Depression and Somatic Symptoms within the Farming Community

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ABSTRACT. *The relationship between somatic symptoms and depression was investigated in a population of farm operators and their spouses. The sample consisted of principal farm operators and their spouses from northeastern Colorado. There were a total of 709 participants who completed data relevant for our analyses. Exploratory and confirmatory factor analyses were conducted on the symptom inventory, and suggested a two-factor structure. One of the factors consisted of symptoms of a psychological nature, and the other consisted of physical symptoms. While both of the factors were significantly correlated with depression, the factor with psychological items was more strongly related to depression. Gender differences in the symptom factor structure were investigated, and only a few minor differences were found. Gender differences in relationships between the somatic symptom factors and depression were also investigated and were not found. Implications for farm operators, spouses, and rural healthcare providers were discussed.*

Keywords. *Depression, Farmers, Health.*

Current research on farming communities indicates that mental health problems, specifically depression, are common (Scarth et al., 2000; Stallones et al., 1995). Linn and Husaini (1987) report that approximately 20% of the farming community can be classified as depressed. It has also been reported that farmers have one of the highest rates of suicide among all occupational groups (Stallones, 1990; Van Wijngaarden, 2003a).

Elevated levels of depression within farming populations may exist for many reasons specific to the unique population. Farming has always been a dangerous and stressful job. Farm operators and their spouses deal on a daily basis with heavy machinery, dangerous tools, and unpredictable (and often large) animals. Further, financial problems, isolation, overwork, unpredictable weather, and governmental regulations are just a few of the possible stressors that might cause strain. Researchers have found that these conditions alone make farmers more vulnerable to mental health problems (Booth and Lloyd, 2000). Pesticide exposure may also predispose farmers to higher risk of mental health disorders, including depression (Stallones and Beseler, 2002; Van Wijngaarden, 2003b). However, in the last few decades, the lives of farm operators and their spouses have been further complicated. Farm life is changing dramatically and rapidly. Over 100,000 agricultural jobs have disappeared in rural communities over the last 20 years, coupled with an increase of over one million people living within these same areas (Booth and Lloyd, 2000). The number of farmers has been drastically reduced within the last decade, and the trend appears to be continuing (Booth and Lloyd, 2000). Along with these increased

Article was submitted for review in February 2005; approved for publication by the Journal of Agricultural Safety and Health of ASABE in June 2005.

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  ISSN 1074-7583

stressors comes increased financial hardship, with fewer workers employed full-time and more farmers forced to seek other sources of income. They also face increased criticism of their farming practices from other rural residents and from the media (Booth and Lloyd, 2000).

Compounding the problem of relatively high rates of depression in the farming community is farmers' reluctance to seek treatment. This trend is prevalent in the rural community as a whole. Linn and Husaini (1987) report that only 5.3% of farmers and 5.7% of rural non-farmers have ever sought treatment for a mental health problem. Martinez-Brawley and Blundall (1989) claim that of 44 farming families interviewed, only 24 mentioned considering a professional social agency as a resource for mental health problems. The reason for the lack of mental healthcare utilization seems to be multifaceted. First, farm operators and their wives may not be seeking mental healthcare due to the negative stigma still associated with mental health problems within rural communities. Further, absence of mental health services in rural areas makes it difficult to find local mental healthcare professionals (Booth et al., 2000). Evidence that the stigma of depression is still prevalent is shown by Martinez-Brawley and Blundall (1991), who stated that Iowa and Pennsylvania farmers considered use of services associated with depression as the least socially acceptable of all services studied. Martinez-Brawley and Blundall (1989) reported that, of the services available in their communities, concerns about family reputation were the most important obstacle to seeking professional help for mental health problems. Another reason for under utilization of mental health services is an ingrained belief system that stresses alternative routes to solving problems (Martinez-Brawley and Blundall, 1991, 1989). Relying on one's own resources, seeking nonprofessional help, and passive waiting or praying rather than formal psychiatric treatment appear to be the alternative choices for farming populations (Linn and Hussaini, 1987). A number of researchers have suggested that there are problems with the services themselves (Linn and Hussaini, 1987; Martinez-Brawley and Blundall, 1991, 1989). Linn and Hussaini (1987) mentioned limited availability of services in the community and a lack of awareness of the available services as impediments for mental healthcare utilization.

A number of authors have suggested another problem surrounding mental healthcare utilization for people in general. Katon (1982), Cockerham et al. (1988), and Rowan et al. (2002) have suggested that individuals who are depressed may seek more traditional medical attention than non-depressed individuals. Research has shown that depression can lead to increased physical (somatic) symptoms (Cockerham et al., 1988; Meyer et al., 2000; Simon et al., 1999; Stoudemire et al., 1985). Katon (1982) suggested that an increase in physical symptoms leads a patient to seek medical attention. Since the patient may be describing very common symptoms, the doctor may treat the symptoms and not the underlying problem, depression. Patients and doctors may not recognize certain symptoms as being related to and indicative of depression. Therefore, patients may not seek mental healthcare, because they do not believe they have a mental health problem. Because of this, it is important for doctors to be better informed about the relationships between somatic symptoms and depression.

The Present Study

Given the high rates of depression and suicide and the decreased availability of mental healthcare services in farming communities, it is important for healthcare professionals to have alternative ways for identifying depressed patients. There is a need for physicians to be more aware of the somatic symptoms or groups of somatic symptoms that may be

related to depression. The current study attempted to identify groups of somatic symptoms that were closely related to depression, and in turn provided the medical community with additional tools for identifying depression. This study also explored differences between males and females with regard to somatic symptoms and the relationship between these symptoms and depressive symptoms. These differences were investigated due to the extensive literature suggesting higher rates of depression in women as compared to men (Nolan-Hoeksma, 1990; WHO, 2001).

Method

Sample

Data for this study came from a cross-sectional survey of farm operators and their spouses conducted in an eight-county area in northeastern Colorado. The sample was selected using a multi-stage area sample of farms in this eight-county area. The first stage of the sample was to randomly draw township range units from each of the eight counties proportional to the number of farms with a resident farm operator. Farm study units were then identified using rural directories and property value assessment files. Farm residents, operators, and spouses were recruited from the sampled farms for the study between 1993 and 1997. A total of 761 individuals representing 479 farms were enrolled in the study. The sample was comprised mostly of males (60.4%; some farmers did not have a spouse, and in some cases the spouse was not able to participate), of whites (98.2%), of high school graduates (90.4%), and of those above the age of 30 years (96.5%). Table 1 lists detailed demographic information. A total of 709 participants responded to all of the subsections of the questionnaire used for the current study.

Procedure

Participants were asked to complete a personal interview lasting between 45 minutes and 2 hours (farm operators and their spouses were interviewed separately). All of the interviews were conducted in English since there were no known Spanish-speaking-only farm operators in the eight-county area. Interviewers used a paper questionnaire for each participant. The interviewer took care to read each question and each possible response

Table 1. Selected demographic characteristics, Colorado farm family health and hazard surveillance eight-county survey, 1993-1997.

Characteristic	Males (*n* = 460) % (*n*)	Females (*n* = 301) % (*n*)	Total (*n* = 761) % (*n*)
Age in years			
<30	2.6 (12)	5.0 (15)	3.6 (27)
30-39	19.2 (88)	19.6 (59)	19.3 (147)
40-49	29.6 (136)	26.9 (81)	28.7 (218)
50-59	20.5 (94)	22.3 (67)	21.2 (161)
>59	28.1 (129)	26.3 (79)	27.3 (208)
Race			
White	98.3 (451)	98.7 (297)	98.3 (748)
Black	0.7 (3)	0.3 (1)	0.01 (4)
Asian, Pacific Islander	0.4 (2)	0.0 (0)	0.0 (2)
High school graduate			
Yes	88.0 (405)	94.0 (282)	90.4 (687)
No	12.0 (55)	6.0 (18)	9.6 (73)

category. The interviewer never mentioned that the respondent could respond by saying that he/she did not know or that he/she refused to answer the question, but some respondents did choose these options. These responses were coded as missing data for the purposes of our analyses. Two specific sections of the questionnaire were used in these analyses. These subsections included the Center for Epidemiological Studies Depression scale (CES-D), (Radloff, 1977) and the World Health Organization (WHO) neurological symptom inventory.

The CES-D scale is a 20-item scale with possible scores ranging from 0 to 60. Responses were made based on how the participant had felt or behaved during the week prior to the interview. The CES-D scale has been widely used and shown to be a valid screening tool for detecting depression (Radloff, 1977; Roberts, 1980; Sheehan et al., 1995). Rating categories include: rarely or none of the time (<1 day), some or a little of the time (1-2 days), occasionally or a moderate amount of the time (3-4 days), and most or all of the time (5-7 days). Four items were coded in the reverse direction from the 16 negative items on the scale. This scale's internal consistency reliability was $\alpha = 0.83$. Table 2 lists the CES-D items.

The WHO neurological symptom inventory was used as a measure of somatic symptoms. The reasoning for this choice was based on the definition of "somatic" and comparison of this inventory with other somatic symptom inventories. The Merriam-Webster dictionary defines somatic as "of, relating to, or affecting the body especially as distinguished from the germ plasm or the psyche." The items included in the WHO inventory are listed in table 3. A majority of the items refer to symptoms that are "of, relating to, or affecting the body." Since this inventory has not been traditionally used in studies of somatic symptoms, its content was compared to that of a more commonly used somatic symptom inventory, the Physical Symptom Inventory (PSI) (Cvetanovski and Jex, 1994; Hall and Spector, 1991; Jex and Spector, 1996; Spector and Jex, 1998). There were a number of item similarities between the two inventories. For instance, the PSI

Table 2. Center for Epidemiological Studies Depression (CES-D) scale items (Radloff, 1977).

The following twenty questions are a series of questions related to how you have felt or behaved during the past week. How often have you:
1. Felt bothered by things that don't usually bother you.
2. Not felt like eating; had a poor appetite.
3. Felt that you could not shake off the blues even with help from your family and friends.
4. Felt that you were as good as other people.
5. Had trouble keeping your mind on what you were doing.
6. Felt depressed.
7. Felt that everything you did was an effort.
8. Felt hopeful about the future.
9. Thought your life had been a failure.
10. Felt fearful.
11. Slept restlessly.
12. Felt happy.
13. Talked less than usual.
14. Felt lonely.
15. Felt other people were unfriendly.
16. Enjoyed life.
17. Had crying spells.
18. Felt sad.
19. Felt that people disliked you.
20. Felt that you could not get going.

asks, “During the past 30 days did you have dizziness?” Another item similar to an item on the WHO inventory asks, “During the past 30 days did you have headaches?” As a result of the similarity, we decided to proceed using the WHO inventory as a measure of somatic symptoms. The WHO inventory consists of 24 items, and items that are very similar to or the same as some of those on the PSI are identified by asterisks (*) in table 3. Participants were asked to respond regarding how often they had experienced the symptoms in the past month. Responses to these items were made on a five-point scale (1 = not at all, 2 = a little, 3 = moderately, 4 = quite a bit, 5 = extremely). The WHO inventory scale’s internal consistency reliability was $\alpha = 0.78$.

In analyzing the data, we first explored the structure of the WHO neurological symptom inventory items using a two-step approach. The first step involved an exploratory factor analysis, and the second step involved a confirmatory factor analysis. These analyses were conducted for the sample as a whole and then again with just women and just men. The separate analyses for men and women were conducted to determine if there were gender differences in inventory structure. After factors were identified, their relationships with depression were explored. Correlations between the components and depression were conducted using the entire sample, only females, and only males.

Results

Exploratory factor analysis was conducted using principal axis extraction and varimax rotation. A structure that included two factors was selected using the scree plot.

Table 3. The World Health Organization (WHO) neurological symptom inventory.

Tell me how often you have experienced the following symptoms in the past month.
1. Tired more easily than expected for the activity you do.*
2. Felt light headed or dizzy.*
3. Had difficulty concentrating.
4. Been confused or disoriented.
5. Had trouble remembering things.
6. Have your relatives noticed that you have trouble remembering things?
7. Had to make notes to remember things.
8. Found it hard to understand the meaning of newspapers, magazines, and books you have read.
9. Felt irritable.
10. Felt depressed.
11. Had heart palpitations even when not exerting yourself.*
12. Had a seizure.
13. Been sleeping more than is usual for you.*
14. Had difficulty falling asleep.*
15. Been bothered by incoordination or loss of balance.
16. Had any loss of muscle strength in your legs or feet.
17. Had any loss of muscle strength in your arms or hands.
18. Had difficulty moving your fingers or grasping things.
19. Had numbness or tingling in your fingers lasting more than a day.
20. Had numbness or tingling in your toes lasting more than a day.
21. Had headaches at least once a week.*
22. Had difficulty driving because you felt dizzy or tired even though you’d slept enough.*
23. Have you felt high from chemicals you use at work?
24. Have you had a lower tolerance for alcohol (takes less to get drunk)?

* Indicates items that are very similar to or the same as some of those on the PSI.

Cortina (2002) noted that use of the scree plot generally gives a more accurate picture of the number of factors to extract from factor analysis. Further, using other criteria for making this decision, such as eigenvalues greater than one, would suggest extracting eight factors, a number of which would only have one or two items loading on them. This creates a situation in which factors are poorly defined (Tabachnick and Fidell, 2001, pp. 622). The two-factor solution explained 23.52% of the variance in items. Rotated component loadings for all of the items are presented in table 4. There were a number of items that cross-loaded on the factors or did not load highly on either factor and were thus eliminated from the scale. The items eliminated were items 1, 2, 11, 12, 13, 20, 22, 23, and 24. The items that were retained are identified in table 4. The resulting first component includes symptoms that are more of a psychological nature (i.e., had difficulty concentrating, been confused or disoriented, felt irritable, felt depressed), and the second component included symptoms of a physiological (physical) nature (i.e., had incoordination or loss of balance, had any loss of muscle strength in arms or hands, had numbness or tingling in fingers lasting more than a day). Reliability was recalculated for both of the factors separately. The alpha reliability for the psychological factor and the physical factor were 0.77 and 0.74, respectively.

Table 4. Rotated factor loadings.

	Item	Factor 1 Psychological	Factor 2 Physical
1.	Tired more easily than expected for the activity you do.	0.45	0.36
2.	Felt light headed or dizzy.	0.31	0.35
3.	Had difficulty concentrating.[a]	0.69	0.13
4.	Been confused or disoriented.[a]	0.41	0.16
5.	Had trouble remembering things.[a]	0.52	0.13
6.	Have your relatives noticed that you have trouble remembering things?[a]	0.36	0.14
7.	Had to make notes to remember things.[a]	0.35	0.02
8.	Found it hard to understand the meaning of newspapers, magazines, and books you have read.[a]	0.34	0.09
9.	Felt irritable.[a]	0.72	0.06
10.	Felt depressed.[a]	0.69	0.14
11.	Had heart palpitations even when not exerting yourself.	0.29	0.09
12.	Had a seizure.	−0.06	0.04
13.	Been sleeping more than is usual for you.	0.28	0.23
14.	Had difficulty falling asleep.[a]	0.44	0.11
15.	Been bothered by incoordination or loss of balance.[b]	0.25	0.52
16.	Had any loss of muscle strength in your legs or feet.[b]	0.16	0.52
17.	Had any loss of muscle strength in your arms or hands.[b]	0.10	0.81
18.	Had difficulty moving your fingers or grasping things.[b]	0.12	0.69
19.	Had numbness or tingling in your fingers lasting more than a day.[b]	−0.07	0.36
20.	Had numbness or tingling in your toes lasting more than a day.	0.05	0.16
21.	Had headaches at least once a week.[a]	0.38	0.06
22.	Had difficulty driving because you felt dizzy or tired even though you'd slept enough.	0.27	0.20
23.	Have you felt high from chemicals you use at work?	0.03	−0.01
24.	Have you had a lower tolerance for alcohol (takes less to get drunk)?	0.17	0.19

[a] Retained items loading on factor 1.
[b] Retained items loading on factor 2.

The sample was next divided by gender, and exploratory factor analyses were rerun for both males and females. The results within both of the subsamples were very similar to those using the entire sample. The scree plots both indicated that two factors should be extracted. Further, rotated factor loadings showed patterns similar to those for the entire sample. In both the male and female subsamples, a seemingly psychological and physical component emerged. Factor loadings for both subsamples were similar to the factor loadings for the complete sample. Overall, the differences between the analyses by gender and for the entire sample were not substantial.

Next, a confirmatory factor analysis was run to compare the fit of this two-factor structure against a more parsimonious one-factor solution. This analysis indicated that the two-factor solution provided a better fit to the data than a one-factor solution. The relevant statistics are provided in table 5 and brief explanations follow. The goodness-of-fit index (GFI) and the adjusted goodness-of-fit index (AGFI) are similar in that they assess the proportion of variance in the sample covariance matrix accounted for by the estimated population covariance matrix; however, the AGFI value accounts for the number of parameters estimated. Values greater than 0.90 indicate an acceptable fit (Schermeileh-Engel et al., 2003). For the comparative fit index (CFI), higher values indicate a better fit (Schermelleh-Engel et al., 2003). Finally, the RMSEA index is a measure of the root mean square error of approximation. It is adjusted for degrees of freedom. Values for this index need to be below 0.10 to be acceptable (Steiger, 1990). In sum, the chi-squared change from the one-factor model to the two-factor model was significant, the RMSEA was lower for the two-factor model, and the remaining fit indices were higher for the two-factor model, indicating that the two-factor solution better fits the data.

To further support the two-factor structure, confirmatory factor analyses were conducted in the female and male subsamples. Both of these analyses produced results similar to those when the complete sample was used. The two-factor model seemed to fit the data better than the one-factor solution in both of the subsamples.

The resulting two somatic symptom factors were correlated to depression. Scores for depression were either one or zero. Responses for the depression items were summed, and then scores were categorized into two groups: (0) not depressed, and (1) depressed. Those that had a score of 16 or greater on the CES-D were considered depressed (Radloff, 1977). Table 6 displays the means, standard deviations, and correlations of the three variables of interest (somatic symptoms factor 1 − psychological symptoms, somatic symptoms factor 2 − physical symptoms, and depression). Correlations between all of the variables were significant ($p < 0.01$). The correlations that include the depression variable were point biserial correlations. The two somatic symptom factors were only moderately correlated, indicating that they were related, but the two should not be used interchangeably. The psychological symptoms factor was more strongly related to depression than the physical symptoms factor.

Finally, the sample was divided by sex, and the correlations were rerun. Tables 7 and 8 display means, standard deviations, and correlations for the variables of interest for males and females, respectively. The relationships between the somatic symptom factors and depression were similar in both groups. Further, the subsample correlations were

Table 5. Comparisons of the two-factor structure with the one-factor structure.

Model	χ^2	df	χ^2_{diff}	df_{diff}	GFI	AGFI	CFI	RMSEA
One factor	887.24[a]	65			0.82	0.75	0.67	0.13
Two factor	393.97[a]	64	493.27[a]	1	0.92	0.89	0.87	0.08

[a] $p < 0.01$.

Table 6. Means, standard deviations, and correlations for entire sample (*N* = 709).

Variable	M	SD	1	2	3
1. Depression	N/A	N/A			
2. Psychological symptoms	14.27	3.83	0.47[a],[b]		
3. Physical symptoms	5.60	1.61	0.20[a],[b]	0.36[a]	

[a] $p < 0.01$.
[b] Point biserial correlation.

Table 7. Means, standard deviations, and correlations for males (*N* = 434).

Variable	M	SD	1	2	3
1. Depression	N/A	N/A			
2. Psychological symptoms	13.81	3.57	0.42[a],[b]		
3. Physical symptoms	5.60	1.57	0.20[a],[b]	0.35[a]	

[a] $p < 0.01$.
[b] Point biserial correlation.

Table 8. Means, standard deviations, and correlations for females (*N* = 274).

Variable	M	SD	1	2	3
1. Depression	N/A	N/A			
2. Psychological symptoms	15.00	4.12	0.51[a],[b]		
3. Physical symptoms	5.62	1.69	0.20[a],[b]	0.38[a]	

[a] $p < 0.01$.
[b] Point biserial correlation.

very similar to those for the entire sample. All of the correlations were significant. The correlation between the psychological factor and depression was the correlation that varied the most from the male to female subsamples. A Williams t-test was conducted to see if this difference was statistically significant. These correlations were not significantly different ($t = 1.24$, $p > 0.01$).

Discussion

The current study identified a two-factor structure for a somatic symptoms inventory. The factor that included psychological symptoms had a stronger relationship with depression than the factor that included physical symptoms. However, it is noted that the physical symptoms factor did have a significant relationship with depression. It is also notable that the magnitude of the relationships between these variables was nearly unchanged when the sample was analyzed by gender. While the finding that somatic symptoms and depression are related is not novel, this study's findings lend additional support to the existence of this relationship and enhance healthcare professionals' ability to identify depressed individuals within the farming population.

Implications

The findings of this study imply that medical professionals might use somatic symptoms of a psychological nature as an aid in identifying patients who may be depressed. This may be particularly useful for rural or farming populations in which depression is a concern but limited mental healthcare resources are available and few people make use of those that are. A number of researchers (Cockerham et al., 1988; Katon, 1982; Rowan et al., 2002) have suggested that depressed individuals may seek more traditional medical attention than non-depressed individuals. Without knowing the

connection between somatic symptoms and depression, medical care providers may misdiagnose depressed individuals. If depression goes undiagnosed, different symptoms could appear and the depression could become increasingly severe (Horwath et al., 1994; Lehmann, 1983).

It is suggested that physicians increase their knowledge about depression so they can more easily identify when a patient might need mental health services. The current findings suggest that physicians and other healthcare providers should be aware of depression as a possibility when patients are reporting somatic symptoms. Further, it is suggested that farming communities be educated about symptoms of depression and mental healthcare. Education may help reduce the stigma that farm operators and their spouses associate with mental health issues and mental healthcare, and increase their likelihood of utilizing such services.

The findings of this study are also important for those researchers studying gender differences in depression. While it is well established that women are more likely to experience depression than men (Nolan-Hoeksma, 1990; WHO, 2001), depression does not seem to be differentially related to somatic symptoms based on gender. This seems to indicate that some aspects of the nomological network surrounding depression may be similar for both men and women. In any case, future research looking into other correlates of depression and establishing some cause and effect relationships between depression and its correlates would be helpful.

Limitations and Future Directions

The current study is not without limitations. Among the limitations is common method variance. The variables studied were investigated using self-report measures. There is a possibility that responses were related based on how the data were collected rather than what kinds of data were collected. We note that it would be difficult and sometimes futile to get information on depression and somatic symptoms from sources other than people themselves (e.g., patient privacy, knowledge of other people's symptoms). Another limitation is the use of theWHO measure of neurological symptoms. A strong case was made for the similarity of this inventory to typical somatic symptom inventories. Further, we would argue that the use of this measure is actually a strength of the study because it identifies another possible tool for identifying depressed people.

Conclusion

A number of studies have suggested that depression is a problem in the farming community (Booth and Lloyd, 2000; Linn and Husaini, 1987; Scarth et al., 2000; Stallones et al., 1995). Further, other research has noted that farmers are hesitant to seek help for mental health problems (Martinez-Brawley and Blundall, 1989, 1991). This study indicates that somatic symptoms in general, and those of a psychological nature in particular, are related to depression. This is an important step in improving medical care in farming populations, and it is hoped that future studies will be conducted to further assist farm operators, spouses, and rural medical care providers in alleviating problems with depression.

Acknowledgments

Support for this study came from the Centers for Disease Control, National Institute of Occupational Safety and Health (Grant No. U04/CCU806060) and the National Center for Injury Prevention and Control (Grant No. R49/CCR811509). The current study's contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control.

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