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Organizational Resources and Social Support Influences on Stress and Depression: A Comparison among Cooperative and Non-Cooperative Farmers

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Abstract

Background—Farmers are disproportionally affected by depression and suicide. Social connectedness has been shown to reduce depression and suicide among the general population but its impact on farmers is less well-known. Our previous research indicated that farmers who had cooperative resources and social support reported decreased symptoms of depression. However, it was unclear whether farmers who were not cooperative members or utilized resources from non-cooperative organizations differed from cooperative farmers in mental health.

Methods—A survey consisted of online self-completion and phone interviews was conducted among 307 participants (197 co-op, 110 non-co-op) to examine whether Midwest (north central United States) cooperative and non-cooperative farmers differ in perceived stress and symptoms of depression and whether potential differences were impacted by program use, program satisfaction, and social support.

Results—Cooperative farmers reported lower perceived stress and symptoms of depression than non-cooperative farmers and the difference was statistically significant for perceived stress. Use of educational programs, such as training and mentorship, was associated with decreased perceived stress but not symptoms of depression. Satisfaction with programs and social support were associated with decreased perceived stress and symptoms of depression. Program satisfaction was observed to have more associations with decreased perceived stress and symptoms of depression than program use.

Conclusions—Results reveal that organizational resources and social support can mitigate mental health risks among farmers. This study highlighted an opportunity for future investigation of social connectedness in addressing farmers' mental health.

Disclosure statement

We have no financial or other conflicts of interest to disclose.

Keywords

Farmers; cooperatives; organizational resources; perceived stress; symptoms of depression

Introduction

Suicide rates among male farmers were 36.1 per 100,000 population compared to 27.4 in males of the general population.[1] Extensive research has identified increased risks among farmers linked to health conditions, financial insecurity, and occupational environments.[2] However, limited research exists to illuminate prevention opportunities for farmers. Reducing the multilevel risks likely requires systematic reforms, whereas, promoting social connectedness is actionable at a community level. In fact, enhancing social connectedness is one of the Centers for Diseases Control and Prevention's (CDC) recommendations to prevent suicide.[3] CDC defines social connectedness as "the degree to which a person or group is socially close, interrelated, or shares resources with other persons or groups".[4] In addition, social connectedness encompasses subjective relationships with others, which is often conceptualized by social support.[5]

Social support in this manuscript refers to the perceived availability of assistance from family, friends, and community members. Social support protects psychological wellbeing among the general population because it encourages positive cognitive emotions and healthy coping behaviors.[6,7,] However, few studies have been conducted among farmers, who likely have different attitudes towards mental health than the general population. We previously reported that tangible, informational, and emotional support reduced symptoms of depression among cooperative (co-op) dairy farmers.[8] While this observation was consistent with the literature that social support lessens depression symptoms among the general population[9], more research is needed to delineate its impacts on stress and depression among farmers.

Co-ops, trade associations, and extension offices provide farmers resources and engagement opportunities. Co-ops typically market commodities, deliver services, engage members in decision-making, and advocate on issues affecting farming communities.[10,11] Our initial research shows that participating in co-op educational and mentorship programs are associated with fewer symptoms of depression among Midwest farmers.[8] However, more research is needed to explore the roles of co-ops on farmers' mental health. Associations and extension offices (hereinafter non-co-ops) provide comparable services and engagement programs to meet members' production and social needs. Many trade associations offer sector specific services and function as education and advocacy networks.[12,13] Extension offices are land-grant university affiliates, disseminating agricultural research findings and best practices to farmers.[14,15] Research is needed to understand whether the programs delivered by co-ops and non-co-ops influence mental health. Specifically, it is unclear whether co-op and non-co-op farmers differ in stress and depression and how potential differences relate to organizational participation.

Methods

Study design

We conducted a cross-sectional study among Midwest farmers to examine whether perceived stress and symptoms of depression differ by co-op membership, and how these outcomes differ in relation to the frequency of use and satisfaction of co-op and non-co-op programs and social support. The Midwest is a north central region in the United States comprising North Dakota, Minnesota, Wisconsin, Michigan, South Dakota, Nebraska, Iowa, Kansas, Missouri, Illinois, Indiana, and Ohio (Figure 1). A survey with online and phone participation options was administered from January to May 2021. Online participants were recruited from farmer organizations in which the responding staff emailed the study invitation to their farmer-members. Farmer organizations we reached out to include farmer-to-consumer groups (e.g., farmers' markets, online buying group), member organizations (e.g., Practical Farmers of Iowa, Farmers Union), and extension offices. Phone participants were recruited from a subscription list purchased from an agricultural data marketer. Study participant eligibility criteria were farm operators who were 18 years or older AND managed a farm during the last 12 months. Participants completing the survey received a $15 check. The study was approved by the University of Iowa Institutional Review Board.

Measures

The primary exposures were the frequency of programs used and program satisfaction. Programs encompassed marketing and sales, technical support, financial services, education, policy engagement, and farmer support networks from co-ops and non-co-ops. Frequency of programs used was measured by a 5-point scale (0 = never to 4 = very often). Participants who indicated using any programs were asked to rank program satisfaction using a 4-point scale (0 = dissatisfied to 3 = satisfied). The secondary exposure was social support, measuring by a 4-item scale that was identified in studies examining stress following the 1980s farm crisis.[16, 17] Participants ranked their emotional support, financial support, tangible support, and informational support from disagree (0) to agree (3).

The outcome measures, perceived stress and symptoms of depression, were assessed by the 10-item Perceived Stress Scale (PSS) and the 10-item Center for Epidemiologic Studies Depression Scale (CES-D), respectively.[18,19] The PSS instrument assesses stress on a 5-point scale (0 = never to 4 = very often) related to unpredictable, uncontrollable, and overloading life events occurring in the last month.[20] The maximum total PSS score is 40 and high scores suggest increased stress levels. The CES-D instrument assesses feelings in the last week on a 4-point scale (0 = none of the time to 3 = all of the time).[21] The maximum total CES-D score is 30 and high scores indicate increased symptoms of depression. Both tools have been used to examine stress and depression among farmers.[22–25]

Treatment of variables

The use of each program was aggregated into *never* and *ever* due to its left-skewed distribution. *Never* included participants who never used a program from co-ops and non-co-ops. *Ever* included participants who used a program at least once from at least one source. Program satisfaction was collapsed into *not completely satisfied* and *completely satisfied*

due to its right-skewed distribution. *Not completely satisfied* included participants who were dissatisfied, slightly dissatisfied, and slightly satisfied with programs from co-ops and non-co-ops and *completely satisfied* included participants who were satisfied with programs from at least one source. “Slightly satisfied” was grouped with *not completely satisfied* because of small cell sizes.

The total scores of PSS and CES-D were calculated for each participant by first reversing scores of positively phrased symptoms on each instrument and then by summing up their respective 10-item scores.[18, 19] Residuals between program use, social support, and CES-D scores were not distributed normally, even after log-transforming the scores. We converted these CES-D scores into a five-level ordinal categorical variable.[26]

Analyses

We investigated whether participants differed across demographics and farm operation characteristics using Chi-square tests and whether outcome variables differed by co-op membership and exposure variables using two sample t-tests and Kruskal-Wallis tests. Associations between exposure and outcome variables were examined using multivariable linear and ordinal logistic regressions. The regression models first examined whether each exposure variable was associated with the outcome variables. All exposure variables with statistical significance were then included in subsequent models to investigate their effects on the outcome variables. All analyses were conducted using SAS version 9.4 (SAS Institute Inc., Cary, North Carolina).

Results

Demographic and operation characteristics

The total sample encompassed 307 participants (197 co-op, 110 non-co-op), among them 112 participated by phone and 195 through online. The phone response rate was 9.9%. The online response rate was undetermined because the number of individuals that received the study invitation from farm organizations was unknown. Co-op participants had a significantly higher mean age than non-co-op participants [co-op = 56 years (SD = 14), non-co-op = 47 years (SD = 13), $p < 0.0001$]. Co-op and non-co-op participants were also significantly ($p < 0.05$, Table 1) different in demographics and farming characteristics but similar in mental health stressors.

Outcome differences by co-op membership and program use

The perceived stress analysis used the full sample (N = 307) while the symptoms of depression analysis excluded eight participants who skipped the CES-D scale (N = 299: 191 co-op, 108 non-co-op). Co-op participants had a significantly lower perceived stress mean score than non-co-op participants [co-op = 15 (standard deviation [SD] = 6.48), non-co-op = 19 (SD = 4.92), $p < 0.0001$]. The mean perceived stress scores were in the range of 14 to 26 for moderate stress. Co-op participants also had a lower mean score for symptoms of depression than non-co-op participants, but this difference was statistically nonsignificant [co-op = 7 (SD = 4.53), non-co-op = 8 (SD = 5.13), $p = 0.1464$]. The mean depression symptom scores were lower than the cut-off 10 for significant depression risk.

Participants who *ever* used a program reported lower stress scores than participants who *never* used the same program, regardless of co-op membership. The decreased stress scores were significant ($p < 0.05$) for technical support among all participants, and for financial services and education among non-co-op participants. Participants who *ever* used support networks reported significantly ($p < 0.05$) higher stress scores than participants who *never* used this program. Associations between depression symptom scores and each of the programs was statistically non-significant ($p \geq 0.05$).

Outcome differences by program satisfaction

Participants who were *completely satisfied* with programs reported lower stress and depression scores than participants who were *not completely satisfied* with the same programs. The lower stress scores were significant ($p < 0.05$) across all program satisfaction ratings except for support networks among co-op participants and all programs among non-co-op participants. The low depression symptoms scores were significant ($p < 0.05$) across all program satisfaction for co-op and non-co-op participants except for policy engagement and support networks.

Outcome differences by social support

Co-op and non-co-op participants had significantly ($p < 0.05$) lower perceived stress and symptoms of depression scores when they agreed that tangible support, financial support, and emotional support were available, compared to participants who slightly agreed, slightly disagreed, or disagreed. Non-co-op participants who disagreed with having informational support reported significantly ($p < 0.05$) lower perceived stress scores than participants who slightly disagreed, slightly agreed, or agreed with having this support.

Multivariable regression analyses of individual exposure and outcome variables

Program use—Participants who were older or farmed more than 1,000 acres reported significantly ($p < 0.05$) lower perceived stress scores than participants who were younger or farmed less than 1,000 acres. Participants who were females or used antidepressants reported significantly ($p < 0.05$) higher perceived stress scores than participants who were males or did not use antidepressants, respectively. Participants who *ever* used programs in marketing and sales, technical support, financial services, education, and policy engagement reported lower stress scores when compared to those who *never* used these programs, but the difference was only significant ($p = 0.0193$) for education. Participants who *ever used* programs in marketing and sales, education, policy engagement, and support networks reported lower but non-significant ($p \geq 0.05$) depression symptom scores when compared to those who *never* used these programs.

Program satisfaction—Satisfaction across all programs except for education was associated with significantly ($p < 0.05$) decreased perceived stress scores when compared to dissatisfaction with the same programs. Satisfaction with marketing and sales, technical support, financial services, and education programs was associated with significantly ($p < 0.05$) decreased depression scores when compared to dissatisfaction with these programs. Age and sex did not significantly ($p \geq 0.05$) impact the relationships between program

satisfaction and outcome variables. Using antidepressants was associated with significantly ($p < 0.05$) higher depression scores.

Social support—Each social support measure was associated with significantly ($p < 0.05$) decreased perceived stress and symptoms of depression scores. Older participants reported significantly ($p < 0.0001$) lower stress scores than younger participants. Participants who were females or used antidepressants reported significantly ($p < 0.05$) higher stress scores than participants who were males or did not use antidepressants. Participants who used antidepressants or facing financial hardships typically reported significantly ($p < 0.05$) increased depression scores than participants who did not have these conditions.

Multivariable regression analyses of all significant exposures and outcome variables

The final analyses only included significant programs. Being older, having a large farm size (> 1,000 acres), and using educational programs were associated with decreased perceived stress, while being a female and using antidepressant medications were associated with increased perceived stress (Table 2). Satisfaction with financial services was associated with decreased symptoms of depression, while using antidepressant medications was associated with increased symptoms of depression.

The final analyses included all social support measures with statistical significance. The results show that being older and having tangible support and financial support were associated with decreased perceived stress, while being a female and using antidepressant medications were associated with increased perceived stress (Table 3). Being older and having emotional support were associated with decreased symptoms of depression, while using antidepressant medications and experiencing financial hardships were associated with increased symptoms of depression.

Discussion

Demographics and farming characteristics

Our sample encompassed 64% co-op and 36% non-co-op members, which was close to the national farmer demographics. The USDA agricultural cooperative statistics documented nearly 1.9 million (56%) co-op members in 2017.[Citation27] Co-op participants were primarily experienced male farmers of large grain operations, whereas many non-co-op participants were beginning female farmers of small-scale vegetables and other specialty crops. These characteristics were consistent with the sampled region that mainly produces grain while also cultivating diverse crops and livestock. Furthermore, female farmers tend to engage in diverse small-scale productions.[Citation28]

Findings

Co-op participants reported fewer symptoms of perceived stress and depression than non-co-op participants and the difference was only statistically significant ($p < 0.05$) for perceived stress. Regression analyses revealed three key findings. First, the use of educational programs was only *protective* against perceived stress, and the use of any program did not predict symptoms of depression. This observation was not surprising. Depression is

a chronic condition, and it is likely shaped by factors with long-term effects, such as financial hardships, relationship problems, and social isolation. It was also possible that participants who experienced depression symptoms were less likely to seek out programs. Second, satisfaction with programs was *protective* against perceived stress and symptoms of depression. As satisfaction across all programs except for education increased, perceived stress decreased. Likewise, as satisfaction with marketing and sales, technical support, financial services, and education increased, symptoms of depression decreased. These results suggest that co-ops and non-co-ops influence farmers' stress and depression through program offerings related to market stability, financial services, and social engagement. In addition, the quality of relationships with co-ops and non-co-ops (*i.e.*, high program satisfaction) was more indicative of farmers' mental health than the level of interaction (*i.e.*, high frequency of participating in a program). These findings establish evidence of the protective effects of organizational participation on farmers' mental health.

Third, social support was *protective* against perceived stress and symptoms of depression. Participants having social support reported lower stress and depression scores than participants who did not have social support. Regression analysis revealed that when multiple types of support are available, only tangible support and financial support decreased perceived stress, and only emotional support decreased symptoms of depression. While the results confirm that social support reduces psychological distress among older farmers,[17] they point out that it does not reduce stress for farmers who are a female or using antidepressants. These observations were consistent with the literature that the mental health effects of social support are specific to the type of support[7], and the heterogeneity is likely due to variability in social support measures.[9]

The overall findings of decreased perceived stress and symptoms of depression that were associated with specific programs, program satisfaction and social support are consistent with the literature that social connectedness lessens mental health risks.[29,30] Specifically, social connectedness creates psychological gains (*e.g.*, sense of belonging, shared social identity), influences healthy behaviors, and provides coping resources.[31,32] For instance, US adults who had diverse social engagement such as attending faith-based activities and interacting with friends reported fewer symptoms of depression than adults whose social networks were limited to few family members or friends.[31] Cruwys et al found that depression relapse reduced by 63% when increasing social groups from zero to three.[32] To our knowledge, no studies have investigated the mental health impacts of farmers' relationships with organizations.[33,34] This study fills a critical gap in the social connectedness literature.

Female farmers reported higher stress levels than male farmers, which is consistent with the limited mental health literature on this population.[35] The underrepresentation of female farmers in studies hinders our understanding of contextual factors impacting their wellbeing. Nonetheless, the additional roles (e.g., a caregiver, a childcare provider, and a health insurance policyholder through off-farm employment) they undertake and the lack of recognition as farmers[36] may worsen their mental health more than that of male farmers.

Study limitations

The cross-sectional study design limited our ability to determine causality between program participation and mental health. The findings however suggest that future prospective studies to establish causality are warranted. Using interviewers to administer the questionnaire may have led participants to respond to questions in ways they viewed were socially desirable. This bias may underestimate stress and depression symptom scores,[37] inflating the effects of program use, program satisfaction, and social support on outcomes. However, to minimize the likelihood of low statistical power from a small sample size, we decided to offer online and phone survey options to encourage study participation. We examined the effects of online and phone participation on outcomes and observed statistically nonsignificant ($p \geq 0.05$) results. In addition, participants with negative affectivity may have had overstated stress and depression, program dissatisfaction, and social support.[38] This may have been a problem because the questionnaire was administered during the COVID-19 pandemic, but we do not expect that negative affectivity biased findings. The COVID-19 pandemic has had an impact on mental health across populations.[39] Nondifferential bias was possible as the pandemic may have resulted in participants increasing their reporting of exposure (program use) regardless of the outcome status (stress, depressive symptoms). Finally, our sample included farmers who participated in different co-ops and organizations, which likely introduced heterogeneity in program use and satisfaction and therefore the ability to interpret the association of programs on mental health. Future studies comparing programs within the same organization could reduce this heterogeneity.

Implications

This study makes a convincing argument for investigating the effects of social connectedness on farmers' mental health. Organizational participation overlaps the social-ecological model that has been used to examine multilevel mental health determinants. At the organizational level, co-ops allow farmers to collectively negotiate for markets and services.[15, 40] Through the cooperative process, farmers maintain their independence while developing a sense of belonging and control. Researchers refer to this phenomenon as social identity framing (*e.g.*, we the co-op owners) whereby members perceive themselves as part of a group that shares values and beliefs rather than an isolated self.[33, 34, 41] The self-concept and practices of aligning individual attitudes and behaviors with the group are powerful predictors of health. The material and psychological resources provided by organizations to address farmers' economic and social needs should be emphasized in public health research.

From a policy perspective, supporting farmer organizations is needed to ensure equitable production and trading environments for farmers. Co-ops have encountered ongoing consolidation threats.[42] Industry consolidations have generated concerns among small-scale (*e.g.*, 70 cows vs the national average 175) co-op members regarding viability of their co-ops, farms, and their social identity. Policy support to strengthen the development of farmer organizations (co-ops and non-co-ops) can protect infrastructures that are critical to farmers' livelihoods.

In public health practices, partnering with community-led organizations in the development and implementation of mental health programs may be cost-effective and culturally relevant.

Farmers face rural mental health resource shortages and stigma to seek help.[43] This study suggests that an alternative intervention through organizations such as co-ops that address upstream risks are likely to resonate with and are welcomed by farmers.

Conclusions

This study identified protective effects of social connectedness in alleviating farmers' stress and depression. Using a sample consisting of Midwest co-op and non-co-op farmers, we tested the association between program use, program satisfaction, and social support on perceived stress and symptoms of depression. Our results have relevant implications for future research and prevention efforts that intend to promote farmers' mental health, including examining organizational resources, social support, and community partners. Chronic stress and depression are preventable. By providing market stability and strengthening support networks, co-ops and non-co-ops can mitigate mental health risks. They may be potential partners in addressing rural mental health disparity.

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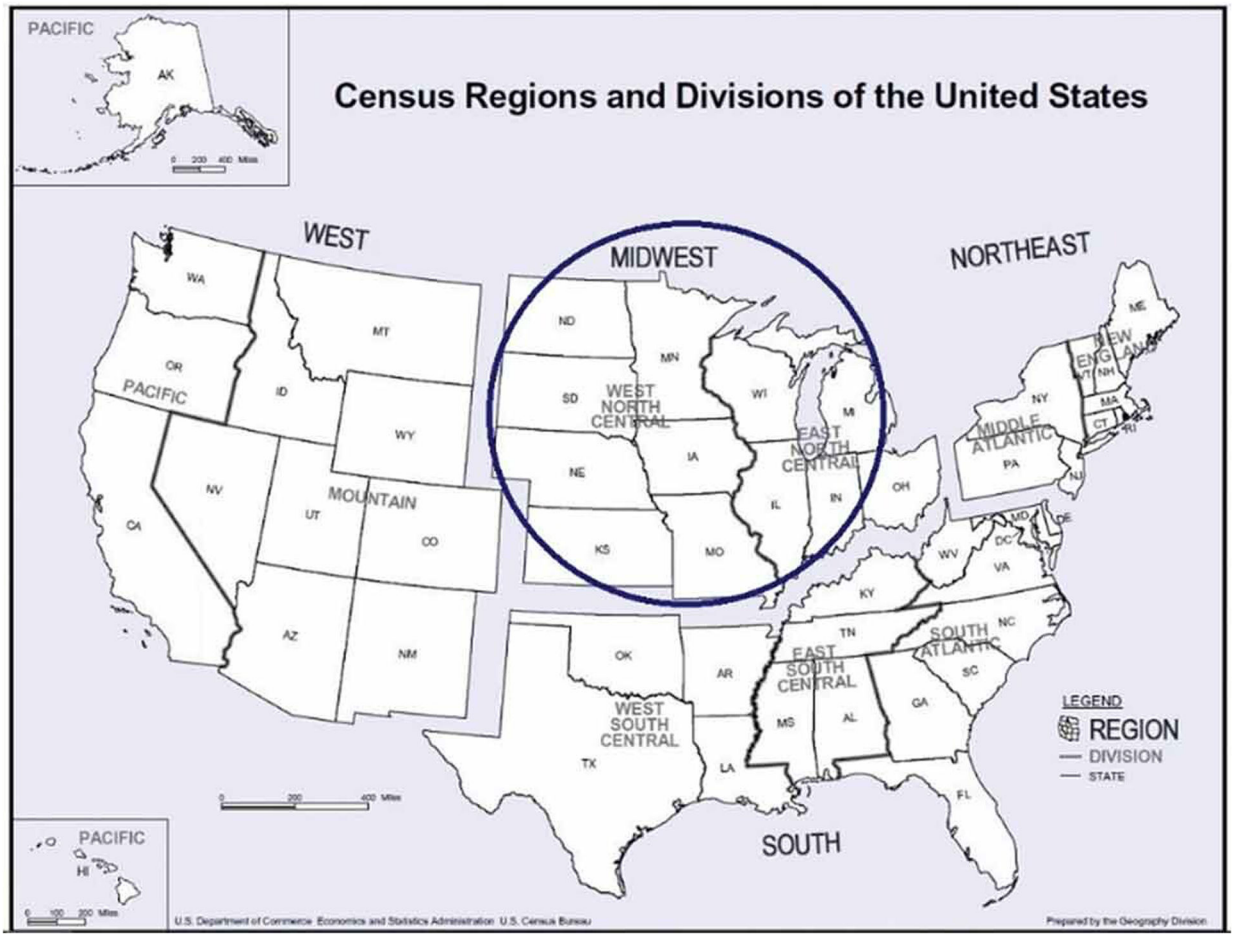

Figure 1.
Midwest of the United States.[44]

Table 1.

Demographics and operation characteristics.

Demographics and Farming Characteristics	Co-op Participants N (%)	Non-Co-op Participants N (%)	p-value
Sex			< 0.0001
Female	39 (20)	56 (51)	
Male	158 (80)	53 (48)	
Missing	-	1 (1)	
Primary household income			< 0.0001
Farming	128 (65)	39 (36)	
Off-farm employment	19 (10)	44 (40)	< 0.0001
Both	49 (25)	27 (24)	
Years of farming			
1 to 10	15 (8)	15 (8)	
11 to 20	34 (17)	34 (17)	
21 to 30	22 (11)	22 (11)	
> 30	126 (64)	126 (64)	
Farm ownership			< 0.0001
Owner	128 (65)	70 (64)	
Co-owner	68 (35)	31 (28)	
Farm manager	1 (<1)	9 (8)	
Farming practice			< 0.0001
Conventional	177 (90)	72 (66)	
Organic	20 (10)	38 (34)	
Farm enterprise			< 0.0001
Dairy	33 (17)	6 (6)	
Grain	118 (60)	21 (19)	
Fruits and vegetables	11 (6)	34 (31)	
Other specialties	34 (17)	49 (45)	
Farm size (acres)			< 0.0001
1–500	56 (28)	84 (76)	
501–1,000	14 (7)	7 (6)	
1,001–1,500	29 (15)	3 (3)	
> 1,500	98 (50)	16 (15)	
Antidepressants			0.1712
Yes	20 (10)	17 (16)	
No	177 (90)	93 (84)	
Chronic health problems or injuries			
Yes	43 (22)	79 (72)	0.1482
No	149 (76)	31 (22)	
Missing	5 (2)	-	
Divorce or separation			0.0575
Yes	4 (2)	7 (6)	

Demographics and Farming Characteristics	Co-op Participants N (%)	Non-Co-op Participants N (%)	p-value
No	187 (95)	102 (93)	
Missing	6 (3)	1 (1)	
Crop or livestock diseases			0.429
Yes	123 (62)	72 (66)	
No	69 (35)	36 (33)	
Missing	5 (3)	2 (1)	
Financial difficulties			0.4252
Yes	93 (47)	53 (48)	
No	100 (51)	52 (47)	
Missing	4 (2)	5 (5)	

Table 2.

Regression coefficients (β), standard errors (SE), p-values for perceived stress and symptoms of depression across all significant programs.

	Perceived Stress		SC	
Variable	**β≤ (SE)**	**p-value**	**β≤ (SE)**	**p-value**
Program use				
Age (continuous)	−0.09 (0.02)	<0.0001	-	-
Sex (male vs female)	2.04 (0.70)	0.0038	-	-
Acres (‚â§ 1,000 vs > 1,000)	−1.74 (0.25)	<0.0001	-	-
Antidepressants (no vs yes)	1.93 (0.87)	0.0269	-	-
Education (never vs ever used)	−1.34 (0.57)	**0.0193**	-	-
Program satisfaction				
Age (continuous)	−0.08 (0.08)	0.3391	-	-
Sex (male vs female)	3.16 (2.79)	0.2697	-	-
Antidepressants (no vs yes)	-	-	6.01 (2.04)	0.0053
Marketing and sales (not completely satisfied vs completely satisfied)	−0.84 (2.64)	0.7528	−2.31 (1.45)	0.1183
Technical support (not completely satisfied vs completely satisfied)	−0.75 (2.92)	0.7989	−1.51 (1.69)	0.3770
Financial services (not completely satisfied vs completely satisfied)	0.94 (2.30)	0.6864	−3.18 (1.52)	**0.0430**
Education (not completely satisfied vs completely satisfied)	-	-	1.83 (1.60)	0.2597
Policy engagement (not completely satisfied vs completely satisfied)	−4.17 (3.50)	0.2461	-	-
Support networks (not completely satisfied vs completely satisfied)	−0.45 (3.11)	0.8876	-	-

Statistically significant predictors are highlighted in bold.

Table 3.

Regression coefficients (β), standard errors (SE), p-values for perceived stress and symptoms of depression across all significant social support measures.

	Perceived Stress		Symptoms of Depression	
Variable	**β≤ (SE)**	**p-value**	**β≤ (SE)**	**p-value**
Age (continuous)	−0.12 (0.02)	<0.0001	10.01 (0.01)	0.157
Sex (male vs female)	3.38 (0.66)	<0.0001	0.33 (0.24)	0.1754
Antidepressants (no vs yes)	1.95 (0.92)	0.0349	1.72 (0.36)	<0.0001
Financial hardships (no vs yes)	-	-	0.02 (0.01)	0.0206
Informational support (not completely agree vs agree)	0.55 (0.42)	0.1882	0.14 (0.15)	0.3406
Tangible support (not completely agree vs agree)	−1.47 (0.41)	**0.0004**	−0.12 (0.15)	0.4392
Financial support (not completely agree vs agree)	−0.73 (0.34)	**0.0341**	−0.22 (0.13)	0.0892
Emotional support (not completely agree vs agree)	−0.10 (0.32)	0.7625	−0.52 (0.12)	**<0.0001**

Statistically significant predictors are highlighted in bold.