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Self-Reported Depressive Symptoms in Women Hospitalized for Acute Coronary Syndrome

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Abstract

The purpose of this cross-sectional observational study was to explore depressive symptoms, among 377 women, during hospitalization for acute coronary syndrome (ACS). Women were screened for depressive symptoms using the Beck Depression Inventory-II (BDI-II). Pearson chi-square tests for independence were used for comparisons between categorical variables and *t* tests for independent samples were used for comparisons between continuous variables. Tukey's HSD test along with one-way ANOVA test was used to conduct multiple comparisons between the three defined age groups ranging from 29–49, 50–64, and 65 years. A total of 118 women screened positive for depression (BDI-II score ≥ 14). The percentage of women that met the criteria for a positive depression screening was significantly different between the three age groups. The proportion of depressed women who reported feelings of sadness, past failures, punishment, self-dislike, agitation, worthlessness, sleep disturbances, and irritability varied significantly by age group. Study findings indicate that symptom experience and severity may differ across a lifetime. These results support the need to understand the complexity of depressive symptoms experienced by women. The ability to understand and recognize depressive symptoms in women, with ACS, may assist health care professionals with the management of a modifiable cardiovascular risk factor.

Keywords

common mental health; coronary heart disease; depression; mental health; women's mental health

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Introduction

Cardiovascular disease (CVD) continues to be the number one leading cause of mortality in women (AHA 2011). An estimated 7.5 million women live with a history of acute coronary syndrome (ACS) and angina pectoris (AHA 2011). ACS typically includes a diagnosis of unstable angina or myocardial infarction (AHA 2011). Studies indicate that women, when compared to men, experience unexplained higher rates of cardiovascular morbidity and mortality during and after hospitalization for ACS (Vaccarino *et al.* 1999 & 2001). Women 60 years or younger experience greater cardiovascular mortality risk when compared to older women [>60 years] or men (Vaccarino *et al.* 1999). This increased cardiovascular risk is poorly understood and traditional cardiovascular risk factors fail to explain the higher rates of adverse cardiovascular outcomes seen in women. Because women seem to be uniquely at risk, researchers have investigated additional non-traditional cardiovascular risk factors such as depression.

Depression is often cited as the most prevalent mental illness in women, occurring twice as often as that in men (Stewart *et al.* 2003, Reeves *et al.* 2011). Evidence suggests that depression is an independent risk factor for future adverse coronary events and the presence of depressive symptoms has been associated with higher rates of morbidity and mortality in ACS patients (Frasure-Smith *et al.* 1999, Lespérance *et al.* 2000, Frasure-Smith & Lespérance 2003, Van Melle *et al.* & Barth *et al.* & Lett *et al.* 2004, Parashar *et al.* 2009). Depression is especially prevalent in women with CVD, with up to 47% of women reporting depressive symptoms during and after an ACS event (Frasure-Smith *et al.* 1999, Mallik *et al.* 2006, Frazier *et al.* 2012). Parashar *et al.* reported that women have a higher prevalence of self-reported depressive symptoms during and after hospitalization for ACS up to 1.5 to 2 times higher than men (2009). In 2012, a study that explored gender differences in depressive symptom experience among patients hospitalized with ACS reported that women experience a greater number of somatic symptoms of depression (sleep, appetite disturbances, and fatigue) when compared to men (Frazier *et al.*). Due to the higher prevalence of depressive symptoms, it becomes imperative to identify women at risk for depression and future adverse cardiovascular events.

Despite the high prevalence depression in women, in both the general and ACS population, depressive symptoms often go undetected in both women and men hospitalized for cardiovascular conditions. Depression is a heterogeneous construct of somatic and cognitive symptoms making screening and detection difficult, especially in ACS populations, as somatic cardiovascular symptoms may over shadow the somatic symptoms of depression (Doyle *et al.* 2010). It has been recognized that in cardiovascular populations, as in most medical populations, determining if a somatic symptom is related to the underlying disease process or indicative of depression or both is especially challenging. The inability to determine if a symptom is related to an underlying disease process or depression may lead to under diagnosing depression in this vulnerable population. Properly identifying and understanding symptoms of depression, especially in women, is critical because of the associated poorer prognosis and worse cardiovascular outcomes seen in women with depressive symptoms (Frasure-Smith *et al.* 1999, Lespérance *et al.* 2000, Frasure-Smith & Lespérance 2003, Van Melle *et al.* & Barth *et al.* & Lett *et al.* 2004, Parashar *et al.* 2009).

Because of the deleterious effects of depression in CVD patients, the American Heart Association has recommended routine depression screening for all in-patient and out-patient cardiac patients (AHA 2008). Whether or not the AHA recommendation is enforced is unknown. The feasibility and cost-effectiveness of depression screening, for all cardiovascular patients, has been called into question (Caro *et al.* 2012). Identifying a subgroup of high-risk cardiovascular patients would narrow the initial screening to a subset of patients known to be at an increased risk for experiencing depressive symptoms. Although identification of depressive symptoms is indicated for all cardiac patients, prompt depression screening of women with CVD may be warranted given their propensity towards experiencing symptoms of depression and developing worse cardiac outcomes. Evidence that depression and cardiovascular mortality rates are even higher in younger women supports the need to further understand symptoms of depression in women across various age groups (Mallik *et al.* 2006, Vaccarino *et al.* 1999).

To our knowledge, no study has depicted specifically the symptoms of depression, in women hospitalized for ACS, by age group. Notably, the issue of under-representation of women in research, especially cardiovascular studies limits our knowledge of depression symptom experience in this vulnerable population (Berg 1999). Most studies have focused on the final depression score rather than examining specific depressive symptoms or limit the study to specific somatic or cognitive depressive symptoms of interest, excluding other symptoms of depression. Unfortunately to date, few studies have exclusively examined the specific depressive symptoms reported by hospitalized women, which may have implications for health care providers treating women hospitalized for and recovering from ACS. Because depressive symptoms have been associated with worse prognosis and higher rates of mortality, understanding the symptoms of depression, experienced by women across their lifetime, may influence depression screening efforts and health care management in women with CVD. To address this gap, we examined both somatic and cognitive symptoms of depression, between three defined age groups of women hospitalized with ACS.

Methods

Participants

A cross sectional observational study, with a convenience sample of 377 adult women, was recruited between November 2007 and November 2011 from two large teaching and research hospitals. Inclusion criteria for the present study included the following: (1) women age 18 years or older, (2) physician discharge diagnosis of ACS, defined as hospitalization for acute myocardial infarction; unstable angina; or angina requiring cardiovascular revascularization, (3) completed Beck Depression Inventory-II (BDI-II) (Beck *et al.* 1996), (4) English or Spanish speaking, and (5) ability to provide informed consent. Human subject approval was obtained through the University's Institutional Review Board and trained research nurses obtained written informed consent from each participant. Self-reported responses to demographic and clinical characteristics concerning general health status, previous hospitalizations, diagnosed medical conditions, and family health history were obtained and documented by trained research nurses after obtaining the informed consent.

Self-Reported Depressive Symptoms

Self-reported depressive symptoms were obtained using the BDI-II instrument, which reflects the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders Fourth Edition criteria for diagnosing depression and has been used previously in ACS populations (DSM 1994). The BDI-II was administered by trained research nurses, within 1 to 3 days of the patient's hospital admission. BDI-II scores range from 0–63. Depressive symptoms for each of the 21 BDI-II questions were defined as present if the participant chose 1, 2, or 3 on a 4-point Likert scale ranging from 0 to 3. A total depression score <14 was considered negative for depression, and a score between 14–63 was considered positive for depression. Three additional self-reported questions were obtained to determine current anti-depressant use, history of depressive symptoms, and history of depression diagnosis or treatment. The three questions required yes or no responses and were as follows: 1) Are you currently taking anti-depressants? 2) Have you ever felt sad or depressed much of the time in the past year? 3) Have you ever been diagnosed or treated for depression?

Statistical Analyses

Independent sample *t* tests were used to compare the continuous variables between the depressed (BDI-II ≥ 14) and non-depressed (BDI-II < 14) groups of women. Pearson chi-square tests for independence were used to examine associations between categorical data. Tukey's HSD tests were used with one-way ANOVA to conduct multiple comparisons between the three defined age groups: <49 years, 50–64 years, and ≥ 65 years. A significance level was set at 2-tailed with $p < 0.05$ deemed statistically significant. All data were analyzed using SAS 9.2 statistical software (SAS Institute Inc, Cary, NC).

Results

Demographic and Clinical Variables

Table 1 describes the entire sample of 377 women and compares the demographic and clinical characteristics of both the depressed $n=118$ (31%) and non-depressed $n=259$ (69%) women. Self-reported ethnicities included Caucasian (53.33%), African American (26.93%), Spanish/Hispanic/Latino descent (16.80%), Other race (2.93%), which included self-reported Asian, Pacific-Islander, Native American and race not reported as Spanish/Hispanic/Latino descent. Depressed women were younger (59.00 ± 14.00) than non-depressed women (66.00 ± 12.00) ($p < 0.0001$) and depressed women had significantly higher body mass indexes (32.31 ± 8.06) than non-depressed women (30.02 ± 7.41) ($p=0.007$). Women who self-reported a previous history of coronary artery disease had significantly higher depression rates (37.63%) compared to women with no self-reported history of coronary artery disease (25.53%) ($p=0.0118$). There were no significant between-group differences in any of the other variables.

Depressive Symptomatology

Figure 1 shows the percentages per age group, in women who screened positive for depression: 56.82% in the 29–49 age group; 37.91% in the 50–64 age group; and 19.44% in

the 65 age group. Figure 2 shows the prevalence of each of the 21 BDI-II depressive symptom questions for the women who screened positive for depression. As reported on the BDI-II, women frequently reported symptoms of tiredness or fatigue (96.61%), loss of energy (95.76%), and sleep changes (92.37%). Table 2 shows a comparison of three self-reported depression questions, mean BDI-II scores, and 21 BDI-II questions symptoms present for the three age groups, including only those women that screened positive for depression (n=118). Depressed middle-aged women (ages 50–64 years, 80.70%) and younger women (<49 years, 72.00%) were more likely than older women (≥65, 51.43%) to report feelings of sadness or depression in the past year (p=0.0116). However, middle-aged and younger women did not differ from the older women in current anti-depressant use (p=0.2319) or history of depression diagnosis or treatment (p=0.0991). Comparisons based on the BDI-II scores between the three age groups showed that there is a statistically significant difference between BDI-II scores among the 3 age groups (F=5.22, df= 2, 115, p =0.0068). Tukey's HSD test showed BDI-II scores of younger (24.76±8.99) and middle-aged (24.84±8.88) women are significantly higher than older women (19.40±6.71) (p<0.05). For 8 of the 21 self-reported BDI-II depressive symptoms, the proportion of depressed women was significantly different among the three age groups: sadness [<49 (76.00%), 50–64 (86.21%), ≥65 (58.82%) (p=0.0121)], past failures [<49 (68.00%), 50–64 (62.07%), ≥65 (38.24%) (p=0.0353)], punishment feelings [<49 (36.00%), 50–64 (39.66%), ≥65 (8.57%) (p=0.0047)], self-dislike [<49 (64.00%), 50–64 (68.97%), ≥65 (35.29%) (p=0.0054)], agitation [<49 (84.00%), 50–64 (84.48%), ≥65 (60.00%) (p=0.016)], worthlessness [<49 (44.00%), 50–64 (60.34%), ≥65 (25.71%) (p=0.005)], sleep changes [<49 (100.00%), 50–64 (94.83%), ≥65 (82.86%) (p=0.0293)], and irritability [<49 (88.00%), 50–64 (84.48%), ≥65 (58.82%) (p=0.0065)].

Discussion

While many studies have found that depression is especially prevalent in women, as well as unexplained worse cardiac outcomes, to the authors' knowledge, no known studies have exclusively examined the depressive symptoms reported by women hospitalized for ACS, by age group. Our study confirms that symptoms of depression are common in women hospitalized for ACS and that women report varied symptoms of depression based on age. In the present study, while the difference between mean BDI-II scores between the younger and middle-aged groups did not reach statistical significance, the difference was statistically significant when comparing the older women (≥65 years of age) to both the younger and middle-aged women (<65 years of age). Women <65 years of age were more likely than older women (≥65 years of age) to report feelings of sadness or depression in the past year, but no significant differences in current anti-depressant use or history of depression diagnosis or treatment were noted. These findings are similar to a previous study that examined whether younger women were prone to reporting depressive symptoms during hospitalization for myocardial infarction (Mallik *et al.* 2006). The authors reported that younger women (defined as women <60 years) had the highest depression scores out of any other age group (Mallik *et al.* 2006). Why women in this age group report more symptoms of depression remains unclear and warrant further research. Psychological (anxiety, stress, and, personality traits), physiological (hormonal influences), genetics, and social (gender

roles) factors may explain gender differences and differences across various age points in the prevalence of depressive symptoms in women (Kuehner 2003, Mallik *et al.* 2006).

In the present study, depressed women frequently reported symptoms of tiredness or fatigue, loss of energy, and sleep disturbances. 100 percent of the depressed women, in the 29–49 age group, reported these three somatic symptoms. It is interesting to note that the top three depressive symptoms reported are not only all somatic symptoms, but all three are symptoms that may indicate poor sleep quality. Presently, sleep disturbance has not been identified as a traditional cardiovascular risk factor, but evidence suggests that symptoms of sleep disturbance are associated with relative risks for CVD ranging from 1.5 to 3.9 (Speidelhalder *et al.* 2010). Future research is indicated to evaluate the impact of sleep symptom screening and sleep disturbance management or sleep hygiene measures on quality of life and CVD outcomes in women. Screening for symptoms of sleep disturbances may need to be particularly aggressive in women with CVD with or without additional symptoms of depression. Young women, with sleep disturbances, may also represent a particularly vulnerable group.

A strength of our study is that unlike previous studies of depression and ACS (often excluding or including a limited number of women), this study focused exclusively on women hospitalization for ACS. Our group has previously shown that somatic symptoms of depression may serve as meaningful indicators of depression among women with CVD (Frazier *et al.* 2012). In this study, women in all three age groups had frequent somatic complaints of tiredness or fatigue, loss of energy, and sleep changes. During hospitalization for ACS, the somatic symptoms of depression may also be symptoms of ACS, which often results in addressing the urgent coronary issues, while leaving the depression undetected and untreated (McSweeney *et al.* 2003). These somatic symptoms of depression often overlap with the symptoms of ACS reported by women (Eken *et al.* 2010). The inability to determine if a somatic symptom is related to an underlying cardiovascular disease process or depression may lead to under diagnosing depression or CVD in this vulnerable population. This underscores the importance with which health care providers must consider depression and CVD symptomatology in this at-risk population. We need to find a methodology of consistently addressing both pathologies as we try to manage depression and CVD in women. These may mean using or developing a more cognitively based depression screening instrument for women with CVD.

Limitations include the fact that this study was performed with primarily Caucasian women. Even though our sample did include representation of both African American and Spanish/Hispanic/Latino descent, our findings may not be generalizable to a more ethnically diverse population. In addition, while our study used a well-validated instrument to screen for twenty-one depressive symptoms, they were assessed via self-report, which may be subject to recall bias and the large number of associations tested increases the probability of committing a Type I error. Additionally, we did not use a diagnostic tool to definitively diagnosis depression; however, many studies have indicated that even minimal or mild symptoms of depression, although they may not meet the diagnostic threshold for depression, are still associated with poor clinical prognosis. This indicates that even depression screening alone may play an important role in possibly detecting sub-threshold

depression (Bush *et al.* 2001, Doering *et al.* 2011). It should also be mentioned that our cross-sectional design provided us with limited depression data evaluated only during the acute hospital setting. Our focus was on gaining a better understanding of the depressive symptoms reported by hospitalized women, in order to provide information to improve the recognition of depression in women hospitalized for ACS. Future research should consider gaining a broader understanding of the symptoms of depression reported by women, in both in-patient and out-patient settings. It is possible that some women may experience varied chronic symptoms of depression that may develop prior to hospitalization or might not develop until after hospitalization for ACS.

Conclusions

In conclusion, the present study found that symptoms of depression are common in women hospitalized for ACS and symptoms reported vary based on age. Being aware of the possible distinct depressive symptoms reported by women throughout their lifespan and their similarities to symptoms of ACS, may provide unique information for screening and identifying depression in women during hospitalization for ACS. Although depression screening is important in all ACS patients, women, especially younger women (<64 years of age), may represent a vulnerable sub-group of cardiac patients at high risk for depression. Women may benefit from targeted depressive screening. Younger women may represent a more narrowed subset of cardiovascular women at an even higher risk for symptoms of depression and subsequent adverse cardiac events. Understanding the varied depressive symptoms reported by women may have important clinical implications for health care providers, especially when caring for women during hospitalization for ACS. These findings may influence the way health care providers screen and manage the depressive symptoms reported by women with ACS.

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Accessible Summary

- Depressive symptoms are common in women hospitalized for acute coronary syndrome, but symptom experience and severity may differ across a women's lifetime.
- Tiredness or fatigue, loss of energy, and sleep disturbances were the three depressive symptoms most frequently reported by depressed women, hospitalized for acute coronary syndrome, across all age groups.
- These results stress the need to further understand the complexity of depressive symptoms in women with cardiovascular disease.

Figure 1.

Percentages per age group, in women hospitalized for acute coronary syndrome, which screened positive for depression as defined as a Beck Depression Inventory-II score 14

Figure 2.

Prevalence of self-reported depressive symptoms in depressed (Beck Depression Inventory-II 14) women hospitalized for acute coronary syndrome. Depressive symptoms were defined as present if the participant chose 1, 2 or 3 on a four-point Likert scale ranging from 0 to 3 for each of the 21 Beck Depression Inventory-II questions

Table 1

Comparison of demographic and clinical characteristics of depressed and non-depressed women hospitalized for acute coronary syndrome

Variables	All (n=377)	Depressed (n = 118)	Non-depressed (n = 259)	p-value
Age at Consent				<0.0001*
<i>M</i> (year) $\pm$ <i>SD</i>	64 $\pm$ 13	59 $\pm$ 14	66 $\pm$ 12	
Range	29–96	29–91	31–96	
Age Group				<0.0001*
29–49	44 (11.67)	25 (56.82)	19 (43.18)	
50–64	153 (40.58)	58 (37.91)	95 (62.09)	
65	180 (47.75)	35 (19.44)	145 (80.56)	
Body Mass Index				0.007*
<i>M</i> (lb/inch ²) $\pm$ <i>SD</i>	30.74 $\pm$ 7.68	32.31 $\pm$ 8.06	30.02 $\pm$ 7.41	
Range	16.47–61.33	19.22–61.33	16.47–58.70	
Race				0.7288
Caucasian	200 (53.33)	60 (30.00)	140 (70.00)	
African American	101 (26.93)	32 (31.68)	69 (68.32)	
Spanish/Hispanic Latino descent	63 (16.80)	21 (33.33)	42 (66.67)	
Some other race	11 (2.93)	5 (45.45)	6 (54.55)	
Marital Status				0.1843
Single, Divorced, Separated, Widowed	198 (52.94)	56 (28.28)	142 (71.72)	
Married	176 (47.06)	61 (34.66)	115 (65.34)	
Living Arrangement				0.5391
Live with spouse or family member	278 (74.33)	88 (31.65)	190 (68.35)	
Live alone	90 (24.06)	26 (28.89)	64 (71.11)	
Assisted living or nursing home	6 (1.6)	3 (50.00)	3 (50.00)	
Education				0.1185
High school	187 (50.00)	63 (33.69)	124 (66.31)	
Some college/vocational technical	105 (28.07)	36 (34.29)	69 (65.71)	
College Degree and above	82 (21.93)	18 (21.95)	64 (78.05)	
Smoking				0.423
Yes, currently	69 (18.45)	26 (37.68)	43 (62.32)	
Yes, but quit ($\leq$ 1 year)	103 (27.54)	32 (31.07)	71 (68.93)	
Never/rarely	202 (54.01)	59 (29.21)	143 (70.79)	
Alcohol				0.9144
Yes, currently	111 (29.68)	36 (32.43)	75 (67.57)	
Yes, but quit ($\leq$ 1 year)	18 (4.81)	5 (27.78)	13 (72.22)	
Never/rarely	245 (65.51)	76 (31.02)	169 (68.98)	
Coronary Artery Disease History				0.0118*
Yes	186 (49.73)	70 (37.63)	116 (62.37)	
No	188 (50.27)	48 (25.53)	140 (74.47)	

Values are in n (%)

Table 2

Comparison of self-reported depression questions, Beck Depression Inventory-II scores, and Beck Depression Inventory-II symptoms in depressed women hospitalized for acute coronary syndrome

Depression Questions	Depressed Women by Age Group				p-value	(df, statistic) ¹
	29-49 (n=25)	50-64 (n=58)	65 (n=35)			
Current anti-depressant use	6 (24.00)	20 (35.71)	7 (20.00)		0.2319	(2), 2.92
Feelings of sadness or depression	18 (72.00)	46 (80.70)	18 (51.43)		0.0116*	(2), 8.92
History depression diagnosis or treatment	9 (36.00)	32 (58.18)	14 (40.00)		0.0991	(2), 4.62
Beck Depression Inventory-II Score (0-63)					0.0068*	(2, 115), 5.22 ²
<i>M ± SD</i>	24.76 ± 8.99	24.84 ± 8.88	19.40 ± 6.71			
Range	14-46	14-48	14-44			
Beck Depression Inventory-II Symptoms						
Q1_Sadness	19 (76.00)	50 (86.21)	20 (58.82)		0.0121*	(2), 8.83
Q2_Pessimism	17 (68.00)	43 (74.14)	20 (57.14)		0.2359	(2), 2.89
Q3_PastFailure	17 (68.00)	36 (62.07)	13 (38.24)		0.0353*	(2), 6.69
Q4_LossPleasure	21 (84.00)	47 (81.03)	25 (71.43)		0.4237	(2), 1.72
Q5_GuiltFeelings	16 (64.00)	32 (55.17)	21 (60.00)		0.7377	(2), 0.61
Q6_PunishFeelings	9 (36.00)	23 (39.66)	3 (8.57)		0.0047*	(2), 10.72
Q7_SelfDislike	16 (64.00)	40 (68.97)	12 (35.29)		0.0054*	(2), 10.44
Q8_SelfCriticalness	17 (68.00)	39 (67.24)	16 (45.71)		0.0862	(2), 4.90
Q9_SuicidalWhish	6 (24.00)	14 (24.14)	4 (11.43)		0.2954	(2), 2.44
Q10_Crying	21 (84.00)	45 (77.59)	22 (62.86)		0.1365	(2), 3.98
Q11_Agitation	21 (84.00)	49 (84.48)	21 (60.00)		0.0160*	(2), 8.27
Q12_LossOfInterest	20 (80.00)	38 (65.52)	25 (71.43)		0.4097	(2), 1.78
Q13_Indecisiveness	15 (60.00)	36 (62.07)	20 (57.14)		0.8952	(2), 0.22
Q14_Worthless	11 (44.00)	35 (60.34)	9 (25.71)		0.0050*	(2), 10.61
Q15_LossOfEnergy	25 (100.00)	53 (91.38)	35 (100.00)		0.0672	(2), 5.40
Q16_SleepChanges	25 (100.00)	55 (94.83)	29 (82.86)		0.0293*	(2), 7.06
Q17_Irritability	22 (88.00)	49 (84.48)	20 (58.82)		0.0065*	(2), 10.09
Q18_AppetiteChanges	22 (88.00)	42 (72.41)	30 (85.71)		0.1538	(2), 3.74
Q19_Concentration	19 (76.00)	50 (86.21)	27 (77.14)		0.4102	(2), 1.78

Depression Questions	Depressed Women by Age Group			p-value	(df, statistic) ¹
	29-49 (n=25)	50-64 (n=58)	65 (n=35)		
Q20_TirednessFatigue	25 (100.00)	54 (93.10)	35 (100.00)	0.1175	(2), 4.28
Q21_LossInterestSex	19 (76.00)	46 (79.31)	29 (82.86)	0.8058	(2), 0.43

Values are in n (%); Current anti-depressant use within 1 year from date of interview; Feelings of sadness or depression experienced within 1 year from date of interview; Depression is defined as a Beck Depression Inventory-II score 14; Symptoms for each of the 21 Beck Depression Inventory-II questions were defined as present if the participant chose 1, 2, or 3 on a 4-point Likert scale ranging from 0 to 3;

¹ Chi-squared values;

² F value.