SELECTED AGRICULTURAL STUDENTS' SELF-PERCEIVED EMOTIONAL AND FINANCIAL WELLBEING

A Record of Study

by

MEGAN LUANNE ROBERTS

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Chair of Committee,	Gary Wingenbach
Co-Chair of Committee,	Rudy A. Ritz
Committee Members,	Timothy H. Murphy
	David E. Lawver
Head of Department,	Scott Schafer (Interim)

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ABSTRACT

Social isolation, stressful work environments, and lack of access to healthcare may affect rates of mental health issues, including suicide, in farmers (Tiesman, Konda, Hartley, Chaumont Menéndez, Ridenour, & Hendricks, 2015). In addition to emotional stressors, the distressed production agricultural economy during 2014-2018 added financial stress for many US agricultural producers (ERS USDA, 2018a). The purpose of this non-experimental, correlational study was to measure factors influencing current emotional wellbeing in select adult production agriculture students in Minnesota. Integrated theory of health behavior change, Fishbien and Ajzen's (1975) theory of reasoned action, and the Total Farmer Health^{SM} model informed the study's design.

A quantitative survey research design was used with a target population of adult agricultural students (N = 2,420). Two-hundred sixty students responded. The survey included portions of the RAND Medical Outcome Survey SF-36, as well as questions about agricultural stressors, financial status, and desired educational resources. Data were analyzed with descriptive and inferential statistics. Respondents did not have significantly different emotional wellbeing, as measured by the SF-36 emotional health scales, than the general population. However, several factors significantly predicted lower emotional wellbeing in the respondents, including subjective feelings about their financial status and, if applicable to the respondent, their objective farm financial ratios. Students' top four reported observed stressors were financial worries, anxiety, burnout, and farm transfer. To address emotional wellbeing and financial hardship, students

selected one-on-one assistance as their most desired educational delivery method. This study had numerous limitations, including high non-response rate and survey instrument concerns. Future research, in particular research with a general farmer population, could overcome these limitations and provide additional insight into farmer emotional wellbeing.

DEDICATION

This dissertation is dedicated to my husband Dan (my favorite farmer) and to my son Evan. It is also dedicated to Gary and Lu, exceptional farmers that also happen to be my exceptional parents.

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I would be remiss if I did not acknowledge first and foremost the support of my family in helping me through these past four years. As a full-time educator, a doctoral student, a wife, and a (part-time) farmer, I have been stretched thin most days. My husband Dan, with a very demanding occupation himself, has never hesitated to proof read a paper, take non-grad school items off my to-do list, help me conceptualize challenging issues facing farmers, and provide endless encouragement. After months of data delays moved my defense date past Evan's birthdate, Dan quietly and subtly found ways to keep me going towards completing my degree amidst the demands of parenthood. Dan, thank you for everything. Similarly, my parents, my brother/sister-in-law, and my in-laws have helped me work through the challenges of balancing grad school and the rest of my life. My mom in particular has risen to the occasion more than once. Who could forget the time my mom and I drove non-stop through the night to College Station, Texas from Madelia, Minnesota? Did I mention it was snowing up here in America's tundra when we left for Texas in the middle of the night? When push comes to shove, she is supremely motivated…perhaps the apple didn't fall far from the tree. Thanks Mom and Dad for teaching me to work hard and to always put my best foot forward no matter the circumstances.

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My manuscript is higher quality because I had you as a chair. In June of 2017 when I was trying to find the best fit for a chair, you let me know that you'd be happy to work with me as a chair … I appreciated that more than you know. Dr. Ritz, thank you for reminding me to be patient, your steady encouragement, and telling me that I "can't save the world with a dissertation." That might be some of the best advice an over-achiever grad student could hear. It is actually now my go-to piece of advice when other students ask me about their research. Thank you also to committee members, Dr. Lawver and Dr. Murphy. I am grateful for your assistance and wisdom.

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CONTRIBUTORS

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The data used in this study came from the Minnesota State College and University System's Centers of Excellence in Agriculture: AgCentric and the Southern Minnesota Center of Agriculture. Keith Olander, Director of AgCentric, and Brad Schloesser, Director of the Southern Minnesota Center of Agriculture, coordinated data collection. Meg Moynihan, Minnesota Department of Agriculture, shared results of her 2017 survey with ag professionals and provided additional insight into her work on farmer stress in Minnesota. All other work conducted for this research study was completed independently.

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NOMENCLATURE

AgCentric	AgCentric, the Northern Minnesota Center of Agriculture, a Minnesota State College and University Center of Excellence
ASH	Agricultural Safety and Health
CDC	Centers for Disease Control
FBM	Adult Farm Business Management Students
FLSA	Fair Labor Standards Act
ITHBC	Integrated Theory of Health Behavior Change
MDA	Minnesota Department of Agriculture
MOS	Medical Outcomes Survey, a precursor to the RAND SF-36
MNState	Minnesota State College and University System, formerly known as MNSCU
NIOSH	National Institute for Occupational Safety and Health
PS	Post-Secondary (Community College) Agricultural Diploma or Degree Student
PPE	Personal Protective Equipment
OSHA	Occupational Safety and Health Administration
SF-36	RAND 36-Item Health Survey Version 1.0
SMCA	Southern Minnesota Center of Agriculture, a Minnesota State College and University Center of Excellence
UMASH	Upper Midwest Agricultural Safety and Health Center

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CHAPTER I

INTRODUCTION

The US Centers for Disease control reported 54 farmers, ranchers, and other agricultural managers committed suicide during 2015, the most recent year of data (Peterson et al., 2018). Farmer suicide data, coupled with data from a Minnesota Department of Agriculture (MDA) convenience sample survey of agricultural professionals and law enforcement professionals (Moynihan, 2017), suggested farmer emotional wellbeing was a relevant and concerning problem in Minnesota. Social isolation, stressful work environments, and lack of access to healthcare may lead farmers to be high risk for mental health issues including suicide (Tiesman, Konda, Hartley, Chaumont Menéndez, Ridenour, & Hendricks, 2015). In addition to those factors, the distressed production agricultural economy during the mid-2010s added financial stress for many agricultural producers. The Economic Research Service of the United States Department of Agriculture predicted 2018 to have the lowest net farm income since 2006 (2018a). No current data on emotional wellbeing during challenging financial periods had been collected from Minnesota's agricultural producers. Similarly, no current data on emotional wellbeing had been collected from Minnesota's agricultural college students. The relationship between financial constraint and decreased emotional wellbeing warranted further study.

Background of the Study

In Minnesota, there has been recent renewed focus on agricultural safety and farmer wellbeing. In the 2016 Minnesota legislative session, several laws and significant committee discussions focused on agricultural safety and health (ASH) educational initiatives to meet diverse stakeholders' needs and wants (VonBank, 2017). A Farm Safety Working Group was organized by the Minnesota Commissioner of Agriculture, under direction of the 2016 Minnesota legislature, to meet, collect information, and develop a formalized report on the status of farm safety and health in the state (VonBank, 2017). The report identified stakeholders of safety and health programming including Minnesota State College and University System collegiate students and farm business management students (VonBank, 2017). A series of special feature articles in Minnesota's largest newspaper, *The Star Tribune,* focused on the high rates of death and injury in production agriculture compared to other occupations (Meitrodt, 2015). The article highlighted the lack of University of Minnesota Extension Educators with appointments in ASH (Meitrodt, 2015). Meitrodt perceived Minnesota as lagging behind other states in ASH educational outreach programs and applied research (Meitrodt, 2015). Similarly, the Farm Safety Working Group report noted that in comparison to adjacent Midwestern states, the University of Minnesota Extension did not have a funded educator position for farm safety and health (VonBank, 2017).

In the 2017 Minnesota legislative session, several legislators focused on ASH issues with proposed bills aimed at providing legislative support and funding for formal ASH educational initiatives (H.R 1192, 2017) (S. 1048, 2017). Two bills included a

proposed $300,000 over two years for funding of a University of Minnesota Extension position in farm safety and health, but the proposed funding language in the bills was not passed into law (H.R. 1192, 2017) (S. 1048, 2017). The only formal appropriation of money for ASH in 2017 Minnesota law was a renewal of funding for a rollover protection retrofits (Laws of Minnesota, 2017).

Beginning in mid-2017, a focus specifically on mental health in agricultural populations began making headlines. Farmer suicides in Minnesota received media and governmental attention, including commentary from the Minnesota Commissioner of Agriculture on his experiences with farm stress (Davis, 2017). In response, the MDA first launched a survey of law enforcement professionals' and agricultural professionals' observances of farmer stress (Meersman, 2018; Moynihan, 2018). The MDA then started a Farm and Rural Helpline for farmers facing mental health obstacles (Yust, 2017) and began a professional development workshop series to train agricultural professionals to recognize and respond to mental health issues in farmers (Yust, 2018). The 2017 MDA survey of 550 law enforcement professionals and agricultural professionals, which has limitations as a convenience sample, indicated a majority of respondents saw increased financial worries, anxiety, and other stressors (Meersman, 2018; Moynihan, 2018).

In 2018, focus on farmer mental health and stress continued in Minnesota. Numerous Minnesotan media reports focused on the topic, and the 2018 Minnesota legislature again took up the topic of farm safety and health but shifted their focus primarily to farmer stress (Mohr, March 2018). This was a shift from the 2016 and 2017

legislatures. Four 2018 House of Representative bills (HF 2896, HF 3515, HF 3255, and HF 2888), all with companion bills in the Senate, proposed appropriating funding for farmer mental health counseling and associated resources (Mohr, March 2018). None of these bills made it into final law (Dayton, 2018; Mohr, April 2018; Mohr, May 2018).

At the national level, Congressman Tom Emmer, from Minnesota's sixth Congressional District, also introduced legislation in March 2018 related to farmer mental health. His bill was called the Stemming the Tide of Rural Economic Stress and Suicide (STRESS) bill (H.R. 5259). Similar to the proposed 2018 legislation in Minnesota, this bill was not passed into law. Another bill containing similar provisions, Facilitating Accessible Resources for Mental Health and Encouraging Rural Solutions for Immediate Response to Stressful Times (FARMERS FIRST) bill (S. 2712), introduced in April 2018 by Senators Tammy Baldwin (Wisconsin) and Joni Ernst (Iowa) was included in section 7412 of the final 2018 Farmbill. The Farmbill legislation passed into law in December 2018. It included $10 million for increased federal funding to state departments of agriculture, cooperative Extension, qualified non-profits, and other appropriate entities to provide services to farmers in crisis through a Farm and Ranch Stress Assistance Network (Agricultural Improvement Act, 2018).

Minnesota-based media covered mental health in farmers from a variety of angles, including suicide, access to mental health counselors, and impacts from external factors, such as tariffs (e.g. Bierschbach, 2018; Davis, 2018; Moini, 2018). In June 2018, the Upper Midwest Agricultural Safety and Health Center (UMASH) and the MDA jointly held a statewide summit focused on "building resilient agricultural

communities: a working forum on mental health outreach and community-based support for Minnesota farmers, agricultural workers, and their families" (UMASH, June 2018). The forum grew out of UMASH, MDA, and other's concerns about emotional and mental health in Minnesota's agricultural populations (UMASH, June 2018). After the forum, UMASH opened a call for proposals focused on addressing mental health and resiliency in Upper Midwestern agricultural populations (UMASH, July 2018). MDA continued with several initiatives related to addressing farm stress, including creating a statewide Farmer Stress Working Group in October 2018 (M. Moynihan, personal communication, October 2018).

Statement of Purpose and Research Questions

The purpose of this study was to quantitatively measure factors, including financial status, influencing current emotional wellbeing in selected Minnesota production agriculture students. The intended study outcome was to develop a model of factors influencing emotional wellbeing in the study's target population. The intended use for the model of factors was to provide insight into future development of educational resources for improving emotional wellbeing and farm finances in PS and FBM students. The mental health scales in the short form RAND 36-Item Health Survey 1.0 (SF-36) operationalized emotional wellbeing in this study. The following research questions guided this study:

1. Is there a difference in emotional wellbeing between the general population and selected Minnesotan production agriculture students?

2. Do selected Minnesotan production agriculture students identify significantly different sources of stress than Minnesotan law enforcement officers and agricultural professionals (Moynihan, 2017)?
3. Does self-perceived economic hardship predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?
4. Do farm-level economic data predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?
5. Do selected demographic variables predict the type of emotional wellbeing educational resources and farm financial educational resources desired by selected Minnesotan production agriculture students?

Definitions

Numerous key terms were utilized in this study. The terms were associated with agricultural education, farm business management, finance, and mental health. Terms defined operationally in this study were:

1. *Agricultural education*: This study operationally defines agricultural education in a broad sense. Agricultural education is research and learning focused on agriculture and natural resources within the broad contexts of "communications, education, extension, and leadership" (Roberts, Harder, & Brashears, 2016, p. 6).

2. *Agricultural professional*: While there are numerous broad definitions for the term agricultural professionals, in this study agricultural professional refers to the 245 USDA employees, 85 farm-animal veterinarians, 72 state and county agency employees,

65 agricultural educators, and six agricultural bankers that participated in the MDA's 2017 Farm Stress Survey (Moynihan, 2017).

3. *Current ratio*, a measure of *liquidity*: Current ratio is total current farm assets divided by total current farm liabilities (Becker, Kauppila, Rogers, Parsons, Nordquist, & Craven, 2014). "Current" refers to assets and liabilities with a 12 month or less class life. The current ratio is expressed as a decimal. A current ratio under 1.3 is considered financially vulnerable, while above 2.0 is considered strong (Becker et al., 2014). The current ratio is one of three common calculations used to measure liquidity. Liquidity "is the ability of [a] farm business to meet financial obligations as they come due – to generate enough cash to pay [the] family living expenses and taxes, and make debt payments on time" (Becker et al., 2014, p. 2).

4. *Debt-to-asset ratio*, a measure of *solvency*: Debt-to-asset ratio is the overall (i.e. current and non-current) farm debt divided by the overall farm assets expressed as a percentage. It can be described as "the bank's share of the business," and 60% or above indicates financial vulnerability in the business, while 30% or below indicates strength (Becker et al., 2014). The debt-to-asset ratio is one of three common calculations used to measure solvency. Solvency "is the ability of [a farm] business to pay all its debts if it were sold tomorrow. Solvency is important in evaluating the financial risk and borrowing capacity of the business" (Becker et al., 2014).

5. *Emotional wellbeing*: Emotional wellbeing can be conceptualized as the opposite of emotional ill-being or unhealthiness. Felce and Perry's 1995 quality of life model links emotional wellbeing with the terms "affect or mood, satisfaction, or

fulfilment" (p. 60). However, there is no standardized definition nor standardized instrument for measuring emotional wellbeing in general populations or agricultural populations. In this study, the mental health related scales from the preexisting RAND 36-Item Health Survey 1.0 (SF-36) were used to measure emotional wellbeing in this study from an operational standpoint. The sub-scales from the SF-36 used were role limitations due to emotional problems (also called role functioning), energy/fatigue (also called SF-36 Vitality), emotional wellbeing (also called Mental Health Index III), and social functioning (also called SF-36 Social Functioning) (Hays, Sherboune & Mazel, 1995). In research questions three, four, and five, emotional wellbeing was defined as the summed total of the four sub-scales from the SF-36 divided by four, i.e. the mean average of the sub-scales. The range of scores is 0-100, with zero indicating low emotional wellbeing and 100 indicating high emotional wellbeing. Depression and anxiety were the emotional/mental health related stressors addressed in research question two.

6. *Farm business management student*: In Minnesota, farm business management (FBM) students are farm owners, farm operators, or those interested in farming as an occupation; students enroll in tuition based credits at a Minnesota State College and University system (MNState) two-year institution (AgCentric, 2018). According to MNStates's Northern Agriculture Center of Excellence, AgCentric, "the purpose of the [FBM] program is to assist students in meeting their business and personal goals. This is best accomplished through the use of quality records and sound business decisions" (2018). FBM students meet with instructors typically in a one-on-

one setting (Southern Minnesota Center of Agriculture, 2018). FBM students are adults 18 or older.

7. *Financial hardship*: Financial hardship in this study was measured through both subjective self-perceived questions and objective farm level economic data questions. The two subjective self-perceived questions were excerpted from the American's Changing Lives survey (House, 2018), including a question on financial satisfaction and a question on ability to pay bills. A lack of subjective financial hardship occurred when a respondent indicated greater financial satisfaction and slight to no difficulty in paying monthly bills. Possible subjective financial scores range from 2-10, with 10 indicating a complete lack of financial hardship and two indicating severe financial hardship.

Farm level economic data questions measured financial hardship from an objective, quantitative standpoint. Current ratio and debt-to-asset ratio have established thresholds that indicate financially "vulnerable" farm businesses (Becker et al., 2014). As the current ratio reaches 1.3 or below and the debt-to-asset ratio approaches 60% or above, a farm would be experiencing financial hardship, i.e. "vulnerable" financial status (Becker et al., 2014). There is no universally established threshold for vulnerability for net farm income, although lower net farm income would indicate more vulnerability than higher net farm income. Precedent to examine both objective and subjective financial hardship measures in the context of farmer stress and emotional wellbeing began with researchers studying the 1980s Farm Crisis (e.g. Armstrong & Schulman, 1990; Marotz-Baden, 1988).

8. *Law enforcement professional*: In this study, law enforcement professional refers to the 59 law enforcement officers that responded in the MDA's Farm Stress Survey (Moynihan, 2017). The law enforcement professionals, e.g. county sheriffs, interacted with farmers as part of their professional duties and were recruited through convenience sampling.

9. *Net farm income*, a measure of *profitability*: Net farm income is the yearly return on investment to a farm's labor, management, and equity (Becker et al., 2014). It represents yearly farm income minus expenses and is calculated on the farm income statement. It is expressed as a numerical dollar figure. It is one of five commonly established calculations to measure farm profitability, which "is the difference between the value of goods produced and the cost of the resources used in their production" (Becker et al., 2014, p. 2).

10. *Post-secondary student*: In general, across the United States, a post-secondary student may describe any student past the secondary (i.e. high school) educational stage (The National Center for Educational Statistics, 2018). In this study, a post-secondary student was defined operationally as students enrolled in post high school two-year degree, two-year diploma, or one-year certificate programs. Due to the population parameters, all post-secondary student respondents in this study were enrolled in a MNState system agricultural production program. MSState agricultural production students plan to pursue careers in farming, either as a producer or as a farm worker. They also typically have direct farming experience, either having grown up on a farm, worked on a farm, and/or farmed as a primary or secondary operator. PS students

are generally 18 or older, and in this study, all participants were required to self-identify as adults to participate in the survey.

11. *Occupational stress*: Occupational stress, also known as job stress, is defined by the National Institute for Occupational Safety and Health (NIOSH) "as the harmful physical and emotional responses that occur when the requirements of the job do not match the capabilities, resources, or needs of the worker" and can lead to injury or poor health (1999). Occupational stress is one of three focal areas by NIOSH for improving overall safety, health, and wellbeing in US workers (2018). While there are established instruments for measuring occupational stress and its impact on workers in general industry, such as NIOSH's Quality of Worklife Survey, there is no standard accepted instrument for agricultural populations. In this study, occupational stress was addressed through a modified question from the MDA Farmer Stress Survey (Moynihan, 2017).

Basic Assumptions and Limitations

It was important to recognize basic assumptions and limitations of this research. It was assumed PS students and FBM students understood the content of the survey, including questions on debt-to-asset ratio, current ratio, and net farm income, because they were enrolled in educational programs that require students to calculate those benchmarks on their respective farms. As adult PS and FBM collegiate students, it was assumed that reading and comprehension skills were sufficient to complete the questionnaire as written. Finally, because the survey was anonymous, limited social desirability bias was assumed. Social desirability bias occurs when respondents report

socially desirable personality traits when completing surveys associated with their identity (Paulhas, 1984).

It was assumed that FBM students do not match the characteristics of the general farmer nor general adult learner populations. FBM students are a unique adult learner population in Minnesota. Farmers enroll in the FBM program through community colleges in MNState: Central Lakes College, Ridgewater College, Northland College, Alexandria Technical College, St. Cloud Technical College, Minnesota West Community and Technical College, Riverland Community College, and South Central College. However, it should be noted that only FBM students enrolled at six of those institutions were included in the survey population due to administrative decisions not to participate in the study at Alexandria Technical College and St. Cloud Technical College.

Adult FBM students represented a wide variety of ages, farm types, experiences, education levels, and generally were not full-time college students. To be a part of the FBM program, it was assumed FBM students are either full or part-time adult farmers. While the term "student" was used in the FBM program, the association between FBM instructors and FBM students could also be described as a farm financial consultant and client relationship. FBM students have self-selected into adult-level continuing agricultural education. It was assumed FBM students desire continuing education and instructor interaction. This could affect data collected from this sub-population in a variety of ways. For example, social isolation may be a factor in farmer suicide (Tiesman et al., 2015), but it was assumed FBM students have built-in monthly or

bimonthly interactions with an FBM instructor. In the Minnesota FBM program, instructors meet individually with FBM students, most often at the student's home or business (Southern Minnesota Center of Agriculture, 2018).

It was also important to note unique assumptions of Minnesota's PS agricultural college students. These students self-selected agriculture as their field of higher education study. It was assumed, therefore, these students likely have different experiences than other young adults associated with agriculture who did not choose to continue their education and/or association with agriculture into adulthood. Only PS students enrolled at MNState community colleges with agricultural two-year programs were included in the target population. For this study, these institutions included Ridgewater College, Minnesota West Community and Technical College, and South Central College. No agricultural college students at four-year universities in Minnesota were surveyed, nor were college students under the age of 18, such as Post-Secondary Enrollment Option students. Therefore, the researcher assumed students in this study's target population fit the characteristics of adult learners, as outlined by Knowles (1975).

In April 2018, MNState began data collection with post-secondary (PS) and farm business management (FBM) students (see additional details in Methods). As the SF-36 asks respondents to report their self-perceived emotional wellbeing based on their behaviors during the prior four weeks, the timing of the survey was important. Other questions in the survey ask respondents to report their observations and experiences during the past year. The researcher assumed respondents were able to accurately recall experiences, behaviors, and observations within both a four-week and a one-year period.

The researcher assumed external factors at the time of the survey could have affected individual responses. Within the time of the survey being available for completion by respondents, April to October 2018, each respondent experienced different challenges and achievements. As aforementioned, the survey asked respondents to recall experiences at the specific time of taking the survey and within the prior four-week and one-year periods. While it was unknown what personal or professional challenges or achievements may have occurred to affect individual responses, between April and October 2018 several major state, national, and international current events occurred causing impacts to the overall farm economy.

A student completing the survey in April may have faced different farm policy and economics than if he/she had waited to complete it in October. For instance, in April 2018, the USDA announced a revised Milk Margin Protection program to financially assit dairy producers due to financial hardships in the dairy industry (USDA Press, April 2018). In June 2018, the Trump administration announced plans to implement tariffs on major trading partners including China, which resulted in announced retaliatory tariffs targeting many US agricultural goods (USDA Press, June 2018). In July 2018, the USDA announced that the Trump administration planned to continue its tariff-based trade policy and would implement a $12 billion adjustment program to help US farmers impacted by implemented retaliatory tariffs totaling over $11 billion in lost commodity value (USDA Press, July 2018). These announcements had negative price impacts on many US agricultural commodities. For example, during the time of the survey, November Soybean Futures on CMEGroup dropped $2.48/bu

from a high of $10.60/bu to a low of $8.12/bu, a difference of more than 20% (see Figure 1). September 2018 marked the lowest soybean futures and cash prices for Minnesota farmers in years (Central Farm Service, 2018; Crystal Valley Coop, 2018).

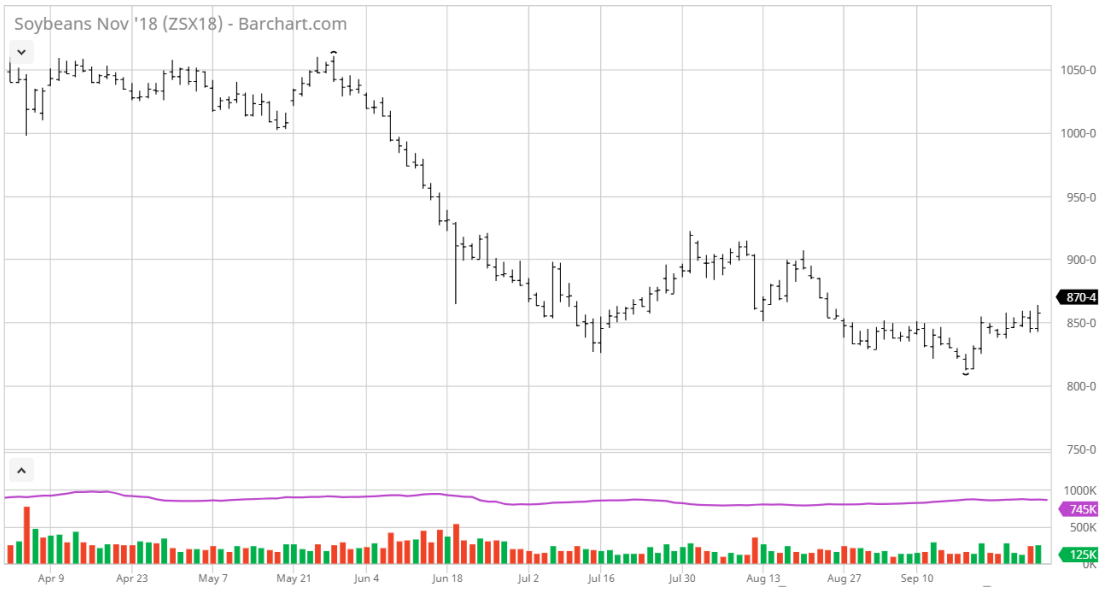

Figure 1. Changes in CMEGroup November Soybean Futures (ZXS18) from April 1 to September 31, 2018 by Barchart.com, 2018. Copyright 2018 by Barchart.com.

In addition to national policy impacts, at the state and local level there were several agricultural related events that could have affected respondents. For example, in May 2018, the Minnesota legislative season ended with a failure to enact an Omnibus Agriculture Policy bill when the bill was vetoed (Dayton, 2018). In July 2018, 36 Minnesota counties and one tribal nation were placed in a peacetime state of emergency by Governor Mark Dayton due to flooding and other extreme weather conditions (Executive Order No. 18-11, 2018). These counties represented more than a third of the

state. In August and September, harvest began in Minnesota, which increased crop farmers' workload (USDA NASS, September 2018). The USDA described the wet and muddy conditions of Minnesota's 2018 harvest as "challenging" (USDA NASS, October 2018). The beginning of harvest in August and September in Minnesota also widened commodity basis and lowered cash prices in many areas of the state (Central Farm Service, 2018; Crystal Valley Coop, 2018), increasing financial challenges for crop farmers.

The assumptions and limitations outlined show caution should be taken when interpreting the findings beyond the scope of this study. Generalizing to the population of Minnesota's farmers is cautioned because PS and FBM students have self-selected into higher education in agriculture, which differs from the overall farming population. Furthermore, generalizing this study's agricultural college student data to all Minnesota agricultural college students is cautioned, as no four-year university students were included in the sample. The timing of this study from April to October 2018 limited the ability to generalize to other periods in agriculture. Finally, the target population was limited to Minnesotans and did not include individuals from other geographic areas.

Summary

In recent years, increased focus on farmer safety, health, stress, and wellbeing occurred in Minnesota and nationally. During this same period, farm economic factors reduced farm prices and profits (USDA, 2018). No current data existed related to Minnesota farmers' emotional wellbeing levels nor the relationship between wellbeing

and financial hardship. The purpose of this study was to measure factors influencing emotional wellbeing in selected Minnesota production agriculture students. The intended outcome was to develop a model of factors influencing emotional wellbeing in the target population. This study was guided by five research questions related to the overall purpose statement. The definitions used, target population selected, instrument utilized, and other research parameters led to important assumptions and limitations. The next chapter overviews relevant literature and the frameworks used to guide this research.

CHAPTER II

LITERATURE REVIEW

To understand better emotional wellbeing in farm populations, the researcher conducted a literature review. Frankel, Wallen and Hyun (2012) emphasized the importance of the literature review to the research process, as it enables the researcher to understand what is already known on a topic and how new research may facilitate an extension of prior knowledge. This chapter overviews agricultural safety and health (ASH) education and research in the United States and a recent focus in ASH on emotional wellbeing. Research on farmers' perceived emotional wellbeing is contrasted with the more robust research on college students' perceived emotional wellbeing. Educational resources desired by farmers are discussed. The chapter concludes with a synopsis of the theoretical and conceptual frameworks used in this study. The Theory of Integrated Health Behavior Change, a model adapted from the Theory of Reasoned Action (Fishbien & Ajzen, 1975) for the field of nursing, was the theoretical framework. AgriSafe's Total Farmer Health model provided a conceptual framework that partially guided the development of this study's research questions.

Statement of Purpose and Research Questions

The purpose of this study was to measure quantitatively factors, including financial status, influencing current emotional wellbeing in selected Minnesota production agriculture students. The mental health scales in the short form RAND 36-

Item Health Survey 1.0 (SF-36) operationalized emotional wellbeing in this study. The following research questions guided this study:

1. Is there a difference in emotional wellbeing between the general population and selected Minnesotan production agriculture students?
2. Do selected Minnesotan production agriculture students identify significantly different sources of stress than Minnesotan law enforcement officers and agricultural professionals (Moynihan, 2017)?
3. Does self-perceived economic hardship predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?
4. Does farm-level economic data predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?
5. Do selected demographic variables predict the type of emotional wellbeing educational resources and farm financial educational resources desired by selected Minnesotan production agriculture students?

A Brief History of Agricultural Safety and Health in the US

Prior to the 1980s, there was minimal state or national focus on agricultural safety besides the basic legal protections ensured to farm workers by the Department of Labor through the Fair Labor Standards Act of 1938, and an amendment related to youth working in agriculture enacted in 1971 (U.S.C 29 Sec 201). Other than the 1971 regulatory modification to the FLSA, there was a lack of concerted national emphasis on agricultural safety and health (Frank, McKnight, Kirkhorn, & Gunderson, 2004).

Because of this deficit, in 1988, the University of Ohio and The Ohio State University held a national conference focused on the lack of a national research agenda in agricultural safety and the highly hazardous characteristics of agricultural work (Frank et al., 2004). This conference resulted in a pivotal agricultural safety report, *Agriculture at Risk: A Report to the Nation* (Frank et al., 2004). In part, due to the *Agriculture at Risk* report and increased national attention, the Centers for Disease Control and Prevention (CDC) and the National Institute for Occupational Safety and Health (NIOSH) developed the Agricultural Health and Safety Initiative in 1990 (NIOSH Office of Extramural Programs, 2016). This was under a directive from Congress. NIOSH then established 10 ASH centers nationwide (NIOSH Office of Extramural Programs, 2016).

ASH centers fund scientific research, develop and implement outreach programming, evaluate program effectiveness, and create linkages with other organizations with a stake in ASH education (NIOSH Office of Extramural Programs, 2016). One ASH center, the Upper Midwest Agricultural Safety and Health Center (UMASH), is located at the University of Minnesota, and three additional NIOSH ASH Centers have programming reach in Minnesota (NIOSH Office of Extramural Programs, 2016). UMASH is a collaboration between two colleges at the University of Minnesota, two medical institutions, and the Minnesota Department of Health. UMASH provides the Upper Midwest with occupational health and safety expertise on emerging and existing agricultural issues, including rural stress (UMASH, July 2018).

The 1990 NIOSH/CDC initiative also marked a shift in national focus from agricultural safety to a more holistic, comprehensive view that incorporated health. In the 1990s, agricultural safety initiatives began including more agricultural health research and education. One example is the Agricultural Health Study, a joint project started in 1993 by the National Cancer Institute, National Institute of Environmental Health Sciences, Environmental Protection Agency, and NIOSH (National Institute for Health, n.d.). Many ASH researchers, of youth and adult populations, are conducting work to improve health and safety adoption, diffusion, and trust without depending on the regulatory system for change (e.g. Byler, et al., 2013; Janssen & Nonnenmann, 2016; Murphy, 2017). Recently, media and agricultural organizations have focused coverage of ASH topics on farmer mental health and emotional wellbeing in the context of current farm financial hardships (e.g. Ivanova, 2018; Kutner, 2016; Latzke, 2017; Perdue, 2017; Snell, 2018; Wiengarten, 2017).

Beginning in 2017, several NIOSH ASH Centers concentrated initiatives and opened calls for proposals on farmer emotional wellbeing research. The Central States Agricultural Safety and Health Center (CS-CASH) awarded multiple pilot project grants with connections to farmer wellbeing and/or mental health (Rogan, 2017). UMASH's grant program in 2018 specifically focused on proposals to build emotional resiliency in agricultural populations (UMASH, July 2018). Additionally, two national Extension conferences focusing on stress in rural and farm populations were held. University of Georgia's 2018 conference, Rural Stress: Promising Practices and Future Directions, focused on stress in a broad range of rural populations, not just farmers. Rural stressors

identified included “economic stagnation, opioid dependence, population migration, [and] increasing suicide rates” (Melancon, 2018). Michigan State University’s 2019 Farm Stress Management Summit planned to equip Extension and agribusiness professionals with skills to respond proactively to farmers in need of mental health resources (Pish, 2019).

Farmers’ Health and Perceived Emotional Wellbeing

In the late 1980s and throughout the 1990s, the aftermath of the “farm crisis”—a period of extreme economic recession in US agriculture beginning in 1982 (FDIC, 1998)—caused an influx in research on farmers’ emotional wellbeing. Among agricultural populations in the 1980s, researchers found low levels of emotional wellbeing, operationalized as increases in anxiety, depression, alcohol and drug usage, domestic violence, and other behavioral health concerns (Bultena et al., 1986; Davis-Brow & Salmon, 1988; Hargrove, 1986; Heffernan & Heffernan, 1986; Walker & Walker, 1987; Weigel & Weigel, 1987).

Financial stressors, in particular farm debt, were factors linked to increased farmer stress (e.g. Keating, Doherty & Munro, 1986). Armstrong and Schulman (1990) studied depression, financial strain, and perceived personal control, finding self-perceived household economic hardship was a statistically significant positive predictor of depression, while debt-to-asset ratio, an objective measure of farm financial solvency, was not. Marotz-Baden (1988) found that lower income and lower economic satisfaction were correlated with stress, particularly for older generation farmers and

their farming sons. Weigel, Weigel and Baden (1987) showed younger generation farmers had the highest stress levels and least satisfaction with family dynamics.

In the decade after the farm crisis, Hoyt, Conger, Valde, and Weihls (1997) found rural residents may hold stigmatized views related to seeking mental health, and rural residents may be at significant risk because "personal economic hardship is consistently found to be related to physiological distress" (p. 449-450). Fraser et al. (2005) found 45 articles on farmer mental health and stress in a comprehensive literature review of published research on farmer mental health from 1985 to 2005. The term "emotional wellbeing" was not used by researchers in Fraser et al.'s (2005) literature review, although wellbeing was a term utilized by other researchers, such as Armstrong and Schulman (1990), during this period.

Like most research in farmer stress, a focus on farmwomen's stress also began in earnest during the 1980s farm crisis. Research in the 1980s and 90s focused on farmwomen's roles, their health, and their economic status. Research identified that farmwomen often served multiple roles; in addition to family and farm responsibilities, farmwomen took off-farm jobs, the so-called third shift (Gallagher & Delworth, 1993; Scholl, 1983). Marotz-Baden (1988) found the role and age of women on the farm resulted in different stress levels based on income and economic satisfaction. Marotz-Baden and Matthies (1994) studied stress in women who identified as "daughters-in-law" in the farm family context, finding that lower levels of integration into the family (i.e. negative relationships with parents-in-law) and reduced integration into the farm business correlated with higher stress. Walker and Walker (1987) found farm males and

females shared many stressors. However, farmwomen's stressors were more related to managing time, family responsibilities, and political issues, as compared to males citing the farm operation and its problems as a major stressor (Walker & Walker, 1987). Tutor-Marcom, Bruce, and Greer (2014) found farmwomen had unique self-perceived social-emotional needs in response to farm stress. Tutor-Marcom et al. (2014) also noted a lack of recent research on farmwomen's stress in the literature in the United States.

Compared to research on farmer (both male and female) stress and farm family stress during the 1980s farm crisis and its aftermath in the 1990s, research post-2000s on farmer stress and emotional wellbeing is more limited. Rosmann (2008) summarized behavioral healthcare in US agricultural populations, both historically and in the early 2000s, finding farmers have behavioral and other health disparities compared to non-farmer populations. While the comprehensive US governmental Agricultural Health Study (2017) of 89,000 farmers and their spouses has tracked health outcomes of farmers since 1993, it focused on tracking environmental exposures and disease prevalence, not specifically stress or mental health implications. Examining the link between farm safety and farmer emotional well-being, Robertson, Murphy, and Davis (2006) found the aftermath of farm injuries caused social and emotional stress for the farmer, farm family, and affected community.

Internationally, there is more recent research on farmer stress and burnout, e.g. Finnish dairy farmers (Kallioniemiam, Simolab, Kasevac & Kymäläinend, 2016), European and Australian dairy farmers (Kolstrup et al., 2013), and stress and wellbeing

of Australian farmers with hearing impairment (Hogan, Phillips, Brumby, Williams & Mercer-Grant, 2015). Jones-Bitton and Hagen (2018) found in Canadian farmers "45 percent of farmers surveyed were classified as having high levels of stress, while 58 percent were classified with varying levels of anxiety and 35 percent met the definition for depression" (p. 1). Prickett et al. (2015) studied self-perceived health among Canadian farmers by gender. Although depression, sleep, and mental health risk factors, such as drinking, were a part of the study, farm stressors and emotional wellbeing were not a part of it. Elliot et al. (2018) found Canadian farmwomen who worked a farming third shift (i.e. off-farm employment, farm labor, and home/parenting duties) had better health status, in contrast to previous studies. Again, similar to Prickett et al.'s (2015) study, health variables were measured primarily as physical heath, not emotional wellbeing.

College Students' Health and Perceived Emotional Wellbeing

While there is limited research on emotional wellbeing in agricultural student populations, there is a significant research on college students' mental health. Mental health concerns are common in US college students (Pedrelli et al., 2015). At four-year universities, approximately a third of students identified as having diagnosable mental health illnesses, including depression and anxiety (Eisenburg, Hunt, & Speer, 2013). At colleges and universities, a majority of students reported various emotional wellbeing and mental health concerns, from hopelessness, loneliness, to feeling anxious (American

College Health Association, 2017). Female college students reported higher incidences of mental health concerns in all categories (ACHA, 2017).

Mental health affects college student success, including persistence, completion, and academics (Eisenberg, Golberstein, & Hunt, 2009). Community college students under age 25 were found to be more likely to have undiagnosed mental illness than older students and students at universities, further affecting their success rates compared to university students (Eisenberg, Goldrick-Rab, Lipson & Broton, 2016). The American Psychological Association has made campus mental health an advocacy focus area, due to the high rates of mental illness with college students and the rising rates of severe mental illness (2018).

As of 2018, there was no recently published research on emotional wellbeing in college agricultural students. Concerning safety and health research in college agricultural students, only a few studies existed. Ramaswamy and Mosher (2016) studied college of agriculture students' perceptions of agricultural safety. They measured 900 Iowan agricultural students' perceptions of the relationship between implementation of quality management programs in agricultural workplaces and safety hazards. The authors noted a lack of research, stating, "no comprehensive study exists on the safety perceptions of pre-professional college students in agricultural disciplines, nor has any research examined how perceptions may differ across agricultural disciplines" (2016, p. 51). Rudolphi (2017) also focused on Iowan agricultural young adults; she assessed agricultural safety behaviors and PPE usage after an intervention finding limited sustained behavior change in study participants. Sanderson, Dukeshire,

Rangel, and Garbes (2010) interviewed Canadian college agricultural students regarding their agricultural safety behaviors and found safety behaviors largely lacking.

Agricultural Educational Resources Desired by Farmers

Chiu et al. (2015) found limited background information on communication sources that farmers used and trusted for health information. While academics and medical clinics were trusted highly by farmers in Chiu et al.'s (2015) study, there was low frequency of use of their health information. Findings from Chiu et al. (2015) echoed earlier research by Seiz and Downey (2001). Farmers often distrust ASH professionals without agricultural backgrounds but are willing to learn information from trusted sources, such as Extension (Burgus & Duysen, 2017; Franklin, Mc-Bain-Rigg, King, & Lower, 2015; Seiz & Downey, 2001).

Burgus, Duysen, and Wendl (2017) noted the results from their mixed-methods study showed minimal differences in preference for ASH resources tailored to feature different producers' farming practices, when analyzed by age, gender, or other demographics. Short, graphic, non-technical written educational resources were desired regardless of demographic differences (Burgus, Duysen, & Wendl, 2017). This finding contradicts previous research that farmer age, education, and gender contributed to differences in desired educational/informational materials and delivery formats (Barbercheck et al., 2009; Chiu et al., 2015; Jensen, English, & Menard, 2009; Velandia et al., 2010).

Although not within the context of agricultural education and Extension, there has been research on access to emotional wellbeing resources by rural populations. General studies (i.e. not exclusive to agricultural populations) of rural mental health identify a paradoxical need for more mental health services in rural areas, but lower access to such facilities and resources (Ziller, Anderson, & Coburn, 2010; Fortney et al., 2015). Access to specialized mental health resources and general behavioral health care, is limited, if not non-existent, in rural areas when compared to urban areas (Mackie, 2012).

Theoretical Framework

The integrated theory of health behavior change (ITHBC), originating in nursing, "suggests that health behavior change can be enhanced by fostering knowledge and beliefs, increasing self-regulation skills and abilities, and enhancing social facilitation" (Ryan, 2009, p. 1). Changing and adhering to behaviors in the short-term influences health in the long-term (Ryan, 2009; Middleton, Anton, & Perri, 2013). Knowledge of the issue is an important first step, but not enough to create behavioral change (Ryan, 2009). Health behavior changes are established through values and self-engagement (Ryan, 2009). The ITHBC is rooted in several health models, including "theories of health behavior change, self-regulation theories, social support theory, and research related to self-management of chronic illnesses," as well as Fishbien and Ajzen's Theory of Reasoned Action (Ryan, 2009, p. 5). A 2018 search of the *Journal of*

Agricultural Education and the *Journal of Extension* showed the ITHBC has not previously been used as a theoretical framework in an article from either journal.

The Theory of Reasoned Action states a person's behaviors are largely based on intent made up of pre-existing attitudes and social norms, and behavior change first requires change in attitude or a social norm (Fishbien & Ajzen, 1975). The theory attempts to describe the complex series of short- and long-term factors that interact to create behaviors (see Figure 2). Behavioral beliefs interact with a personal evaluation of outcome(s) to create a pre-determined attitude toward a certain behavior. Motivation to comply with a behavior along with normative beliefs (i.e. societal or group opinion on the behavior) interact to create a person's subjective belief toward a behavior. Those subjective beliefs work together with attitudes toward the behavior to create a behavioral intention. From this intention, an individual may or may not act on the behavior. In other words, even if a multitude of factors worked in tandem to create a positive intention towards a behavior, an individual still may not choose to act.

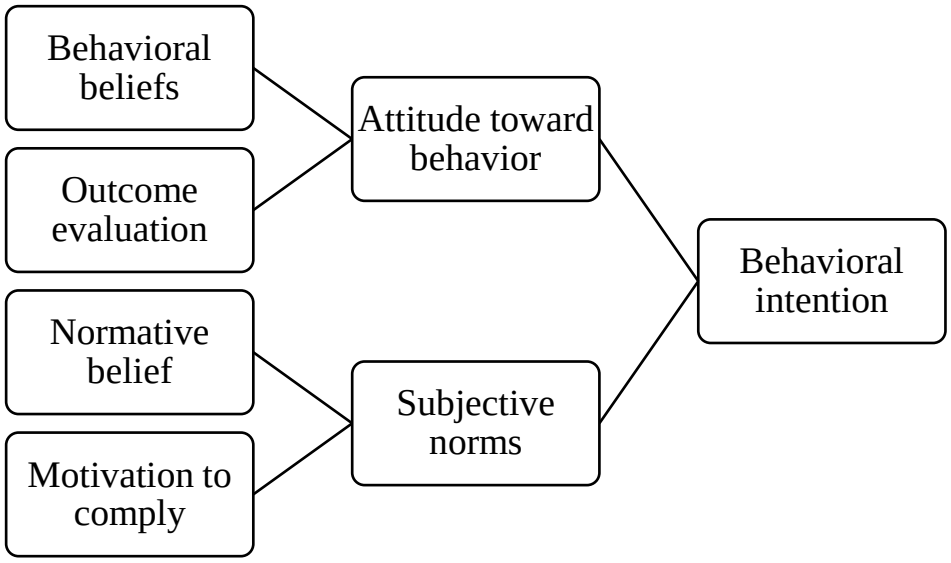

Figure 2. The reasoned action model of factors affecting behavioral intention, a precursor to behavioral change. Adapted from *Belief, attitude, intention, and behavior: An introduction to theory and research*, by M. Fishbein and I. Ajzen, 1975. Copyright 1975 by Addison-Wesley.

If the intended outcome of this study was to create long-term, improved emotional wellbeing behaviors in Minnesota's agricultural populations, then future educational resources created must go beyond awareness and knowledge change. The educational resources must attempt to change self-engagement (i.e. personal attitudes towards a behavior) and social beliefs (i.e. subjective norms). To improve agricultural emotional wellbeing outcomes, the target population must intentionally choose to make behavioral health changes and then adhere to those changes. Since no current data existed on the emotional wellbeing status in the target population, educators attempting to create effective behavioral changes with Minnesota's agricultural college students

may have been limited in in their ability to tailor resources to the true needs of the learners.

Using the ITHBC helped direct the study design towards gathering accurate emotional health baseline data that could then be used by agricultural educators to change attitudes and norms. However, even with effectively designed educational resources, a major limitation of educational approaches is these interventions do not fully ensure changes in health attitudes and norms (Middleton, Anton, & Perri, 2013). Without measurable changes in personal health attitudes or societal health norms, short-term behavior changes and long-term adherence to the actions are unlikely.

Conceptual Framework

The Total Farmer Health[SM] framework conceptualized this study's approach. Total Farmer Health[SM] adds an agricultural context to the CDC's and NIOSH's generic occupational Total Worker Health® model. Total Worker Health® is "defined as policies, programs, and practices that integrate protection from work-related safety and health hazards with promotion of injury and illness prevention efforts to advance worker well-being" (NIOSH Office of the Director, 2017). Total Farmer Health[SM] shifts the CDC's Total Worker Health® framework to fit the social and economic factors affecting the health of those on farms. The approach is integrated across disciplines to consider the multiple factors at play, including fitness, healthcare, weather, sleep, cognition, hazard, diet, finances, and social dimensions of farmer wellbeing (AgriSafe Network, 2017) (see Figure 2). Total Farmer Health[SM] provided the framework for

including economic and financial questions in this study as potential predictors of emotional wellbeing, a factor of overall health for agricultural college students. Financial impacts on farmer health/wellbeing were addressed through the subjective and objective financial questions in the Farmer Wellbeing questionnaire. The social impact on farmer health/wellbeing, another factor addressed in the Total Farmer Health^{SM} framework, was operationalized in this study through the social scale from the SF-36. Cognition was indirectly addressed through inclusion of two SF-36 sub-scales, the role functioning/emotional problem scale and the emotional wellbeing scale. Finally, the stressor identification question indirectly addressed several hazards to health, including alcohol and drugs.

While the Total Farmer Health^{SM} model was used conceptually in development of this study, not all aspects of the model were addressed in the instrument. The SF-36 energy/fatigue scale included in this study's Farmer Wellbeing questionnaire could be considered a consequence of lack of sleep, although tiredness can be a symptom of emotional health problems regardless of adequate sleep. Therefore, the instrument cannot be considered a reliable measure of sleep in the context of farmer health. Fitness, healthcare, weather, safety hazards, and diet were not directly addressed in the Farmer Wellbeing questionnaire because of a desire for brevity and a greater focus on emotional health instead of physical health.

Figure 3. Total Farmer Health[SM] Model by AgriSafe Network, 2017. Used by permission. Copyright by AgiSafe Network, Inc 2017.

Like the ITHBC and the theory of reasoned action, the Total Farmer Health conceptual framework shows addressing agricultural health behavior, operationalized as emotional wellbeing in this study, is complex. It must involve interdisciplinary approaches. Agricultural educators committed to researching and solving complex

problems (Roberts, Harder, & Brashears, 2016) have a unique and important role in improving health outcomes for adult students involved in production agriculture.

Summary

At the Minnesota and national level, a major recent ASH focus in the media and agricultural organizations was related to farmer mental health and emotional wellbeing in the context of current farm financial hardships (e.g. Kutner, 2016; Latzke, 2017; Meerson, 2018; Perdue, 2017; Wiengarten, 2017; Yust, 2017; Yust, 2018). This was not the first time farmer emotional wellbeing has received national attention. During the 1980s, a significant area of research by agricultural economists, rural sociologists, agricultural educators, and others focused on the stress and mental health impacts of the Farm Crisis (e.g. Bultena et al., 1986; Davis-Brow & Salmon, 1988; Hargrove, 1986; Heffernan & Heffernan, 1986; Walker & Walker, 1987; Weigel & Weigel, 1987). However, there has been a lack of research on this topic with only a few relevant studies completed recently (e.g. Bitton Jones & Hagen, 2018).

Factors, such as social isolation, stressful work environments, and lack of access to healthcare contribute to the high risk for mental health issues, including suicide, in US farmers (Tiesman et al., 2015). The current distressed agricultural economy continues to add further financial stress for most agricultural producers (ERS USDA, 2018a), which may further reduce emotional wellbeing. This study's focus of creating awareness about emotional wellbeing in agricultural populations in Minnesota, and then recommending tailored educational resources based on the results, conforms to the

ITHBC and Ajzen's Theory of Reasoned Action. AgriSafe's (2017) Total Farmer Health model helped conceptualize topics to include in the development of the instrument. No current data on emotional wellbeing during challenging financial periods had been collected from Minnesota's agricultural producers or from Minnesota's agricultural college students prior to this study. There was also a lack of data regarding agricultural educational resources desired by Minnesota's agricultural populations during periods of financial duress. The next chapter outlines the methods and analysis used in this study.

CHAPTER III

METHODS

A quantitative survey research design was used in this study of emotional wellbeing in select Minnesotan agricultural students. The research was correlational and sought to find relationships between more than two naturally occurring variables without researcher intervention (Field, 2015). This chapter outlines the methods utilized to respond to the study's research questions.

Statement of Purpose and Research Questions

The purpose of this study was to measure quantitatively factors, including financial status, influencing current emotional wellbeing in selected Minnesota production agriculture students. The mental health scales in the short form RAND 36-Item Health Survey 1.0 (SF-36) operationalized emotional wellbeing in this study. The following research questions guided this study:

1. Is there a difference in emotional wellbeing between the general population and selected Minnesotan production agriculture students?
2. Do selected Minnesotan production agriculture students identify significantly different sources of stress than Minnesotan law enforcement officers and agricultural professionals (Moynihan, 2017)?
3. Does self-perceived economic hardship predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?

4. Does farm-level economic data predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?
5. Do selected demographic variables predict the type of emotional wellbeing educational resources and farm financial educational resources desired by selected Minnesotan production agriculture students?

Research Design

This non-experimental, quantitative study used a survey research methodology. Survey research allowed for data collection with a large number of people at the same time (Fraenkel, Wallen, & Hyun, 2012). Survey design enabled both descriptive and inferential statistical analysis of the data (Fraenkel et al., 2012). Descriptive analysis summarizes the study's data using indices or graphs; relationships between the data are not identified when using only descriptive methods (Fraenkel et al., 2012). Inferential analysis enables the researcher to infer information about the overall population from data collected during the study (Fraenkel et al., 2012). The researcher developed an online anonymous Farmer Wellbeing questionnaire to collect the survey data. The questionnaire opened on April 1, 2018 and remained open until October 1, 2018.

The study was correlational. Correlational research examines relationships between more than two naturally occurring variables without experimental interference (Field, 2015). In the target population, the researcher sought to determine relationships between emotional wellbeing, sources of stress, self-perceived financial hardship, farm-level economic data, and select demographic data. Differences in these variables were

self-identified by the respondents through their answers on the Farmer Wellbeing questionnaire; there was no experimental manipulation of the variables through the research design.

Population

The target population was comprised of two sub-sets, post-secondary (PS) students (n = 223) and farm business management (FBM) students (n = 2,197) at two-year community and technical colleges represented by MNState Centers of Excellence in Agriculture. Therefore, there were 2,420 possible agricultural respondents (223 PS students population subset + 2,197 FBM students population subset = total population N of 2,420). The targeted participants represented a non-probability purposive, accessible population (Fraenkel et al., 2012). The third-party survey administrator attempted to conduct a census of students in the target population. This decision was based on requirements of the leadership at the MNState Agricultural Centers of Excellence. Total respondents, n = 260, at the conclusion of the data collection resulted in a total response rate of 10.7%.

Census approaches often result in low response rates, reducing reliability, validity, and generalizability (Bartlett, Kotrlik, & Higgins, 2001). Census data are further limited because information is missing about the characteristics of the non-respondents (Fraenkel et al., 2012). Follow-up reminders were sent via emails and an electronic newsletter by the third-party survey administrators, MNState Agricultural Centers of Excellence/South Central College. Although steps, such as the follow-up

reminders, were taken to increase the response rate, the questionnaire is limited by the nearly 90% non-response.

All on-campus agricultural PS students enrolled at Ridgewater College in Willmar, Minnesota West Community and Technical College in Worthington, and South Central College in North Mankato were included in the targeted PS students. These campuses and their PS agricultural students were selected by MNState because they represent three established agriculturally based two-year programs (B. J. Schloesser, personal communication, February 2018). PS students were majority male, primarily white, and predominately between ages 18-21. An attempted census of PS students involved in production agriculture was conducted; no probability sampling occurred. Total PS respondents were 66, which is 29.6% of the PS student population.

Farmers enrolled in the FBM program at Central Lakes College, Ridgewater College, Northland College, Minnesota West Community and Technical College, Riverland Community College, and South Central College represented the second targeted group. Two Minnesota State colleges with FBM programs, Alexandria Technical College and St. Cloud Technical College, did not participate in the coordinated IRB process due to administrative changes at both colleges in 2017-18. Therefore, FBM students at Alexandria Technical College and St. Cloud Technical College were not included in the target population or the final data set.

FBM students represented a variety of ages, farm types, and experience levels; students enrolled in programs were directly involved in production agriculture at full- or part-time levels (Southern Minnesota Center of Agriculture, 2018). Similar to the

approach with PS students, an attempted census of FBM students was conducted at the request of the third-party survey administrator. Therefore, no probability sampling occurred. Total FBM respondents were 158, which is 7.2% of the FBM student population.

Lindner, Murphy, and Briers (2001) suggest a minimum response rate of 85%. The low response rate, 10.7%, in this study warranted further testing to determine the impact of nonresponse error on the data. Using Lindner, Murphy and Briers recommended procedure of comparing late respondents (the last 50% of submitted questionnaires) to early respondents (the first 50% of submitted questionnaires), an independent *t*-test was conducted on the SF-36 emotional wellbeing scale, the primary variable of interest in this study. No significant difference ($p > .05$) was found between early and late respondents (see Table 1), indicating that responses were generalizable within the target population of this study and non-response error was likely minimal in this dataset (Lindner, Murphy, & Briers, 2001).

Table 1

Comparison of Early and Late Respondents' Emotional Wellbeing (n = 257)

	Early Respondents		Late Respondents			
Variable	*M*	*SD*	*M*	*SD*	*t*	*p*
Emotional Wellbeing	67.16[a]	17.22	70.42[a]	18.87	-1.45	.15

Note. Total study $n = 260$, but three respondents did not complete all four subscales for emotional wellbeing. [a]Range 0 – 95.25.

Limited information was available to compare respondents to the target population, with the exception of college affiliation (see Table 2). The third-party survey administrator was unable to provide demographic information about the study's total target population (B. J. Schloesser, personal communication, October 2018). Therefore, it is unknown how the missing respondents' demographic information compares to the respondents. Of the respondents that submitted their age (n = 238), ages ranged from 17-76, with a mean of 37.54, median of 36, and mode of 18. Of the respondents that identified their gender (n = 236), selections were male (n = 186, 78.81%), female (n = 47, 19.92%), prefer not to say (n = 2, .85%), and other (n = 1, .42%). Respondents identifying their race/ethnicity (n = 236) were a majority white (n = 228, 96.61%).

Table 2

Comparison by College of Total Number of Agricultural Students in Target Population (N = 2420) to Total Number of Student Survey Respondents (n = 260)

College	Total number of PS students	PS survey respondents	Total number of FBM students	FBM survey respondents
Central Lakes	NA	NA	325	8
Minnesota West	30	4	452	16
Northland	NA	NA	367	20
Ridgewater	75	42	334	46
Riverland	NA	1	446	4
South Central	118	16	604	48
Total	223	66[a]	2197	158[a]

Note. Total population figures adapted from Office of the Dean, Southern Minnesota Center of Agriculture, Minnesota State College and University System from B.J. Schloesser, personal communication, November 9, 2018; [a] 36 respondents did not identify whether they were a PS or FBM student, and of those that identified PS or FBM status, an additional 19 did not identify institution.

Instrumentation

The Farmer Wellbeing questionnaire contained several measures totaling 24 emotional wellbeing and farm finance questions. In addition, one introductory question asked students to identify as an FBM or PS student. Four demographic questions on age, ethnicity, gender, and college enrolled concluded the questionnaire. Dillman, Smyth, and Christian (2014) recommended placing demographic questions at the end of a questionnaire, which influenced the question order. The full questionnaire totaled 29

questions (see Appendix A). The questionnaire contained Likert-type, categorical, open-ended numerical, and multiple response questions. These questions resulted in ratio-, interval-, and nominal/categorical-level data. Likert-type scales are commonly used in education for subject-completed assessment of attitudes (Fraenkel et al., 2012; Likert, 1932).

Emotional wellbeing was measured using pre-established emotional- and mental-health questions excerpted from the RAND 36-Item Health Survey Version 1.0 Questionnaire (SF-36) (see Appendix B). The SF-36 is based on decades of prior research in self-perceived mental and physical health (Ware, 1992; Ware, 2000). In this study, there were 14 questions used from the SF-36. Table 3 shows the four scales used on the Farmer Wellbeing questionnaire, as well as the associated questions from the SF-36 that are averaged to form each scale. The scales from the SF-36 used were the a) role functioning limitations due to emotional problems scale, b) energy/fatigue scale, c) emotional wellbeing scale, and d) social functioning scale. The SF-36 has known general population means, standard deviations, and reliability alphas for each scale (Steward et al., 1992) (see Threats to Validity and Reliability section, Table 6).

Table 3

Emotional questionnaire items utilized from the pre-existing RAND 36-Item Health Survey 1.0 to create an operationalized measure of emotional wellbeing

Scale	Number of items	Items averaged to form the scale
Role functioning, emotional	3	17 18 19
Energy/fatigue	4	23 27 29 31
Emotional wellbeing	5	24 25 26 28 30
Social functioning	2	20 32

Note. Adapted from "36-Item Short Form Survey (SF-36) Scoring Instructions," by RAND Corporation, 2018, Retrieved from https://www.rand.org/health/surveys_tools/mos/36-item-short-form/scoring.html. Copyright 1994-2018 by the RAND Corporation.

Coding of the SF-36 converted questions to scores ranging from 0 to 100. SF-36 Questions 24, 25, 28, 29, and 31 were negatively worded. Negatively worded questions were reverse coded according to scoring instructions. Pairing positive and negatively worded questions, with reverse coding of negative questions, is a design strategy to help reduce response bias and improve reliability (van Sonderen, Sanderman, & Coyne, 2013). After coding, lower scores represented poorer health and higher scores represented better health (Steward et al., 1992).

Table 4 shows mean scale scores for respondents from the general population diagnosed with depressive symptoms or major depression. These scores indicated how respondents with depression score, on average, on specific mental health scales from the SF-36 (Hays, Sherbourne, & Mazel, 1995). Depression is one form of emotional non-

wellbeing, so the reported means for individuals with depression were a reference point to compare general population means from the SF-36 to those with a mental illness. All means in Table 4 are lower than the general population means (see Threats to Validity and Reliability section, Table 6); however, not all means were significantly different between respondents with depressive symptoms versus respondents with major depression.

Table 4

Mean Scores from SF-36 Mental Health Scales for Respondents with Depressive Symptoms or Major Depression (N = 1,790)

	Depressive Symptoms		Major Depression	
Scale	*M*	*SD*	*M*	*SD*
Role functioning/emotional	62.2*	3.6	40.5*	6.2
Energy/fatigue	51.4	1.8	50.8	3.7
Emotional well-being	65.3	1.8	58.6	3.3
Social functioning	77.7	2.3	69.7	4.5

Note. Results from baseline of the Medical Outcomes Study. Adapted from *CoreUser's Manual for the Medical Outcomes Study (MOS) Core Measures of Health-Related Quality of Life,* by Hays, Sherbourne and Mazel, 1995. Copyright 1995 RAND Corporation. *Significantly different at $p < .05$.

The SF-36 is widely used and found to be a relatively stable and reliable metric in both ill and healthy populations; however, there are limitations to the instrument (Obidoa, Reisine, & Cherniack, 2010) (see also Threats to Reliability and Validity

section). Past research has shown caution should be used when comparing across genders and age groups, as well as when using with healthy populations (Obidoa et al., 2010). Lins and Carvalho (2016) further warn against using the SF-36 as a comprehensive measure of health because the physical and emotional scales are not combinable for an overall health rating. In this study, the physical health scales were not used, only the emotional health scales. Therefore, the researcher did not attempt at making conclusion about overall health. van Sonderen, Sanderman, and Coyne (2013) reported reverse wording of self-reported health questionnaire items may be ineffective, increasing response bias due to respondent confusion and/or inattention. Finally, the SF-36 uses several double-barreled questions, which are warned against in research-based survey design. Double-barreled questions (Lavrakus, 2008; Sudeman & Bradburn, 1982) are cautioned because they attempt to measure more than one variable in one answer.

Five questions focused on farm finances and personal economics. Two self-perceived financial questions were used from America's Changing Lives Survey (House, 2018). These questions were deemed reliable and valid in research (House, 2018) similar to the purposes of this research. To contrast the self-perceived financial questions, three objective measures of farm financial data were included. Open-ended questions asked respondents to enter their debt-to-asset ratio, current ratio, and net farm income. These are standard questions for MNState students of farm business management. Debt-to-asset ratio is a valid measure of solvency, current ratio is a valid measure of liquidity, and net farm income is a valid measure of profitability (Becker et

al., 2014) (see Definitions section for additional information on these terms). Solvency, liquidity, and solvency are the three categories of financial ratio analysis and are accepted as uniform and objective measures of agricultural finances by the Farm Financial Standards Council and the Economic Research Service of the USDA (ERS USDA, 2018b).

The 2017 farm financial measures for the entire FBM population in Minnesota were published in the public Finbin online database (Center for Farm Financial Management, May 2018). These data were collected in January-March 2018 from a true census of FBM students (*N* = 2,306*)* participating in the Finbin online database. Data collection occurred during one-on-one appointments with FBM instructors. Known population figures for the financial measures for the FBM student sub-set enabled the researcher to compare the farm financial questions responses submitted in the Farm Wellbeing questionnaire to the results from the 2017 statewide FBM census (see Threats to Validity and Reliability section for comparison analyses).

One question in the Farm Wellbeing questionnaire focused on possible farm stressors. The multiple response question about stressors was derived from a 2017 MDA farm stress survey of agricultural professionals in Minnesota (Moynihan, 2017; Yust, 2018). Respondents chose one of three answers (yes, have experienced/observed an increase; no, have not experienced/observed an increase; or, unsure) for each of ten stressors. The stressors were depression, anxiety, financial worries, burnout, marital difficulties, farm transfer concerns, gambling addiction, alcohol addiction, drug addiction (other than alcohol), and other.

Finally, four questions related to educational resources were developed by the researcher. A panel of five experts (university faculty members and administrators in agricultural business management and extension education from Minnesota) reviewed the questionnaire to ensure content and face validity. The first question asked if respondents had experienced financial hardships within the past year, were relevant educational resources available to them. The respondent could answer yes, no, or not applicable (as some respondents did not experienced financial hardship in the past year). A multiple selection check box response was used to ask the respondent their desired format for financial education resources. Another question asked about emotional problems in the past year; again, were relevant educational resources available to the respondent? The respondent may answer yes, no, or not applicable (as some respondents did not experienced emotional problems in the last year). A multiple selection check box response was used to ask the respondent their desired format for educational resources to cope with emotional problems.

Threats to Validity and Reliability

Valid instruments enable researchers "to draw warranted conclusions about the characteristics of the individual results" (Fraenkel et al., 2012, p. 141). In other words, valid research instruments measure what they are supposed to measure. Reliable instruments are "one[s] that give consistent results" (Fraenkel et al., 2012, p. 141). The design of this study presented multiple threats to validity and reliability. Strategies to

overcome threats to validity and reliability are outlined below. Validity in this non-experimental study is discussed in terms of content, criterion, and construct validity.

Content, Criterion, and Construct Validity

Content validity is "the degree to which an instrument logically appears to measure an intended variable; it is measured by expert judgement" (Fraenkel et al., 2012, p. G-2). A panel of experts (university faculty members and administrators in agricultural business management and extension education) reviewed the questionnaire for content validity before it was sent to respondents. Several minor changes were made at the suggestion of the experts; in particular, a profitability measure was added to more thoroughly assess farm finances. Another change involved re-wording questions about educational resources to clarify and allow multiple selection response. However, not all suggestions by the experts could be incorporated. For example, the exact wording of previously developed and established questions, such as the SF-36 excerpts, could not be changed without invalidating the known population alphas, means, and standard deviations from RAND Health. The SF-36 has been utilized for nearly 30 years as a quality of life assessment in adult populations (RAND Corporation, 2018; Ware, 1992; Ware, 2000). Two questions from the Americans' Changing Lives Survey were previously reviewed by content experts involved in that survey; the survey is "oldest ongoing nationally representative longitudinal study of the role of a broad range of social, psychological, and behavioral factors" (House, 2018).

Criterion-related validity is “the degree to which performance on an instrument is related to performance on other instruments intended to measure the same variable, or to other variables logically related to the variable being measured” (Fraenkel et al., 2012, p. G-2). The primary criterion-related validity check involved the objective farm financial measure questions. The 2017 farm financial measures for the entire FBM population in Minnesota were published publicly in the FINBIN database in April 2018 and served as a crosscheck for the objective financial measures submitted by respondents. As this study’s instrument sought respondents’ 2017 data, this comparison provided evidence of concurrent validity. Concurrent validity is the degree to which the scores on an instrument are related to the scores on another instrument administered at the same times, or to some other criterion available at the same time” (Fraenkel et al., 2012, p. G-2). To determine if the mean financial ratios from the Farmer Wellbeing questionnaire FBM respondents, x, was significantly different from the mean financial ratios from the known 2017 FBM population, μ, one sample t-tests were conducted.

The null hypotheses were H_0: $\mu_k = x_k$, that the sample mean is equal to the known population mean (i.e. the 2017 published FINBIN averages). The respondents’ debt-to-asset ratio mean was 42% or .42 (SD = .193), while the FINBIN ratio was 44% or .44 (SD = not reported), (t = -.22, p = .83). The null hypothesis fails to be rejected and the debt-to-asset ratio in the sample is not statistically different from the debt-to-asset ratio in the FINBIN database census of MN FBM students. The current ratio mean was 2.87 (SD = 4.85), while the FINBIN ratio was 1.60 (SD = not reported), (t = 1.97, p = .05). The null hypothesis fails to be rejected and the current ratio in the sample is not

statistically different from the current ratio in the FINBIN database census of MN FBM students. The net profit mean was $19,013 (*SD* = $295,111), while the FINBIN mean was $62,005 (*SD* = not reported), (*t* = -1.30, *p* = .20) The null hypothesis fails to be rejected and the current ratio in the sample is not statistically different from the current ratio in the FINBIN database census of MN FBM students. These analyses showed the respondents were not significantly different from the total population (see Table 5). This provided insight about the non-respondents.

Table 5

Comparison of Finbin's Total FBM Student Population (N =2369) Financial Ratios to Farmer Wellbeing Questionnaire Respondents' Financial Ratios

Financial Ratio	Population μ	Respondent x	t	p
Debt-to-asset ratio ($n = 65$)	44%	42%	-.22	.83
Current ratio ($n = 57$)	1.60	2.87	1.97	.05
Net farm income ($n = 79$)	$62,005	$19,013	-1.30	.20

Note. Total population figures adapted from Finbin Database, Center for Farm Financial Management, Copyright 2018 University of Minnesota. Decimals on debt-to-asset ratio and net farm income not included in this comparison because the Finbin Database did not include decimals.

Construct-related validity is "the degree to which an instrument measures an intended hypothetical psychological construct, or non-observable trait" (Fraenkel et al., 2012, p. G-2). During the content-related validity review, the use of double-barreled questions, a construct validity issue, was identified by the expert reviewers. Addressing

multiple items in one question/response results in unclear variable definitions. Double-barreled questions are cautioned against in research-based surveys (Lavrakus, 2008; Sudeman & Bradburn, 1982). Double-barreled questions were not altered because SF-36 items were selected specifically to compare this survey's data with known general population values. The researcher conducted a thorough review of literature and theory related to emotional wellbeing, farm finances, and adult educational resources to improve overall construct-related validity based on recommendations outlined in Fraenkel et al. (2012).

Reliability

Threats to reliability are factors that result in research error and may include "researcher (or observer) error, environmental changes and participant changes" (Lund Research, 2012, p. 2). In this study, the most notable threats to reliability were timing of the survey and consistency of respondent interaction. These were considered environmental changes. Several questions from the SF-36 asked for self-perceived emotional wellbeing based on behaviors during the prior four weeks. Other questions asked for observations and experiences during the past year, i.e. 52 weeks. If respondents were unable to recall experiences, behaviors, and observations accurately within four-week and one-year periods, reliability of the data would be limited. MNState began data collection with post-secondary (PS) and farm business management (FBM) students on April 1, 2018 and continued data collection through

October 1, 2018. Emotional wellbeing for each respondent could have varied during those seven months, even if the instrument was individually reliable at a specific time.

The SF-36 emotional scales were selected as the emotional wellbeing measures because of known acceptable reliabilities and uses in medical studies (RAND Corporation, 2018). See Table 6 for known Cronbach's alphas of each SF-36 scale; Cronbach's alpha "is the most common measure of scale reliability" (Field, 2015, p. 708). The SF-36 also has several reverse-scaled equivalent forms questions, which have previously shown reliable internal consistency of the instrument (RAND Corporation, 2018). See Table 7 for a comparison of the Cronbach's alphas of each SF-36 scale when measured with the Farmer Wellbeing respondents' data. Cronbach's alpha was not calculated for the summed four emotional wellbeing scales as Cronbach (1951) advised to report subscale alphas separately and not combine factors. Scales showed generally good to excellent reliability.

Table 6

Reliability, Central Tendency, and Variability of Emotional Scales in the RAND 36-Item Health Survey 1.0, SF-36

Scale	Questionnaire Items	α	*M*	*SD*
Role functioning/emotional	3	0.83	65.78	40.71
Energy/fatigue	4	0.86	52.15	22.39
Emotional well-being	5	0.90	70.38	21.97
Social functioning	2	0.85	78.77	25.43

Note. Results from baseline of the Medical Outcomes Study (*N*=2,471). Adapted from "36-Item Short Form Survey (SF-36) Scoring Instructions," by RAND Corporation, 2018, retrieved from https://www.rand.org/health/surveys_tools/mos/36-item-short-form/scoring.html. Copyright 1994-2018 by the RAND Corporation.

Table 7

Reliability, Central Tendency, and Variability of SF-36 Emotional Scales in Selected Agricultural Students (n = 260)

Scale	α	*M*	*SD*
Role functioning/emotional (*n* = 260)	0.69	61.54	36.58
Energy/fatigue (*n* = 259)	0.86	76.45	24.04
Emotional well-being (*n* = 256)	0.83	68.79	21.16
Social functioning (*n* = 257)	0.83	50.98	18.11

Note. Scales range from 0-100, with lower scores indicated poorer emotional health and higher scores indicated better emotional health.

To measure reliability of the stressors question, Kuder-Richardson Formula-20 was used. This reliability measure is appropriate for use with dichotomous questions (Kuder & Richardson, 1937). Because the unsure choice was coded as no, this question was dichotomous. The *r* for the 10 stressor questions after binary coding (yes = 1, no and unsure = 0) was .78, indicating acceptable reliability.

Two methods were planned to measure reliability for the financial-related questions. For the self-perceived financial scale, reliability measurement was difficult because the subjective financial hardship was measured by only two questions. Therefore, a split-half procedure was conducted for that scale (Fraenkel et al., 2012). The Guttman Split-Half coefficient was .87, indicating acceptable reliability. To measure reliability of the objective financial hardship measures, the researcher had planned to conduct correlations on test-retest between the target population data from FINBIN and respondents' data from the Farmer Wellbeing questionnaire. The reliability correlations were planned for net farm income, current ratio, and debt-to-asset ratio. However, non-aggregated FINBIN data was not publicly available, which prohibited such tests.

Missing Data

Missing data can affect reliability and validity of research if not treated properly. Between April 1 and October 1, 2018, 316 responses to the questionnaire were recorded in Qualtrics. After deleting submissions that contained no questions answered, 277 responses remained. An additional 17 responses answered less than six questions, which

did not allow for analysis of any operationalized variable(s). Therefore, those 17 responses were also deleted, leaving an *n* of 260 full and partial responses. Partial responses consisted of responses where the respondent chose not to answer some or all of specific constructs within the questionnaire but did answer at least one full construct.

Another source of missing data were unusable responses to open-ended questions. Four open-ended ratio-level quantitative questions—debt-to-asset ratio, current ratio, net farm income, and age—had the potential for non-useable responses. For example, while responses such as "a lot," "a big negative," and "to[o] much" were not technically missing answers, they were nonetheless unusable for the purposes of quantitative analysis and therefore excluded. Answers such "idk," "NA," "?," etc. were treated as missing and deleted. Answers that were numerical but not in correct format for analysis were not treated as missing if the respondents' intentions were clear. For example, a response of "fifty percent" under debt-to-asset ratio was changed by the researcher to "50%," and a response of "40k loss" under net farm income was changed by the researcher to "-40,000."

Data Collection

During an agribusiness internship meeting and/or on-campus classroom session, PS students were directed to an informed consent form with a link to the anonymous online Farmer Wellbeing questionnaire in Qualtrics. Similarly, during an individual FBM meeting and/or FBM faculty verbal or email communication, FBM students were directed to the link to the anonymous online Farmer Wellbeing questionnaire in

Qualtrics. All students in the population could complete none, part, or the entire questionnaire. The questionnaire was open from April 1 to October 1, 2018. Reminders to have PS and FBM students complete the Farmer Wellbeing questionnaire were sent by the third-party survey administrator via email multiple times during the six months of data collection. While the survey was completely anonymous, a date and time stamp weas recorded in Qualtrics when the respondent submitted the questionnaire. This was recorded for a comparison analysis of the early and late responses.

The Farmer Wellbeing questionnaire was available via paper for those preferring not to complete it online. If requested, instructors would have left an addressed stamped return envelope containing a blank paper questionnaire with a unique code with the student. The anonymous paper questionnaire would have been returned via mail and collected in a secure location until the coded surveys could be entered into Qualtrics by administrative professionals trained in survey procedures at South Central College. However, no paper Farmer Wellbeing questionnaires were requested by respondents.

The researcher sought Texas A&M University IRB approval to access and analyze archival data from the MNState system. Texas A&M IRB determined on July 23, 2018 that although the survey data collection involved human subjects, data analyses did not involve human research and did not require IRB review or approval (see Appendix C). Because the researcher's doctoral program was offered jointly between Texas A&M and Texas Tech Universities, there was an articulated IRB process at Texas Tech University. On July 31, 2018 Texas Tech University IRB concluded that the TAMU determination was correct, and IRB review or approval was not needed by

Texas Tech University (see Appendix D). Therefore, the researcher was not involved in any data collection to conform to the TAMU IRB determination, which approved archival data access and subsequent data analysis only.

South Central College served as the lead institution for data collection in the MNState system. MNState collected the primary data and interacted with the human subjects as a third-party collaborator. Therefore, IRB review and approval were needed and sought by South Central College (see Appendix E). IRB approval helped to ensure respect for persons, beneficence, and justice as based on the tenants of the Belmont Report (1978). Initial Institutional Review Board approval was granted in March 2018. In May 2018, South Central College and SMCA administrators coordinated campus approvals for PS and FBM data collection at Central Lakes College, Ridgewater College, Northland College, Minnesota West Community and Technical College, Riverland Community College, and South Central College. In January 2019, an addendum was filed to the original IRB submission by South Central College to allow the researcher to access the unidentified, anonymous data for the purposes of this study. At no time were identifiers associated with data. On January 2, 2019, the researcher obtained the archival data from South Central College via an excel spreadsheet of Qualtrics data. Data did not contain personal identifiers, and non-aggregated data only was stored on a password-protected computer.

The MDA agreed in February 2018 to allow the researcher to use and modify the stressor question language from their 2017 convenience sample 10-question survey (M. Moynihan, personal communication). Agricultural professionals, agricultural educators,

and law enforcement professionals from Minnesota took the survey in summer 2017 (see Table 8). The stressor question in the MDA survey originally read as "In the last year, have you observed an increase in the following? (in farmers you work with and/or other farmers you know)." Access to the data from the MDA survey via SurveyMonkey was granted on February 16, 2018. Data was unidentified and anonymous. Demographic data and results of the MDA's stressor question were downloaded and transferred to SPSS. The MDA internally approved their 2017 survey research; no IRB review took place.

Table 8

Occupations of Respondents to the MDA's 2017 Survey of Agricultural Professionals and Law Enforcement Officers (n = 526)

Job Category	*n*	% of respondents
USDA Employee	241	45.82
Veterinarian	85	16.16
State or county agency employee	70	13.31
Educator (Extension, College, etc)	65	12.36
Law enforcement	59	11.22
Agricultural banker	6	1.14

Note. Data adapted from Minnesota Department of Agriculture Stressor Survey by M. Moynihan, 2017. Copyright 2017 Minnesota Department of Agriculture. Respondents (*n* =11) not selecting a job category were not included in data shared with the researcher.

Data Analysis

After data access was granted, it was downloaded from Qualtrics into Excel. The Excel sheet was shared with the researcher by the third-party survey administrator on January 2, 2019. Data was sorted, cleaned, and recoded in Excel. Data was then uploaded to IBM SPSS (v. 24) statistical platform. Descriptive statistics were reported for all research questions. For non-parametric and inferential statistical analysis, all procedures, unless specifically noted, followed protocols outlined by Field (2015). The alpha level was set at .05 *a priori* for all non-parametric and inferential analyses.

Research Question One

Research question one—is there a difference in emotional wellbeing between the general population and selected Minnesotan production agriculture students—was analyzed using an ANOVA (one-way analysis of variance or GLM1) comparing FBM and PS student means versus the known SF-36 population. There were known estimated general population means (Steward et al., 1992), so an ANOVA was an appropriate statistical analysis to compare the multiple means from the four different SF-36 emotional well-being scales of the three different groups, FBM students, PS student, and the known SF-36 population (Field, 2015). Four dependent interval-level variables were measured for this analysis. Emotional well-being scales from the SF-36 were a) role limitations due to emotional problems, b) energy/fatigue, c) emotional wellbeing, and d) social functioning. The independent categorical variable was respondent-type, i.e. selected Minnesota production agricultural students (i.e. FBM students or PS students)

or the general population. The dependent variables were interval level data; therefore, means, ranges, and standard deviations of the dependent variables were reported for descriptive statistics.

For the inferential statistical analysis using ANOVA, *F*-statistics were reported for the omnibus hypotheses and *t*-statistic for planned comparisons. For the omnibus hypotheses, effect sizes for ω^2 were evaluated using Kirk (1996). For the follow-up hypotheses, effect sizes for $r_{contrast}$ were evaluated using Cohen (1988). Levene's statistic was used to check for homogeneity of variance. The planned comparisons were:

1) role limitations due to emotional problems in FBM students vs. the known SF-36 population;
2) energy/fatigue in FBM students vs. the known SF-36 population;
3) emotional wellbeing in FBM students vs. the known SF-36 population;
4) social functioning in FBM students vs. the known SF-36 population;
5) role limitations due to emotional problems in PS students vs. the known SF-36 population;
6) energy/fatigue in PS students vs. the known SF-36 population;
7) emotional wellbeing in PS students vs. the known SF-36 population;
8) social functioning in PS students vs. the known SF-36 population;
9) role limitations due to emotional problems in all respondent students vs. the known SF-36 population;
10) energy/fatigue in all respondent students vs. the known SF-36 population;

11) emotional wellbeing in all respondent students vs. the known SF-36 population;
12) social functioning in all respondent students vs. the known SF-36 population; and,
13) total emotional wellbeing in PS students vs. total emotional wellbeing in FBM students vs. the SF-36 population.

The omnibus null hypothesis for research question one assumed that the difference between respondents and general population means was not significantly different from zero (H_o: $\mu_1=\mu_2=\mu_3$). The omnibus alternative hypothesis for research question one assumed that the difference was significantly different from zero (H_a: $\mu_1 \neq \mu_2 \neq \mu_3$). Null and alternative hypotheses were also analyzed for each of the planned comparisons outlined above. The hypotheses are illustrated mathematically as, H_0: $\mu_k = m_k$ and H_a: $\mu_k \neq m_k$.

Research Question Two

Research question two— do selected Minnesotan production agriculture students identify significantly different sources of stress than Minnesotan law enforcement officers and agricultural professionals—was analyzed by a two-step process. Because the variables were categorical and violate the classical assumptions of ordinary least squares, the analyses used were non-parametric. Descriptively, the frequencies, mode, and percentage of respondents selecting each stressor were reported.

For the first analysis of research question two, a 10x4 Chi-square was used to determine if any stressor was selected by respondents more than randomly expected. The Chi-square was conducted to determine a) if agricultural students selected any stressors more than expected, and b) if Minnesotan law enforcement professionals and agricultural professionals from the MDA survey (Moynihan, 2017) selected any stressors more than expected. In the Chi-square, the four columns were yes (students), no/unsure (students), yes (professionals), no/unsure (professionals), and the ten rows were the stressors. While there is not consensus on whether unsure (or alternatively "don't know") should be interpreted the same as answering no (e.g. Groothuis & Whitehead, 2002; Miller, 2018), in this study the primary interest was in positive observation of stressors. Therefore, yes was coded 1 and all other responses (i.e. no and unsure) were coded 0.

The dependent categorical variables were observed stressors identified in the MDA developed question. Respondents could select if they had observed depression, anxiety, financial worries, burnout, marital difficulties, farm transfer concerns (retirement, sale, estate planning, etc.), gambling addiction, alcohol addiction, drug addiction (other than alcohol), or other stressors. The qualitative open-ended responses for the "other" category were not included in the quantitative statistical analysis. The independent categorical variable was respondent-type Minnesota production agricultural students i.e., FBM students or PS students, or respondents from the MDA 2017 survey i.e., law enforcement officers and agricultural professionals. See Table 9 for a conceptual illustration of the Chi-square analysis.

The null hypothesis for research question two assumed that the difference in selection of categorical variables and random selection was not significantly different from zero. The null hypothesis indicated selection of variables by respondents was independent. The alternative hypothesis for research question two assumed that the difference between the categorical variables was different from zero. The alternative hypothesis indicated selection of variables was dependent. In other words, respondents observed, and therefore selected, some stressors more than others at a statistically significant level. The hypotheses are illustrated mathematically as H_0: $p_1 = p_k$ and H_a: $p_1 \neq p_k$, where p represents proportions of participants in each response and k represents the number of response categories.

For the second analysis of research question two, a non-parametric comparison was used to compare agricultural student responses to agricultural and law enforcement responses. The independent categorical variables in this analysis were if the respondents were Minnesota production agricultural students or respondents from the MDA 2017 survey. The dependent variables were the positively identified stressors; "no" and "unsure" responses are not considered in this analysis. In each group, observed stressors are ordered from least selected "yes" to most selected "yes" and then assigned a mean rank. Through this process, the categorical data was transformed to ordinal data, and a Mann Whitney test was used to compare the statistical significance of the two independent groups' responses. The null hypotheses stated the mean ranks for each stressor was equal between groups. The alternative hypotheses stated mean ranks for each stressor was not equal between groups. *U* and *z*-score were reported for test-

statistics, and *r* was used for effect size (Field, 2015; Rosenthal, 1991). Effect size was interpreted using Cohen (1988).

Table 9

Illustration of Rows and Columns in the Chi-square Analysis of Expected Responses

	2018 Agricultural Student Survey by MNState		2017 Law Enforcement and Ag Professionals Survey by MDA	
Variables	Responded Yes	Responded No/Unsure	Responded Yes	Responded No/Unsure
Depression	.50	.50	.50	.50
Anxiety	.50	.50	.50	.50
Financial Worries	.50	.50	.50	.50
Burnout	.50	.50	.50	.50
Marital Difficulties	.50	.50	.50	.50
Farm Transfer Concerns	.50	.50	.50	.50
Gambling Addiction	.50	.50	.50	.50
Alcohol Addiction	.50	.50	.50	.50
Drug Addiction	.50	.50	.50	.50
Other	.50	.50	.50	.50

Note. In this illustrative example, .50 represents 1/2 of total *n* in each the MNState survey and the MDA survey. Unsure was collapsed into the no category for the Chi-square analysis.

Research Question Three

Subjective financial or economic hardship was the focus of research question three. Research question three—does self-perceived economic hardship predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students—was measured using simple linear regression following protocol outlined in Field (2015). Emotional wellbeing, the interval level dependent variable, was measured as the summation of the four RAND SF-36 scales in the survey divided by four (possible range 0-100). The independent interval variable was self-perceived economic hardship, which is the summed scores of the two Likert-questions on subjective financial state (possible range 2-10). Descriptively, means and standard deviations were reported for the dependent and independent variables. The magnitude of correlations was measured using Davis' (1971) conventions. The Durbin Watson test was used to check the independence of errors; values above 3 or below 1 indicate concern (Field, 2015). Cohen's *f* was calculated for effect of the omnibus model, and effect magnitude was interpreted using Cohen (1988). The standardized beta was reported to indicate the importance of the model predictor (Field, 2015).

The omnibus null hypothesis for research question three assumed there was no statistically significant relationship between self-perceived economic hardship and economic wellbeing (H_o: $R^2=0$). The alternative hypothesis assumed there was a statistically significant relationship between self-perceived economic hardship and economic wellbeing (H_a: $R^2\neq0$). The follow up hypothesis states that the beta was not statistically different from zero (H_o: $\beta_1=0$). While, the alternative hypothesis states the

beta for self-perceived economic hardship was statistically different from zero, (H_a: $\beta_1 \neq 0$).

Research Question Four

Objective financial or economic hardship was the focus of research questions four. Research question four—do farm-level economic data predict decreased levels of emotional wellbeing for selected production agriculture students in Minnesota—was measured using multiple linear regression outlined in Field (2015). The rationale for comparing self-perceived economic hardship versus objective farm financial measures as predictors of emotional wellbeing comes from research during the 1980s farm crisis, which found self-perceived hardship influenced depression (e.g. Armstrong & Schulman, 1990). Emotional wellbeing, the interval-level dependent variable, was measured as the sum of the four RAND SF-36 scales divided by four. The independent ratio variables were 2017 debt-to-asset ratio, 2017 current ratio, and 2017 net farm income. Descriptively, means and standard deviations for all variables were reported. In multiple linear regression, multicollinearity was checked by examining tolerance values and variation inflation factors. In the data set, tolerance values were checked for values under 0.2 (Menard, 1995) and variation inflation factors, VIF, more than 10 (Myers, 1990), which would indicate issues of multicollinearity. The Durbin Watson test was used to check the independence of errors; values above 3 or below 1 indicate concern (Field, 2015). Cohen's *f* was calculated for effect of the omnibus model, and effect magnitude was interpreted using Cohen (1988). The standardized betas were reported to

indicate the importance of the model predictors (Field, 2015). The multiple linear regression was planned to be repeated three times, using FBM data, PS data, and all respondents' data.

The omnibus null hypothesis for research question four assumed there was no statistically significant relationship between farm level economic data and economic wellbeing (H_o: $R^2=0$). The alternative hypothesis assumed there was a statistically significant relationship between self-perceived economic hardship and economic wellbeing (H_a: $R^2\neq0$). The follow up hypotheses state that each beta—2017 debt-to-asset ratio, 2017 current ratio, and 2017 net farm income—was not statistically different from zero (H_o:$\beta_k=0$). While, the alternative hypotheses state each beta was statistically different from zero, (H_a: $\beta_k\neq0$).

The regression analysis and hypotheses tests were planned to be repeated three times using FBM data, PS data, and all respondents' data. However, due to the small number of PS students (n = 5) who responded to the farm financial questions, the regression was calculated only once using all respondents' data (n = 52).

Research Question Five

Research question five— do selected demographic variables predict the type of emotional wellbeing educational resources and farm financial educational resources desired by selected Minnesotan production agricultural students —was measured by logistic regression. Logistic regression is appropriate for use with categorical variables, predicting the probability of Y occurring based on a known X (Field, 2015). First, a

logistic regression was planned with emotional wellbeing educational resources desired as the categorical dependent variable, with gender and age as the independent variables. Second, a logistic regression was planned with farm financial education resources desired as the categorical dependent variable, with gender and age as the independent variables.

The grouping variables were selected based on past literature. Gender was selected as a grouping variable because earlier studies on farm stress noted differences in female and male responses (e.g. Hoyt et al., 1997; Tutor-Marcom et al., 2014) and educational resources desired by farmwomen (Barbercheck et al., 2009). Age was selected as the other grouping variable because earlier studies showed differences in farm stress between generations (e.g. Marotz-Baden, 1988; Weigel, Weigel, & Baden, 1987) and educational resources desired by farmer age (Jensen, English, & Menard, 2009; Velandia et al., 2010). In this study, age was transformed using SPSS's Ntile function into four ordinal categories, or quartiles: 17-19, 19-36, 36-55, 55+. Descriptively, frequencies, mode, and percentage of respondents selecting each educational resource were reported for the dependent variable. Point-biserial correlations between the dependent variables and the two independent variables were reported, and magnitudes were interpreted with Davis (1971). Point-biserial correlation was used due to the dependent variables' discrete dichotomy (Field, 2015). Before the inferential analyses were conducted, an independent samples *t*-test was conducted to determine if emotional wellbeing differed by gender or age in the respondents. Effect of

the *t*-test was reported according to Rosenthal (1991), and the effect magnitudes were interpreted with Cohen (1988).

A non-parametric logistic regression was conducted as the inferential analysis. In logistic regression, there are concerns about violating the classical assumptions of regression, although there is no assumption of linear relationships between the independent and dependent variables. In particular, there is concern of multicollinearity. Tolerance and variation inflation factors were checked (Menard, 1995 and Myers, 1990 as cited in Field, 2015). Collinearity diagnostics were analyzed for the variance proportion and its corresponding small Eigenvalue for dependency of regression coefficients (Field, 2015). Finally, the linearity of the logit was also checked for interaction effects. Chi-square was reported as the major test statistics. To analyze the model's two betas of age and gender, Z^2 (Wald Statistic), *z*-values, and *p*-values were reported. Additionally, Hosmer and Lemeshow, Cox and Snell, and Nagelkerke R^2 are reported and interpreted with Cohen (1988). Odds-ratio measured effect size of the beta, and the magnitude was interpreted using Haddock, Rindskopf, and Shadish (1998).

The omnibus null hypothesis assumed the likelihood of selecting educational resources formats was not significantly related to age or gender. The alternative hypothesis assumed the likelihood of selecting educational resources formats was significantly related to age or gender. These hypotheses were evaluated by the significance of the model's chi-square. The follow-up null hypothesis was no linear relationship of the variables existed in the study population (H_o: $\beta_k = 0$). The follow-up

alternative hypothesis was a linear relationship of the variables existed in the study population (H_a: $\beta_k \neq 0$).

Summary

This chapter summarized the methods utilized to analyze the five research questions. The target population was described, as well as the unique requirements of the third-party survey administrator to utilize an attempted census approach instead of sampling. Instrumentation, including where questions originated, rationale for each scale's inclusion, and validity procedures, was overviewed. MNState collected data from April 1 through October 1, 2018 and granted data access to the researcher in January 2019. Reliability tests, as well as data screening occurred before data analysis began. The breadth of research questions resulted in a variety of statistical tests utilized, including ANOVA, Chi-squares with a Mann-Whitney follow-up, linear regression, multiple regression, and log regression. The next chapter presents results of the data analysis. Chapter five interprets the implications of those results in the context of agricultural education.

CHAPTER IV

RESULTS

This chapter reports the results of the descriptive and inferential data analysis for each of the study's five research questions.

Statement of Purpose and Research Questions

The purpose of this study was to measure quantitatively factors, including financial status, influencing current emotional wellbeing in selected Minnesota production agriculture students. The mental health scales in the short form RAND 36-Item Health Survey 1.0 (SF-36) operationalized emotional wellbeing in this study. The following research questions guided this study:

1. Is there a difference in emotional wellbeing between the general population and selected Minnesotan production agriculture students?
2. Do selected Minnesotan production agriculture students identify significantly different sources of stress than Minnesotan law enforcement officers and agricultural professionals (Moynihan, 2017)?
3. Does self-perceived economic hardship predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?
4. Does farm-level economic data predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?

5. Do selected demographic variables predict the type of emotional wellbeing educational resources and farm financial educational resources desired by selected Minnesotan production agriculture students?

Research Question One

Research question one—is there a difference in emotional wellbeing between the general population and selected Minnesotan production agriculture students—was analyzed using an ANOVA. Three groups—the known population mean from the SF-36 (Ware, 1992), PS students, and FBM students—were compared for each of the four emotional wellbeing sub-scales and an overall emotional wellbeing average. The overall emotional wellbeing average represented the mean average of the four summed sub-scales (i.e. [role functioning + social functioning + energy/fatigue + emotional wellbeing]/4 = overall emotional wellbeing average). Table 10 shows the means, standard deviations, and minimum and maximum scores of the emotional wellbeing scales by sub-population groups (i.e. PS students and FBM students). See the Instrumentation sub-section in Chapter III for the known general population means and standard deviations.

Before analyzing the ANOVA, Levene's statistic was used to check for homogeneity of variance among the groups of students. Levene's statistic was not significant at the .05 level for role functioning ($F = .412$, $p = .521$), social functioning ($F = .949$, $p = .331$), or emotional wellbeing ($F = 3.26$, $p = .072$). Levene's statistic for energy/fatigue ($F = 5.64$, $p = .018$) was significant at the .05 level, indicating results for

this scale should be interpreted with caution. Levene's statistic for the overall summed SF-36 emotional average ($F = 3.028$, $p = .083$) was not statistically significant at the .05 level, showing no violation of the classical assumption of homogeneity of variance between groups of PS and FBM students.

Table 10

Description of PS and FBM Groups by SF-36 Scales (n = 224)

Group and Scale	*N*	*M*	*SD*	*Min*	*Max*
FBM Role Functioning	158	60.55	37.02	0.00	100.00
PS Role Functioning	66	65.15	36.24	0.00	100.00
FBM Social Functioning	158	75.32	25.03	0.00	100.00
PS Social Functioning	66	80.77	22.11	0.00	100.00
FBM Energy/Fatigue	155	51.13	22.71	0.00	100.00
PS Energy/Fatigue	66	53.64	18.01	0.00	85.00
FBM Emotional Wellbeing	156	67.41	18.67	16.00	100.00
PS Emotional Wellbeing	66	72.00	16.40	0.00	96.00
FBM Overall Emotional Average	153	63.52	21.74	11.25	100.00
PS Overall Emotional Average	65	67.92	18.67	0.00	95.25

Note. Coding was 0-100 per question and each scale is a mean average of the sums of the individual questions. Questionnaire adapted from "36-Item Short Form Survey (SF-36) Scoring Instructions," by RAND Corporation, 2018, retrieved from https://www.rand.org/health/surveys_ tools/mos/36-item-short-form/scoring.html. Copyright 1994-2018 by the RAND Corporation.

There was no statistical difference between groups for the role functioning scale, $F(2, 224) = .37$, $p = .69$, $\omega^2 = .01$. The ω^2 was a low effect size (Kirk, 1996). There was no statistical difference between groups for the social functioning scale, $F(2, 223) = 1.17$, $p = .31$, $\omega^2 < .01$. The ω^2 effect size was negligible (Kirk, 1996). There was no statistical difference between groups for the energy/fatigue scale, $F(2, 221) = .32$, $p = .73$, $\omega^2 = .01$. The ω^2 effect size was low (Kirk, 1996). There was no statistical difference between groups for the emotional wellbeing scale, $F(2, 222) = 1.51$, $p = .22$, $\omega^2 < .01$. The ω^2 effect size was negligible (Kirk, 1996). There was no statistical difference between the student groups for the averaged SF-36 emotional scales, $F(2, 218) = 1.02$, $p = .36$, $\omega^2 < .01$. The ω^2 effect size was negligible (Kirk, 1996). In summary, results indicated no significant differences between the known general population mean, PS students' mean, and FBM students' mean for any of the emotional wellbeing scales (see Table 11). The lack of significance of the omnibus hypotheses meant no planned comparisons were analyzed, and *t*-scores and $r_{contrasts}$ were not calculated. All null hypotheses for question one failed to be rejected. PS and FBM students did not have significantly different emotional wellbeing than the general population when measured by the emotional scales from the SF-36.

Table 11

One-Way Analysis of SF-36 Emotional Scale Scores by Group Means (n = 224)

Variable	*SS*	*Df*	*MS*	*F*	*p*	ω^2
Role Functioning						
Between groups	1001.31	2	500.65	.37	.69	.01
Within groups	300600.95	222	1354.06			
Total	301602.25	224				
Social Functioning						
Between groups	1372.77	2	686.38	1.17	.31	<.01
Within groups	129695.72	221	586.86			
Total	131068.48	223				
Energy/Fatigue						
Between groups	291.08	2	145.54	.32	.73	.01
Within groups	100504.69	219	458.93			
Total	100795.78	221				
Emotional Wellbeing						
Between groups	979.56	2	489.78	1.51	.22	<.01
Within groups	71481.74	220	324.92			
Total	72461.30	222				
Overall SF-36 Average						
Between groups	885.53	2	442.77	1.02	.36	<.01
Within groups	94130.28	216	435.79			
Total	95015.81	218				

Research Question Two

Research question two—do selected Minnesotan production agriculture students identify significantly different sources of stress than Minnesotan law enforcement officers and agricultural professionals—was analyzed by a two-step process. First, Chi-square analyses were conducted. The first Chi-square determined if Minnesotan student respondents selected stressors at statistically significant different levels than compared to random selection. The second Chi-square determined if Minnesotan professional respondents (Moynihan, 2017) selected stressors at statistically significant different levels than compared to random selection. A Mann Whitney test was used to compare the statistical significance of the two independent groups' ranked responses.

Frequencies, mode, and percentage of respondents selecting each stressor were reported for Minnesotan production agriculture student respondents (see Table 12) and Minnesotan law enforcement officers and agricultural professionals (see Table 13).

Table 12

Minnesotan Production Agriculture Students' Frequencies of Observed Farm and Agricultural Stressors (n = 260)

	Yes		No		Unsure		
Stressors	*f*	%	*f*	%	*f*	%	Mode
Depression (*n* = 257)	106	41.24	109	42.41	42	16.34	No
Anxiety (*n* = 256)	145	56.64	81	31.64	30	11.72	Yes
Financial Worries (*n* = 258)	179	69.40	56	21.71	23	8.91	Yes
Burnout (*n* = 255)	143	56.08	79	30.98	33	12.94	Yes
Marital Difficulties (*n* = 257)	59	22.96	145	56.42	53	20.62	No
Farm Transfer Concerns (*n* = 257)	114	44.36	98	38.13	45	17.51	Yes
Gambling Addiction (*n* = 257)	7	2.72	199	77.43	50	19.46	No
Alcohol Addiction (*n* =253)	30	11.86	178	70.35	46	18.17	No
Drug Addiction (*n* = 255)	9	3.53	201	78.82	45	17.65	No
Other (*n* = 140)	4	2.86	80	57.14	56	40.00	No

Note. % reported is valid percentage of those that responded to each observed stress sub-question, the percentage excludes missing responses.

Table 13

Minnesotan Law Enforcement Officers and Agricultural Professionals' Frequencies of Observed Farm and Agricultural Stressors (n = 527)

	Yes		No		Unsure		
Stressors	*f*	%	*f*	%	*f*	%	Mode
Depression (*n* = 522)	163	31.23	201	38.51	158	30.27	No
Anxiety (*n* = 524)	300	57.25	136	25.95	88	16.79	Yes
Financial Worries (*n* = 526)	419	79.66	69	13.12	38	7.22	Yes
Burnout (*n* = 517)	204	39.46	200	38.68	113	21.86	Yes
Marital Difficulties (*n* = 521)	114	21.88	231	44.34	176	33.78	No
Farm Transfer Concerns (*n* = 519)	287	55.29	143	27.55	89	17.15	Yes
Gambling Addiction (*n* = 517)	11	2.13	313	60.54	193	37.33	No
Alcohol Addiction (*n* = 522)	33	6.32	297	56.90	192	36.78	No
Drug Addiction (*n* = 515)	15	0.19	302	58.64	198	38.45	No
Other (*n* = 39)	39	NA	NA	NA	NA	NA	NA

Note. % reported is valid percentage of those that responded to each observed stress sub-question, the percentage excludes missing responses. Data adapted from Minnesota Department of Agriculture Stressor Survey by M. Moynihan, 2017. Copyright 2017 Minnesota Department of Agriculture.

Although “unsure” counts were reported separately under the frequency tables, for the Chi-square analysis, “no” and “unsure,” were collapsed into one group with as expected selection rate of 50% of *n* (see Table 14 and 15). Financial worries were selected as the most observed/experienced stressor by both the agricultural student target population, yes = 179 or 69.40%, and the MDA’s agricultural professional’s convenience sample, yes = 419 or 79.66%. All stressors, with the exception of students’ selection of farm transfer concerns, were significantly different from that of random selection.

Table 14

Chi-Square Analysis of Minnesotan Production Agriculture Students' Observed Farm and Agricultural Stressors (n = 260)

Stressor	X^2	*p*	Expected *n*	Observed *n*	Residual
Depression – Yes	7.88	.01	128.5	106	-22.5
Depression – No/Unsure				151	22.5
Anxiety – Yes	4.52	.03	128.0	145	17.0
Anxiety – No/Unsure				111	-17.0
Financial Worries – Yes	38.76	<.01	129.0	179	50.0
Financial Worries – No/Unsure				79	-50.0
Burnout – Yes	3.77	.05	127.5	143	15.5
Burnout – No/Unsure				112	-15.5
Marital Difficulties – Yes	75.18	<.01	128.5	59	-69.5
Marital Difficulties – No/Unsure				198	69.5
Farm Transfer Concerns – Yes	3.27	.07	128.5	114	-14.5
Farm Transfer Concerns – No/Unsure				143	14.5
Gambling Addiction – Yes	228.77	<.01	128.0	7	-121.0
Gambling Addiction – No/Unsure				249	121.0
Alcohol Addiction – Yes	147.23	<.01	126.5	30	-96.5
Alcohol Addiction – No/Unsure				223	96.5
Drug Addiction – Yes	220.27	<.01	127.5	9	-118.5

Table 14 Continued

Stressor	X^2	p	Expected n	Observed N	Residual
Drug Addiction – No/Unsure				246	118.5
Other – Yes	124.46	<.01	70	4	-66.0
Other – Blank				136	66.0

Table 15

Chi-Square Analysis of Minnesotan Law Enforcement Officers and Agricultural Professionals' Frequencies of Observed Farm and Agricultural Stressors (n = 527)

Stressor	X^2	*p*	Expected *n*	Observed *n*	Residual
Depression – Yes	73.59	<.01	261	163	-98.0
Depression – No/Unsure				359	98.0
Anxiety – Yes	11.02	.01	262	300	38.0
Anxiety – No/Unsure				224	-38.0
Financial Worries – Yes	185.07	<.01	263	419	156.0
Financial Worries – No/Unsure				107	-156.0
Burnout – Yes	22.98	<.01	258.5	204	-54.5
Burnout – No/Unsure				313	54.5
Marital Difficulties – Yes	164.78	<.01	260.5	114	-146.5
Marital Difficulties – No/Unsure				407	146.5
Farm Transfer Concerns – Yes	5.83	.02	259.5	287	27.5
Farm Transfer Concerns – No/Unsure				232	-27.5
Gambling Addiction – Yes	473.94	<.01	258.5	11	-247.5
Gambling Addiction – No/Unsure				506	247.5
Alcohol Addiction – Yes	398.35	<.01	261	33	-228.0
Alcohol Addiction – No/Unsure				439	228.0
Drug Addiction – Yes	456.75	<.01	257.5	15	-242.5

Table 15 Continued

Stressor	X^2	p	Expected n	Observed n	Residual
Drug Addiction – No/Unsure				500	242.5
Other – Yes	382.55	<.01	263.5	39	-224.5
Other – Blank				488	224.5

Statistically significant results of the Chi-Square analysis resulted in a follow-up Mann Whitney test to determine if the selections of stressors were ranked significantly different between the independent groups. A descriptive ordinal rank of the observed stressors in the groups varied only slightly, with burnout ranking third with the agricultural students but fourth with the agricultural professionals and law enforcement officers (see Table 16). However, the Mann Whitney analysis showed additional differences existed between the two groups. Students selected depression, financial worries, burnout, farm transfer concerns, and alcohol addiction at statistically significant different rankings than did agricultural professionals (see Table 17).

Table 16

Ordinal Rank of Observed Stressors in Independent Groups (n = 784)

Stressors	Agricultural Professional and Law Enforcement	Agricultural Students
Financial Worries	1	1
Anxiety	2	2
Burnout	4	3
Farm Transfer	3	4
Depression	5	5
Marital Difficulties	6	6
Alcohol Addiction	7	7
Drug Addiction	8	8
Gambling Addiction	9	9
Other	10	10

Students selected depression (mean rank = 363.85) significantly more than agricultural professionals (mean rank 402.87), $U = 73797.50$, $z = 2.76$, $p = .01$, $r = .10$. The effect size was small (Cohen, 1988; Rosenthal, 1991). Students selected financial worries (mean rank = 419.53) significantly less than agricultural professionals (mean rank 379.24), $U = 60880.00$, $z = -3.18$, $p = <.01$, $r = -.11$. The effect size was small (Cohen, 1988; Rosenthal, 1991). Students selected burnout (mean rank = 343.54) significantly more than agricultural professionals (mean rank 407.69), $U = 76873.00$, z

= 4.36, p = <.01, r =.16. The effect size was small (Cohen, 1988; Rosenthal, 1991). Students selected farm transfer concerns (mean rank = 416.89) significantly less than agricultural professionals (mean rank 377.44), U = 59395.00, z = -2.87, p = <.01, r =-.10. The effect size was small (Cohen, 1988). Students selected alcohol addiction (mean rank = 373.55) significantly more than agricultural professionals (mean rank 395.00), U = 69688.50, z = 2.64, p = .01, r = .09. The effect size was less than small (Cohen, 1988; Rosenthal, 1991). The null hypotheses for depression, financial worries, burnout, farm transfer concerns, and alcohol addiction are rejected in favor of the alternative that students and agricultural professionals observe these farm stressors at different rates.

Table 17

Difference between Ranked Selection of Agricultural Stressors by Agricultural Professionals and Law Enforcement Officers and Minnesotan Agricultural Students

Observed Stressors	*N*	*U*	*Z*	*R*	*p*
Depression	779	73,797.50	2.76	0.10	.01*
Anxiety	780	66,662.00	-.16	-0.01	.87
Financial Worries	784	60.880.00	-3.18	-0.11	<.01*
Burnout	772	76,873.00	4.36	0.16	<.01*
Marital Difficulties	778	67,669.00	.34	0.01	.73
Farm Transfer Concerns	776	59,395.00	-2.87	-0.10	<.01*
Gambling Addiction	773	66,577.50	.53	0.02	.60
Alcohol Addiction	775	69,688.50	2.64	0.09	.01
Drug Addiction	770	66,067.50	.46	0.02	.64
Other	65	67.92	18.67	-0.08	.05

Research Question Three

Subjective financial or economic hardship was the focus of research question three. Research question three—does self-perceived economic hardship predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students—was measured using simple linear regression.

The mean overall emotional wellbeing average for respondents (n = 251) who entered information for both subjective financial questions was 64.65 (SD = 20.69). The mean subjective financial scale was 6.71 (SD = 2.26) (see Table 18). The emotional

wellbeing average was positively correlated, at a statistically significant level, with respondents' subjective financial scale ($r = .63$, $p < .01$). The magnitude of the correlation was substantial (Davis, 1971).

Table 18

Means and Standard Deviations for Subjective Financial Measures (n = 258)

Variable	*M*	*SD*
Satisfied with Family's Financial Situation[a] (*n* = 258)	2.97	1.14
Ability to Pay Monthly Bills[a] (*n* = 258)	3.72	1.27
Sum of Subjective Scale[b] (*n* = 251)	6.71	2.26

Note. n varies due to non-response; *n* for sum of subjective scale only includes respondents who also had an average emotional wellbeing scales score; mean emotional wellbeing scale score for these respondents 64.65 (*SD* = 20.69); [a] Coded 1-5, with 1 indicating financial hardship and 5 indicating no financial hardship. [b] Scale ranged from 2 -10 with 2 indicating financial hardship and 10 indicating no financial hardship.

Before interpreting the multiple linear regression, tolerance values were checked for values under 0.2 (Menard, 1995) and variation inflation factors, VIF, more than 10 (Myers, 1990). VIF was 1.00 and tolerance was 1.00. These collinearity statistics did not indicate issues of multicollinearity. The Durbin Watson test was used to check the independence of errors; the value of 1.933 does not indicate interdependence of errors (Field, 2015).

The overall emotional wellbeing scales average regressed on the subjective financial hardship scale had an $R^2 = .40$, $F(1,250) = 165.77$, $p < .01$ (see Table 19). The regression explained 40% of the variance in emotional wellbeing data. Cohen's *f* was

.82, a large effect size (Cohen, 1988). The results of the regression were statistically significant at the .05 level, and the null hypothesis was rejected. Subjective financial data statistically significantly predicted emotional wellbeing in the respondents. The subjective financial scale coefficient was 5.78 (t = 12.88, p < .01). The standardized beta coefficient was .63. The beta null hypothesis was rejected and the alternative hypothesis was accepted as true. One unit of increased subjective financial scale increased the average emotional wellbeing scale score by 5.78 units, cetaris paribus. The experimental regression equation was

$$\text{Emotional Wellbeing}_i = 25.85_{(\text{constant})} + 5.78_{(\text{subjective financial hardship i})}x_{1.}$$

Table 19

Regression of Overall Emotional Wellbeing Scales Average on Subjective Financial Scale (n = 251)

Variables	*B*	*SE B*	*β*	*t*	*p*
Constant (b)	25.85	3.18		8.13	<.01*
Subjective Finances (x_1)	5.78	.45	.63	12.88	<.01*

Note. R^2 = .40, $F(1,250)$ =165.77, p <.01*; * Signifies p <.05

Research Question Four

Research question four—do farm-level economic data predict decreased levels of emotional wellbeing for selected production agriculture students in Minnesota—was measured using multiple linear regression. The mean overall emotional wellbeing average for respondents (n = 52) who entered their farm-level solvency, liquidity, and

profitability data was 62.68 (*SD* = 21.30). The debt-to-asset ratio mean was 41.7% or .4172 (*SD* = .193), the current ratio mean was 2.99 (SD = 5.06), and the net profit mean was $58,608.77 (*SD* = $201,556.67) (see Table 20).

The emotional wellbeing average was significantly correlated with respondents' debt-to-asset ratio (r = -.37, p = .01, moderate association), current ratio (r = .26, p = .03, low association), and net profit (r = .29, p = .02). The emotional wellbeing correlations had magnitude of associations that were moderate for debt-to-asset ratio, low for current ratio, and low for net profit (Davis, 1971). Debt-to-asset ratio was significantly correlated with current ratio (r = -.53, p < .01, substantial association) and net profit (r = -.29, p = .02, low association) (Davis, 1971). However, current ratio and net profit was not statistically significantly correlated (r = .06, p = .35, negligible association) (Davis, 1971) (see Table 21).

Table 20

Means and Standard Deviations for Objective Farm Financial Measures (n = 52)

Variable	*M*	*SD*
Debt-to-Asset Ratio	.42	.19
Current Ratio	2.98	5.06
Net Profit	$58,608.77	$201,556.67

Table 21

Objective Farm Financial Measures Correlations[a] with Overall Emotional Wellbeing Scales Average (n = 52)

Variable	*r*	*p*	*Magnitude*[b]
Debt-to-Asset Ratio	-.37	.01*	Moderate
Current Ratio	.26	.03*	Low
Net Profit	.29	.02*	Low

[a]Correlations are Pearson's; [b]Effect size associations are interpreted by Davis, 1971; *Signifies $p < .05$

Before interpreting the multiple linear regression, tolerance values were checked for values under 0.2 (Menard, 1995) and variation inflation factors, VIF, more than 10 (Myers, 1990). VIFs were 1.52 for debt-to-asset ratio, 1.40 for current ratio, and 1.10 for net profit. Tolerance statistics were .66 for debt-to-asset ratio, .72 for current ratio, and .91 for net profit. These collinearity statistics did not indicate issues of multicollinearity. The Durbin Watson test was used to check the independence of errors; the value of 2.14 did not indicate interdependence of errors (Field, 2015).

The overall emotional wellbeing scales average regressed on farm debt-to-asset ratio, current ratio, and net profit, had an $R^2 = .185$, $F(3, 51) = 3.631$, $p = .019$ (see Table 22). The regression explained 18.5% of the variance in the emotional wellbeing data. Cohen's *f* was .48, a medium effect size (Cohen, 1988). Results of the regression are statistically significant at the .05 level, and the null hypothesis was rejected. Farm financial data statistically significantly predicted emotional wellbeing in the respondents. However, the individual *t*-values of the beta coefficients were not

statistically significant for any of the three variables. The standardized beta coefficients were -.25 for debt-to-asset ratio, .12 for current ratio, and .22 for net farm income. The follow-up null hypotheses failed to be rejected.

Table 22

Regression of Overall Emotional Wellbeing Scales Average on Farm Debt-To-Asset Ratio, Current Ratio, and Net Profit (n = 52)

Variables	*B*	*SE B*	β	*t*	*p*
Constant (b)	71.07	9.26		7.68	<.01*
Debt-to-Asset Ratio (x_1)	-26.94	17.68	-.25	-1.52	.13
Current Ratio (x_2)	.50	.65	.12	.78	.44
Net Farm Income (x_3)	<.01	<.01	.22	1.58	.12

Note. R^2 = .185, $F(3,51)$ =3.63, p = .019*; * Signifies p <.05

Research Question Five

Research question five—do selected demographic variables predict the type of emotional wellbeing educational resources and farm financial educational resources desired by selected Minnesotan production agricultural students—was analyzed in a multi-step process of descriptive statistical analysis followed by planned logistic regression. Two demographic characteristics, age (n = 174) and gender (n = 236), were examined as the independent variables in this research question. Ages ranged from 17-76, with a mean of 37.54, median of 36, and mode of 18. Genders selected by

respondents were male (*n* = 186, 78.81%), female (*n* = 47, 19.92%), prefer not to say (*n* = 2, .85%), and other (*n* = 1, .42%).

The dependent variables were educational resources desired. First, respondents who had experienced financial hardship and/or emotional problems answered two questions about whether they felt educational resources were readily available (see Table 23). Then, any respondents could select educational resources desired. Educational resources desired for farm finances and emotional wellbeing were multi-select questions, i.e. respondents could select more than one of the six delivery methods. The delivery methods were the dependent variables. Table 24 summarizes the summed total and percentage of respondents selecting each delivery methods. One-on-one delivery was selected most for farm financial education (i.e.186 or 78.48% of respondents), and selected most for emotional wellbeing education (i.e. 161 or 75.94% of respondents).

Table 23

Desired Educational Delivery Methods for Farm Financial and Emotional Wellbeing Resources for Minnesotan Production Agricultural Students (n = 260)

Variable	Freq.	%
If you have experienced financial hardship in the last year, were relevant farm financial educational resources readily available? (*n* = 147)		
Yes, resources were readily available	111	75.51
No, resources were not readily available	36	24.49
If you have experienced emotional problems in the last year, were relevant educational resources readily available? (*n* = 112)		
Yes, resources were readily available	71	63.39
No, resources were not readily available	41	36.61

Table 24

Desired Educational Delivery Methods for Farm Financial and Emotional Wellbeing Resources for Minnesotan Production Agricultural Students (n = 260)

Variable	Freq.	%[a]
Farm Financial Educational Resources (*n* = 237)		
One-on-one	186	78.48
Classroom	73	31.74
Factsheets	51	22.52
Self-paced online	32	13.50
Over the phone	31	13.08
Online with an instructor	22	9.28
Emotional Wellbeing Educational Resources (*n* = 212)		
One-on-one	161	75.94
Classroom	32	15.09
Factsheets	41	19.34
Self-paced online	33	15.56
Over the phone	31	14.62
Online with an instructor	16	7.54

[a] Respondents could select more than one of the six delivery methods; % does not sum to 100.

Before analyzing the desired education information, an independent samples *t*-test was used to determine if there was a difference in the emotional wellbeing based on demographics. Emotional wellbeing was not statistically different between genders

(male M = 66.15 and female M = 60.29) (t = 1.71, p = .09, r = .11). The effect size was small (Cohen, 1988; Rosenthal, 1991). However, the younger half of respondents had significantly different emotional wellbeing (M = 69.08) than the older half of respondents (M = 60.26) (t = 3.27, p = <.01, r = .24). The effect size was small (Cohen, 1988; Rosenthal, 1991). While the researcher cannot ensure there were no other confounding variables affecting the differences in desired resources by gender and age, the *t*-test results show educational resource differences were not due to different emotional wellbeing levels by gender. In contrast, different emotional wellbeing by age may have affected desired resources.

Research question five had planned inferential analysis of logistic regressions. However, after analyzing the bivariate point biserial correlations between independent and dependent variables, only one bivariate correlation had a statistically significant correlation with a magnitude >.30 (i.e., a "moderate" association; Davis, 1971) (see Table 25). Therefore, only one logistic regression was conducted; one-on-one delivery format was regressed on age quartiles. To check for multicollinearity, a linear regression was used, tolerance was 1.00 and VIF was 1.00, indicating no collinearity concerns (Field 2015). Eigenvalues for condition 1 of 1.91 and condition 2 of .09 do show some variation and could indicate parameters could be overly sensitive to small changes in the data (Field, 2015). Cook's Distance and DFBeta for the constant and predictor were less than one in all cases.

Table 25

Bivariate Correlations[a] of Educational Resources Desired and Selected Demographic Characteristics of Minnesotan Production Agricultural Students (n = 260)

Variable	Age in Quartiles	Gender
Farm Financial Educational Resources		
One-on-one	.32*	.01
Classroom	-.23*	-.09
Factsheets	-.04	<.01
Self-paced online	.16*	.02
Over the phone	-.16*	.28*
Online with an instructor	-.08	.12
Emotional Wellbeing Educational Resources		
One-on-one	.18*	-.01
Classroom	-.16*	-.12
Factsheets	.03	.04
Self-paced online	.21*	-.10
Over the phone	-.12	.18*
Online with an instructor	-.02	.13

Note. The *n* for age and farm financial = 226, *n* for age and emotional wellbeing = 206, *n* for gender and farm financial = 228, *n* for gender and emotional wellbeing = 206; [a] Point-biserial correlation (r_{pb}) reported due to discrete dichotomous variables. * Signifies $p < .05$.

The overall goodness of fit was measured by the omnibus tests of model coefficients. Model 1 has $X_2(1) = 23.77$, $p < .01$. This model compares the intercept of an equation with no predictors to the model that includes the predictor of age in quartiles. Age was statistically significant predictor of the likelihood of selecting one-on-one education. The null hypothesis was rejected in favor of the alternative hypothesis. The model was able to classify correctly 78.3% of cases by age. However, the Cox and Snell R^2 of .10 and the Nagelkerke R^2 of .15 only suggested between 10% and 15% of variance of selecting one-on-one education delivery was explained by the model's predictor of student's age. This was a small effect (Cohen, 1988). The -2LL was 212.55, while the initial -2LL was 236.33. The Homer Lemeshow Test, $X_2(2) = 4.61$, $p = .10$, had an R^2 of .11 (see Table 26).

Table 26

Omnibus Test of Age in Quartiles on Desired One-on-one Delivery of Educational Resources (n = 226)

	X^2	-2LL	*Df*	*P*
Omnibus Model	23.77	212.55	1	.01*
Hosmer Lemeshow	4.61	236.33[a]	2	.10

Note. [a] baseline -2LL is reported. R^2_{CS}=.10, R^2_N=.15, R^2_L=.11; *$p < .05$

The statistical test of the beta for age in quartiles was significant, $b = .74$, $SE = .16$, Wald $z = 20.35$, $p = .01$ (see Table 27). The null hypothesis was rejected in favor of the alternative; a linear relationship existed between the variables. The odds

ratio of 2.09 [*CI* = 1.52 to 2.88] meant the odds of a person selecting one-on-one delivery for farm financial educational resourced positively increased with age quartile. The magnitude of the odds ratio was small (Haddock, Rindskopf, & Shadish, 1998). The calculated beta meant, for every one-unit increase in age quartile, the log-odds of selecting one-on-one delivery of farm financial increased .74, cetaris paribus. The constant was not statistically significant, however, b = -.37, SE = .37, Wald z = 1.01, p = .32, meaning the following equation should be interpreted with caution. The experimental logistic regression equation was:

$$\log(p/1\text{-}p)_{\text{one-on-one i}} = -.37_{(\text{constant})} + 0.74_{(\text{age quartile i})}x_{1.}$$

Table 27

Coefficients of the Model Predicting Desired One-on-One Educational Delivery for Financial Education (n = 226)

	B	*SE B*	Wald *z*	*p*	*Odds Ratio*
Age Quartiles (x_1)	.74	.16	20.35	<.01*	2.09
Constant (b)	-.37	.37	1.01	.32	

Note. Model's $X_2(1) = 23.77$, $p < .01$*; *$p < .05$

Summary

Chapter four summarized the findings of this study's five research questions. Research question one resulted in a non-significant ANOVA, respondents did not have statistically significant differences in emotional wellbeing than the known general population levels. Research question two's Chi-square analyses showed stressors were

selected at statistically significant different rates than random selection in both agricultural professionals and in agricultural student respondents. A follow-up Mann Whitney analysis showed agricultural professionals and agricultural students selected some stressors at percentages that were not statistically equivalent. In research questions three and four, both subjective and objective financial hardship affected emotional wellbeing when analyzed with linear regression and multiple regression. In research question five, emotional wellbeing and farm financial educational resources available in 2018 and desired in the future were analyzed. Demographic variables were correlated at low levels with desired educational resources, with the exception of age quartiles and desire for one-on-one delivery of financial education resources. The next chapter interprets the implications of this study's findings in the context of agricultural education and provides recommendations for additional research.

CHAPTER V

CONCLUSIONS

This chapter interprets, through the context of agricultural education, the study's quantitative findings. Conclusions for each of the study's research questions are addressed. A model of factors influencing emotional wellbeing in the study's target population was developed. Roberts' Model of Agricultural Wellbeing (2019) serves as a guide for future development of educational resources to improve emotional wellbeing and farm finances in PS and FBM students. Finally, recommendations for future research are outlined herein.

Statement of Purpose and Research Questions

The purpose of this study was to measure quantitatively factors, including financial status, influencing current emotional wellbeing in selected Minnesota production agriculture students. The mental health scales in the short form RAND 36-Item Health Survey 1.0 (SF-36) operationalized emotional wellbeing in this study. The following research questions guided this study:

1. Is there a difference in emotional wellbeing between the general population and selected Minnesotan production agriculture students?
2. Do selected Minnesotan production agriculture students identify significantly different sources of stress than Minnesotan law enforcement officers and agricultural professionals (Moynihan, 2017)?

3. Does self-perceived economic hardship predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?
4. Does farm-level economic data predict decreased levels of emotional wellbeing for selected Minnesotan production agriculture students?
5. Do selected demographic variables predict the type of emotional wellbeing educational resources and farm financial educational resources desired by selected Minnesotan production agriculture students?

Conclusions and Implications

The researcher addresses each research question individually in the following section. The results yielded important implications for further research.

Research Question One

Because of farm financial hardships during data collection from April to October 2018 (ERS USDA, 2018a; USDA Press, April 2018; USDA Press, June 2018; USDA Press, July 2018), the researcher predicted average emotional wellbeing in the agricultural student target population would be less than the general population. When tested with a one-way ANOVA, Minnesotan PS and FBM students did not have significantly different emotional wellbeing scores than were found in the general population, as measured by the SF-36 emotional scales. No follow-up contrasts were conducted because of the lack of significance of the overall ANOVA.

This study's results conflicted with earlier research during a previously difficult financial period for production agriculture, the Farm Crisis of the 1980s. In agricultural populations of the 1980s, low levels of emotional wellbeing were found, operationalized as increased anxiety, depression, alcohol and drug usage, domestic violence, and other behavioral health concerns (e.g., Bultena et al., 1986; Davis-Brow & Salmon, 1988; Hargrove, 1986; Heffernan & Heffernan, 1986; Walker & Walker, 1987; Weigel & Weigel, 1987). This study's result also conflicted with recent media and agricultural organizations coverage of farmer mental health and reduced emotional wellbeing in the context of current farm financial hardships (e.g., Ivanova, 2018; Kutner, 2016; Latzke, 2017; Perdue, 2017; Snell, 2018; Wiengarten, 2017).

This study's analyses of averages from the target population showed there are outliers—some students' responses indicated extremely low emotional wellbeing. For example, 22 respondents (total $n = 222$) felt "so down in the dumps that nothing could cheer [them] up" a majority of the time, a medical indicator of significant emotional distress, and 19 (total $n = 222$) felt "physical health or emotional problems interfered with [their] social activities" all or most of the time. Every sub-scale had respondents with scores of zero, the lowest possible emotional wellbeing average. Although the respondents' mean emotional wellbeing scale results mirrored the known general population, individual respondent outliers show some students were experiencing extremely low emotional wellbeing.

When this study was proposed, the specific focus in research question one on emotional distress in an agricultural student population was primarily because of the

CDC's 2016 findings on farmer suicide. The CDC reported that farming, fishing, and forestry had the highest suicide rate of any occupational group, 84.5 deaths per 100,000 (McIntosh et al., 2016). McIntosh et al.'s (2016) data were widely broadcasted in media and governmental reporting on farmer stress (e.g. Davis, 2017; Davis, 2018; Ivanova, 2018; Kutner, 2016; Moynihan, 2018). However, in November 2018 just after data collection concluded in this study, the report was retracted (McIntosh et al., 2016) because of the erroneous coding of farmers with agricultural workers in the CDC data set (CDC, November 2018). The revised published rates were considerably lower; they no longer showed that farmers had the highest occupational suicide rates (Peterson et al., 2018).

> The 2012 and 2015 male suicide rates among Farmers, Ranchers, and Other Agricultural Managers (SOC 11–9013, a subgroup of the SOC 11 Management major group) were 44.9 (CI = 34.2–57.9) and 32.2 (CI = 24.2–42.0) per 100,000, based on 59 and 54 suicides in 2012 and 2015, respectively. The 2012 and 2015 male suicide rates for Agricultural Workers (SOC 45–2000, a subgroup of the SOC 45 Farming, Fishing, and Forestry major group) were 20.4 (CI = 13.8–29.1) and 17.3 (CI = 12.1–23.9), based on 30 and 36 suicides in 2012 and 2015, respectively. (p. 1253)

In the revised report, the management occupation group, which included a farmer and rancher subgroup, ranked 15th for suicide rate by occupation in 2015 and 17th in 2012 (Peterson et al. 2018).

Research Question Two

Reports of farmer suicides in Minnesota, along with the (later retracted) McIntosh et al. (2016) study, received statewide media attention, including from the Minnesota Commissioner of Agriculture (Davis, 2017). In summer 2017, the MDA launched a survey of law enforcement professionals' and agricultural professionals' observances of farmer stress (Meersman, 2018; Moynihan, 2018). The survey of 550 Minnesotan professionals indicated a majority of respondents saw increases in farmers' financial worries, depression, anxiety and other stressors (Meersman, 2018; Moynihan, 2018).

The MDA survey results were of particular interest to the researcher and formed the basis of this study's second research question. The results of the MDA survey (Moynihan, 2018) influenced several major MDA initiatives. The MDA funded a Farm and Rural Helpline for farmers facing mental health obstacles (Yust, 2017), and during winter 2018, the MDA coordinated a professional development workshop series to train agricultural professionals to recognize and respond to farmers' mental health issues (Yust, 2018). The workshop included the survey's results of law enforcement professionals' and agricultural professionals' observances of farmer stress. However, the MDA survey had a number of limitations, including convenience sampling and importantly respondents that were not farmers, but rather professionals observing farmers. The researcher was interested to determine if agricultural professionals' results (secondary observation) would mirror the results of the target population of agricultural production students (primary experience). While agricultural production students differ

from the general population of Minnesotan farmers because they self-selected into continuing education, they more closely resemble a farmer population than the non-farm professionals surveyed by the MDA. FBM students are farmers by occupation.

The first analyses—Chi-square—showed both MDA respondents and this study's respondents selected stressors statistically significantly different from random occurrence. However, Mann-Whitney analyses showed that agricultural production students and agricultural professionals observed depression, financial worries, burnout, farm transfer concerns, and alcohol addiction at different rates. Although selection rates differed between the two surveys, a comparison of the ordinal ranking of observed stressors between this study and MDA respondents showed nearly identical rankings. The top five observed stressors for both surveys were financial worries, anxiety, burnout, farm transfer, and depression, with MDA respondents ranking farm transfer higher than burnout. Although the list of stressors in the Farmer Wellbeing questionnaire was not comprehensive (stressors such as weather, commodity prices, labor, regulations, etc. were not included), the top five identified stressors are likely relevant to many in the target population. Focusing educational resources on these top stressors is suggested.

Research Question Three

Armstrong and Schulman (1990) found self-perceived household economic hardship was a statistically significant positive predictor of depression, while objective measures of farm financial solvency were not. The researcher selected two questions to

measure self-perceived household economic hardship and its relationship with emotional wellbeing in the target population. These two questions—satisfaction with family's financial situation and ability to pay monthly bills—were summed to create a subjective financial hardship scale. The overall emotional wellbeing scales average regressed on the subjective financial hardship scale were statistically significant and explained 40% of the variance in emotional wellbeing data. Follow-up analysis of the beta showed one unit of increased subjective financial wellbeing increased the average emotional wellbeing scale score by 5.78 units, ceteris paribus. While the results corroborated the findings of previous studies (e.g. Armstrong and Schulman (1990) and Marotz-Baden (1988)), there are some limitations to these findings. The self-perceived questions had not been used previously in a study with agricultural respondents. Furthermore, this scale was based solely on two questions.

Research Question Four

Hoyt, Conger, Valde, and Weihls (1997) found rural residents' "personal economic hardship is consistently found to be related to physiological distress" (p. 449-450). In particular, farm debt was a factor linked to increased farmer stress (e.g. Keating, Doherty & Munro, 1986). Marotz-Baden (1988) also found that lower income and lower economic satisfaction were correlated with stress. In contrast, Armstrong and Schulman (1990) found farm debt-to-asset ratio was not a statistically significant positive predictor of depression. These conflicting findings about the association of farm financial data and farmer stress, coupled with the unique access to a student

population with knowledge of farm financial ratios led the researcher to analyze if farm financial data predicted lower emotional wellbeing in research question four.

The emotional wellbeing average had the largest correlation with respondents' debt-to-asset ratio (r = -.369, p = .004, moderate association), which supported Keating, Doherty and Munro's (1986) study of farmers during the Farm Crisis of the 1980s. Further analysis showed the overall emotional wellbeing scales average regressed on farm debt-to-asset ratio, current ratio, and net profit was statistically significant, but only explained 18.5% of the variance in emotional wellbeing data. No individual betas were statistically significant, leading to a lack of applicable experimental regression equation. In comparison to self-perceived economic hardship's relationship with farmer wellbeing, objective farm-level data had a weaker relationship with farmer wellbeing and explained less variance. Furthermore, less than a quarter of overall respondents (n = 260) responded to the farm financial ratio questions (n = 52) in the Farmer Wellbeing Questionnaire; the small n of this analysis was an important limitation to note.

Research Question Five

The majority of respondents indicated that educational resources were available if they experienced financial hardships or emotional problems in the last year. This indicated respondents felt MNState and other providers of adult agricultural education, such as Extension, had available, applicable resources on these topics. However, the number of respondents indicating that resources were not available should not be overlooked. In regards to farm financial educational resources, 36 respondents or

24.49% said no, resources were not available. Although only a minority of respondents said no, it was notable because the FBM program, and to a lesser extent the PS program, specifically focuses on farm financial management education (AgCentric, 2018). For students facing financial hardship, farm financial educational resources may need to be better tailored to fit the needs of all PS and FBM students. Similarly, not all respondents (41 or 36.61%) felt education resources were available to address emotional problems. Unlike the explicit focus of farm finances, emotional education is not a focus of FBM or PS agricultural education; although, the FBM program promotes access to a free statewide rural mental health specialist (AgCentric, 2018). Nonetheless, the pervasive nature of mental health and emotional wellbeing concerns with college students across all major and backgrounds (e.g. American College Health Association, 2017; Eisenburg, Hunt, & Speer, 2013; Pedrelli et al., 2015) means incorporating more existing and developing new emotional wellbeing education resources for PS and FBM students is needed.

Demographic characteristics in the target population had low to minimal correlations with desired educational resources and delivery methods. Only age in quartiles and one-on-one delivery of farm financial education had a correlation significant enough to warrant further analysis with logistic regression. The low magnitudes of the correlations contradicted previous research showing differences in desired educational format was influenced by demographic differences (e.g. Barbercheck et al., 2009; Chiu et al., 2015; Jensen, English, & Menard, 2009; Velandia et al., 2010). However, results of this study support recent research by Burgus, Duysen,

and Wendl (2017) showing minimal differences in preference for ASH resources by demographic background. It should be noted this study only analyzed gender and age; race/ethnicity was overwhelmingly white (96.61%), so was not analyzed. Other demographic questions were not asked in the questionnaire.

There was an important confounding variable to note in the interpretation of research question five's logistic regression. Age in quartiles and selection of one-on-one desired delivery of farm financial educational resources were the only variables exhibiting a correlation over .30, and subsequent analysis with logistic regression resulted in statistically significant likelihood of selection of one-on-one education increasing with age quartile. FBM students received their education through primarily one-on-one meetings with an instructor. The FBM coursework focused specifically on farm finances and business management. In the respondent data, FBM students' age (M = 42.97, median = 45) was significantly higher (t = 7.86, p = <.01, r = .49) than PS students' age (M = 24.57, median = 19). In general, older students in the target population have already self-selected into a one-on-one setting (FBM instruction), and younger students in the target population have not (classroom instruction is the primary delivery for PS education). Therefore, the result of the logistic regression was not particularly insightful nor surprising. FBM students received farm financial education in a one-on-one setting, FBM students were older on average, and older students in the sample were more likely to desire one-on-one farm financial education.

As aforementioned, the top five observed stressors by students were 1) financial worries, 2) anxiety, 3) burnout, 4) farm transfer, and 5) depression. The top two desired

resources were one-on-one delivery and factsheets. University of Minnesota Extension is uniquely poised to offer factsheets and research-based materials on the observed stressors of farm financial worries and farm transfer concerns. MNState is uniquely poised to offer one-on-one education with these resources. The MDA's rural mental health counselor program is equipped, but currently is understaffed with only one psychologist, and likely cannot offer one-on-one support for depression, anxiety, and burnout.

Roberts' Model of Agricultural Wellbeing

The Total Farmer Health[SM] framework partially conceptualized this study's approach. The Total Farmer Health[SM] approach included multidisciplinary factors of fitness, healthcare, weather, sleep, cognition, hazard, diet, finances, and social dimensions of farmer wellbeing (AgriSafe Network, 2017). However, fitness, healthcare, weather, safety hazards, and diet were not directly addressed in this study's Farmer Wellbeing questionnaire, and other factors were only indirectly addressed. The Farmer Wellbeing questionnaire had a number of additional limitations, and any model of factors developed from this study, therefore, is limited.

In this study, the only statistically significant regression beta related to emotional wellbeing was self-perceived household economic/financial hardship. Financial status was included as initial factor impacting wellbeing in the Roberts' model. As self-perceived economic hardship increased, emotional wellbeing decreased.

Furthermore, regarding economic hardship, as students' age increased the likelihood of desiring one-on-one educational resources for farm financial education also increased.

The integrated theory of health behavior change (ITHBC), suggests knowledge of the issue is an important first step, but not enough to create behavioral based wellbeing change(s) (Ryan, 2009). Self-engagement and values are important to health behavior changes (Ryan, 2009). Therefore, from a theoretical standpoint, for educational interventions on farm finances or emotional wellbeing to impact wellbeing behavior, the education must not only address knowledge but also attitudes surrounding the issues of agricultural financial and emotional hardships. Both personal (at the individual level) and normative (at the societal or group level) attitudes must be targeted; therefore, these factors were also included as inputs in the Roberts' model. Normative beliefs (i.e. group opinion regarding a behavior) must support the increased focus on financial satisfaction and emotional wellbeing for behavioral change to occur. Individuals must intend to make agricultural wellbeing behavior changes and then act on those intentions; the behavioral intent process is illustrated in the middle circles of the Roberts' model.

The model of agricultural wellbeing developed in this study (see Figure 4) is limited because financial status explained a limited amount of variance in the respondents' emotional wellbeing level. Subjective financial hardship had a greater effect on emotional wellbeing than hardships measured by objective farm-level data, yet subjective self-perceived financial hardship still only explained 40% of the variance. Other agriculture-related factors in addition to finances—the only farm stressor

explicitly named in the model—should be considered in future research when attempting to improve emotional wellbeing behaviors in farmer populations. The "other farm stressors" represented in the Roberts' model needs further analysis. For example, Kunde, Kolves, Kelly, Reddy, and de Leo (2018) recently analyzed behaviors affecting suicide in Australian farmers and concluded "adherence to masculine norms and socialization; expectations of self in maintaining family traditions and occupation; and a male subtype of depression" were factors that needed to be considered to create positive behavioral changes in production agriculture populations (p. 254).

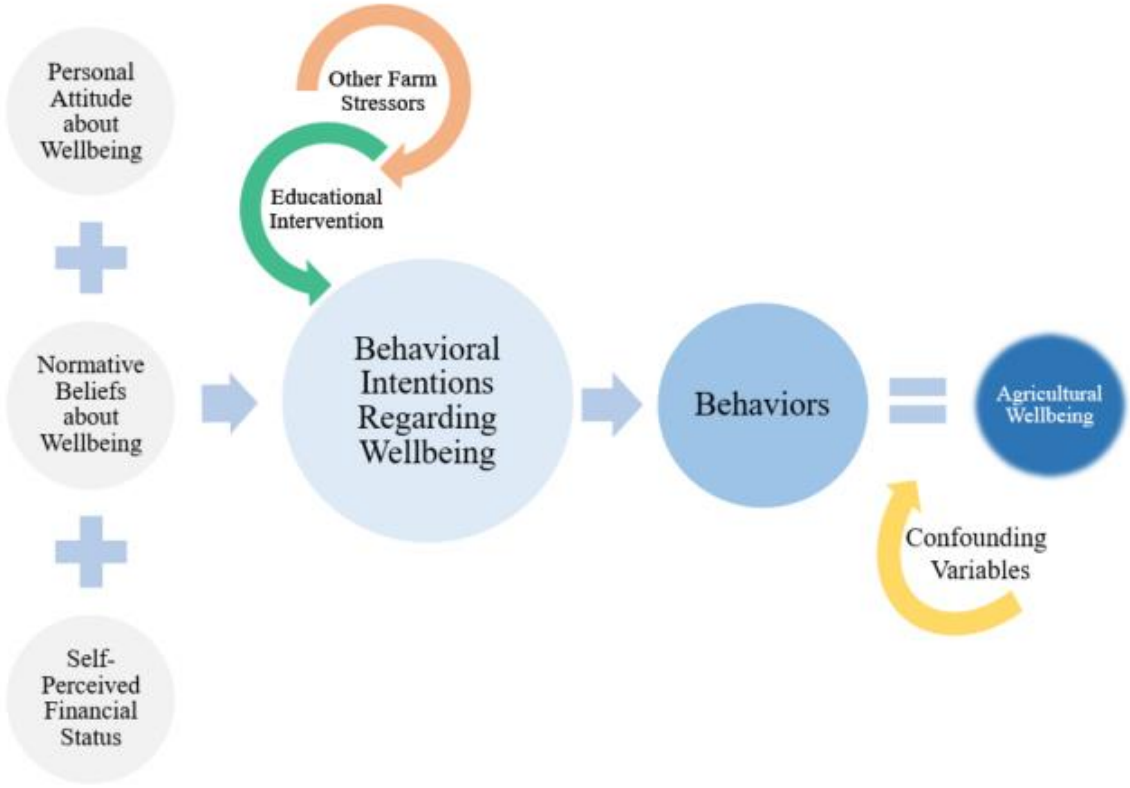

Figure 4. Roberts' Model of Agricultural Wellbeing. Personal attitudes, normative beliefs, and self-perceived status affect behavioral intentions about wellbeing. Other farm stressors and educational interventions may alter the intentions leading to behaviors and possibly agricultural wellbeing.

Future Research Recommendations

Farmer Wellbeing

FBM and PS students do not mirror the general population of farmers. The researcher recommends additional research on emotional wellbeing with a general population of farmers. Random sampling within a population of farmers would improve generalizability of results. While the SF-36 emotional wellbeing scales are reliable and valid measures of emotional health, those scales do not address mental health disorders, such as depression or anxiety. There are several self-reported questionnaires that reliably and validly address mental health; two possible options include the Patient Heath Questionnare-9, PHQ9 (Spitzer, 1999), and the General Anxiety Disorder-7, GAD-7 (Spitzer, Kroenke, Williams, & Lowe, 2006), which measure depression and anxiety, respectively.

Farm Stressors

The question on farm stressors was not a comprehensive list of stressors. In order to compare the agricultural professionals' and law enforcement professionals' responses to students' responses, the researcher did not make changes to the MDA's 2017 stressor question wording. In addition to not addressing some major farm stressors, it could be argued that depression, anxiety, and burnout are not stressors but rather symptoms of stress. Furthermore, the MDA question only allowed for dichotomous responses, which does not address the magnitude of stressors' effect on

respondents. A Likert scale could help measure the magnitude of stressors' effect on farmers. An expert panel and pilot study could be used to update this question's wording and list of stressors. Truchet and Andela (2018) recently developed "The Farmers Stressors Inventory" and identified a list of factors that cause burnout and hopelessness, "workload and lack of time, incertitude toward the future and the financial market, agricultural legislation pressure, social and geographical isolation, financial worry, conflicts with associates or family members, family succession of the farm, and unpredictable interference with farm work" (p. 859). This quantitative inventory may better assess stressors than the stressor question included in this study's questionnaire. Furthermore, qualitative research with farmers and/or agricultural students may be needed to determine additional stressors and those stressors' effects, e.g. a study similar to Kunde et al's (2018) approach with Australian farmers.

This study focused on financial stressors in numerous ways, including the relationship between emotional wellbeing and financial hardship. Unsurprisingly, respondents identified financial worries as their top stressor. In addition to financial worries, respondents identified several stressors, such as burnout and farm transfer, at high rates. The relationship between other stressors and emotional stress is recommended. Specifically, additional research on farmer occupational burnout and farm transfer concerns is recommended.

Financial Status

The self-perceived financial hardship questions in this study had not been used previously with agricultural respondents. Furthermore, this scale was based on only two questions. Additional focus on reliability and validity of these questions is needed. Future research with self-perceived financial hardship with farmers may require developing self-perceived financial hardship questions that better fit a farmer/agricultural population.

There was a low *n* in this study for farm financial data responses. This limited the results. Previous research is mixed in terms of how financial ratios affects emotional status in agricultural populations. A true census and improved data collection, such as correlating FBM students' end of the year financial analysis submissions to an emotional wellbeing measurement might improve reliability and validity of this question. Additional research is needed to determine how self-perceived financial status and farm level economic status differ in their effect on farmer emotional wellbeing.

Farm Finance and Emotional Wellbeing Educational Resources

The Farmer Wellbeing Questionnaire used a dichotomous response for questions on educational resources. Likert scaled questions may have better determined the effectiveness of existing available resources. This might determine how educational resources could better be developed to assist agricultural students and/or farmers. Analysis of evaluation data from existing educational resources could provide additional insight on effectiveness of different educational delivery methods, not just the

desirability of the methods. In particular, evaluation data that measures behavioral changes would help educators better identify emotional wellbeing and farm financial educational resources and delivery models that are most effective and relevant. Knowles (1975) found adult learners valued effective education that had immediate relevance to their occupation and personal life, was problem-centered, focused on experiences, and involved the learner in planning and evaluation. If Extension and MNState intend to improve current emotional wellbeing and farm financial educational resources, then results of this study, additional evaluation data analysis, and adult learning best practices need to be considered.

Summary

Adult agricultural students in this study's target population did not statistically differ from the known general population on emotional wellbeing. However, financial hardships predicted decreased emotional wellbeing levels. The top farm stressors identified were 1) financial worries, 2) anxiety, 3) burnout, 4) farm transfer, and 5) depression. MNState and UMN Extension have complimentary expertise to assist adults in production agriculture with farm finances, emotional wellbeing, and other farm stressors. MNState's focus on one-on-one education and UMN Extension's focus on research driven factsheets and group-based educational programming can collaboratively meet agricultural students and farmers' educational needs. This study had numerous limitations, including low response rates and concerns with the survey instrument. Future research, in particular research with a general farmer population,

could overcome these limitations and provide additional insight into farmers' emotional wellbeing.

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APPENDIX A

FARMER WELLBEING SURVEY INSTRUMENT

Please indicate if you are a:

- Farm Business Management Student
- Post-Secondary Student

During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as a result of any emotional problems** (such as feeling depressed or anxious)?

	Yes	No
Cut down the **amount of time** you spent on work or other activities	○	○
Accomplished less than you would like	○	○
Didn't do work or other activities as **carefully** as usual	○	○

During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

- ○ 1 - Not at all
- ○ 2 - Slightly
- ○ 3 - Moderately
- ○ 4 - Quite a bit
- ○ 5 - Extremely

These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the **past 4 weeks**...

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
Did you feel full of pep?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6
Have you been a very nervous person?	○ 1	○ 2	○ 3	○ 4	○ 5	○ 6

Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
Have you felt calm and peaceful?	1	2	3	4	5	6
Did you have a lot of energy?	1	2	3	4	5	6
Have you felt downhearted and blue?	1	2	3	4	5	6
Did you feel worn out?	1	2	3	4	5	6
Have you been a happy person?	1	2	3	4	5	6
Did you feel tired?	1	2	3	4	5	6

During the **past 4 weeks**, how much of the time has **your physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

- 1 - All of the time
- 2 - Most of the time
- 3 - Some of the time
- 4 - A little of the time
- 5 - None of the time

How satisfied are you with your family's present financial situation?

- 1 – Not at All Satisfied
- 2 – Not Very
- 3 – Somewhat
- 4 – Very
- 5 – Completely Satisfied

How difficult is it for you or your family to meet monthly payments on your bills?

- 1 – Extremely Difficult
- 2 – Very Difficult
- 3 – Somewhat Difficult
- 4 – Slightly Difficult
- 5 – Not Difficult at all

In the last year, have you experienced, or observed in farmers you know, an increase in the following?

□Yes, have experienced/observed an increase
□No, have not experienced/observed an increase
□Unsure

Depression
Anxiety
Financial Worries
Burnout
Marital Difficulties
Farm Transfer Concerns (retirement, sale, estate planning, etc.)
Gambling Addiction
Alcohol Addiction
Drug Addiction (other than alcohol)
Other _____

If you experienced financial hardships in the last year, were relevant farm financial educational resources readily available?

- □ Yes, educational resources were readily available
- □ No, educational resources were not readily available
- □ Not applicable

What is your preferred delivery method for farm financial education? (Check all that apply.)

- □ One-on-one
- □ Classroom
- □ Over the phone
- □ Online with an instructor
- □ Self-paced online
- □ Factsheets

If you have experienced emotional problems in the last year, were relevant educational resources readily available?

- □ Yes, educational resources were readily available
- □ No, educational resources were not readily available
- □ Not applicable

What is your preferred delivery method for educational resources to cope with emotional problems? (Check all that apply.)

- □ One-on-one
- □ Classroom

- Over the phone
- Online with an instructor
- Self-paced online
- Factsheets

What was your 2017 Debt to Asset Ratio? _____
What was your 2017 Current Ratio? _____
What was your 2017 Net Farm Income? _____

Demographic Information

What is your age?
_____age (fill in the blank question)

What is your ethnicity (or race)?
- White
- Hispanic or Latino
- Black or African American
- Native American or American Indian
- Asian / Pacific Islander
- Other
- Prefer not to say

What is your gender?
- Female
- Male
- Other
- Prefer not to say

What college are you enrolled at?
- Alexandria Technical College
- Central Lakes College
- Minnesota West Community & Technical College
- Northland Community & Technical College
- Ridgewater College
- Riverland Community College
- South Central College
- St. Cloud Technical College

APPENDIX B

RAND 36-ITEM HEALTH SURVEY 1.0

Choose one option for each questionnaire item.

1. In general, would you say your health is:

1 - Excellent

2 - Very good

3 - Good

4 - Fair

5 – Poor

2. **Compared to one year ago**, how would you rate your health in general **now**?

1 - Much better now than one year ago

2 - Somewhat better now than one year ago

3 - About the same

4 - Somewhat worse now than one year ago

5 - Much worse now than one year ago

The following items are about activities you might do during a typical day. Does **your health now limit you** in these activities? If so, how much?

	Yes, limited a lot	**Yes, limited a little**	**No, not limited**
3. **Vigorous activities**, such as running, lifting heavy objects, or participation in strenuous sports	1	2	3
4. **Moderate activities**, such as moving a table, Vacuuming, bowling or golfing	1	2	3
5. Lifting or carrying groceries	1	2	3

6. Climbing **several** flights of stairs	1	2	3
7. Climbing **one** flight of stairs	1	2	3
8. Bending, kneeling, or stooping	1	2	3
9. Walking **more than a mile**	1	2	3
10. Walking **several blocks**	1	2	3
11. Walking **one block**	1	2	3
12. Bathing or dressing yourself	1	2	3

During the **past 4 week**s, have you had any of the following problems with your work or other regular activities **as a result of your physical health**?

13. Cut down on the **amount of time** you spent on work or other activities	Yes = 1	No = 2
14. **Accomplished less** than you would like	Yes = 1	No = 2
15. Were limited in the **kind** of work or other activities	Yes = 1	No = 2
16. Had **difficulty** performing the work or other activities (For example – requiring an extra effort)	Yes = 1	No = 2

During the **past 4 weeks**, have you had any of the following problems with your work or other regular daily activities **as result of any emotional problems** (such as feeling depressed or anxious)?

17. Cut down on the **amount of time** you spent on work or other activities	Yes = 1	No = 2
18. **Accomplished less** than you would like	Yes = 1	No = 2
19. Didn't do work or other activities as **carefully** as usual	Yes = 1	No = 2

20. During the **past 4 weeks**, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

1 - Not at all

2 - Slightly

3 - Moderately

4 - Quite a bit

5 – Extremely

21. How much **bodily** pain have you had during the **past 4 weeks**?

1 - None

2 - Very mild

3 - Mild

4 - Moderate

5 - Severe

6 - Very severe

22. During the **past 4 weeks**, how much did **pain** interfere with your normal work (including both work outside the home and housework)?

1 - Not at all

2 - A little bit

3 - Moderately

4 - Quite a bit

5 – Extremely

These questions are about how you feel and how things have been with you **during the past 4 weeks**. For each question, please give the one answer that comes closest to the way you have been feeling.

How much of the time during the **past 4 weeks**...

	All of the time	Most of the time	A good bit of the time	Some of the time	A little of the time	None of the time
23. Did you feel full of pep?	1	2	3	4	5	6
24. Have you been a very nervous person?	1	2	3	4	5	6
25. Have you felt so down in the dumps that nothing could cheer you up?	1	2	3	4	5	6
26. Have you felt calm and peaceful?	1	2	3	4	5	6
27. Did you have a lot of energy?	1	2	3	4	5	6
28. Have you felt downhearted and blue?	1	2	3	4	5	6
29. Did you feel worn out?	1	2	3	4	5	6
30. Have you been a happy person?	1	2	3	4	5	6
31. Did you feel tired?	1	2	3	4	5	6

32. During the **past 4 weeks**, how much of the time has your **physical health or emotional problems** interfered with your social activities (like visiting with friends, relatives, etc.)?

1 - All of the time

2 - Most of the time

3 - Some of the time

4 - A little of the time

5 - None of the time

How TRUE or FALSE is **each** of the following statements to you?

	Definitely True	Mostly True	Don't Know	Mostly False	Definitely False
33. I seem to get sick easier than other people	1	2	3	4	5
34. I am as healthy as anybody I know	1	2	3	4	5
35. I expect my health to get worse	1	2	3	4	5
36. My health is excellent	1	2	3	4	5

APPENDIX C

TEXAS A&M IRB LETTER

DIVISION OF RESEARCH

TEXAS A&M UNIVERSITY

HUMAN RESEARCH, NOT ENGAGED DETERMINATION

July 23, 2018

Type of Review:	Initial Review
Title:	Selected Agricultural Students' Self-Perceived Emotional Wellbeing
Investigator:	Gary Wingenbach
TAMU IRB ID:	IRB2018-0840
Documents Received:	IRB Application Version 1.1; 18S01 Approval Letter Brad Schloesser and Keith Olander—2018-03-26; Roberts_Megan_Proposal_July_v8

Dear Gary Wingenbach:

This Institution determined that the proposed activity is research involving human subjects as defined by DHHS regulations but that this organization is not engaged in the research.

IRB review and approval by this organization is not required. This determination applies only to the activities described in this IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human in which the organization is engaged, please submit a new request to us for a determination.

If you have any questions, please contact the HRPP Administrative Office at 1-979-458-4067, toll free at 1-855-795-8636.

Sincerely,
HRPP Administration

APPENDIX D

TEXAS TECH UNIVERSITY IRB REVIEW

TEXAS TECH UNIVERSITY
Human Research
Protection Program™

Box 41075 | Lubbock, Texas 79409
T 806.742.2064 | F 806.742.3947
www.hrpp.ttu.edu

July 31, 2018

Dr. Rudy Ritz, Dr. Gary Wingenbach, and Ms. Megan Roberts:

Based on your IRB discussion with the Human Research Protection Program at Texas Tech University, we have determined your project, *Selected Agricultural Students' Self-Perceived Emotional Wellbeing,* does not meet the definition of human subjects research. The data you will be receiving is de-identified and you are unable to re-identify the data. You will not be interacting or have an intervention with the participants. Therefore, no IRB review or approval is needed.

Thank you for contacting the office.

Sincerely,

Kelly C. Cukrowicz, Ph.D.
Chair, Texas Tech University Institutional Review Board
Professor, Department of Psychological Sciences

Kelly C. Cukrowicz, Ph.D.
Chair, Institutional Review Board

APPENDIX E

SOUTH CENTRAL COLLEGE IRB LETTER

Institutional Review Board
Office of Research and Institutional Effectiveness

Brad Schloesser, Keith Olander, and Megan Roberts

January 2, 2019

Dear Brad, Keith and Megan:

This letter shall serve as official notification that the modification to add Megan Roberts to your study, "Post-Secondary and Farm Business Management Students' Perceived Emotional Wellbeing under Condition of Financial Contraint", has been reviewed and approved by the South Central College IRB. Your project meets the definition of research exempt that is exempt form IRB review under Category six Investigational Strategies in Educational Settings as defined in 45 CFR 46.101(b)(2). Your request to extend data collection and the study have been granted.

Please notify the IRB of any changes in your study protocol or any unanticipated changes or challenges that you encounter while conducting your research. Please notify the IRB if this study will continue beyond April 30, 2018.

If you have any questions or concerns do not hesitate to contact me. For all future inquiries regarding this research project, please refer to SCC IRB Control Number 17F01. I can be reached at Narren.brown@southcentral.edu.

Best regards,

Narren J. Brown, PhD
Chair
Institutional Review Board
South Central College

SCC IRB Control Number 18S01-Modified
OMB 0990-0279
IORG 0007561
IRB 00009079

www.southcentral.edu
FARIBAULT CAMPUS | 1225 Third Street SW, Faribault, MN 55021 | tel: 507.332.5800 | toll free: 800.422.0391 | fax: 507.332.5888
NORTH MANKATO CAMPUS | 1920 Lee Boulevard, North Mankato, MN 56003 | tel: 507.389.7200 | toll free: 800.722.9359 | fax: 507.388.9951