Similarly, depression scores were calculated by summing the scores from the two items that assessed depression on the PHQ-4. The PHQ-4 has been validated as an ultra-brief tool for detecting both anxiety and depressive disorders with 2,149 patients obtained from 15 primary-care clinics in the U.S.¹³ and among a large nationally representative sample of 5030 participants in Germany¹⁷.

Loneliness was assessed with a single item on the survey. Participants were asked how often they experienced loneliness. Response options were “never,” “sometimes,” “more than half the time,” and “almost every day,” scored as 0, 1, 2, and 3 respectively.

Socio-demographic information was collected which included age, gender, income, and number of people participants were living with. Age was collected as a continuous variable and later divided into four categories: “16-23,” “24-29,” “30-39,” 40-55, and 56+ for data analysis to examine generational differences. Income was assessed as a categorical variable where participants self-identified as fitting into either high, medium, or low income. A dichotomous variable was created by collapsing the number of people participants were living with into two categories: “living with others” (>0 people) and “living alone” (equal to 0 people).

Data Analysis

First, descriptive analyses were performed to assess the frequency and distribution of respondents within each demographic category who met the screening criteria for anxiety or depression (≥ 3 on the GAD-2 or PHQ-2) and for whom neither was suggested (≤ 3 on the GAD-2 or PHQ-2). Second, a chi-square test of independence was performed to examine the relationship

between socio-demographic factors and PHQ-4 screening categories. The socio-demographic factors that were examined in the analyses were gender, age, living alone, and income level. Third, two hierarchical linear regression analyses were calculated to predict anxiety and then depression based on gender, age, living alone, income level, and loneliness (frequency of feeling lonely). A stepwise hierarchical regression method was selected to ensure the degree of variance accounted for by the addition of loneliness to the models can be assessed and compared to the variance accounted for by the demographic variables. In the first step, socio-demographic variables were entered (gender, age, living alone, income level). Age was entered as a continuous variable. Dummy variables were created for income and entered as “low vs high” and “medium vs high.” In the second step of both analyses, loneliness was added to determine the proportion of the variance in anxiety and depression explained by the addition of loneliness, while controlling for the socio-demographic variables. Several diagnostic tests were conducted to ensure all assumptions were met (linearity, homoscedasticity, and normality of residuals, and multicollinearity) for the regression analysis and all assumptions were met. The statistical analyses were all performed using IBM SPSS (Version 28.0.1.0).

RESULTS:

The results of the descriptive and chi-square analyses are shown in Table 1. The chi-square test of independence comparing the frequency of anxiety in female to male participants indicated that female participants were significantly more likely to screen positive for anxiety (81%) than male participants (19%), $\chi^2(1) = 12.815$, $p < 0.001$. The proportion of participants who reported being depressed did not differ by gender, $\chi^2(1) = 3.539$, $p = .060$. Younger respondents had significantly higher levels of anxiety compared to older respondents, $\chi^2(4) = 16.779$, $p = .002$. The highest frequency of anxiety was found among ages 24-29 (26.2%), conversely, the lowest frequency was found for respondents 56 years or older (8.2%). No significant relationship was found between age categories and depression, $\chi^2(4) = 7.812$, $p = .099$. No significant difference was found in the distribution of participants who screened positive for anxiety ($\chi^2(1) = 1.186$, $p = .276$) or depression ($\chi^2(1) = 2.490$, $p = .115$) between those living alone or with others. Medium-income respondents were significantly more likely to have anxiety (42.6%), compared to low-income

respondents (41.5%), and high-income respondents (15.9%), $\chi^2 (2) = 24.828, p < 0.001$. Low-income respondents were significantly more likely to have

depression (39.2%) compared to medium-income respondents (37.8%), and high-income respondents (23.0%), $\chi^2 (2) = 16.435, p < 0.001$.

Table 1. Prevalence of anxiety and depression in Israel during the COVID pandemic

	PHQ-4 Anxiety Screen					PHQ-4 Depression Screen					
	Dichotomized		Suggests Anxiety			Dichotomized		Suggests Depression			
	Anxiety Suggested (n=458)	Not Suggested	(n=195)			Depression Suggested (n=435)	Not Suggested	(n=217)			
	N	%	N	%	χ^2 tests	N	%	N	%	χ^2 tests	
Gender	Female	307	67.0%	158	81.0%	$p < 0.001$	300	68.8%	165	76.0%	$p = 0.060$
	Male	150	32.8%	37	19.0%		135	31.0%	52	24.0%	
Age Categories	16-23	55	12.0%	41	21.0%	$p = 0.002$	54	12.4%	42	19.4%	$p = 0.099$
	24-29	109	23.8%	51	26.2%		104	23.9%	56	25.8%	
	30-39	84	18.3%	43	22.1%		87	20.0%	40	18.4%	
	40-55	144	31.4%	44	22.6%		130	29.8%	58	26.7%	
	56+	66	14.4%	16	8.2%		61	14.0%	21	9.7%	
Living Alone	Living with others	431	94.1%	179	91.8%	$p = 0.276$	412	94.5%	198	91.2%	$p = 0.115$
	Living alone	27	5.9%	16	8.2%		24	5.5%	19	8.8%	
Income Level	Low	109	23.8%	81	41.5%	$p < 0.001$	105	24.1%	85	39.2%	$p < 0.001$
	Medium	216	47.2%	83	42.6%		217	49.8%	82	37.8%	
	High	133	29.0%	31	15.9%		114	26.1%	50	23.0%	

Table 2 presents the results of the hierarchical regression analysis with anxiety as the outcome. The four predictors entered in the first step were: gender, age, living alone, and income. This model was found to be statistically significant and explained 8% of the variance in anxiety scores. Gender, age, and income significantly predicted anxiety scores. Females had significantly more frequent anxiety symptoms compared to male participants. A negative association was found between age and anxiety scores; as age increased, participants had significantly less frequent rates of anxiety. Additionally, individuals in the low-income bracket had significantly more frequent anxiety

symptoms compared to those with a high-income. After entry of loneliness at step two, the variance explained by the model was 38% and income and age were no longer significant predictors of anxiety. The introduction of loneliness explained an additional 30% of variance in anxiety. In the final adjusted model, higher frequency of loneliness significantly predicted more frequent symptoms of anxiety, when controlling for gender, age, living alone, and income. Loneliness was the strongest predictor of anxiety ($\beta = .584, p < .001$) followed by gender ($\beta = .124, p < .001$).

Table 2. Predictors of anxiety in Israel during the COVID pandemic

		Dependent Variable: PHQ-4 Anxiety Screen Subtotal				
		Unstandardized Coefficients		Standardized Coefficients		
Step		B	Std. Error	Beta	t	Sig.
1	Intercept	1.801	.273		6.609	<.001
	Gender (Ref Male)	.552	.144	.148	3.830	<.001
	Age	-.011	.005	-.091	-2.201	.028
	Living alone	.396	.260	.058	1.519	.129
	Income (Low vs High)	.703	.192	.189	3.659	<.001
	Income (Medium vs High)	.206	.163	.061	1.265	.206
<i>R</i> ²		0.079				
ANOVA		$F(5, 646) = 11.030, p < 0.001$				
2	Intercept	.954	.229		4.161	<.001
	Gender (Ref Male)	.463	.119	.124	3.899	<.001
	Age	-.001	.004	-.005	-.131	.896
	Living alone	-.300	.218	-.044	-1.375	.170
	Income (Low vs High)	.175	.161	.047	1.084	.279
	Income (Medium vs High)	.011	.134	.003	.080	.937
	Frequency of feeling lonely	.986	.056	.584	17.595	<.001
<i>R</i> ²		0.377				
ΔR^2		0.298				
ANOVA		$F(6, 645) = 65.182, p < 0.001$				

Table 3 presents the results of the hierarchical regression analysis with depression as the outcome variable. The first step of the model was statistically significant and explained 7% of variance in depression scores. Gender, age, living alone, and low-income significantly predicted depression scores (see Table 3). Females had significantly more frequent depression symptoms than male participants, when controlling for age, living alone, and income. Additionally, younger participants, those living alone, and those in the low-income bracket had significantly more frequent rates of depression symptoms. After entry of

loneliness at step two, the total variance explained increased to 32%. The introduction of loneliness explained an additional 25% of variance in depression scores. In the final adjusted model, higher frequency of loneliness significantly predicted more frequent symptoms of depression, when controlling for gender, age, living alone, and income. Loneliness was the strongest predictor of depression ($\beta = .533, p < .001$), followed by income ($\beta = -.099, p = .017$), and gender ($\beta = .074, p = .026$).

Table 3. Predictors of depression in Israel during the COVID pandemic

		Dependent Variable: PHQ-4 Depression Screen Subtotal				
		Unstandardized Coefficients		Standardized Coefficients		
Step		B	Std. Error	Beta	t	Sig.
1	Intercept	2.426	.242		10.006	<.001
	Gender (Ref Male)	.317	.128	.096	2.472	.014
	Age	-.015	.004	-.136	-3.245	.001
	Living alone	.487	.232	.081	2.100	.036
	Income (Low vs High)	.337	.171	.103	1.971	.049
	Income (Medium vs High)	-.140	.145	-.047	-.965	.335
R ²	0.066					
ANOVA $F(5, 646) = 9.126, p < 0.001$						
2	Intercept	1.742	.212		8.200	<.001
	Gender (Ref Male)	.245	.110	.074	2.226	.026
	Age	-.006	.004	-.056	-1.556	.120
	Living alone	-.074	.202	-.012	-.368	.713
	Income (Low vs High)	-.090	.149	-.027	-.600	.548
	Income (Medium vs High)	-.297	.125	-.099	-2.388	.017
	Frequency of feeling lonely	.796	.052	.533	15.321	<.001
R ²	0.315					
ΔR^2	0.249					
ANOVA $F(6, 645) = 49.478, p < 0.001$						

DISCUSSION:

The results support the conclusions of our first hypothesis stating that females, younger participants, and those of low-medium income were significantly more likely screen for anxiety and compared to males, older participants, and those of high income. The results of the chi-square analysis indicated that females were significantly more likely to screen positive for anxiety than males. Those of medium income were significantly more likely to have anxiety than higher income participants. The results also indicated that younger respondents had a significantly higher likelihood of screening positive for anxiety with the highest likelihood in the 24-29 age group and the lowest likelihood in the 56 and older group. With regards to depression, the results of the chi-square analysis supported our hypothesis that low-income participants were more likely to screen positive for depression compared to higher income participants. However, contrary to our first hypothesis, the chi-square analyses did not indicate a significant difference in the distribution of participants who screened positive for depression based on gender, living alone, or age.

In alignment with our second hypothesis, the regression analysis indicated that gender, age, and income significantly predicted anxiety and depression scores. Females, younger participants,

and low-medium income respondents had more frequent anxiety and depression symptoms. Contrary to our first hypothesis, the regression analyses did not indicate an association between living alone and symptoms of anxiety. But the regression analyses indicated that living alone is significantly associated with higher frequency of depression symptoms when controlling for the other demographic covariates.

In alignment with our third hypothesis which states loneliness will predict a significant amount of the variance in anxiety and depression when controlling for demographic variables (gender, age, living alone, and income), we found that loneliness significantly predicted higher frequency in both anxiety and depression symptoms. Loneliness was by far the strongest predictor when compared to other associated demographic characteristics. When controlling for loneliness, only female identity persisted in predicting the frequency of anxiety symptoms. Similarly, when controlling for loneliness, only female identity, and the difference between medium- and high-income levels significantly predicted the frequency of depression symptoms.

The results of this study have important implications for future research. First, the strongest predictor for anxiety and depression was loneliness. The strength of the association and its

association with depression and anxiety suggests more research should be done on loneliness during COVID-19. Second, future research might examine gender as a potential moderator of anxiety and depression. The present findings not only underscore the distinct importance of gender as a potential moderator in symptoms of anxiety and depression for women, compared to men, but they also highlight the value of psychological adjustment across genders.

Third, the low-medium income bracket compared to the high-income bracket should be researched to determine if this is consistent across studies and what can be done to address higher rates of anxiety and depression among those income groups. Finally, living alone being a predictor of depression, and not anxiety, should be further researched; again, to determine if this is consistent and potential reasons. Younger respondents had significantly more frequent depression and anxiety symptoms compared to older participants. More research should investigate the discrepancies between age groups.

There are several limitations to this study which mainly contribute to a lack of external validity or generalizability. The main limitation is

that several demographic characteristics are not included, namely race, since that is known to play a role in health outcomes. Specifically, with data for Israel a follow up study should consider controlling for Jews compared to Arabs and potentially further specifying within Arabs. Additionally, other measures such as education and suburban or rural living; although income could serve as a proxy for these variables including them could have made for a more complete analysis. Finally, income level was self-identified as low, medium, or high, which presents a risk of bias.

CONCLUSION:

The present study emphasizes that mental health problems during the pandemic are expressed with differing severity based on economic status, gender, living situation and age. Based on the results of the study, mental health issues for younger ages should be highlighted and addressed. In addition, loneliness is a strong factor to be addressed within the mental health community.

Conflicts of Interest Statement

The authors have no conflicts of interest to declare.

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