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Depression and Risk Factors Among Iowa Farmers

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SUMMARY. Previous studies have reported high rates of depression and suicide for farmers compared to other occupations. From a representative sample of 390 Iowa farmers in the Iowa Farm Family Health and Hazard Survey, we found that 12.1% of Iowa principal farm operators had depressive symptoms based on a cut-off point of 16 on a standardized questionnaire for depressive symptoms (the CES-D Scale). A weighted multiple logistic regression model yielded the following risk factors for depressive symptoms: had legal problems (adjusted odds ratio = 7.35, 95% confidence interval = 3.09-17.48); not married (3.89, 1.10-13.73); sentimental value loss (2.96, 1.03-8.54);

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substantial income decline (2.91, 1.67-5.06); and decline in general health assessment compared with the excellent health group [very good and good group (3.39, 0.82-14.06) and fair and poor group (5.41, 1.89-15.43)]. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-342-9678. E-mail address: getinfo@haworth.com]

KEYWORDS. Depressive symptoms, risk factors, rural, farm, CES-D

INTRODUCTION

Depression has been reported to contribute to increased suicide rates, and farmers have been reported to have a higher prevalence of depression than most other occupations.^{1,2} Higher suicide rates have been reported for farmers in the United Kingdom than for the general population.³ In the US, including Iowa, most studies report a higher suicide rate for agricultural workers than for nonagricultural workers,^{4,5} although lower rates of suicide were reported for Canadian and Swedish farmers than for non-farmers.^{6,7}

This study was designed to assess the prevalence and risk factors for depressive symptoms and their relationships among Iowa principal farm operators. The relationships and magnitudes of risk factors for depressive symptoms were measured for primary farm operators in the Iowa Farm Family Health and Hazard Surveillance Project (IFFHHS). If risk factors for depression can be identified and quantified, preventative strategies and treatments can be designed and implemented.

METHODS

Our data are from the health status survey of Iowa farmers (IFFHHS) which is funded by the National Institute of Occupational Safety and Health (NIOSH). This project was designed to determine the prevalence and incidence of health conditions and injuries for Iowa farm operators, family members and others who live or work on Iowa farms.

Population

A stratified two-stage cluster sample of farms in Iowa was selected from among the 101,000 Iowa farms included in the Iowa Agriculture

Statistics Service's (IASS) sampling frame of farms. The IASS defined a farm as a business with at least \$1000 income from agricultural products sold annually. The sampling frame was stratified by geographical region (crop reporting district) to account for differences in farming practices. The nine crop reporting districts approximate a grid created by the vertical and horizontal division of Iowa into three-by-three tiers. Two counties were randomly chosen from each crop reporting district (nine to twelve counties each). Farms were then randomly chosen from within each of these 18 counties for Phase I of the study. This two-stage cluster sampling was utilized to minimize travel costs for farm visits and medical screening.

Of the 2,643 farms selected by IASS, 1180 (44.7%) principal farm operators originally agreed to participate and 989 returned the Phase I questionnaire on farm characteristics and information about persons working and/or living on the farm. Principal farm operators on 390 of these 989 farms returned the comprehensive Phase II mail questionnaires on demographics, farming practices, medical symptoms and traumatic injuries, and stress and well being. The questionnaires were mailed to the principal operators in February 1994.

Variables

The Center for Epidemiology Studies Depression (CES-D) scale was used to determine our response variable of depressive symptoms. This scale has been widely used and has been shown to be a valid screening tool for detecting depressive symptoms.^{8,9,10,11} The CES-D scale is based on a series of 20 questions with a possible range of 0 to 60. We used the score of 16 or higher (commonly used by other researchers) to indicate a high level of depressive symptoms.^{12,13}

For the 344 principal operators who answered all 20 CES-D questions, 39 (11.34%) were classified to have high symptoms of depression. Failure to answer more than four questions (guidelines for CES-D allows maximum of four misses) prevented classification and resulted in the elimination of 23 farmers because they had more than eight missing. There were an additional 23 operators with one to three unanswered questions. Of these, four were classified as having high depressive symptoms because their total score equaled 16 or greater on their answered questions and fifteen were classified as not having high depressive symptoms because their total scores would still have been below 16 even if they had given the "worst" response for their unanswered questions. The remaining four operators were classified on the basis on their estimated total score [(20 times the total for answered questions)/number of answered questions]. One was classified as having high depressive symptoms. The other three

were not. Omitting these 23 operators with one to three unanswered questions might have biased the sample because 21.7% (5/23) were classified as having high depressive symptoms compared to 11.34% for those who answered all 20 questions.

Explanatory variables assessed as potential risk factors were age in years, age quartiles, educational level, current marital status, self-assessment of general health status, major occupation, gross farm income category, access to medical care and insurance, and self-assessment of hearing problems. Also, independent variables of tobacco and alcohol use, farm injuries and pesticides exposure, negative life events and social support (number of persons, friends and clubs) were evaluated. General health was modeled as two dummy variables for comparisons with the baseline of excellent health.

Analyses

Univariate odds ratios were calculated (SAS FREQ procedure with CMH option)¹⁴ to identify risk factors for inclusion in weighted logistic regression analysis. These regression analyses were weighted to reflect differences in the numbers of total and sampled farms in each county within crop reporting districts. All significant (univariate $P < 0.05$) explanatory variables were included in the weighted stepwise logistic regression analyses (SAS LOGISTIC procedure).¹⁵ We used $P < 0.20$ to enter and $P < 0.05$ to stay in the model. A total of 332 observations were included, 25 were omitted for missing one or more of the 12 independent variables and 23 for missing the response variable. General health was modeled as a quasi-continuous variable in stepwise logistic regression analyses (SAS) to determine risk factors ($P < 0.05$) for evaluation in the final logistic regression model in SUDAAN.¹⁶ For this final model, general health was modeled as two dummy variables for comparisons with the baseline of excellent health (SUDAAN PROC LOGISTIC).¹⁶ SUDAAN was used for the final logistic analyses to fully account for the complex structure of our stratified two-stage cluster sample and produce appropriate estimates of standard errors. SUDAAN is a statistical package designed specifically for complex multi-stage surveys. Adjusted odds ratios and confidence intervals are included for the significant ($P < 0.05$) risk factors in the final model. These adjusted odds ratios are estimates of the influence for each explanatory variable after adjusting for the other explanatory variables in the model.

RESULTS

Overall, 12.1% of the 367 Iowa principal farm operators had high depressive symptoms based on the 16 cut-off point. The mean for total CES-D score was 7.07 with SD = 7.68 and a range of 0-53. Most farm operators (98.7%) were male and the mean age was 52.9 and SD = 12.3 years. Depressive symptoms were not significantly related to age in years or quartiles.

Frequencies and univariate odds ratios for significant ($P < 0.05$) potential risk factors for depressive symptoms are summarized in Table 1. Principal operators who were not married, farmed as major occupation, had lost something of sentimental value, had substantial income decline,

TABLE 1. Weighted frequencies and univariate odds ratios for risk factors for depressive symptoms for principal farm operators.

| Variable | Frequency, % | Odds Ratio | 95% C.I. ^a |
|--|--------------|------------|-----------------------|
| Not married | 8.65 | 2.87 | 1.23-6.69 |
| Farming major occupation ^b | 80.06 | 3.74 | 1.25-11.21 |
| Sentimental value loss | 16.39 | 3.98 | 2.07-7.63 |
| Substantial income decline | 40.61 | 3.54 | 1.87-6.70 |
| Gone deeply in debt | 21.84 | 3.25 | 1.73-6.12 |
| Had legal problems | 7.15 | 10.89 | 5.28-22.46 |
| <u>General health assessment^c</u> | | | |
| Excellent | 22.21 | 1.00 | NA |
| Very good or Good | 71.31 | 2.73 | 1.00-7.45 |
| Fair or Poor | 6.48 | 9.36 | 2.89-30.29 |
| No medical insurance ^d | 7.26 | 2.99 | 1.19-7.51 |
| Has hearing loss | 52.86 | 1.98 | 1.03-3.78 |
| Apply livestock insecticide | 28.31 | 1.98 | 1.03-3.80 |
| Support persons ^e | 1.37 | NA | NA |

^a95% confidence intervals from weighted logistic regression.

^bFarming at least 50% of the time.

^cOdds ratio for comparisons with excellent self health assessment.

^dWithout medical insurance sometime during the last two years.

^eThree classes for number of persons (none, 1-5, > 5).

had gone deeply in debt, had legal problems, had low self-assessment of general health, were recently without medical insurance, had loss in hearing, and/or applied livestock insecticides were at least 1.98 times as likely to show symptoms of depression as farmers without these risk factors.

Frequencies and univariate odds ratios for other potential explanatory variables for depressive symptoms are summarized in Table 2. None of these factors (trouble seeing, currently smoking, binge alcohol drinking, no support persons, educational level or gross sales) were significantly ($P > 0.05$) related to the prevalence of depressive symptoms.

The results of weighted logistic regression analyses (PROC LOGISTIC in SUDAAN)¹⁶ are summarized in Table 3. Except for current marital status, the time frame for these risk factors was for the last 12 months (i.e.,

TABLE 2. Weighted frequencies and univariate odds ratios for other potential explanatory variables for depressive symptoms for principal farm operators.

| Variable | Frequency, % | Odds Ratio | 95% C.I. ^a |
|--------------------------------------|--------------|------------|-----------------------|
| Has trouble seeing | 6.27 | 1.83 | 0.58-5.75 |
| Current smoker | 13.02 | 1.49 | 0.65-3.38 |
| Binge drinker ^b | 18.67 | 1.57 | 0.77-3.26 |
| No support persons ^c | 7.78 | 2.13 | 0.80-3.78 |
| <u>Education level</u> | | | |
| Not high school graduate | 11.42 | 1.00 | NA |
| High school graduate | 45.12 | 1.69 | 0.49-5.85 |
| Some college | 23.97 | 1.13 | 0.28-4.43 |
| College graduate | 19.48 | 1.08 | 0.26-4.44 |
| <u>Gross sales value^d</u> | | | |
| < \$40,000 | 30.33 | 1.00 | NA |
| \$40,000-\$100,000 | 28.97 | 1.46 | 0.59-3.62 |
| > \$100,000 | 34.09 | 1.82 | 0.79-4.19 |
| No answer/don't know | 6.60 | 1.92 | 0.54-6.85 |

^a95% confidence intervals from weighted logistic regression.

^bDrank at least five alcoholic drinks on at least one occasion in past month.

^cOdds ratio for none compared with some support persons.

^dAnnual gross sales value for the farm in the past 12 months.

TABLE 3. Adjusted odds ratios^a for risk factors for depressive symptoms for principal farm operators.

| Risk factors | Odds ratio ^b | 95% C.I. ^c |
|--|-------------------------|-----------------------|
| Had legal problems | 7.35 | 3.09-17.48 |
| Not married | 3.89 | 1.10-13.73 |
| Sentimental value loss | 2.96 | 1.03-8.54 |
| Substantial income decline | 2.91 | 1.67-5.06 |
| <u>General health assessment^d</u> | | |
| Excellent | 1.00 | NA |
| Very good or Good | 3.39 | 0.82-14.06 |
| Fair or Poor | 5.41 | 1.89-15.43 |

^aRisk factors from weighted SUDAAN logistic regression, n = 359.

^bAdjusted for other risk factors included in the model.

^c95% confidence intervals from LOGISTIC SUDAAN analyses.

^dOdds ratio for comparisons with excellent self health assessment.

prior to February 1994). The likelihood of depressive symptoms was 7.35 times greater if principal operators had legal problems. Each of the following three risk factors (not being married, substantial income decline, and sentimental value loss) increased the depressive symptom rate from 2.91 to 3.89 times.

For general health self-assessment, principal operators in group 2 (very good and good health) and those in group 3 (fair and poor health) had higher prevalence of depressive symptoms than the excellent health group by 3.4 times and 5.4 times higher, respectively. Principal operators with very good and good self health assessment were grouped together in one class because they had similar depressive symptom rates, 12.38% and 13.16%, respectively. Those with poor and fair health were combined into one group because of their low numbers and frequencies, 19 (5.19%) and 2 (0.55%), respectively.

Based on univariate analyses, principal farm operators were more likely to have symptoms of depression ($P < 0.05$) if they: were without medical insurance in the last two years, were without support persons for discussing their problems, were farming as their major occupation, had applied livestock insecticides, had hearing loss, and/or had gone deeply in debt.

However, these six were not significant explanatory variables in stepwise logistic regression for depressive symptoms.

Stratified analyses of 2×2 tables were evaluated to assess possible interactions among independent variables. No interactions among risk factors for depressive symptoms were significant for combinations of variables with no missing interaction cells.

DISCUSSION

Overall prevalence of high depressive symptoms was 12.1% for Iowa principal farm operators (98.7% male). Based on a national health survey, Sayetta (1980) reported a 17.3% prevalence of high depressive symptoms for the general population.² Stallones reported a prevalence of 7.9% in males and 11.1% in females for Colorado farmers (selected from owners of registered farm trucks).¹⁷ Compared to our results, Belyea¹⁸ and O'Brien¹⁹ reported higher rates of depressive symptoms, 35% of Ohio farmers and 26.1% of rural Missourians, respectively.

Most of our comparisons are made with Colorado's results for men because 98.7% of our sample were men and both studies measured similar traits. Substantial income decline increased ($P < 0.05$) the chances of high depressive symptoms in both studies; odds ratios were 2.91 for Iowa and 2.48 for Colorado farmers, respectively. A higher percentage of Iowa farmers (40.61%) than Colorado males (23.7%) had substantial income decline. This difference may have been related to the timing of our survey because it followed a disastrously poor crop season for Iowa farmers due to the floods of 1993. Perhaps this poor crop season contributed to a higher percentage of Iowa farmers with substantial income decline which in turn may have contributed to higher prevalence of depressive symptoms. The time frame for all our financial risk factors was the 12 months prior to February 1994.

Also, not being married was a significant risk factor for both Iowa and Colorado farm operators. A much lower percentage of Iowa farm operators were unmarried than Colorado male farmers, 8.7% and 47.6%, respectively. The percentage of unmarried Colorado male farmers was unexpectedly high. We would have expected a higher prevalence of depressive symptoms if more Iowa farmers had been unmarried.

In Iowa farmers, legal problems were the highest single risk factor and increased the prevalence of depressive symptoms by 7.35 times. Legal problems were not recorded in the Colorado study. Belyea¹⁸ and Armstrong²⁰ both reported that financial strain (debt/assets) contributed to depressive symptoms.

In both studies, prevalence of depressive symptoms increased as self-assessment level for general health declined. General health was modeled as two dummy variables for comparisons with the baseline of excellent health in our study and as a quasi-continuous variable in the Colorado study.

The risk factors we identified were logical and most were similar to other studies. Legal problems, substantial income decline, not being married, recent losses of sentimental value and low general health assessment are not only significant risk factors, but also tend to be cumulative in effect.

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