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Depression: A Major Psychosocial-Lifestyle Sequela of Cardiac Disease Diagnosis

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Abstract

Even the suspicion of cardiac disease diagnosis tends to have significant psychological, physical, and social repercussions for patients. The present study explored the psychosocial and physical lifestyle changes in stable, ambulant patients with suspected or newly diagnosed cardiac disease. This cross-sectional study of cardiac clinic attendees at a public health institution was conducted between July and August 2015. Face-to-face interviews were conducted with eligible patients (aged at least 18 years, not confused, and able to undergo a 20-minute interview) following patient consent. Collected data were analysed using descriptive and analytic methods (chi-squared test and multiple linear regression) using a 5% error and 95% confidence interval. The prevalence of depression increased from 1.7% pre-diagnosis to 36.6% following suspected or confirmed diagnosis. Among demographic variables, only gender was associated with depression, with females being more affected. Diabetes, stress, and eating seafood and sugary foods were associated with increased depression, while exercising at least three times per week was associated with diminished depression. Functional activities (social, communicative, and physical) worsened, with significant differences between pre- and post-diagnosis. Depression was relatively common in the sample, particularly among females. There is a need for increased focus on the development of interventions addressing depression, especially those encouraging physical exercise for optimum management of patients diagnosed with cardiac disease.

Keywords: Depression, Diet, Exercise, Cardiac Patients, Lifestyles

1. Introduction

Cardiovascular disease (coronary artery disease and cerebrovascular disease) is the leading cause of death worldwide (Finegold, Asaria, & Francis, 2012; Mendis, Puska, & Norrving, 2011) owing to an increase in risk factors such as obesity, smoking, sedentary lifestyle, and psychosocial problems (Ministry of Health, Government of Trinidad and Tobago, 2004; World Health Organization (WHO), 2012). Multiple studies have reported the negative social (Havranek et al., 2015), psychosocial (Compare et al., 2013), and emotional (Tennant & McLean, 2001) effects of a cardiovascular disease diagnosis (Bhattacharyya, Stevenson, & Walters, 2016). These, in turn, lead to a further decline in the diagnosed individual's quality of life (Denollet, Vaes, & Brutsaert, 2000; De Smedt, Clays, & De Bacquer, 2016; Hlatky et al., 1997). The accompanying depressive symptoms (Ilić

& Apostolović, 2002; Lesperance, Fraisure-Smith, & Talajic, 1996) and behavioural changes are also associated with negative personal (Habibović et al., 2018) and lifestyle impacts (Brinks, Fowler, Franklin, & Dulai, 2017; Higuera & Holland, 2019).

Major illnesses such as cardiovascular disease have been associated with psychosocial consequences that can affect health (McColl-Kennedy et al., 2017; Turner & Kelly, 2000). Furthermore, understanding the associations and predictors of psychosocial and physical changes in patients with cardiovascular disease can assist healthcare providers in delivering appropriate treatment (Dexter, 2012). In Trinidad and the Caribbean, no studies have explored the psychosocial implications of suspected or confirmed cardiac disease diagnosis. Such evidence may assist healthcare providers in designing more holistic and comprehensive treatment interventions (pharmacological and non-pharmacological). Therefore, this study's aims are:

1) To determine whether there is a change in the prevalence of clinical depression following cardiac disease diagnosis and to ascertain associations and predictors of depression in stable patients with cardiac disease.
2) To determine whether there is a change in physical and social activities following cardiac disease diagnosis and to identify the associations and predictors of such changes.

2. Methods

2.1 Participants

Four hundred participants with cardiac disease were recruited from a government-run general hospital in Trinidad and Tobago. The inclusion criteria were as follows: (1) adults above 18 years of age, (2) clinic attendees for more than one year, (3) referred for the possibility of cardiac disease or diagnosed with a history of ischaemic heart disease (IHD), ST-elevation myocardial infarction, unstable angina, and/or stable angina or IHD complications such as heart failure, and (4) able to communicate for about 20 minutes. Exclusion criteria were confusion or inability to communicate properly.

2.2 Research Design

This study employed a cross-sectional design.

2.3 Sampling Procedure

The sample comprised patients with cardiac disease at the government-run general hospital. A single institution was selected because of cost considerations and similarity in the conditions among hospitalised patients with cardiac disease. Furthermore, we felt that the sample would be representative because there are no differences in patients' age, gender, or ethnicity among the major public health institutes in the region.

The hospital is a public, 745-bed facility that serves about half the population of Trinidad (approximately 600 000 people, South-West Regional Health Authority [SWRHA], 2020). Approximately one-fifth of medical admissions (about 1 400/month) pertain to cardiac disease—mainly IHD, arrhythmias, or valvular heart disease. The calculated sample size was 385 using a margin of error of 5% and a prevalence of 50%. The sample was selected from the hospital clinic using convenience sampling. Individuals being treated for cardiac disease were identified from medical records and through the attending physician. They were briefed on the nature of the study, which was conducted with strict confidentiality. They were informed that participation was voluntary and that they could withdraw at any time without compromising the treatment. Verbal consent was obtained from patients. Ethical approval was granted by the ethics committee of the SWRHA in 2015.

2.4 Measures

Face-to-face interviews were conducted using a 43-item questionnaire after pilot testing for clarity and ease of response. Participants were asked about their present health status and to recall their health status prior to their cardiac disease diagnosis concerning a number of lifestyle and psychosocial issues. Further information was obtained by a review of patient records. The questionnaire included items on the following:

- Sociodemographics (age, gender, ethnicity, marital status, income, employment, height, weight, and waist circumference).
- Medical diagnosis (type of cardiac diagnosis).
- Cardiovascular risk history (smoking, diabetes, hypertension, abdominal obesity, stressful life/depression, daily vegetable and fruit intake, exercise at least three times per week, family history of

IHD, and hypercholesterolemia).
- Lifestyle habits (smoking, alcohol, and diet).
- Activities of daily living.
- Depression (measured using the Patient Health Questionnaire [PHQ-9] with the following items: little interest or pleasure in doing things; feeling down, depressed, or hopeless; trouble falling or staying asleep or sleeping too much; feeling tired or having little energy; poor appetite or overeating; feeling bad about oneself, or feelings of being a failure or having let oneself or family down; trouble concentrating on activities such as reading the newspaper or watching television; moving or speaking so slowly that other people have noticed or the opposite—being so fidgety or restless that movement has been a lot more than usual; and thoughts that one would be better off dead or of hurting oneself in some way).
- Functional status (taking care of oneself, moving in and out of a bed or chair, walking indoors, walking several blocks, walking one block or climbing stairs, doing house work, doing errands, driving a car, and doing vigorous activities such as running).
- Psychological function (feeling nervous, calm, and peaceful; depressed and blue; down in the dumps, etc.).
- Social activity (visiting relatives and friends, participating in community activities , taking care of other people).
- Social function (doing as much work as others in a similar job, taking breaks to complete activities, working a regular number of hours, doing a job as carefully and accurately as others, working as usual, fear of losing a job).
- Interactions (isolating oneself, being affectionate, being irritable towards others).
- General (sexual satisfaction, own health, getting along with friends or family, staying in bed because of illness, cutting down on activities).

Participants' scores on the physical, psychological, and social items were compared before and after diagnosis of cardiac disease. Each question was rated on a five-point scale reflecting varying severity.

Each item on the PHQ-9 (Kroenke, Spitzer, & Williams, 2001) was rated in the following way: not at all=0; several days=1; more than half the days=2; and nearly every day=3. A total score of 0−4, 5−9, 10−14, 15−19, and 20−27 indicated no, mild, moderate, moderately severe, and severe depression, respectively. Scores between 10 and 27 were indicative of clinical depression.

2.5 Data Collection and Analysis

The data were collected during July and August 2015 by a third-year medical student with experience of similar assignments. The collected data were entered into SPSS software version 20 (IBM Corp., Armonk, NY, USA) and securely stored in a computer to which only the researcher and his research assistants had access.

For each item on the psychosocial and physical issues, the difference in score between pre- and post-cardiac disease diagnosis was calculated and the mean difference obtained was used to generate further analyses on depression and functional status. Analyses included descriptive analysis, a chi-squared test of association, and multiple regressions to identify predictors.

3. Results

3.1 Recruitment

Recruitment took place during July and August 2015. A total of 400 individuals diagnosed with cardiac disease participated in a single interview.

3.2 Statistics and Data Analysis

Table 1 shows the participants' characteristics. Participants' mean age was 65.44 (standard deviation [SD]=11.65) years and the duration of their chronic disease was, on average, 6.71 (SD=6.90) years. Patients were mainly females (57.8%), Indo-Trinidadian (79%), and married (49.3%).

Table 1. Participants' Characteristics (Total Sample, Including Patients with Depression; N=400)

		TOTAL		DEPRESSED	
		Number	**Percent**	**Number**	**Percent**
Gender	1 Male	168	42	55	37.7
	2 Female	231	57.8	91	62.3
Ethnicity	1 Afro	67	16.8	18	12.3
	2 Indo	316	79	121	82.9
	3 Chinese	1	0.3	0	0.0
	4 Mixed	16	4	7	4.8
Marital status	1 Married	197	49.3	62	42.5
	2 Single	125	31.3	51	34.9
	3 Divorced/Separated	22	5.5	10	6.8
	4 Common law	6	1.5	1	0.7
	5 Widowed	50	12.5	22	15.1
Employment status	1 Employed	44	11	11	7.5
	2 Unemployed	349	87.3	134	91.8
	3 Self-employed	7	1.8	1	.7
Type of cardiac disease	1 Heart Failure	64	16	22	15.1
	2 Myocardial Infarction	74	18.5	27	18.5
	3 Stable Angina	9	2.3	4	2.7
	4 IHD	251	62.7	93	63.7

Note. IHD: Ischaemic heart disease.

The most common cardiovascular risk was hypertension, followed by diabetes mellitus and a family history of IHD (Figure 1).

3.2.1 Depression Status, Associations, and Predictors

The reliability of the depression scores was acceptable (Cronbach's alpha: 0.689). Patients who suspected a cardiac disease diagnosis had significantly higher depression ($p<.001$), with a mean difference of -5.82 (SD=4.5, standard error of mean=.23). In addition, no significant differences in mean depression scores were found among the different types of patients (heart failure, myocardial infarction, stable angina, and suspected IHD; $p=.4222$). However, the highest average difference in depression was found among patients with myocardial infarction (Table 2). Clinical depression (PHQ score of 10–27) was found in 36.6% (n=146) of the patients, as compared to 1.7% before the suspected cardiac diagnosis (i.e. an increase of 34.9%). Among individuals with clinical depression, the mean age was 65.83 (SD=11.026) years and the majority were females (n= 91, 62.3%).

Table 2. Mean Difference in Depression Scores Before and After Diagnosis by Type of Cardiac Disease

Dependent Variable: Patient Health Questionnaire scores

Type of cardiac disease	Mean	Standard Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1 Heart Failure	-5.203	.564	-6.311	-4.095

2 Myocardial Infarction	-6.162	.524	-7.193	-5.132
3 Stable Angina	-4.333	1.503	-7.288	-1.378
4 IHD	-5.952	.285	-6.512	-5.393

Note. IHD: Ischaemic heart disease.

Among gender, ethnicity, marital status, employment, and type of disease, only gender was significantly associated with overall depression scores: mental health in females was more greatly affected than in males, as evident from the larger decline (0.27 vs -0.44; Table 3).

Table 3. Sociodemographics and Overall Depression

Sociodemographics	F	*P*
Gender	13.205	0.00
Ethnicity	1.385	0.247
Marital status	2.049	0.087
Employment	0.733	0.481
Type of cardiac disease	1.009	0.389

3.2.2 Medical/Lifestyle Factors and Depression

Among the variables evaluated in the questionnaire, diabetes, stress, and eating seafood and sugary foods were positively associated with depression, while exercise was negatively correlated (Table 4) ($p<0.10$).

Table 4. Correlations Between Lifestyle Factors and Depression

Model	Unstandardised Coefficients		Standardised Coefficients	t	*P*
	B	Standard Error	Beta		
(Constant)	4.552	1.957		2.326	0.021
Diabetes mellitus	-0.838	0.466	-0.086	-1.797	0.073
Stressful life/depression (psychosocial)	-2.869	0.419	-0.317	-6.842	0
Exercise (times per week)	0.909	0.336	0.19	2.705	0.007
Seafood (fish, shrimp, etc.; servings per day)	-1.008	0.34	-0.152	-2.965	0.003
Sugary or salty food snacks or desserts (servings per day)	-1.224	0.38	-0.163	-3.219	0.001

3.2.3 Social and Psychological Issues

In terms of specific social and psychological issues (falling or staying asleep, feeling tired, poor appetite, feeling bad about oneself, trouble concentrating, speaking slowly, having negative thoughts, being nervous, feeling calm and peaceful, feeling depressed, feeling happy, feeling in the dumps, visiting friends and relatives, participating in community activities, taking care of other people, working in a similar job, working in different working conditions), there was a significant difference between pre- and post-diagnosis scores ($p<.05$) except for 'thoughts that you have the support of your family and friends' ($p=0.14$).

There was significant worsening of functional status from pre- to post-diagnosis. These activities include moving in and out of bed, walking indoors such as around the house, walking several blocks, walking one block or climbing up a flight of stairs, doing work around the house, running errands, driving a car or using public

transportation, and doing vigorous activities ($p<.05$). Climbing stairs and doing strenuous activities were most affected.

Social activities such as visiting relatives and friends, participating in community activities, taking care of other people, and performing work-related activities also worsened post-diagnosis. Following a diagnosis of heart disease, there were significant differences in terms of the patients feeling isolated, irritable, making unreasonable demands, and getting along well with other people ($p<.05$) In addition, there was a worsening of the feelings of satisfaction with sexual relationships, feelings about one's own health, staying in bed, and having to cut down on normal activities ($p<.05$).

4. Discussion

The present study aimed to determine whether cardiac disease diagnosis is associated with clinical depression prevalence and physical and social activity, as well as to identify its associations with other variables. Our findings revealed that the suspicion or diagnosis of cardiac disease is associated with a marked increase in depression prevalence. Patients who exercised had lower depression levels. In addition, there was a significant worsening of physical and social activities post-diagnosis.

In our sample, the prevalence of clinical depression increased from 1.7% to 36.6% following cardiac disease diagnosis (an increase of 34.9%; $p<.001$). This increase in depression from patients' premorbid states varied based on their health status and demographic or sociocultural circumstances. Variations in depression or depressive symptoms have been consistently reported. A large study reported that depression was prevalent in 9.3% of ambulatory patients with cardiac disease, 4.8% of the general population (Egede, 2007), 15–30% of patients post-myocardial infarction (Lichtman et al., 2008), and 19.3–33.6% of patients with heart failure (Tsu, 2012). It is also well known that depression can lead to treatment non-compliance as well as failure to make the necessary lifestyle changes (Martin, Williams, Haskard, & Dimatteo, 2005). Depression has also been associated with an increase in the probability of future cardiac events, less adherence to medication, and deterioration of overall quality of life (Brown & Bussel, 2011; Lichtman et al., 2008). Depression among patients with cardiac disease should, therefore, be recognised and managed early on since it is also considered a risk factor for coronary artery disease (CAD; Dhar & Barton, 2016).

Psychological factors such as hostility, anxiety, and depression significantly affect the development, clinical expression, and prognosis of heart disease (Ilić & Apostolović, 2002). In this study, there were no significant differences in mean depression scores among the different types of cardiac conditions. This result may be because of similar concerns regardless of the type of cardiac disease. In addition, among the evaluated demographics, only gender was significantly associated with depression, with females being the most affected. This is concerning, especially when our health care system displays no systemic, discriminatory practices. This finding may result from a subtle lack of focus on female health or a greater susceptibility to depression among females. Similar findings have been reported by the WHO (2012), with a prevalence of 70.7% and 55.5% in females and males, respectively. Such a difference in depression prevalence is undesirable because depression can lead to death and poorer outcomes after a cardiac event, placing females at more risk than males (Doering & Eastwood, 2011; McSweeney et al., 2016). According to the WHO, depression contributes to the global burden of disease (World Federation for Mental Health, 2012), especially among patients with CAD (Bahall, 2019; Lichtman et al., 2008). Poor management of risk factors increases the chances of developing CAD (Hobbs, 2004; Kromhout, Menotti, Kesteloot, & Sans, 2002), while controlling them has proven beneficial in its primary and secondary prevention (Hobbs, 2004; Kromhout, Menotti, Kesteloot, & Sans, 2002).

In this study, social support was associated with decreased depression, confirming Unützer and Park's (2012) findings. Moreover, diabetes, stress, and eating seafood and sugary foods were negatively associated with depression. While there is no clear link between food types and depression (Harvard Health Publishing: Harvard Medical School, 2018), this study revealed that sugary foods can increase depressive symptoms. Our results are consistent with Rutledge et al.'s (2014) finding that diet is associated with depression.

Further, exercise was negatively correlated with depression. Previous research has consistently shown the positive effects of exercise in minimising depression (Pozuelo, 2019) and it seems to be the single most important indicator of decreased depression and improved physical health. It has been reported that myocardial ischaemia can, in fact, lead to exercise intolerance and restrictions in physical activity (Pina et al., 2003). Nonetheless, exercising would increase patients' tolerance to physical activity, allowing them to achieve higher-intensity levels before reaching their angina or ischaemic electrocardiographic threshold (Boden et al., 2014).

Moreover, exercise is important in both primary and secondary prevention of cardiovascular disease. (Fletcher et al., 1996). In general, people who increase their physical activity after a myocardial infarction are more likely to survive subsequent episodes (Lawler, Filion, & Eisenberg, 2011; O'Connor et al., 1989). Patients' continued lack of exercise may result from a sedentary lifestyle, psychological fear, physical challenges resulting from their disease, or cultural norms.

Meanwhile, smoking, alcohol consumption, poor dietary habits, and lack of social support are also associated with depression (Pozuelo, 2019). Pozuelo (2019) found associations between depression and young age, increased comorbidities, higher weight, high body mass index, Hospital Anxiety and Depression Scale score, comorbid anxiety, physical inactivity, smoking, and being less likely to be partnered.

Lastly, there was a significant worsening of physical and social activities in this cohort of stable patients following diagnosis of cardiac disease.

This study has several limitations that should be taken into account when interpreting the results. First, the sample size is small and participants were selected from a single centre. Second, as the focus was on stable patients, attempts to generalise the findings to other groups of patients may be inappropriate. Third, we relied on patients' recall and subjective reports, which may not be completely reliable. Lastly, missing data from patients' records were excluded. This, however, does not diminish the value of the study, which focuses on psychosocial factors.

Cardiovascular disease, the number one cause of death in Trinidad and Tobago, necessitates an evaluation of depression and lifestyle practices to identify susceptible patients, particularly ones who can benefit from appropriate interventions such as exercise, social support, and healthy eating patterns.

5. Conclusion

Clinical depression is a major complication of cardiac disease. Exercise and social support are associated with diminished depression. Among stable patients, physical and social factors also worsen following cardiac disease diagnosis. Efforts must be made to identify and manage depression and other psychosocial factors in patients who have newly been diagnosed with cardiac disease.

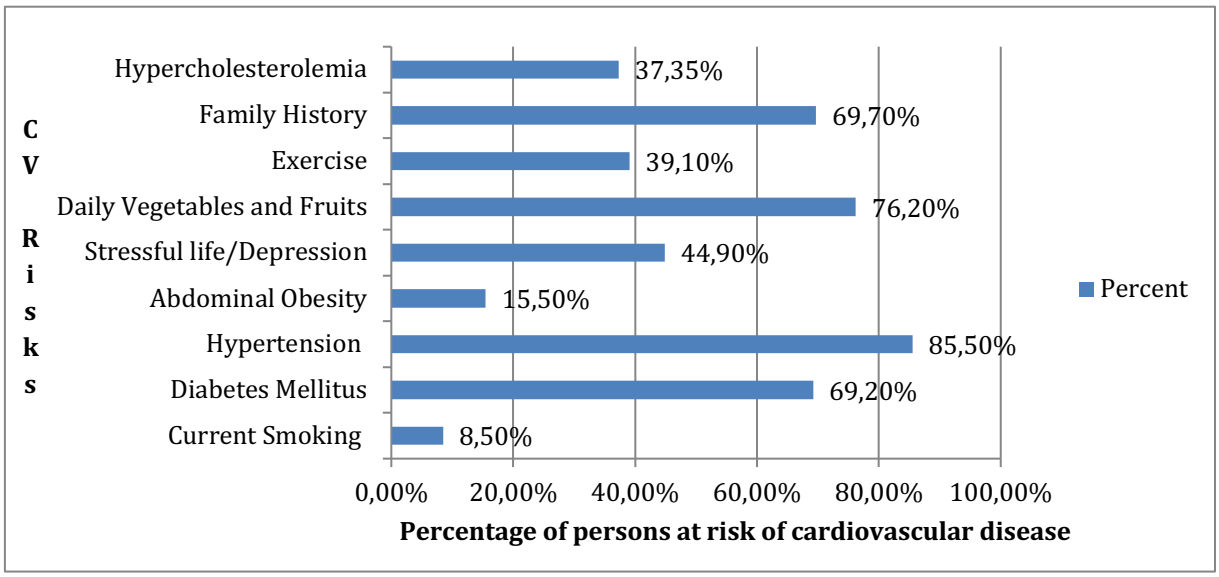

Figure 1. Cardiovascular (CV) risk prevalence (n=389).

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References

Bahall, M. (2019). Prevalence and associations of depression among patients with cardiac diseases in a public health institute in Trinidad and Tobago. *BMC Psychiatry, 19*, 4. https://doi.org/10.1186/s12888-018-1977-3

Bhattacharyya, M., Stevenson, F., & Walters, K. (2016). Exploration of the psychological impact and adaptation to cardiac events in South Asians in the UK: A qualitative study. *BMJ Open*, *6*, e010195. https://dx.doi.org/10.1136/bmjopen-2015-010195

Boden, W. E., Franklin, B., Berra, K., Haskell, W. L., Calfas, K. J., Zimmerman, F. H., & Wenger, N. K. (2014). Exercise as a therapeutic intervention in patients with stable ischemic heart disease: An underfilled prescription. *The American Journal of Medicine*, *127*, 905–911. https://dx.doi.org/10.1016/j.amjmed.2014.05.007

Brinks, J., Fowler, A., Franklin, B. A., & Dulai, J. (2017). Lifestyle modification in secondary prevention: Beyond pharmacotherapy. *American Journal of Lifestyle Medicine, 11*(2), 137–152. https://doi.org/10.1177/1559827616651402

Brown, M. T., & Bussel, J. K. (2011). Medication adherence: WHO cares? *Mayo Clinic Proceedings, 86*(4), 304–314. https://doi.org/10.4065/mcp.2010.0575

Compare, A., Zarbo, C., Manzoni, G. M., Castelnuovo, G., Baldassari, E., Bonardi, A., ... Romagnoni, C. (2013). Social support, depression, and heart disease: A ten year literature review. *Frontiers in Psychology, 4*, 384. https://doi.org/10.3389/fpsyg.2013.00384

Denollet, J., Vaes, J., & Brutsaert, D. L. (2000). Inadequate response to treatment in coronary heart disease: Adverse effects of Type D personality and younger age on 5-year prognosis and quality of life. *Circulation, 102*, 630–635. https://doi.org/10.1161/01.cir.102.6.630

De Smedt, D., Clays, E., & De Bacquer, D. (2016). Measuring health-related quality of life in cardiac patients. *European Heart Journal – Quality of Care & Clinical Outcomes, 2*(3), 149–150. https://doi.org/10.1093/ehjqcco/qcw015

Dexter, H. (2012). Psychosocial interventions for patients with chronic disease. *BioPsychoSocial Medicine, 6*, 2. https://doi.org/10.1186/1751-0759-6-2

Dhar, A. K., & Barton, D. A. (2016). Depression and the link with cardiovascular disease. *Frontiers in Psychiatry, 7*, 33. https://doi.org/10.3389/fpsyt.2016.00033

Doering, L. V., & Eastwood, J. (2011). A literature review of depression, anxiety, and cardiovascular disease in women. *Journal of Obstetric, Gynecologic & Neonatal Nursing, 40*(3), 348–361. https://doi.org/10.1111/j.1552-6909.2011.01236.x

Egede, L. E. (2007). Major depression in individuals with chronic medical disorders: Prevalence, correlates and association with health resource utilization, lost productivity and functional disability. *General Hospital Psychiatry, 29*(5), 409–416. https://doi.org/10.1016/j.genhosppsych.2007.06.002

Finegold, J. A., Asaria, P., & Francis, D. P. (2012). Mortality from ischaemic heart disease by country, region, and age: Statistics from World Health Organisation and United Nations. *International Journal of Cardiology*, *168*(2), 934–945. https://doi.org/10.1016/j.ijcard.2012.10.046

Fletcher, G. F., Balady, G., Blair, S. N., Blumenthal, J., Casperson, C., Chaitman, B., … Pollock, M. L. (1996). Statement on exercise: Benefits and recommendations for physical activity programs for all Americans. *Circulation, 94*(4), 857–862. https://doi.org/10.1161/01.CIR.94.4.857

Habibović, M., Broers, E., Piera-Jimenez, J., Wetzels, M., Ayoola, I., Denollet, J., & Widdershoven, J. (2018). Enhancing lifestyle change in cardiac patients through the Do CHANGE System ("Do Cardiac Health: Advanced New Generation Ecosystem"): Randomized controlled trial protocol. *JMIR Research Protocols*, *7*(2), e40. https://doi.org/10.2196/resprot.8406

Harvard Health Publishing: Harvard Medical School. (2018). *Food and mood: Is there a connection?* Retrieved from https://www.health.harvard.edu/mind-and-mood/food-and-mood-is-there-a-connection

Havranek, E. P., Mujahid, M. S., Barr, D. A., Blair, I. V., Cohen, M. S., Cruz-Flores, S., … Yancy C. W. (2015). Social determinants of risk and outcomes for cardiovascular disease: A scientific statement from the American Heart Association. *Circulation, 132*(9), 873–898. https://doi.org/10.1161/CIR.0000000000000228

Higuera, V., & Holland, K. (2019). *Everything you want to know about depression*. Healthline. Retrieved from https://www.healthline.com/health/depression

Hlatky, M. A., Rogers, W. J., Johnstone, I., Boothroyd, D., Brooks, M. M., Pitt, B., … Mark, D. B. (1997). Medical care costs and quality of life after randomization to coronary angioplasty or coronary bypass surgery. *The New England Journal of Medicine, 336*, 92–99. https://doi.org/10.1056/NEJM199701093360203

Hobbs, F. D. R. (2004). Cardiovascular disease: Different strategies for primary and secondary prevention? *Heart, 90*(10), 1217–1223. https://dx.doi.org/10.1136%2Fhrt.2003.027680

Ilić, S., & Apostolović, S. (2002). Psychological aspects of cardiovascular diseases. *Medicine and Biology, 9*(2), 138–141. Retrieved from http://facta.junis.ni.ac.rs/mab/mab200202/mab200202-02.pdf

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613. https://doi.org/10.1046/j.1525-1497.2001.016009606.x

Kromhout, D., Menotti, A., Kesteloot, H., & Sans, S. (2002). Prevention of coronary heart disease by diet and lifestyle evidence from prospective cross-cultural, cohort, and intervention studies. *Circulation, 105*(7), 893–898. https://doi.org/10.1161/hc0702.103728

Lawler, P. R., Filion, K. B., & Eisenberg, M. J. (2011). Efficacy of exercise-based cardiac rehabilitation post–myocardial infarction: A systematic review and meta-analysis of randomized controlled trials. *American Heart Journal, 162*(4), 571–584. https://doi.org/10.1016/j.ahj.2011.07.017

Lesperance, F., Fraisure-Smith, N., & Talajic, M. (1996). Major depression before and after myocardial infarction: Its nature and consequences. *Psychosomatic Medicine, 58*(2), 99–110. https://doi.org/10.1097/00006842-199603000-00001

Lichtman, J. H., Bigger, J. T., Blumenthal, J. A., Frasure-Smith, N., Kaufmann, P. G., Lesperance, F., … Froelicher, E. S. (2008). Depression and coronary heart disease. *Circulation, 118*(17), 1768–1775. https://doi.org/10.1161/CIRCULATIONAHA.108.190769

Lichtman, J. H., Bigger, J. T., Blumenthal, J. A., Frasure-Smith, N., Kaufmann, P. G., Lespérance, F., … American Psychiatric Association. (2008). Depression and coronary heart disease: Recommendations for screening, referral, and treatment: A science advisory from the American Heart Association Prevention Committee of the Council on Cardiovascular Nursing, Council on Clinical Cardiology, Council on Epidemiology and Prevention, and Interdisciplinary Council on Quality of Care and Outcomes Research: Endorsed by the American Psychiatric Association. *Circulation, 118*(17), 1768–1775. https://doi.org/118:1768-1775.

Martin, L. R., Williams, S. L., Haskard, K. B., & Dimatteo, M. R. (2005). The challenge of patient adherence. *Therapeutics and Clinical Risk Management, 1*(3), 189–199.

McColl-Kennedy, J.R., Danaher, T. S., Gallan, A. S., Orsingher, C., Lervik-Olsen, L., & Verma, R. (2017). How do you feel today? Managing patient emotions during health care experiences to enhance well-being, *Journal of Business Research, 79,* 247−259. https://dx.doi.org/10.1016/j.jbusres.2017.03.022

McSweeney, J. C., Rosefeld, A. G., Abel, W. M., Braun, L. T., Burke, L. E., Daugherty, S. L., … Reckelhoff, J. F. (2016). Preventing and experiencing ischemic heart disease as a woman: State of the science: A scientific statement from the American Heart Association. *Circulation, 133*(13), 1302–1331. https://doi.org/10.1161/CIR.0000000000000381

Mendis, S., Puska, P., & Norrving, B. (Eds.). (2011). *Global Atlas on cardiovascular disease prevention and control*. World Health Organization: Geneva. Retrieved from http://www.world-heart-federation.org/fileadmin/user_upload/images/CVD_Health/Global_CVD_Atlas.pdf

Ministry of Health, Government of Trinidad and Tobago. (2012). *PanAmerican steps: Chronic non-communicable disease risk factor survey: Final report*. Retrieved from https://www.who.int/chp/steps/TrinidadAndTobago_2011_STEPS_Report.pdf

O'Connor, G., Buring, J. E., Yusuf, S., Goldhaber, S. Z., Olmstead, E. M., Paffenbarger, R. S., & Hennekens, C. H. (1989). An overview of randomized trials of rehabilitation with exercise after myocardial infarction. *Circulation, 80*(2), 234–244.

Pina, I. L., Apstein, C. S., Balady, G. J., Belardineli, R., Chaitman, B. R., Duscha, B. D., … Sullivan, M. J. (2003). Exercise and heart failure: A statement from the American Heart Association Committee on exercise, rehabilitation, and prevention. *Circulation, 107*, 1210–1225. https://doi.org/10.1161/01.CIR.0000055013.92097.40

Pozuelo, L. (2019). Depression & heart disease. In *Cleveland Clinic*. Retrieved from https://my.clevelandclinic.org/health/diseases/16917-depression--heart-disease

Rutledge, T., Kenkre, T. S., Thompson, D. V., Bittner, V. A., Whittaker, K., Eastwood, J., … Bairey Merz, C. N. (2014). Depression, dietary habits, and cardiovascular events among women with suspected myocardial ischemia. *The American Journal of Medicine, 127*(9), 840–847. https://doi.org/10.1016/j.amjmed.2014.04.011

South-West Regional Health Authority (SWRHA). (2020). *San Fernando General Hospital*. Retrieved from http://www.swrha.co.tt/content/about-swrha

Tennant, C., & McLean, L. (2001). The impact of emotions on coronary heart disease risk. *Journal of Cardiovascular Risk, 8*(3), 175–183. https://doi.org/10.1177%2F174182670100800309

Tsu, L. V. (2012). Depression in cardiac patients: Underrecognized and undertreated. *U.S. Pharmacist, 37*(11), HS 12–HS 15.

Turner, J., & Kelly, B. (2000). Emotional dimensions of chronic disease. *The Western Journal of Medicine*, *172*(2), 124–128. https://doi.org/10.1136/ewjm.172.2.124

Unützer, J., & Park, M. (2012). Strategies to improve the management of depression in primary care primary care. *Primary Care: Clinics in Office Practice, 39*(2), 415–431. https://doi.org/10.1016/j.pop.2012.03.010

World Federation for Mental Health. (2012). *Depression: A global crisis. World Health Day*. Retrieved from https://www.who.int/mental_health/management/depression/wfmh_paper_depression_wmhd_2012.pdf