An examination of the attitudes' of farmers towards health and safety, stress and fatigue during a global health crisis.

Debbie Bough
MSc in Management
National College of Ireland.

Submitted to the National College of Ireland, (August) (2020)

Abstract:

Due to profound differences in the way humans deal with emotions, it is plausible for every human to develop emotional or mental difficulties at some stage in their lives. The Organisation for Economic Co-operation and Development (2017, pp.60) reports that one in two people will suffer from mental illness during their lifetime. Young farmers, both male and female, are predisposed to emotional or mental difficulties, for a multitude of reasons including their age (Kolstrup, Kallioniemi, Lundqvist, Kymalainen, Stallones, & Brumby, 2013).

Unlike previous studies undertaken by Kearney et al (2014) & Brennan (2015) which examined stressors among farmers during 'normal' economic conditions, this research focused on the needs and capabilities of young adults working in the agricultural industry, during a global health crisis. This gap in the literature provided for an examination of the current attitudes' of farmers towards their own personal health and safety, as well as their fatigue and stress levels during this period. This research sought to examine if farmers, during a global health crisis succumb to the demands the industry and consumers place on them, or if they thrive, resulting in lower levels of stress and fatigue. It also endeavoured to understand if the global crisis impacted on the farmers ability to ensure health and safety precautions were followed.

This research involved a mixed methods qualitative and quantitative questionnaire which can be found in Appendix 3. This study highlighted that stress levels increase with seasonal fluctuations in workload. Furthermore, this study confirms the literature and identifies that economic worries and seasonal fluctuations in workload are attributed to higher levels of stress amongst farmers.

Declaration:

Submission of Thesis and Dissertation

National College of Ireland

Research Students Declaration Form

(Thesis/Author Declaration Form)

Name: Debbie Bough

Student Number: 18103359

Degree for which thesis is submitted: MSc in Management

Material submitted for award

a) I declare that the work has been composed by myself.
b) I declare that all verbatim extracts contained in the thesis have been distinguished by quotation marks and the sources of information specifically acknowledged.
c) My thesis will be included in electronic format in the College Institutional Repository TRAP (thesis reports and projects)
d) I declare that no material contained in the thesis has been used in any other submission for an academic award.

Signature of research student: Debbie Bough

Date: 11.08.2020

Thesis Submission Form

All thesis submissions must be accompanied by a thesis submission form. The current guidelines for submission are available through the library at the following URL: http://libguides.ncirl.ie/thesisguide. The guidelines specific to the School of Business guidelines are listed here http://libguides.ncirl.ie/thesisguide/business

Submission of Thesis to Norma Smurfit Library, National College of Ireland

Student name: Debbie Bough

Student number: x18103359

School: National College of Ireland, Business School.

Course: MSc in Management

Degree to be awarded: MSc in Management

Title of Thesis: _ An examination of the attitudes' of farmers towards health and safety, stress and fatigue during a global health crisis.

One hard bound copy of your thesis will be lodged in the Norma Smurfit Library and will be available for consultation. The electronic copy will be accessible in TRAP (http://trap.ncirl.ie/), the National College of Ireland's Institutional Repository. In accordance with normal academic library practice all theses lodged in the National College of Ireland Institutional Repository (TRAP) are made available on open access. I agree to a hard bound copy of my thesis being available for consultation in the library. I also agree to an electronic copy of my thesis being made publicly available on the National College of Ireland's Institutional Repository TRAP.

Signature of Candidate: Debbie Bough

For completion by the School: The aforementioned thesis was received by

Date:

This signed form must be appended to all hard bound and electronic copies of your thesis submitted to your school.

Table of Contents

Literature Review

A major occupation worldwide (Zhu, Han, Sun, Xie, Qian, Stallones, Xiang and Wang, 2011) farming has faced unprecedented levels of economic challenges in recent years (Hagel, Pahwa, Dosman and Pickett 2013). 8.6% of total employment of Ireland in 2016 was seen in the agri-food sector (Government of Ireland, 2018). Both the European Union and the Government of Ireland face extreme pressures and challenges to encourage young people (aged under 35) into farming as only 6% of all farm holdings in the EU are run by young farmers (European Commission, 2019).

Farming, the business of cultivating the land, is recognised as one of the most dangerous occupations in Ireland and worldwide (Furey, O'Hora, McNamara, Kinsella and Noone, 2016) with the International Labour Organisation (2019) ranking it in the top three most dangerous occupations. By its very nature, farming is a business which involves uncertainties (Kliebenstein, Heffernan and Peck, 1983) especially in the current economic climate in which we find ourselves. Challenging times are in store for global agricultural markets during the 2020 financial year due to the Covid-19 scare (Teagasc, 2020) which may result in uncertain times being faced by farmers. Therefore, it should be acknowledged that these uncertainties have transformed a once tranquil and idyllic occupation (Walker and Walker, 1987), into that of "one of the most stressful occupations in the world" (Padhy, 2018).

Mental Health and stigma

An integral component to the health of an individual, mental health is the "state of well-being in which individuals can cope with the day-to-day stresses that are placed upon them" (WHO, 2018). Any changes in emotion, thinking or behaviour which occur due to stress placed upon an individual, result in mental illness being faced by an individual (Parekh, 2018).

Confusion is often caused due to the terms 'mental health' and 'mental illness' being used interchangeably (Caslin and Colgan, 2019). 'Mental illness' is

considered to be a medical condition similar to that of heart disease or diabetes which can affect every person equally irrespective of one's gender, age or race (Parekh, 2018). It should be noted that a vast amount of stigma is faced by individuals, including farmers, when they do admit they have a mental illness and require assistance (Assembly Research Matters, 2019). This stigma often results in a reluctance to seek formal advice especially in a time of need (Kehoe, 2013).

The basis for daily functioning in terms of emotions, thinking and communicating (Parekh, 2018), mental health is a continuum which applies to every individual (Caslin and Colgan, 2019). Characteristics of good mental health describe an individual who cares for themselves both physically and mentally, and are able to successfully manage any stresses that are presented to them (Caslin and Colgan, 2019). On the opposite / unhealthy end of the spectrum, poor mental health can result in individuals failing to take care of themselves ill-health occurring stressful working conditions (WHO, 2018). It should be noted that in the context of farmers, those who are susceptible to poor mental health are at a higher risk of being involved in a work place accident (Kearney, Rafferty, Hendricks, Landon-Allen and Tutor-Marcom, 2014).

What is stress?

What happens when farmers begin to neglect their mental health? Individuals can experience either a positive or a negative psychological response when presented with a stressor (O'Sullivan, 2011). Romanos, Wise and Seqards (1982 p514) describes '*eustress as the stress faced by an individual in face of achievement and triumph, more commonly referred to as 'the stress of winning'.* Furthermore, distress is experienced by an individual when feelings of security begin to diminish and one begins to feel hopeless, lost and disappointed. Stress, in its positive or negative form, is experienced by everyone (Mental Health Ireland, n.d) but is manifested differently by each

person depending on the situation in which they find themselves (Kearney et al, 2014). Therefore, it should also be considered what happens when eustress turns into distress, when normal working practices become unbearable and challenging for farmers?

A healthy response to the events in which we find ourselves (Mental Health Ireland, n.d), stress can present itself as a positive force resulting in motivational benefits and provides solutions and stimulation to problems (Health and Safety Executive, 2005). However, it is imperative to note that it is only constructive to an individual when it is short lived (Mental Health Ireland, n.d). If stress remains unhandled by an individual who requires assistance, "life-altering effects" (Eckelkamp, 2017) can be felt by the individual and those around them. Stress, regardless of occupation, is a normal response to life demands (Padhy, 2018) but can be subjective in its nature (Lobley, Johnson, Reed, Winter and Little, 2004). Although definitions of this topic are challenging to identify, and the process of stress is complicated in its nature (The Health and Safety Authority, 2015) it is imperative for the purpose of this study, to acknowledge the definition of stress as described by Selye (1974) identifying that "*stress is the nonspecific response of the body to any demand made upon it."* As humans always feel stress, be it positive or negative, consideration into the impact that stress has on the individual is crucial. The more often an individual experiences a stressor, the effects that this has on the individual will reduce (Charlton, 1992). These stressors are situations in which the individual finds themselves can either be caused due to physical stressors or psychological stressors. In the event of an earthquake, all individuals would feel stress, whereas, subjective stressors faced by an individual such as time pressures on the farm would cause farmers to feel stress in a different manner. The situations in which the farmer finds them self will be the cause of eustress or distress faced by them, with symptoms of stress being felt by the body. They can be categorised into physical symptoms (chronic tiredness and fatigue), emotional symptoms (anxiety, worry, feelings of powerlessness) and

behavioural symptoms (an inability to make decisions) (Mental Health Ireland, n.d).

Due to the fact that the same event can be experienced differently in terms of stress by two individuals (Kliebenstein et al, 1983) stress can be paralysing to an individual and affect the persons coping ability (Mental Health Ireland, n.d). Stress symptoms experienced by the individual is the natural warning sign of the body that indicates undue pressure is being experienced and change is required by the individual (Caslin and Colgan, 2019). Therefore, the onus is on the farmer to self-identify that they are agents of change and implement these changes to reduce stress levels (Kearney et al, 2014). Therefore, it should be acknowledged that an individual must identify that a situation will bring distress rather than eustress in order for them to implement any implement of change, such as meditation to calm the mind or removing themselves from situations they do not feel comfortable in.

Main stressors attached to farming

In order to assist farmers in coping with unavoidable issues that may arise, farmers are advised to simplify their lives and limit stressful events with which they may come into contact (Kliebenstein et al, 1983). However, due to numerous occupational stressors which are present for farmers which are fundamentally unique to this industry (IFA, n.d), farmers face challenges in their daily life that are out of their control, including the food supply chain being placed under extreme pressure to cope with the increasing global population, pressure on farmers to ensure they are protecting the environment whilst simultaneously trying to provide a livelihood for themselves.

Following on from these definitions on stress, this research must consider the three main aggravators faced by farmers. The Health Safety Executive (2005) identifies a three-fold analytical distinction regarding the stressor attached to farming namely;

1. Intrinsic aspects of farming stress
2. Extrinsic aspects of farming stress
3. Work-related aspects of stress in farming.

Intrinsic aspects of farming stress

An extremely physically and emotionally demanding career path, farming often results in large volumes of work-related injuries (Zhu et al, 2011*)* with Ireland having now reached crisis point regarding farming related accidents (Brennan, 2015). Day-to-day demands that are placed on the shoulders of young farmers, especially with regards to the current Covid-19 crisis, and economic implications that will follow, will test their mental and physical capacity for the foreseeable future (Kelly, 2020; Forrest, 2020). In order to counter act these economic implications, contingency plans should be implemented by the farmer that will ensure that should illness fall upon them, the day-to-day operational activities on the farm will continue seamlessly, thus reducing overall stress levels faced by them (Murphy, 2020).

Identifying the age of a farmer is crucial to understanding the risks associated with farming, especially that of a predisposition of farmers to accidents. Risk-taking behaviours were more often undertaken by farmers aged below 30 years resulting from inexperience and insufficient training (Murphy and O'Connell, 2017). Risk-taking behaviours are challenging to measure accurately due to the subjective nature of what risk is categorised as; what one individual may consider to be risk, may not be risk to another (Brennan, 2015). Perceived norms of acceptable behaviour in the industry often result in farmers incorrectly assuming that this risk-taking behaviour is the norm (Colémont and Van den Broucke, 2006). *'Macho'* or *'tough'* ideologies being exerted by the farmer often results in carelessness, especially through farmers not wearing personal protective equipment when working on the farmyard (Coury et al, 1999) in fear that peers will perceive them as 'soft' individuals (Murphy, 1981).

With education proving to be one of the most common prevention intervention techniques (Donham and Thelin, 2016) it is a shame to note that farmers are only expected to attain a level-6 educational qualification, and progress no further (HSE, 2005). Educational courses must be provided to farmers to ensure that health and safety-conscious behaviour is promoted by the farmer daily (Donham and Thelin, 2016). Even though structured continuous professional development courses are rare in farming (HSA, 2016) considering the fact that training is normally undertaken by farmers at a young age, it is imperative for courses to be made available to them (Skillnet Ireland, 2019) as farm safety campaigns often result in awareness and behavioural changes (Brennan, 2015). A gap currently exists in the provision of educational services available to farmers especially at present the global pandemic has resulted in no health and safety courses being offered to farmers at present (Geary, 2020).

Farmers face daily challenges with disease prevention with major farming implications occurring. The Bovine Spongiform Encephalopathy (BSE) and Foot and Mouth Disease (FMD) crises led to exponential reductions in farm income which increased external intangible pressures on farmers. These often culminate in detrimental effects on mental health issues on farmers (Murphy, 2019). Furthermore, major stressors faced by farmers include the weather and long working hours (Kearney et al, 2014) which can both result in a tough working environment for farmers (Brennan, 2015). Immense pressure is placed on them to ensure that their tasks are completed in a short-time window which is dependent on the changing weather conditions. Increased costs were faced by farmers in 2019 due to high rainfall levels that resulted in animals being housed sooner rather than grazing the land (Teagasc, 2020). Due to changing weather conditions, it can be challenging for farmers to eliminate stressors from their lives therefore, farmers should always expect the unexpected when dealing with livestock and the weather (O'Donnell, 2020) but predictions are in place that normal weather is assumed for 2020 (Teagasc, 2020).

Extrinsic dimensions of agricultural stress

More sustained anxieties are faced by individuals, as by our very nature, we are not immune to stresses in life. However, farming in its very nature predisposes us to a more stressful and pressured life (Kliebenstein et al, 1983). While humans can tolerate a certain degree of stress, excess stress levels can cause serious health issues and insomnia (Kelly, 2020) as well as social isolation and limited human interaction on a daily basis (Brennan, 2015). Special consideration must also be given to the lone farmer (Health and Safety Authority, 2017) as people need an outlet to express their emotions and not "bottle them up" (Kliebenstein et al, 1983*).* Due to the nature of the job, farmers are predisposed to living in "semi-isolated environments" (Kelly, *2020)* which subsequently makes them prone to social isolation and lacking human contact daily (Brennan, 2015).

Extrinsic dimensions of agricultural stress can also be seen through major world-wide issues which can have detrimental results on the economic well-being of the farm, including, war and crop failure (Kliebenstein et al, 1983). The current legislative and political framework places significant pressure on farmers. Growth in the global economy is hampered due to continuing concerns regarding Brexit, and weak Sterling to Euro exchange rates (Dillon et al, 2019). Moreover, this research was undertaken at the start of the COVID-19 global health pandemic which will inevitability result in everlasting effects on the farm. COVID-19 is an economic shock which is likely to reduce margins across farming enterprises, however, it is challenging to know the long-term implications of this shock at this early stage (Teagasc, 2020). Subsequently, major impacts will be felt on the farmers' life and in order to ensure profitability on the farm, farmers will continue to work under extreme pressures and put themselves at risk to ensure this is achieved (Elkind, 1993).

Work-related aspects of stress in farming

Due to the unpredictable nature of the industry, farming in its nature causes strain to be placed on farmers and their families which may feed back into the

daily life of farmers (Padhy, 2018). For this reason, formal advice on issues is often not sought, with farmers seeking comfort in untrained confidants, such as friends or family. Farmers face a multitude of stressors associated with living and working from home and having to liaise with family members on a daily basis (Kearney et al, 2014). Mounting paperwork demands placed upon farmers through complex farm schemes, government compliance inspections, bureaucracy, income reduction IFA (n.d) often exacerbates stress levels felt by the farmer (Murphy and O'Connell, 2017)**.** A ripple effect can therefore be seen amongst young farmers, aged under 35 years in that, too much administrative work and the working environment in which they find themselves, ultimately results in farmers disregarding important farm safety rules (Bennett, 2016).

An intertwined issue of farm safety and safety concerns should be considered with farmers often disregarding safety concerns based upon their economic state (Elkind, 1993). High levels of economic concerns faced by the farmer often result in safety features, such as seat belts on machinery not being installed, therefore, increasing the overall risk of serious injury faced by equipment users (Hagel et al, 2013). However, it should be considered that those faced with high levels of economic concerns may be unable to invest adequately in safety features for the farm (Brennan, 2015).

Long working hours and a lack of sleep often result in farmers 'buckling under the stress' (Brady, 2019). With Spring being the most stressful time of the year, farmers are advised not to be 'superman' (Kliebenstein et al, 1983). The Health Safety Executive (2005) are particularly mindful for "mixed farmers" which deal with different types of herds, such as cattle and sheep, as they are at a greater risk of dealing with more complex paperwork demands and conflicting timetables. Therefore, the competence of the farmer must be brought into question as those who lack competence will in turn increase stress levels (Kliebenstein et al, 1983).

Rationale behind this study:

The literature review has examined information on stress and the effects of stress on individuals and on farmers during the 1980's, 1990's and 2000's. Therefore, it is imperative to consider if the information presented truly represents the current attitudes of farmers towards health and safety practices on their farm. Moreover, it will also examine, to what extent, if any stress is experienced by farmers.

This study was undertaken at the start of a global health crisis, placing extreme pressures on the shoulders of farmers. The aim of the research is to understand if they succumb to pressure or if they stay strong and thrive? Furthermore, the research endeavours to understand stressful days on the far will this permeate into the household and impact upon life decisions made by them? As the Government of Ireland has advised the Irish population to "Stay at home" in a bid to curtail the spread of COVID-19, it is crucial to identify if risk-taking behaviours are common amongst farmers, and the accident levels as a result of these risk-taking behaviours.

Research Hypotheses

Global health pandemics are a rare occurrence in someone's lifetime. This current study was undertaken during a period of a global health pandemic, Covid-19, with large pressure being placed on food suppliers across the globe. This research will aim to examine the current attitudes of young farmers towards their personal health and safety as well as their own perceived levels of stress during a global health crisis.

In order to successfully identify these patters, the following research hypotheses will be examined.

1. Seasonal fluctuations of workload does not lead to higher levels of stress amongst farmers.
2. Being socially isolated does not increased the farmers level of involvement in accidents.
3. Fewer hours of sleep at night is not associated with higher accident rates on farms
4. Higher rates of risk cannot be seen on farms with farmers who suffer from economic worry
5. Higher fatigue and stress levels are not faced by farmers who worked longer hours on the farm per day.

Methodology

Access to participants:

Due to the extreme pressures and challenges faced by the Irish and European governments to encourage young people into farming, it was deemed imperative to conduct research on a sample of young people who are currently in farming, to see what issues they face surrounding stress and fatigue. Exclusion criteria for this survey was solely based on participants not identifying their occupation as that of a farmer and falling outside of the age (18 – 35 years). It was deemed to be unethical to contact farmers under the age of 18, due to them constituting as a minor. It should be noted that the mean (standard deviation) participant age in this study was 23.16 years.

Debriefing:

Participants were informed of the research prior to commencement of the survey by means of the "Information to Participants document" (see Appendix 1). Participants were informed about the nature of the study, provided with contact details of the researcher and their supervisor and given a description on why this study was being undertaken. Due to the nature of the research, there was potential for participants to feel stressed when reflecting on their own levels of stress. For this reason, participants were provided with information relating to mental health support in their region. Participants were informed that anonymity would be ensured due to non-identifiable questions being posed.

Ethics:

Participants were asked to voluntarily agree to participate in the research study. Additionally, participants were informed that should they wish to opt-out of the research study prior to completing it, they had the right to do so. A copy of the participant consent form can be found in Appendix 2 of this document.

Sampling Techniques:

Non-probability sampling was used in order to access the population sample due to limitations in time and scope. It was hoped that through convenience sampling, the sample population would have been accessed, which would have subsequently resulted in snowballing. On March 12th, 2020, the Irish government made the decision to close all higher educational facilities in a bid to curtail the COVID-19 virus. The result of this closure resulted in the population sample being challenging to access and although a social media campaign was ran asking for participation, limited numbers actually became involved. Multiple attempts were made to contact educational facilities and members of Macra na Feirme (an organisation which represents the interests of farmers aged between 18 - 35 years in Ireland). However, due to the government restrictions in place, it became challenging to access the population sample. Therefore, due to time constraints, a quota of 35 participants was set and once achieved, data analysis was conducted.

Design:

Correlations in the relationship between stress and fatigue levels faced by farmers and their perceptions of safety were analysed through the cross-sectional research. In order to ensure that the data collection tool accurately gathered the required data, a sample tool was created and the test was piloted with 2 farmers. This allowed for any grammatical issues to be highlighted and to ensure that the tool worked. A design flaw occurred in that a multiple choice box was selected as 'select one option', which, had the pilot survey not have been used, it would have resulted in skewed data returning and participants being unable to highlight the information correctly.

Materials:

The research hypotheses were investigated through an online questionnaire which was administered to participants using an online questionnaire on Google Forms (see Appendix 3). This was shared with participants undertaking the survey to allow them to access and respond to it when it suited them best.

Clear instructions were provided to participants prior to commencement of the survey informing them of the nature of the study in question, who was undertaking it, and reasons the study was being undertaken. Participants were advised they must be over 18 years to take part and be from a farming background. Data was collected in a non-identifiable manner, with all results remaining confidential once the data was submitted. Prior to commencing the study, participants were informed that this was being conducted on a voluntary basis and that the survey would take approximately 7 minutes to complete.

The survey was divided into three subsections which examined socio-demographic variables pertaining to farmers, the levels of stress experienced by them (based on research by Kearney et al, 2014) as well as an examination of fatigue levels suffered by them due to their working conditions (based on research by Winwood, Lushington and Winefield, 2016).

Firstly, a mixture of quantitative and qualitative questions examined socio-demographic characteristics of the farmer, including age, sex, marital status and household numbers. Furthermore, information was sought from participants relating to the duration of time spent as a farmer and primary farming activity undertaken by them (dairy, beef, suckler). 3 open-ended qualitative questions were included in the survey:

- When is the most stressful time of the year for you on the farm and why?
- Have you ever been involved in a farm accident? If yes, please give brief details on what caused the accident (s)?
- Do you comply with farm safety rules and regulations? If no, please state what would stop you from complying with them.

The second sub-section sought to examine stress that was experienced by farmers due to their occupation. It examined 28 potential stressors faced by the farmer with the questions being categorised into 3 groups. It included 14 farm-related factors (including weather conditions, farm accidents or injuries),

9 financial factors (including market prices for the crops, financing for retirement), and 5 social factors (including distance from doctors, distance to shopping centres) experienced by the farmer. This was subsequently scored using a Likert scoring scale *(1-2-3-4)* with each participant rating each stressor where 1 = “no stress, ”2 = “a little stressful,” 3 = “moderately stressful,” and 4 = “very stressful,”. Predominately quantitative in its nature, one qualitative question examined ‘please list any other items you find stressful in relation farming and rate them’ (based on research by Kearney et al, 2014).

The third and final sub-section, specifically aimed to measure work-related fatigue faced by farmers, which was analysed using the 15 item Occupational Fatigue Exhaustion Recovery (OFER) scale (Winwood, Lushington and Winefield, 2006). Split into three subscales, namely “chronic work-related fatigue, acute end-of-shift states and effective fatigue recovery between shifts”, a Likert scoring scale *(1-2-3-4-5-6-7)* was used. Each participant rated their experience of fatigue and strain at work over the last few months where 1= “strongly disagree”, 2= “disagree”, 3=” slightly disagree, 4=neither agree nor disagree, 5= slightly agree, 6= agree, 7=strongly agree. It should be highlighted that reverse scoring is used for questions 9, 10, 11, 13 and 15 and are analysed with 1=7, 2=6, 3=5, 4=4, 5=3, 6=2, 7=1 (Winwood, Lushington and Winefield, 2006).

Internal reliability of the subscales was measured using the Spearman rho correlation with co-efficient ranging from 0.80 to 0.85 (Winwood, Lushington and Winefield, 2006). Factor 1 of the OFER scale (OFER-CF) examined chronic fatigue and exhaustion faced by farmers based on the work tasks undertaken by them. The OFER-CF scale comprised of 10 items including “I feel exhausted all of the time”, “I feel most of the time I’m living to work” and “I often wonder how long I can keep going at my work”. Factor 2 (OFER-AF) examined the energy levels of the farmer after having worked. 6 items in the acute Fatigue (OFER-AF) can be examined “I wish I had more ‘get up and go’ generally, “I have plenty of reserve energy when I need it”. It should be acknowledged that

farmers that record high levels on this subscale will have exerted a substantial amount of energy in their day-to-day tasks which places them at a substantially higher risk of developing chronic fatigue. Factor 3, the "inter-shift recovery" (OFER-IR), examines the correlation between the farmers ability to recover energy that they expended during their previous working shift. Examined by three factors, namely "I don't get enough time between work shifts to recover my energy fully", "I feel rested at the start of each workday/shift", and "I can't recover my energy completely between work shifts". It is imperative to note that should a farmer score low on this sub-scale; they are at a high risk of being susceptible to chronic fatigue levels. (Winwood, Lushington and Winefield, 2006).

Statistical analysis

Data was secured in a Google File spreadsheet that was accessible through password access that was only known to the researcher. Once collated, all data was transferred to a password protected SPSS account. SPSS version 23 for Mac (IBM, 2019) was used to conducted statistical analysis on the quantitative data set. The Pearson chi-squared test was used to examine any relationships which exist between demographic and farm-related characteristics, with the Spearman rho correlational test used to examine health characteristics relating to the farmer. Statistical significance was determined using the p-value, which examined the probability of the relationship occurring naturally and not due to chance. P-Values which were less than 0.05 (5% likelihood of not occurring, 95% likelihood of occurring) were accepted as true for the nature of this study.

Limitations:

Although the questionnaire was composed of a mixed methods, qualitative and quantitative questions, statistical analysis was conducted on the quantitative data alone. The qualitative data was commented on, but not statistically analysed.

Results:

The research was divided into three subsections; the first examining sociodemographic variables of the farmer, the second examining stress levels faced by participants due to their participation in individual activities, and finally, the third subsection, which examined the Occupational Fatigue Exhaustion Recovery Scale.

Descriptive Statistics

Age and marital status

As this study seeks to determine stress levels faced by young farmers in Ireland, farmers aged between 18 and 35 years were sought. A total of 36 people, ranging in age from 18 to 35 years, completed the survey with 61.1% of participants in the survey being male and 36.1% being female. 2.8% of respondents did not give permission to participate in the survey. Therefore, the representative sample that will be used during this discussion will identify the stress and fatigue levels faced by 35 farmers in Ireland.

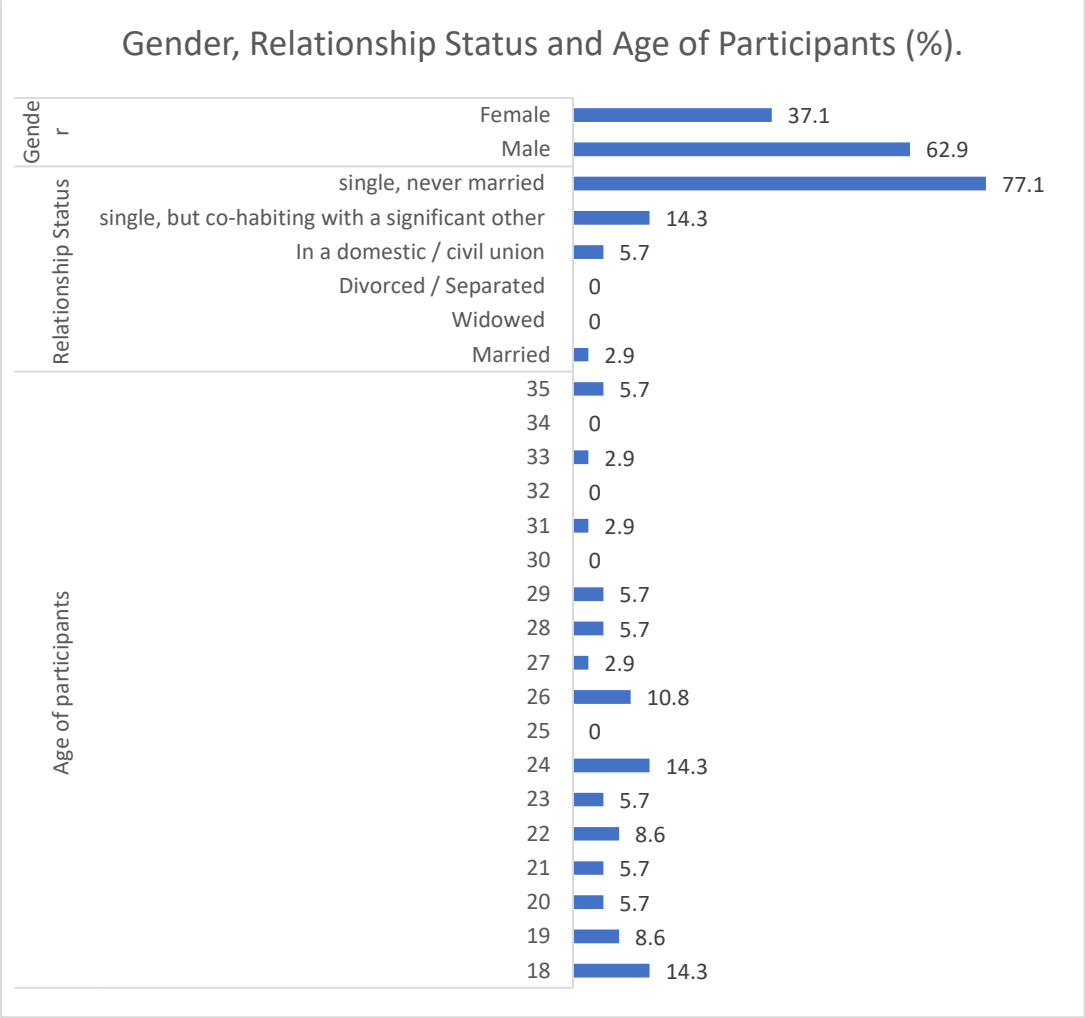

Figure 1: Gender, Relationship Status and Age of Participants (%)

From figure 1 above, it can be noted that the majority of participants in this study were aged 18 years and 24 years (14.3% of overall respondents in this survey). No responses were identified from the age categories 25, 30, 32 nor 34. Furthermore, regarding the marital status of the participants, the most commonly selected status of the sample was 'single, never married' with 77.1% of participants selecting this option. 14.3% of participants were 'single, but co-habiting with a significant other'. 5.7% were 'in a domestic or civil union' with 2.9% being married. None of the participants in the study were widowed or divorced.

Farm system

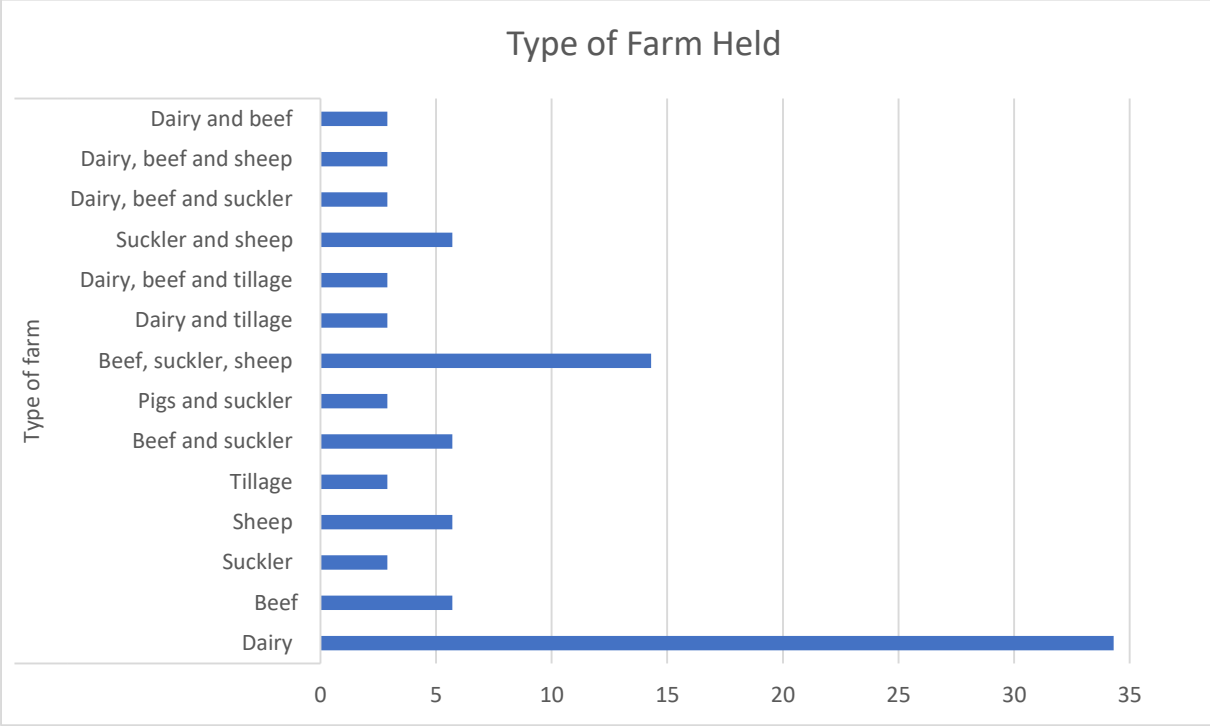

Figure 2: Breakdown of farm type held (%)

In order to develop a greater understanding of the farmer and the work that they complete, farmers were asked to identify which type of farm they held. Figure 2 above shows the breakdown of farm type held by participants in this study. 14 different types of farms were held, with the most commonly held farm by participants was that of a dairy farm with 34.3% selecting this farm system.

Type 1		**Type 2**		**Type 3**	
Dairy	34%	Beef & Suckler	8.6%	Beef, Suckler & Sheep	14.2%
Beef	5.7%	Suckler & Sheep	8.6%	Dairy, Beef & Tillage	2.9%

Sheep	5.7%	Pigs & Suckler	2.9%	Dairy, Beef & Suckler	2.9%
Suckler	2.9%	Dairy & Tillage	2.9%	Dairy, Beef & Sheep	2.9%
Tillage	2.9%	Dairy & Beef	2.9%	-	-
Total	51.2%	-	25.9%	-	22.9% (100%)

Table 1: Breakdown of farm type held

In order to analyse the data, the farm type held by participants was split into three different categories, each based on number of farm ownership. Table 1 highlights that of the 14 types of farms identified, 'dairy' farm appeared 6 times. 8 of the 14 farm types were only held by 2.9% of participants.

Working patterns

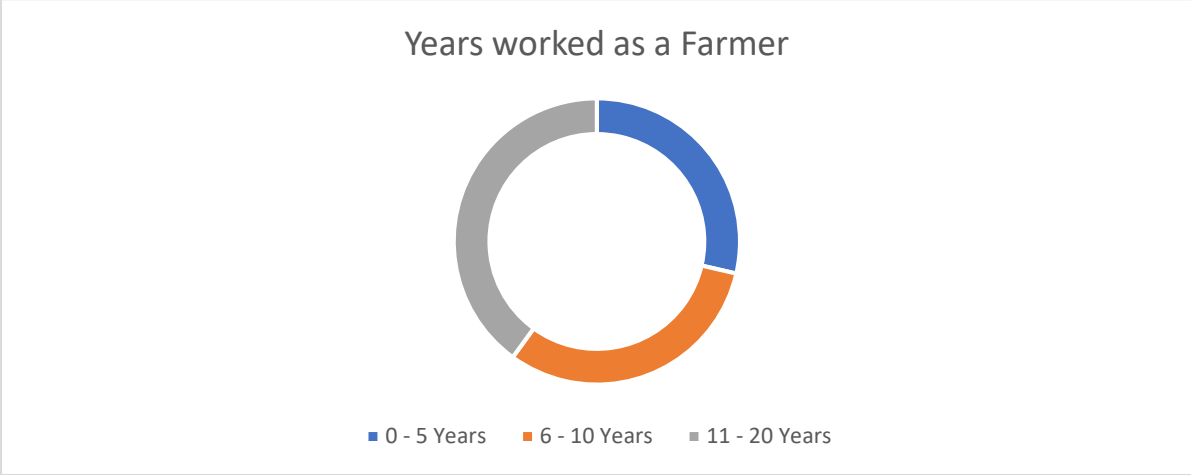

Figure 3: "Years worked as a farmer" by participants

For the purpose of this study, farmers were requested to identify "how many years have you been working as a farmer". Participants chose from being a farmer for "0-5 years", "6 -10 years", or "11 – 20 years." Figure 3 above highlights that the majority of participants (40%) identified that they had been

working as a farmer for “11 – 20 years”. 31.4% of farmers identified that they had been working as a farmer for 6 – 10 years, with the fewest of them reporting being new to the trade at ‘0 – 5 years’ (28.6%).

Moreover, farmers in this study identified that the majority of them work on a farm with 2 people (60%), followed by 3 people assisting on the farm with day to day tasks (22.9%). Only 8.6% of participants have help from “1 person” or “4 or more people”.

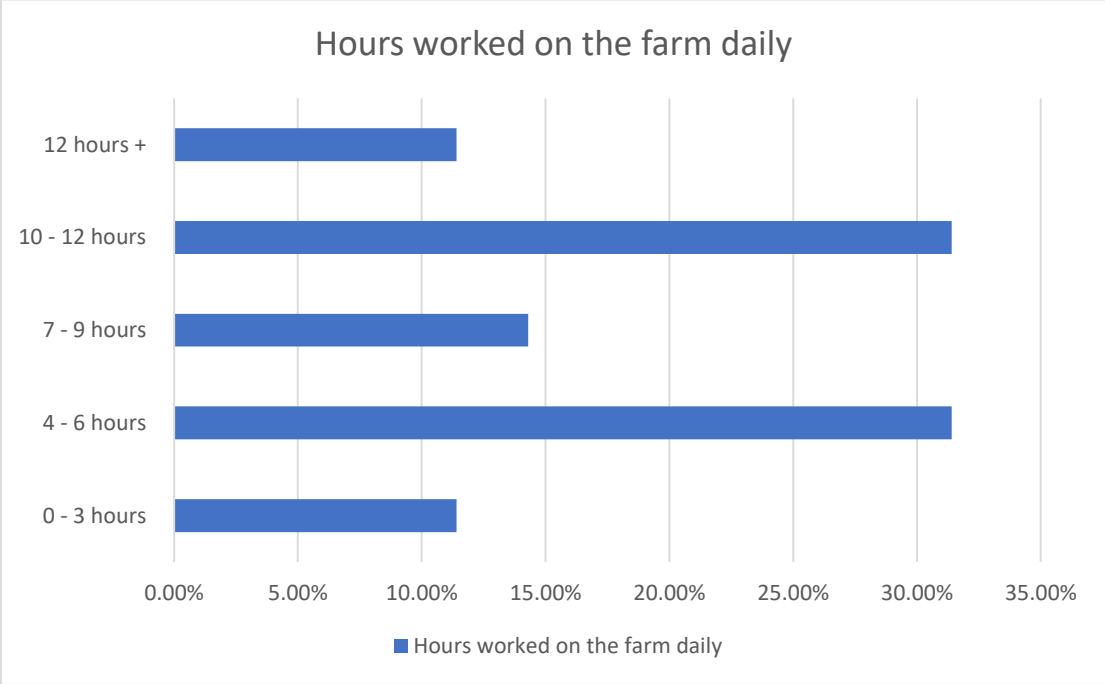

Figure 4: “Hours worked on the farm daily (% of respondents)”

Figure 4 above highlights the variety of responses that were seen by participants in relation to the number of hours worked on the farm per day. The majority of farmers (31.4%) identified that they either worked between “4 – 6 hours” or “10 – 12 hours”. The second most commonly identified daily working duration was that of “7 – 9 hours”, with a response rate of 14.3%. 11.4% of participants either worked between “ 0 – 3 hours” or “more than 12 hours”.

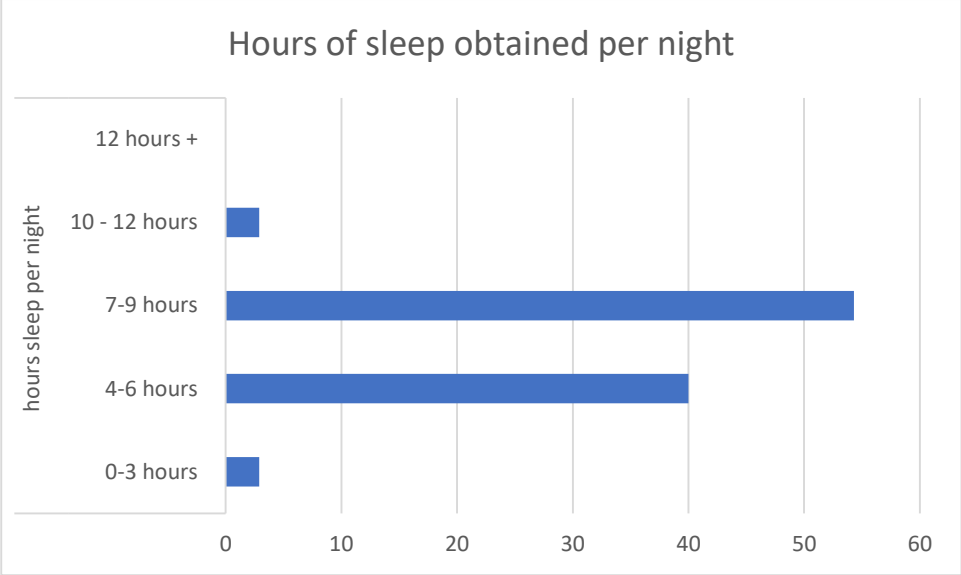

Figure 5: Hours of sleep obtained per night (% of respondents)

Regarding hours of sleep obtained by participants per night, none of the respondents in the survey identified receiving 12 or more hours of sleep per night. Most commonly, 54.3% of respondents receive between "7 – 9 hours" of sleep nightly. The second most commonly reported duration of sleep, at 40%, was "4 – 6 hours". 2.9% of respondents surveyed noted to experience "0 – 3 hours of sleep" and "10 – 12 hours of sleep" per night.

Health and safety

Figure 6: Health and Safety Training Course (%)

As noted in figure 6, 45.7% of participants in this study have undertaken a health and safety training course, whereas the majority (54.3%) have not. Furthermore, the majority of participants in this study have not been involved in farm accidents (82.9%) compared to 17.1% who have not been involved.

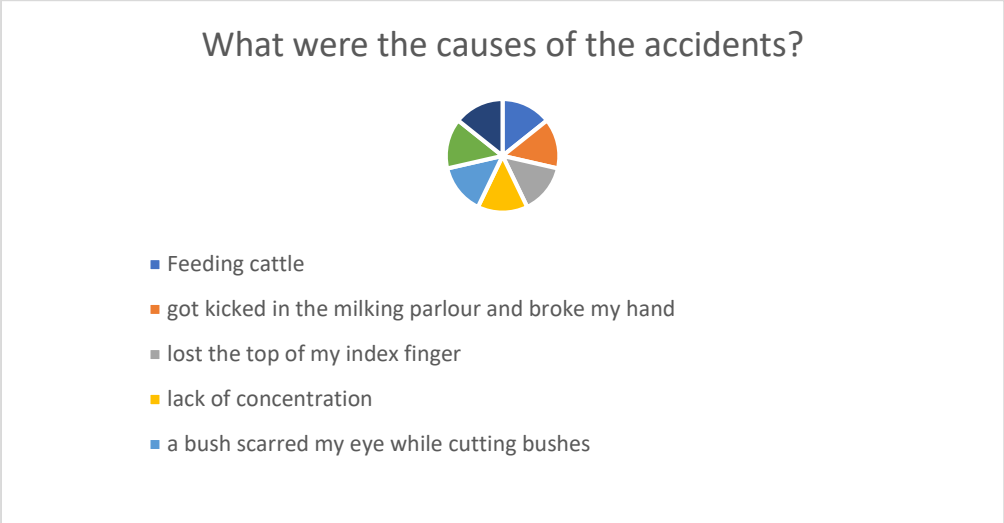

Figure 7: Breakdown of the causes of the accidents experienced by farmers

Due to the mixture of qualitative and quantitative questions that are posed in this research, question 11 and 12 of the questionnaire (see appendix 3) provided participants with the opportunity to identify “have you ever been involved in a farm accident”, “if yes, please give brief details on what caused the accident(s)?”. 7 respondents replied to question 11, with “yes” and stated that they each had personally suffered from accidents on the farm, and identified reasons why these accidents occurred (see figure 7).

1. Feeding cattle
2. Got kicked in the milking parlour and broke my hand
3. Lost the top of my index finger
4. Lack of concentration
5. A bush scarred my eye while cutting bushes
6. Animal attack (2-week recovery), machinery accident (5-week recovery)

7. Cow attack after calving.

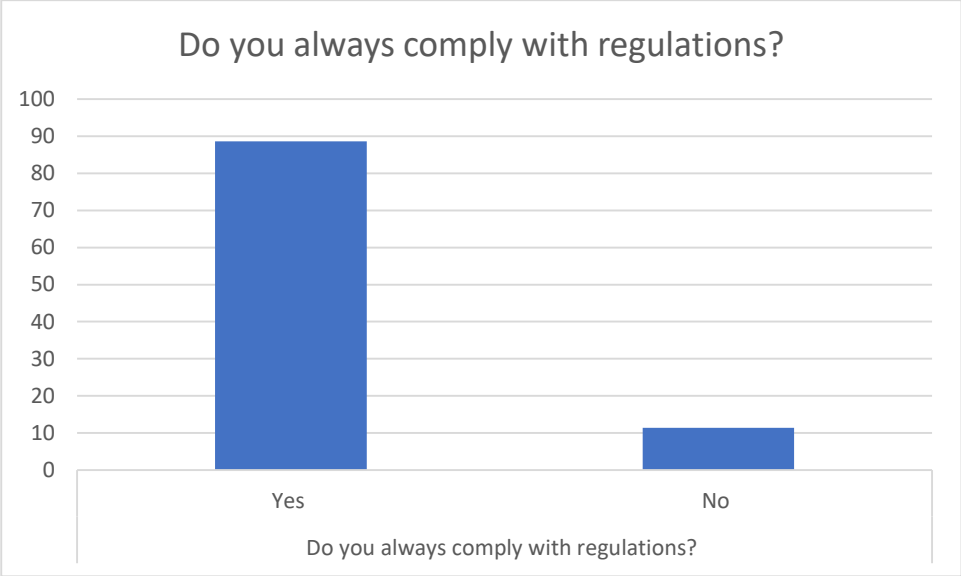

Figure 8: Compliance with regulations (% of participants)

The majority of participants in this study (88.6%) comply with regulations. Three reasons were identified by participants for not complying with regulations, namely; 1. Costs, 2. Cost & risk mitigation, 3. Speed of completing the task and short labour. It is important to consider that 62.9% of respondents are less concerned with prioritising health and safety on the farm when faced with fatigue, compared to 37.1% who prioritise health and safety when faced with fatigue.

Stress relating to “farm accidents and injuries” highlights an important insight into the life of a farmer. 40% of participants find “a little stressful”, “moderately stressful” is felt by 31.4% of respondents. It should be noted that 20% of participants experience “no stress” relating to farm accidents and injuries. Finally, 8.6% of participants in this study experience “very stressful”.

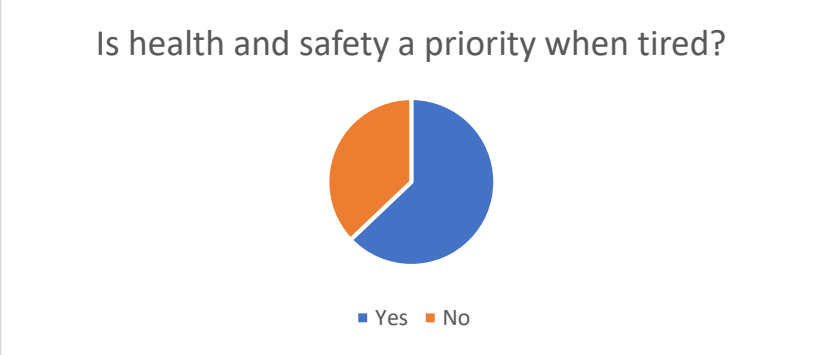

Figure 9: Health and Safety Prioritisation when tired

Figure 9 above highlights that 62.9% of participants regard health and safety to be more of a priority when tired compared to 37.1% who do not feel this.

Stress

The second subsection of this research required participants to rate the stress on a Likert scale (1-4) caused to them by individual activities, such as "problems with livestock or crops".

Table 2 below identifies the result of question 18 from appendix 3, relating to the factors that contribute to farm related stress. and whether individual respondents perceived these activities to cause them "no stress", to be "a little stressful", "moderately stressful" or "very stressful". For each question, the maximum level will be highlighted in bold – for example, for the variable 'lack of close neighbours', the most prominent response was 62.90% as 'no stress'. It should be noted that that one variable "concern over the future of the farm", resulted in 31.40% of participants identifying that this causes them "moderate stress" and "very stressful".

Stressor	No stress (1) %	A little stressful (2) %	Moderately Stressful (3) %	Very Stressful (4) %
Lack of close neighbours	**62.90**	28.50	8.60	0

Distance from shopping centres	**57.10**	40	2.90	0
Farm accidents and injuries	20	**40**	31.40	8.60
The weather	0	25.70	31.40	**42.90**
Market price for crops	2.90	17.10	37.10	**42.90**
Limited social interaction opportunities	17.10	**48.70**	17.10	17.10
Seasonal variations in workload	8.60	25.70	**45.70**	20
Not enough money for day to day expenses	11.50	**40**	31.40	17.10
High debt load	17.10	**34.30**	28.60	20
Working with bankers and loan officers	**37.10**	28.60	20	14.30
Not enough time to spend with family in recreation	14.20	**42.90**	20	22.90
Concern over the future of the farm	22.90	14.30	**31.40**	**31.40**

Not having the manpower to operate the farm	28.60	**37.20**	17.10	17.10
Government export policy	28.60	**40**	20	11.40
Operating hazardous machinery	**40**	31.40	17.10	11.40
Taxes	14.30	**40**	25.70	20
Distance from doctors / hospitals	41	**45**	11.50	2.90
Balancing the many roles I perform as a family member	20	**40**	20	17.20
Problems with machinery	5.70	**48.60**	31.40	11.40
Problems with livestock or crops	2.90	31.30	**42.90**	22.90
Not enough cash	11.40	**42.80**	22.90	22.90
Working with the extended family	25.70	**34.30**	14.30	25.70
Having too much work	17.10	25.80	**40**	17.10

for one person				
Financing for retirement	**40**	34.30	14.30	11.40
Government farm price supports	14.30	**62.90**	5.70	14.30
Dealing with non-relative help	28.60	**45.70**	20	5.70
Outsiders not understanding the nature of farming	17.10	28.60	**34.30**	20
Health care costs	20	**51.40**	20	8.60
Other:	• Manage a relationship and a farm • Drawing manure • Macra's approach to representing farmers. Rise of factory dairy being promoted by Teagasc. Pushing family farms out. • Not having stock at the rate of thrive that you'd like them. Push cost of feed etc. • Media image that society has of farming • Juggling a part time job with farm work			
28 respondents did not provide an answer, 7 did.				

Table 2: *Farm related factors of stress*

Occupational Fatigue Exhaustion Recovery Scale (OFER).

The third and final subsection of this research examined the Occupational Fatigue Exhaustion Recovery Scale (OFER). Question 19 of appendix 3 specifically focused on the direct experience of the farmer in relation to fatigue and strain at work over the past few months. The OFER aims to analyse the work-life balance of farmers, especially with regards to the stress they experience in the workplace and to what extent that it has a predominately negative effect on their experiences in the homeplace. Internal consistency of the Occupational Fatigue Exhaustion Recovery Scale (OFER) was measured through the Spearman rho coefficient, with a cut-off point of 0.50 deemed to be the point of statistical relevance for this study (Winwood, Lushington and Winefield, 2006)..

For each question, the maximum level will be highlighted in bold – for example, for the variable " I often feel at the end of my rope", the most popular response, at 28.60% of participants, "slightly agree" with this statement. The statement 'My work drains my energy completely every day' resulted in varying responses as 17.10% of participants highlighted that they 'disagree', 'neither agree nor disagree' and 'strong agree' with this statement.

	Strongly Disagree (0) %	**Disagree (1) %**	**Slightly Disagree (2) %**	**Neither Agree nor Disagree (3) %**	**Slightly Agree (4) %**	**Agree (5) %**	**Strongly Agree (6) %**
I often feel at the end of my rope	14.30	17	0	22.90	**28.60**	2.90	14.3
I often dread	**25.70**	20	17.10	20	8.60	2.90	5.70

waking up to another day of my work							
I often wonder how long I can keep going at my work	8.60	**28.6**	22.90	11.40	17.10	5.70	5.70
I feel that most of the time I'm just living to work	11.50	14.30	**22.90**	5.70	17.10	11.40	17.10
Too much is expected of me in my work	8.60	**20**	11.40	20	17.10	14.30	8.60
After a typical work period, I have little energy left	5.60	20	8.60	0	**28.60**	22.90	14.30

I usually feel exhausted when I get home from work	8.60	14.30	5.70	2.90	**28.50**	20	20
My work drains my energy completely every day	14.40	**17.10**	5.70	**17.10**	14.30	14.30	**17.10**
I usually have lots of energy to give to my family or friends	8.60	22.90	**25.80**	14.10	14.30	11.40	2.90
I have energy for my hobbies after work	14.30	22.80	**25.70**	8.60	8.60	17.10	2.90
I never have enough time to recover	8.70	17	11.40	22.90	**25.70**	5.70	8.60

my energy							
Even when tired, I'm usually refreshed by the next shift	5.70	14.30	11.40	25.70	**28.60**	11.40	2.90
I rarely recover my strengths between shifts	11.40	11.40	14.30	14.30	**22.90**	20	5.70
Recovering from fatigue isn't a problem for me.	11.40	**17.20**	17.10	20	17.10	2.90	14.30
I'm often fatigued by one shift at the start of the next	5.70	17.10	14.30	22.90	**25.70**	2.90	11.40

Table 3: Breakdown of the responses in the Occupational Fatigue Exhaustion Recovery Scale

OFER CF: Chronic Fatigue

In order to analyse the chronic fatigue faced by individuals, the Spearman coefficient of 5 questions were examined;

1. I often feel at the end of my rope
2. I often dread waking up to another day of my work
3. I often wonder how long I can keep going at my work
4. I feel that most of the time I'm just living to work
5. Too much is expected of me in my work.

	I often feel at the end of my rope	**I often dread waking up to another day of my work**	**I often wonder how long I can keep going at my work**	**I feel that most of the time I'm just living to work**	**Too much is expected of me in my work**
I often feel at the end of my rope	*1.0000*	*0.695***	*0.689***	*0.567***	*0.499***
I often dread waking up to another day of my work	*0.695***	*1.0000*	*0.754***	*0.546***	*0.458***
I often wonder how long I can keep going at my work	*0.689***	*0.754***	*1.0000*	*0.749***	*0.709***
I feel that most of the	*0.567***	*0.546***	*0.749***	*1.0000*	*0.843***

time I'm just living to work					
Too much is expected of me in my work	*0.499***	*0.458***	*0.709***	*0.843***	*1.0000*

**. Correlation is significant at the 0.01 level (2-tailed)

Table 4: OFER_CF: Chronic Fatigue faced by the participants

From table 4 above, significant correlations can be identified with between the variables, however, the minimum item factor correlation must equal 0.55 or more for the results to be significant (Winwood, Lushington and Winefield, 2016). Varying levels of correlations can be noted in the table 4 with results varying between 0.458 to 1.

For example, the most significant correlation in the chronic fatigue section highlighted that between the variables "too much is expected of me in my work" and "I feel that most of the time I'm just living to work", R(0.55) = 0.843, $p < .01$. The weakest correlation, deemed to be non-significant by Winwood, Lushington and Winefield (2016), highlights that between the variables "too much is expected of me in my work" and "I often dread waking up to another day of my work", R(0.55) = 0.458, $p < .01$.

OFER-Acute Fatigue:

Highlighting the amount of energy retained by farmers after their day of work, the Spearman rho examined the acute fatigue levels faced by farmers, through the following five questions:

1. After a typical work period, I have little energy left
2. I have energy for my hobbies after work
3. I usually have lots of energy to give to my family or friends

4. I usually feel exhausted when I get home from work
5. Even when tired, I'm usually refreshed by the next shift.

	After a typical work period I have little energy left	**I have energy for my hobbies after work**	**I usually have lots of energy to give to my family or friends**	**I usually feel exhausted when I get home from work**	**Even when tired, I'm usually refreshed by the next shift**
After a typical work period I have little energy left	1.000	(0.550)**	(0.491)**	0.960**	(0.253)
I have energy for my hobbies after work	(0.550)**	1.000	0.765**	(0.566)**	0.691**
I usually have lots of energy to give to my family or friends	(0.491) **	0.765**	1.000	(0.467)**	0.731**
I usually feel exhausted when I get home from work	0.960**	(0.566)**	(0.467)**	1.000	(0.260)
Even when tired, I'm usually refreshed by the next shift	0.253	0.691**	0.731**	(0.260)	1.000

**. Correlation is significant at the 0.01 level (2-tailed)

Note: (0.260) – brackets indicate a negative result.

Table 5: OFER-Acute Fatigue:

From table 5 above, the minimum item factor correlation must equal 0.82 or more for the results to be significant (Winwood, Lushington and Winefield, 2016). Correlations between two variables did not prove to be statistically significant at the 0.01 level (2-tailed), namely:

1. "Even when tied, I'm usually refreshed by the next shift" compared with "after a typical work period, I have little energy left" - R (0.82) = 0.253, *p < .01.*
2. "Even when tied, I'm usually refreshed by the next shift" compared with "I usually feel exhausted when I get home from work" - R (0.82) = (0.260), *p < .01.*

Varying levels of correlations can be noted in the table 5 with results varying between (0.566) to 1.000. The most statistically significant correlation exists between "After a typical work period, I have little energy left" vs " I usually feel exhausted when I get home from work" - R(0.82) = (0.960) , *p < .01.*

OFER-Intershift Recovery:

In order to determine the ability of the farmers to recover from their tiredness from the end of one shift to the start of the next shift, three questions were examined using the Spearman's rho correlation;

1. Recovering from fatigue isn't a problem for me
2. Even when tired, I'm usually refreshed by the next shift
3. I rarely recover my strengths between shifts

The minimum item factor correlation for the OFER-Intershift Recovery must equal 0.75 for the correlations to be statistically significant (Winwood, Lushington and Winefield, 2016).

	I rarely recover my strengths between shifts	Recovering from fatigue isn't a problem for me	Even when tired, I'm usually refreshed by the next shift
I rarely recover my strengths between shifts	1.000	(0.243)	(0.071)
Recovering from fatigue isn't a problem for me	(0.243)	1.000	0.697
Even when tired, I'm usually refreshed by the next shift	(0.071)	0.697	1.000

Note: (0.071) – brackets indicate a negative correlation between the two variables.

Table 6: OFER-Intershift Recovery:

From table 6 above, none of the data in the graphs represented statistical significance at **. at the 0.01 level (2-tailed). Varying levels of correlations can be noted in the table 6 with results varying between (0.243) to 1.000. The highest correlation existed between the variables 'recovering from fatigue isn't a problem for me' compared with 'even when tired, I'm usually refreshed by the next shift', R(0.75) = (0.697) , $p < .01$.

Inferential Statistics

Hypothesis One: Seasonal fluctuations of workload does not lead to higher levels of stress amongst farmers.

"Seasonal variations in workload" caused 45.70% of farmers to feel "moderately stressed" by this stressor. 25.70% of respondents felt that these

variations only caused for “a little stress” to be faced by them. “Very stressful” conditions were felt by 20% of respondents with 8.60% reporting this stressor to cause “no stress” to them. Therefore, it was considered appropriate that in order to assess the null hypothesise that “seasonal fluctuations of workload does not lead to higher levels of stress amongst farmers”, it was important to analyse the Spearman’s rho of some of the most pertinent issues that occur with regards to seasonality. These include, ‘farm accidents and injuries’, ‘the weather’, ‘market price for crops’, ‘cash flow issues’ and ‘having too much work for one person’.

	Seasonal variations in workload	**Farm accidents and injuries**	**The weather**	**Market price for crops**	**High debt load**	**Problems with machinery**	**Problems with livestock and crops**
Seasonal variations in workload	1.000	(0.049)	0.481**	0.561**	0.134	0.281	0.351**
Farm accidents and injuries	(0.049)	1.000	(0.425)*	(0.193)	0.040	0.023	0.049
The weather	0.481**	0.425*	1.000	0.222	(0.212)	0.100	0.134
Market price for crops	0.561**	(0.193)	0.222	1.000	0.310	0.195	0.311

High debt load	0.134	0.040	(0.212)	0.310	1.000	0.244	0.250
Problems with machinery	0.281	0.023	0.100	0.195	0.244	1.000	0.545**
Problems with livestock and crops	0.351*	0.049	0.134	0.311	0.250	0.545**	1.000

*. Correlation is significant at the 0.05 level (2-tailed)

**. Correlation is significant at the 0.01 level (2-tailed)

Note: (0.193) – brackets indicate a negative correlation between the two variables.

Table 7: Seasonal fluctuations of workload does not lead to higher levels of stress amongst farmers

Varying levels of correlations can be noted in the table 7 with results varying between (0.425) to 1.000. Strong positive correlations can be seen with "seasonal variations in workload" and three other variables;

1. The weather: 0.481**
2. Market price for crops: 0.561**
3. Problems with livestock and crops: 0.351 **

Some of the weakest, and negative, correlations can be noted with "farm accidents and injuries" when compared with the following three variables;

1. Seasonal variations in workload – (0.049)
2. The weather – (0.425)
3. Market price for crops: (0.193)

Hypothesis Two: Being socially isolated does not increased the farmers level of involvement in accidents.

A Spearman's rho coefficient was used to determine if there was any statistically significant relationships between social factors and their isolation, in correlation with the health and safety being measured through farm accident involvement of participants. The results of the analysis can be seen from table 8 below. The Spearman's rho coefficient acknowledges a positive correlation between all of the factors Table 2 above with Farm accident Involvement, namely; 'limited social interaction opportunities', 'lack of close neighbours', 'farm accidents and injuries', 'not enough time to spend with family in recreation', 'distance from shopping centres', and 'distance from doctors and hospital'.

	Farm Accident Involvement	**Limited Social Interaction Opportunities**	**Lack of close neighbours**	**Farm accidents and injuries**	**Not enough time to spend with family in recreation**	**Distance from shopping centres**	**Distance from doctors & hospitals**
Farm Accident Involvement	1.000	(0.088)	0.062	0.052	0.170	(0.052)	(0.262)
Limited Social Interaction	(0.088)	1.000	0.485**	0.048	0.253	0.207	0.192

Opportunities							
Lack of close neighbours	0.062	0.485**	1.000	0.242	0.022	0.452**	0.342*
Farm accidents and injuries	0.052	0.048	0.242	1.000	(0.163)	(0.053)	0.249
Not enough time to spend with family in recreation	0.170	0.253	0.022	(0.163)	1.000	(0.085)	0.201
Distance from shopping centres	(0.052)	0.207	0.452**	(0.053)	(0.085)	1.000	0.582**
Distance from doctors & hospitals	(0.262)	0.192	0.342*	0.249	0.201	0.582**	1.000

*. Correlation is significant at the 0.05 level (2-tailed)

**. Correlation is significant at the 0.01 level (2-tailed)

Note: (0.053) – brackets indicate a negative correlation between the two variables.

Table 8: Being socially isolated does not increased the farmers level of involvement in accidents.

Varying levels of correlations can be noted in the table 8 with results varying between (0.262) to 1.000. Strong positive correlations can be seen with "Distance from shopping centres

" and two other variables;

1. Lack of close neighbours: 0.452
2. Distance from doctors and hospitals: 0.582**

Hypothesis Three: Fewer hours of sleep at night is not associated with higher accident rates on farms

Due to the nature of the question, it was deemed suitable to use the Spearman's rho correlation to examine the relationship between "farm accident involvement" and "hours of sleep obtained by the farmer per night". In this case, $\propto$ (the significance level) must be less than or equal to 0.05 in order for the null hypothesis to be rejected. As the p value is being reported as 0.299, there is insufficient evidence to reject the null hypothesis. It is important to note that while there is a rho coefficient of 0.181, as it is close to 0, this result is not statistically significant.

Hypothesis Four: Higher rates of risk cannot be seen on farms with farmers who suffer from economic worry

Due to the complexity of the null hypothesis that was chosen, it was decided to analysis the Spearman's rho for a variety of variables that relate to economic worry. The variables that were selected included; 'not enough money for day-to-day expenses', 'high debt load' and 'taxes'. The Spearman's rho coefficient was deemed suitable in order to determine statistical significance between financial factors such as "not enough cash", and, "not enough money for day-to-day expenses" as well as the "farm accident involvement" levels experienced by farmers. Table 9 below represents the correlation coefficient for each analysis and the significance level for each test. The statistical level of validity was set at 0.05 for this test.

	Compliance with regulations	High Debt Load	Taxes
Compliance with regulations	1.000	(0.005)	(0.005)
High Debt Load	(0.005)	1.000	0.080
Taxes	(0.005)	0.080	1.000

Note: (0.005) – brackets indicate a negative correlation between the two variables.

Table 9: Analysis between financial factors and farm accident involvement rates

Compliance with regulations and high debt load resulted in a correlation value of -0.005. No statistically significant data is reported in this instance and there seems to be no correlation between the two variables. The final analysis was conducted on the relationship between 'compliance with regulations' and 'taxes'.

Hypothesis Five: Higher fatigue and stress levels are not faced by farmers who worked longer hours on the farm per day.

In order to answer this research hypothesis, the Spearman's coefficient was used to examine any correlations between "hours worked on the farm" and the "OFER-Intershift Recovery" results provided. Table 10 below shows the results this;

	Hours worked on the farm	Recovering from fatigue isn't a problem for me	Even when tired, I'm usually refreshed by the next shift	I rarely recover my strengths between shifts

Hours worked on the farm	1.000	(0.240)	(0.498)**	0.047
Recovering from fatigue isn't a problem for me	(0.240)	1.000	0.697**	(0.243)
Even when tired, I'm usually refreshed by the next shift	(0.498)**	0.697**	1.000	(0.071)
I rarely recover my strengths between shifts	0.047	(0.243)	(0.071)	1.000

**. Correlation is significant at the 0.01 level (2-tailed)

Note: (0.243) – brackets indicate a negative correlation between the two variables.

Table 10: Breakdown of the responses in the Occupational Fatigue Exhaustion Recovery Scale

Varying levels of correlations can be noted in the table 10 with results varying between (0.498)** to 1.000. Strong correlations can be seen with " Even when tired, I'm usually refreshed by the next shift" and two other variables;

1. Hours worked on the farm: (0.498), suggesting a negative correlation, that the more hours worked on the farm, the less refreshed the farmer is between shifts.

2. Recovering fatigue isn’t a problem for me: 0.697, suggesting a positive correlation between the variables.

Discussion

A dearth of research exists relates to fatigue levels and stress levels in the workplace, but few studies have address these concerns specifically towards young Irish farmers. This researched endeavoured to explore the correlations that exist between stress and fatigue faced by Irish farmers. Due to the global pandemic which presented itself in Ireland in March 2020, the rationale behind conducting this research could not have been stronger. It was imperative to understand if there were any correlations between the immense pressure that was placed on the shoulders of somewhat 'inexperienced' young farmers. The ultimate aim, therefore, being to examine if this global pandemic had either a positive or a negative impact on stress and fatigue levels experienced by young Irish farmers.

Descriptive Statistics;

Age and marital status

In this study, young farmers were identified as being aged between 18 and 35 years old. The number of young farmers working in the country at present is currently on the decline from 10.7% in 2005 to 6.1% in 2016 (Agriculture and Rural Development, 2019). Research suggests that an ageing workforce is seen in the agricultural industry, with only 5% of participants aged under 35 years of age (CSO, 2018).

This current research highlights a gender balance split of 62.9% / 37.1% male to female. According to the most recent data available, Agriculture and Rural Development (2019) identifies that across European countries, there is an average of 28% of farms managed by females. The role of women in agriculture has had substantial media presence over the past decade. This research shows substantially higher levels of female in agriculture than in national records. Specifically, this research highlights that in the age category that this research assess (18-35), female farmers account for only 4.9% of the working sector. Across the European Union, the focus is on improving the integration of females into farming, such as through rural development funds and within the

Common Agricultural Policy. Ireland, when compared to the rest of Europe, had the fewest amount of females integrated into farming. This is challenging and needs to be addressed urgently. The gender equality issues need to be addressed urgently and societal norms need to be changed in order to allow for the voices of women to be heard in this industry.

It is important to consider future implications of females in agriculture that their male counterparts do not need to consider. As the total number of females in the industry is rising, it is imperative that severe time constraints will be placed upon the ability of the woman should she wish to bear children. The woman will be required to ensure that she does not neglect the child during peak workload seasons if additional assistance is not located on time. She must also ensure that she follows the correct Health and Safety advice, especially with regards to lifting materials should she be pregnant and working.

Farm system

In order to analyse the results, three categories were created due to the Health Safety Executive (2005) forewarning over concerns of 'mixed farmers', dealing with different types of herds as they are more susceptible to dealing with more complex paperwork demands and conflicting timetables.

The first specifically focusing on specialist farms, the second on dual-mixed farms and the third focusing on farmers with 3 types of farms. In comparison with the CSO (2018) statistics, the results of this study identified that the most prominent type of farm held by an Irish farmer is that of a 'dairy farm'. Although in the CSO (2018) statistics, beef production accounted for the most common type of farm in the country, it only accounted for 5.7% of the farm types in this study.

With 14 different types of farms identified in this research, the majority of respondents in this research identified themselves to be dairy farmers. This is

in direct contraction to a Teagasc (2020) report which suggests that the largest agricultural enterprise in this nation is that of beef farming, a section which only occupied 5.7% in this study. The same report highlighted that sheep farming accounts for 10% of the overall farming production in the country, with tillage representing 7%.

The vast amounts of dairy farmers in the study could be accounted for the strong global demand which occurred for dairy products. The year 2015 saw the abolition of the 'milk quotas', which limited the amount of milk a farmer could produce without being financially impacted. This has accounted for an increase in dairy farm herd numbers from 1.1 million in 2013 to 1.3 million in 2019 (Government of Ireland, 2019a). Tillage was poorly represented in this study with 2.9% of respondents highlighting they farmed this option. It is no surprise as this survey was conducted in the Border region of Ireland and due to topography and climate of the country, Teagasc (2020) have highlighted that the majority of tillage farming is undertaken in South Leinster and East Munster. Failure to consider the sample size could potentially result in these results being misinterpreted, therefore, it is crucial to consider that it is only in the context of this survey that the results appeared this way.

Once of the most significant results related to farmers owning 'beef, suckler and sheep'. Beef, or 'non-breeding beef systems' (Teagasc, 2016) as they are more formally known, are suitable for farms that are fragmented. Due to allowing farmers the option of distribution the workload throughout the year, they permit farmers to have a quicker turnaround of capital and stock. 'Suckler' or 'non-suckling beef systems' allow for predictably in annual returns due to similar annual outputs and turnover. The blend of 'beef' and 'suckler' allows for the accurate division of labour as animals can be sold during the winter months to enable a reduced workload period in the winter months. In order for farmers to ensure profit maximisation on their farm, the addition of sheep to the farm permits all of the grass to be maintained as well as the protection of the livestock as sheep tend to keep other animals away.

Working patterns

By breaking down the individual responses for the 5 respondents who are aged 18, three of them identified that they had been working as a farmer for 0- 5 years. One participant identified having worked for 6 – 10 years and the latter, highlighting a period of 11 – 20 years. Although this is one specific instance of one person aged 18 years, it brings into question the age at which children of farmers start working on the farm.

This research highlights that 40% of the participants have been working on the farm for a period duration of between 11 and 20 years. All of the data suggests that participants in this study started working at a very early age and for this reason, future research should examine 'at what age did you start farming' as there are potential issues arising with minors in the workplace.

According to the Government of Ireland (2019b), the 'Standard Man Day' of an individual equates to an 8 hour working day on a farm. It is interesting to note that in this study, only 14.3% of participants follow Governmental guidance and work 8 hours per day. The majority of participants either work slightly more hours, or slightly less. The results of this study may suggest that part-time farming is of particular importance as 11.4% of participants identified that they only work 0-3 hours per day. The nature of the work causes an issue to arise with the maximum hours of work per week. 57.10% of participants that highlight that they work more than 7 hours daily. Legislative concerns arise due to the 48-hour net maximum working week – which seems not to apply to farmers who are self-employed, working the land themselves. This confirms the concerns of Brennan (2015) who highlighted that challenging and tough working conditions exist for farmers with Kearney et al (2014) highlighting the intrinsic aspect of farming (the weather) to be a major concern.

It is estimated that in March 2018, farmers worked 86 hours per week (or 12.4 hours per day) (Fox, 2018). A knock-on implication of these long hours and tiredness could result in increased levels of accidents. It is interesting to note

that the farmers in this study experience high levels of exhaustion, with 68.50% of farmers experiencing some form of 'exhaustion when they get home from work'. Furthermore, 57.30% of farmers experience some form of 'not having lots of energy to give to my friends or family'. Therefore, further research should endeavour to examine this question in more depth to see the representative sample of hours worked per day. An increased sample size would permit a greater understanding of these values and could allow for a greater understanding into the reasons behind why farmers experience high levels of exhaustion.

Health and safety

Confirming the fears of Brennan (2015), Ireland has in fact reached crisis point regarding farming related accidents. 54.3% of respondents in this survey identified that they have not taken part in a health and safety course. Distress is a major factor which can result from the lack of education received especially when related to risk-taking behaviours undertaken by farmers.

Risk taking behaviours are common place in society, as feared by Murphy and O'Connell (2017) as the refusal to participate in a Health and Safety course in itself could be considered risky behaviours. Therefore, farmers are encouraged to participate in health and safety courses in order to gain the basic skills required for the industry and deal with the major issues which cause accidents in the industry *(*Health and Safety Authority*,*2020) such as handling a tractor safely, the correct way to handle livestock as well as proper equipment handling techniques. It is imperative to change the culture and attitudes around farm safety in order for farm related accidents to reduce in numbers.

Stress

Stigma surrounding mental health and associated illnesses often results in a reluctance to seek formal advice, especially in times of need (Kehoe, 2013). With 48.70% of participants in this study finding 'limited social interaction

opportunities' to be '*a little stressful"*, this may prove that there is still a vast amount of stigma associated with seeking advice from others. With an array of facilities in local communities which offer community members the ability to integrate into the community, it's hard to fathom the fact that 48.70% of farmers experience some levels of stress over the 'limited social opportunities' available to them. Although the period of March 2020 – July 2020 was extremely challenging for the Irish population due to the lockdown that was imposed, as the country begins to reopen itself, farmers are encouraged to find safe measures in order to interact with their peers. Telecommunications, for example, are an excellent way to stay connected whilst staying distant from one's peers.

Furthermore, this may highlight that farmers are reluctant to speak about their mental health to others. Farmers should be encouraged to actively participate in 'social farming', a support based placement on farms which uses both natural and human assets in order to help people achieve their goals (Social Farming Ireland, 2020). Irrespective of the type of farm held, social farming encourages farmers to develop social relationships with their peers, have more integrated roles in the community and an increased sense of purpose and giving. Especially in rural Ireland, with the availability of youth organisations such as Macra na Feirme the author of this text recommends to farmers that in order to fully integrate themselves into the community, they actively seek membership of organisations in order to reduce their stress levels.

Inferential statistics

Hypothesis One: Seasonal fluctuations of workload does not lead to higher levels of stress amongst farmers.

A person with good mental health is able to care for themselves, both physically and mentally (Caslin and Colgan, 2019). It is imperative to consider the impact that stressors, such as the weather, have on the person. When examining the data, 45.70% of farmers (see Table 2) felt "moderately stressed" by "seasonal

variations in workload". As there are positive correlations for most of the correlations, it is important that as an overall consensus that the alternative hypothesis is accepted. The most prevalent issues from Table 7, highlights a negative correlation between 'seasonal variations in workload' and 'farm accidents and injuries' (0.049).

It is surprising to note this correlation as the weather can have a large impact on the ability of the farmer to conduct his job. As the correlation came back significant between "seasonal variations in workload" and "the weather", it confirms the results that, 42.9% of participants found the weather to be 'very stressful'. Due to poor grazing conditions in 2017 and 2018 resulting from 'a cold wet Spring' and a 'dry hot Summer', farmers across the country spent an additional €7 million on animal feed (The Government of Ireland, 2019). For this reason, it is imperative that farmers have and implement contingency plans should the weather cause havoc on their plans (Kliebenstein, Heffernan, Peck, 1983).

Seasonality can have a long-term damaging impact on the lives of those living in rural communities (Devereux and Longhurst, 2010) however this research suggests that farmers have not learned from the past and have not implement any solutions to reduce the stress levels that they face from these stressors. It should be noted that there were no negatively correlated variables in this examination. Future research should endeavour to pinpoint the cause of this issue as it is deemed that 'higher levels of stress' is too vague when being assessed for causations.

Hypothesis Two: Being socially isolated does not increased the farmers level of involvement in accidents.

'Distance from shopping centres' plays an insignificant role in 'farm accident involvement', however, as highlighted during the Covid-19 pandemic, there has been a rise in recent months in farm accidents. This may be due to farmers not

being in a position to purchase lifesaving equipment, such as fluorescent jackets that may be required when working late on the farm.

It is interesting to note that the results in this study are similar to research undertaken by Kearney et al (2014) who, in an examination on social factors and stress levels which resulted in accidents, found that social factors such as 'distance from shopping centres' and 'the lack of close neighbours' did not cause stress to the farmer. This study highlighted a positive correlation between the two variables. However, although their study focused heavily on the stress levels that are associated with farming, it is imperative to acknowledge that when these stressors are not addressed, a person's health can suffer, such as through tiredness, which can inevitably result in injuries.

The most significant comparison in Table 8 refers to the correlation between "limited social interaction opportunities" and "lack of close neighbours", highlights a strong and positive correlation (0.485) between the two variables. In order to reduce the levels of work-place accidents, it is advised that farmers try to break free from their social isolation, once Covid-19 restrictions are lifted in their entirety. Farmers should find new outlets to spend time with family members, or even take part in guided mediation classes to encourage them to reduce their stress levels (Kliebenstein et al, 1983).

It is a surprise that the correlation between 'farm accident involvement' and 'distance from doctors and hospitals' does not bring a stronger correlation. It could be implied that farmers of this age group are not concerned about their health and do not see importance of being near to medical facilities should they require assistance.

Therefore, the alternative hypothesis in this instance must be accepted, highlighting that social isolation does in fact have an impact on the level of farm related accidents. Future research must bear into consideration that of the lone farmer (HSA, 2017 p.9) which has not been considered in this study. The

isolated settings in which farmers work on a daily basis can often result in a farmer falling victim to injury and being without support or assistance for a period of time. It is imperative for future studies to acknowledge that social isolation does occur, especially in rural Ireland, and assess the impact that this has on the lone farmer.

Hypothesis Three: Fewer hours of sleep at night is not associated with higher accident rates on farms

It is important to define the term 'accident' in order to successfully determine if the null hypothesis can be accepted or rejected. According to Simpson, Wadsworth, Moss and Smith (2005) *"an accident is an incident where a person is injured and requires medical treatment from someone else".* This hypothesis therefore examines the fact that there is no association between someone who gets fewer hours of sleep than their peers and someone who injures themselves and requires medical attention.

Although the alternative hypothesis cannot be accepted based on the data provided, it is important to compare the results of this study to results of the study conducted by Spengler, Browning and Reed (2004). Defining sleep deprivation was an issue faced in the study in that there are individual differences in sleep need. The universally accepted amount of sleep representing "a good night's sleep" is 8 hours per night (Spengler et al, 2004). The latter study found that there was no correlation between hours of sleep and injury incidence. It is important for future research to examine the issues behind fewer hours of sleep, as this was not discussed in this study. The issues relating to an ability to sleep could be due to substance use.

As the Government advised the population to 'stay at home' in 2020, there was an increase in bodies around the farm that may not have been there prior to this government request. Children, for example, who may never have been at home during the day due to schooling, were now commonly seen around the

farm. Future research should endeavour to examine correlations between age of participants, if they have children and whether these children pose a risk around a farm.

Hypothesis Four: Higher rates of risk cannot be seen on farms with farmers who suffer from economic worry

Due to the low significance rating in the comparison to 'compliance with regulations' and two of the three variable, the author of this text deems it imperative to reject the correlation between higher rates of risk can be seen on farms with farmers who suffer from economic worry (see Table 9). There is sufficient evidence from the 3 analyses above to accept the null hypothesis. The alternative hypothesis in this instance is deemed to be rejected: Higher rates of risk can be seen on farms with farmers who suffer from economic worry. This is confirmed through research undertaken by Brennan (2015) who acknowledges that high levels of economic worry can result in farmers being unable to purchase safety equipment for the farm.

However, bearing this into consideration, it is imperative that farmers heed warnings from officials in order to protect themselves against injury. In order to do so they must ensure that they 'stay one step ahead' *(Kliebenstein et al, 1983)* of any dangers they may face.

Hypothesis Five: Higher fatigue and stress levels are not faced by farmers who worked longer hours on the farm per day.

It is important to consider that as sleep plays such an important role in managing stress levels, it must be used as a coefficient in examining overall fatigue and stress levels faced by farmers. Although every industry results in fatigue levels faced by the employee, it is especially pertinent to highlight that there is are higher levels of fatigue faced by those who partake in shift work (Safe work Australia, 2020). If an employee, based on their fatigue levels, experiences any form of stress, it can have a serious implication on their

performance levels on the farm (HSA, 2020). As previously discussed in the literature review, stress is a normal response to the demands we face in life (Padhy, 2018). Therefore, it is imperative to highlight the significance that 'sleep' plays in our overall health and performance levels in the workplace.

In this instance, there is not enough evidence to support rejecting the null hypothesis. Therefore, the alternative hypothesis 'higher fatigue and stress levels are faced by farmers who worked longer hours on the farm per day', should be borne into consideration. Future analysis needs to be conducted into if these farmers are part time or full time, as hours worked on the farm does not explicitly highlight whether farmers have another job.

Conclusions, Limitations and Future Research

Limitations to this research:

This research was conducted at the beginning of the global health pandemic, COVID-19. It is challenging to ascertain at the time of writing if the stress and fatigue levels that are faced by Irish farmers are augmented due to this crisis, or if they are reduced. Early March 2020 saw the global economy forced into a 'lockdown' scenario with government officials advising the population to stay at home. This resulted in extreme pressures being placed on food suppliers to ensure that the population had access to the necessary food for survival. For this reason, due to the timing of the survey, it can be hypothesised that limited numbers of respondents came forward due to increased workloads.

The study itself is limited in its nature as it is challenging to understand if these statistics represent the sentiments of all farmers in Ireland, or in the border region where the researcher is based. Additionally, should it be the case, questions would therefore arise whether the possibility of a looming Brexit would have a subsequent implication on levels of stress faced by farmers in this region. It is surprising to note that not one participant identified Brexit, or its implications, in this study.

Due to the large amount of different farm types that were identified by the participants, the researcher was required to categorise them based on the amount of farm types held by each farmer. Due to the small percentages seen in the third category described, 3 subcategories were identified with 2.9% of farmers working this type of farm, future research should endeavour to gather a larger sample size to try to distribute the levels more evenly. It is hoped that with an increased participation level, more farmers will identify themselves, which will result in more statistically relevant information.

Future Research

The major issue faced by this research was the small sample size which may have skewed the data and reported higher levels of stress and fatigue than what would be actually seen if the sample was larger. Future research should endeavour to re-examine this sample at a later stage in order to ensure that the hypotheses remain unaffected. Ideally, a mixed methods approach for survey distribution may assist in accessing more respondents. The aforementioned Covid-19 crisis resulted in the closure of educational facilities such as colleges and libraries which may have impacted upon respondents replying to the survey (through not having computer access). Through the provision of hard-copy surveys, it is hoped that there would be a higher response rate for future projects.

A drawback to this survey was that it failed to examine the educational achievements of participants. As the literature review suggests, future research should aim to examine the educational levels of farmers to confirm whether or not research undertaken by the HSE (2005) to determine if farmers do in fact only achieve a level-6 educational qualification, is in fact the case. A ripple effect can therefore be seen amongst young farmers, aged under 35 years in that, lacking in educational awareness they undertake more risky behaviour due to increased workloads (Bennett, 2016).

Conclusion:

With the overarching aim of this study to examine the stress and fatigue levels faced by farmers, it can be concluded that the global pandemic did not have a negative impact upon these levels as most of the data equalled findings in previous studies. Although, the onus is on the farmer to self-identify that they are agents of change and implement these changes to reduce stress levels (Kearney et al, 2014), it is highly evident that farmers have neglected to inform themselves about past trends and have not educated themselves on how best

to deal with them, for example, with regards to stress and seasonality. Although challenges will present themselves with access to the provision and delivery of services, such as with regards to health and safety courses, it is imperative that once they are up-and-running again, that farmers partake in these services. With an increasingly aging population, it is imperative to for the government to encourage more youth into the industry. The Government must reimagine the public perception of what it is to be a farmer and encourage technological advancements in order to reduce the workload. There must be consideration given to the female farmer, who may require additional physical and mental support should she wish to bear children.

A worrying insight was that when faced with levels of economic worries, as reported in this study, as well as the government lockdown which restricted movements of the Irish population, this confirmed insights provided by Brennan (2015) that high levels of economic worry can result in farmers being unable to purchase safety equipment for the farm.

Although the element of shift work cannot be ignored, further research needs to examine this in more depth as there is an overall gap in the research that focuses specifically on this element. It can therefore be concluded that farmers do not 'succumb to the pressures of farming' nor do they thrive during it. They simply push on and get the work done.

References:

Agriculture and Rural Development (2019) *Females in the field: more women managing farms across Europe.* Available at: https://ec.europa.eu/info/news/queens-frontage-women-farming-2019-mar-08_en [Accessed 18 July 2020]

Assembly Research Matters (2019) *Farmers and mental health.* Available at: https://www.assemblyresearchmatters.org/2019/05/15/farmers-and-mental-health/ [Accessed 16 November 2019].

Bennett, K. (2016) *An exploratory study of the effects of stress and fatigue on Irish farm safety.* Available at: https://www.hsa.ie/eng/Your_Industry/Agriculture_Forestry/Other_Hazards/Fatigue/Effects_of_Stress_and_Fatigue_on_Irish_Farm_Safety.pdf [Accessed 12 May 2020].

Brady, 2019) https://www.independent.ie/business/farming/agri-business/milk-brady-how-to-manage-stress-levels-as-labour-shortages-begin-to-bite-37901603.html [Accessed 12 May 2020].

Brennan, C. (2015) *Exploring the impact of a farm safety intervention programme in Ireland. Examining farmers' behaviour towards farm safety. A study of the Farm Safety Mentor Programme.* MA thesis. National University of Ireland: Galway. Available at: http://www.irishrurallink.ie/wp-content/uploads/2015/12/Cathal_Brennan_Dissertation_2015_Final.pdf [Accessed 19 May 2020].

Caslin, B. and Colgan, F. (2019) *Coping with the pressures of farming.* Available at: https://www.teagasc.ie/media/website/publications/2018/Coping-with-the-pressures-of-farming.pdf [Accessed 16 May 2020]

Central Statistics Office *(2018) Statistical Yearbook of Ireland 2018.* Available from: https://www.cso.ie/en/releasesandpublications/ep/p-syi/psyi2018/agri/farmsandfarmers/

Centre for Studies on Human Stress (CSHS) (2019) *Two broad categories of stressors.* Available at: https://humanstress.ca/stress/what-is-stress/stressors/ [Accessed 02 June 2020].

Charlton, B.G. (1992) "Stress", *Journal of Medical Ethics,* 18(3), pp 156- 159. Jstor. https://www.jstor.org/stable/pdf/27717198.pdf?ab_segments=0%2Fbasic_search%2Fcontrol&refreqid=search%3A9c518f80a0e4fc56cfaa21083b22d3bd

Colémont, A., and Van den Broucke, S. (2006), "Psychological determinants of behaviours leading to occupational injuries and diseases in agriculture: A literature overview", J*ournal of Agricultural Safety and Health*, 12(3), pp. 227-238. Research Gate. DOI: 10.13031/2013.21230

Devereux, S. and Longhurst, R. (2010) 'Incorporating seasonality into agricultural project design and learning', *IDS Bulletin,* 41(6), Wiley Online Library. Available at: **https://doi.org/10.1111/j.1759-5436.2010.00186.x**

Donham, K. and Thelin, A. (2016) *Agricultural medicine: Rural occupational and environmental health, safety and prevention.* New Jersey: John Wiley and Sons

Eckelkamp, M. (2017) *How to manage harvest stress.* Available at: https://www.agprofessional.com/article/how-manage-harvest-stress [Accessed 13 May 2020].

Elkind, P. D. (1993) Correspondence between knowledge, attitudes, and behaviour in farm health and safety practices. *Journal of Safety Research,* 24(3), pp. 171-179. Science Direct. doi: https://doi.org/10.1016/0022-4375(93)90028-L

European Commission (2019) '*Young Farmers'.* Available at: https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/income-support/young-farmers_en [Accessed 16 November 2019].

Forrest, C. (2020) *Farmers urged to mind mental health during Covid-19.* Available at: https://kildare-nationalist.ie/2020/05/12/farmers-urged-to-mind-mental-health-during-covid-19/#.XsGbFRNKiRs. [Accessed 22 May 2020].

Fox, C. (2018) *Dairy farmers worked 12-hour plus days and got just one day off during stressful spring – Teagasc*. Available at: https://www.independent.ie/business/farming/dairy/dairy-advice/dairy-farmers-worked-12-hour-plus-days-and-got-just-one-day-off-during-stressful-spring-teagasc-37616024.html [Accessed 18 July 2020].

Furey, E.M., O'Hora, D., McNamara, J., Kinsella, S., and Noone, C. (2016) 'The roles of financial threat, social support, work stress, and mental distress in dairy farmers' expectations of injury', *Front Public Health,* 4(126), online. PMCID Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4914495/

Geary, M. (2020*)TAMS payments must not be delayed due to Covid-19 restrictions - IFA.* Available at: https://www.agriland.ie/farming-news/tams-ii-payments-must-not-be-delayed-due-to-covid-19-restrictions-ifa/ [Accessed 10 May 2020].

Gil Coury, H., Kumar, S. and Jones, E. (1999), "Farm related injuries and fatalities in Alberta", *International Journal of Industrial Ergonomics,* 23 (1999), 539-547.

Government of Ireland (2018) *Fact sheet on Irish Agriculture: January 2018.* Available at: https://www.agriculture.gov.ie/media/migration/publications/2018/January2018Factsheet120118.pdf [Accessed 19 May 2020].

Government of Ireland (2019a) *Chapter 2: Agricultural Commodities and Inputs.* Available at: https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/publications/annualreviewandoutlook2019/chapter-3.html [Accessed 17 July 2020].

Government of Ireland (2019b) *Chapter 2: Farm Income and Structures.* Available at:

Hagel, L., Pahwa, P., Dosman, J.A. and Pickett, W. (2013) 'Economic worry and the presence of safety hazards on farms', *Accident Analysis & Prevention,* 53(1), pp. 156 – 160, Science Direct. doi: 10.1016/j.aap.2013.01.011

Hagel, L., Pahwa, P., Dosman, J.A. and Pickett, W. (2013) 'Economic worry and the presence of safety hazards on farms', *Accident Analysis & Prevention,* 53(1), pp. 156 – 160, Science Direct. doi: 10.1016/j.aap.2013.01.011

Health and Safety Authority (2016) *Annual Report 2016.* Available at: https://www.hsa.ie/eng/Publications_and_Forms/Publications/Corporate/HSA_Annual_Report_2016_final_version.pdf [Accessed 10 May 2020]

Health and Safety Authority (2017) *Code for practice for preventing injury and occupational ill health in agriculture.* Available at: https://www.hsa.ie/eng/Publications_and_Forms/Publications/Agriculture_and_Forestry/Code_of_Practice_for_preventing_injury_and_occupational_ill_health_in_agriculture.pdf [Accessed 30 April 2020].

Health and Safety Authority (2020) *Training.* Available at: https://www.hsa.ie/eng/Your_Industry/Agriculture_Forestry/Training/ [Accessed 18 July 2020].

Health and Safety Executive (2005) *Research Report 362: Farmers, farm workers and work-related stress.* Available at: https://www.hse.gov.uk/research/rrpdf/rr362.pdf [Accessed 01 May 2020]

Healy, J. (2019) *Opening statement by IFA President Joe Healy to the Joint Oireachtas Committee on Agriculture, Food and the Marine on TB programme.* Available at: https://data.oireachtas.ie/ie/oireachtas/committee/dail/32/joint_committee_on_agriculture_food_and_the_marine/submissions/2019/2019-10-01_opening-statement-joe-healy-ifa-president-the-irish-farmers-association-ifa_en.pdf [Accessed 18 May 2020].

IFA (n.d) *Let's talk: Dealing with stress.* Available at: http://www.ifa.ie/wp-content/uploads/2013/10/IFA-Stress-Leaflet-Web.pdf [Accessed 17 May 2020].

Kearney, G., Rafferty, A., Hendricks, L., Landon-Allen, D. and Tutor-Marcom, R. (2014) 'A cross-sectional study of stressors among farmers in Eastern North Carolina', *NC Medical Journal, 75(6) pp. 384 – 392,* Available at: https://www.ncmedicaljournal.com/content/ncm/75/6/384.full.pdf [Accessed 15 May 2020].

Kelly, M. (2020) *Managing uncertainty.* Available at: https://www.teagasc.ie/media/website/publications/2020/Keeping-in-touch--Managing-uncertainty.pdf [Accessed 15 May 2020].

Kearney, G., Rafferty, A., Hendricks, L., Landon-Allen, D. and Tutor-Marcom, R. (2014) 'A cross-sectional study of stressors among farmers in Eastern North Carolina', *NC Medical Journal, 75(6) pp. 384 – 392,* Available at:

https://www.ncmedicaljournal.com/content/ncm/75/6/384.full.pdf [Accessed 15 May 2020].

Kelly, M. (2020) *Managing uncertainty.* Available at: https://www.teagasc.ie/media/website/publications/2020/Keeping-in-touch--Managing-uncertainty.pdf [Accessed 15 May 2020].

Kelly, P. (2016) *Selecting a Beef System.* Available at: https://www.teagasc.ie/media/website/publications/2016/Beef-Manual-Section3.pdf. [Accessed 16 July 2020].

Kelly, T. (2020) *Managing uncertainty.* Available at: https://www.teagasc.ie/media/website/publications/2020/Keeping-in-touch--Managing-uncertainty.pdf [Accessed 22 May 2020].

Kliebenstein, J.B., Heffernan, W.D. and Peck, D.A. (1983) 'Stress and stress management in farming', *Journal of ASFMRA,* 47(2), pp. 22-28, Jstor. Available at: https://www.jstor.org/stable/43758071

Kolstrup, L.C., Kallioniemi, M., Lundqvist, P., Kymalainen, H., Stallones, L., Brumby, S. ' International perspectives on psychosocial working conditions, mental health, and stress of dairy farm operators', *Journal of Agromedicines,* 18(3), pp. 244 – 255. doi: 10.1080/1059924X.2013.796903 [accessed 19 Oct. 19]

Lobley, M., Johnson, G., Reed, M., Winter, M. and Little, J. (2004) *Rural stress review: final report.* Available at: https://www.researchgate.net/publication/29811131_Rural_Stress_Review_Final_Report.

Mental Health Ireland (n.d) *Stress: The pocket guide on how to manage and reduce stress.* Available at: https://www.mentalhealthireland.ie/wp-content/uploads/2019/11/Stress-Booklet.pdf [Accessed 17 May 2020].

Murphy, D.J. (1981), "Farm safety attitudes and accident involvement", *Accident Analysis and Prevention*, 13(4), 331-337, Elsevier. Doi: 10.1016/0001-4575(81)90057-9

Murphy, M. and O'Connell, K. (2017) *Farm Deaths and Injuries: Changing Irish Farmer Attitudes and Behaviour on Farm Safety.* Available at: https://sword.cit.ie/cgi/viewcontent.cgi?article=1001&context=dptmecp [Accessed 19 May 2020].

Murphy, T. (2020) *Operational contingency planning on the dairy farm.* Available at: https://www.teagasc.ie/media/website/publications/2020/Operational_Contingency_Planning_on_the_Dairy_Farm-Tom_Murphy-01052020.pdf [Accessed 16 May 2020].

National Federation of Young Farmers' Club (n.d) *External agricultural training: A fresh approach to training.* Available at: http://www.nfyfc.org.uk/agriculturaltraining?AspxAutoDetectCookieSupport=1 [Accessed 22 May 2020].

OECD. (2017) *'Health at a glance 2017*', Available at: https://www.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-2017/mental-health_health_glance-2017-12-en [Accessed 19 Oct 2019]

O'Donnell, C. (2020) *IFA and RSA stress road safety during silage season.* Available at: https://www.agriland.ie/farming-news/ifa-and-rsa-stress-road-safety-during-silage-season/ [Accessed 15 May 2020].

O'Sullivan, G. (2011) "The relationship between hope, eustress, self-efficacy, and life satisfaction among undergraduates. *Social Indicators Research,* 101(1), pp. 155-172: https://www.jstor.org/stable/41476424

Padhy, C. (2018) 'Stress among farmers and its alleviation*',* In*ternational Journal of Management, Technology and Engineering,* 8(XII), pp. 2882 – 2885, Available at: https://pdfs.semanticscholar.org/4cf3/d18342591f03cf4a858c4dd0076a8000d090.pdf [Accessed 21 January 2020]

Parekh, R. (2018) *What is mental illness?* Available at: https://www.psychiatry.org/patients-families/what-is-mental-illness [Accessed 17 May 2020].

Skillnet Ireland (2019) *The development and implementation of an accredited*

continuing professional development framework in agriculture. Available at: https://www.skillnetireland.ie/wp-content/uploads/2019/04/Skillnet-Ireland-Macra-report-Apr19.pdf [Accessed 17 May 2020].

Romanos, W.J., Wise, J.C. and Sewards, J.M. (1982) *Stress differs from distress. Journal (American Water Works Association.* 74(10), pp. 512- 517. Jstor: https://www.jstor.org/stable/41271375

Safe Work Australia (2020) *Fatigue.* Available at: https://www.safeworkaustralia.gov.au/fatigue [Accessed 25 July 2020].

Selye, H. (1976) *'Stress without distress'. Boston: Springer.*

Simpson, S.A., Wadsworth, E.J.K., Moss, S.C. and Smith, A.P. (2005) Minor injuries, cognitive failures and accidents at work: incidence and associated features. *Occupational Medicine,* 55(2), pp. 99 – 108, Oxford Academic. doi:10.1093/occmed/kqi035

Social Farming (2020) *Social Farming and the Social Inclusion and Community Activation Programme (SICAP).* Available at: https://www.socialfarmingireland.ie/wp-content/uploads/2019/01/Social-Farming-SICAP-Report-web-version.pdf. [Accessed 18 July 2020].

Spengler, S.E., Browning, S.R. and Reed, D.B. (2004) Sleep deprivation and injuries in part-time Kentucky farmers. *AAOHIN Journal,* 52(9), pp.373 – 382, Sage. Available at: https://journals.sagepub.com/doi/pdf/10.1177/216507990405200905

Teagasc (2020) *Annual SCSI / Teagasc agricultural land market review and outlook.* Available at: https://www.teagasc.ie/media/website/publications/2020/SCSI-Agri-land-property-report.pdf [Accessed 17 May 2020].

The Centre for Studies on Human Studies (n.d) *Two broad categories of stressors.* Available at:

Walker, L. and Walker, J. (1987), "Stressors and symptoms predictive of distress in farmers", Family Relations, 36(4), 374-378.

World Health Organisation (2018) *Mental Health: Strengthening our response.* Available at: https://www.who.int/en/news-room/fact-sheets/detail/mental-health-strengthening-our-response [Accessed 18 May 2020].

World Health Organisation (2019) *Mental disorders.* Available at: https://www.who.int/en/news-room/fact-sheets/detail/mental-disorders [Accessed 18 May 2020].

Zhu, H., Yunfeng, H., Sun, Y., Xie, Z., Qian, X., Stallones, L., Xiang, H. and Wang, L. (2011) 'Sleep-related factors and work-related injuries among farmers in Heilongjiang Province, People's Republic of China', *International Journal of Environmental Research and Public Health,* 11(9), pp. 9446 – 9549*,* National Centre for Biotechnology Information. doi: 10.3390/ijerph110909446

List of Tables:

List of Figures :

Appendices

Appendix 1: Information for Participants

1. Information for Participants

I would like to invite you to take part in a research study. Before you decide whether or not to participate, you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Ask questions if anything you read is not clear or if you would like more information.

Who am I and what is this study about?

The aim of this study is to identify what stressors are present for young farmers in Ireland and the effects they have on the physical and mental health of farmers. This research is being completed as part-fulfilment of a Master's of Science in Management from the National College of Ireland.

What will taking part involve?

Participants will be asked to complete an online questionnaire that will take approximately 10 minutes to complete. Non-identifiable personal questions, including age and relationship status will be asked. Furthermore, participants will be asked about the type of farm owned, hours worked on the farm per day, and issues that can relate to farming related stress.

Why have you been invited to take part?

You have been invited to take part as it has been identified that you are a farmer, aged between 18 and 35 years of age in the Republic of Ireland.

Do you have to take part?

Participation is completely voluntary and you have the right to refuse participation, there will be no consequences for participants who fail to answer a question or withdraw at any stage of the process.

What are the possible risks and benefits of taking part?
The research endeavours to find the causes of stress amongst young farmers in Ireland. Some of the questions asked are sensitive in nature and are potentially triggering for some participants. If you should find yourself stressed or anxious after taking part in the study, you can access mental health help here: https://www2.hse.ie/mental-health/

Will taking part be confidential?
Yes, as participants are required to complete an online questionnaire, all answers are confidential.

How will information you provide be recorded, stored and protected?
All data collected through the online questionnaire will be stored in a password protected excel file that the researcher has access to, only until after the Masters of Science in Management has been conferred, and at which stage, will be deleted.

What will happen to the results of the study?
The results of this study will be provided to Macra na Feirme who will hopefully use the results to push for more supports for farmers in Ireland. The results will also be written up as a thesis for the MSc in Management qualification, and stored in the NCI library.

Who should you contact for further information?

For further information on this study, please contact;

Researcher: Debbie Bough <x18103359@student.ncirl.ie>
Supervisor: April Hargreaves <April.Hargreaves@ncirl.ie>

Thank you

Appendix 2: Participant Consent

Consent to take part in research

· By ticking the box below, you voluntarily agree to participate in this research study.

· All data can be withdrawn up until the data is submitted.

· I have had the purpose and nature of the study explained to me in writing and I have had the opportunity to ask questions about the study.

· I understand that participation involves completing an online questionnaire.

· I understand that I will not benefit directly from participating in this research.

· I understand that all information I provide for this study will be treated confidentially.

· I understand that in any report on the results of this research my identity will remain anonymous due to the methods used with data collection

· I understand that I am free to contact any of the people involved in the research to seek further clarification and information.

For further information on this study, please contact;

Researcher: Debbie Bough <x18103359@student.ncirl.ie>
Supervisor: April Hargreaves April.Hargreaves@ncirl.ie

Appendix 3: Questionnaire

Q1: What is your gender?	
Male	
Female	

Q2: What is your age?	
18	
19	
20	
21	
22	
23	
24	
25	
26	
27	
28	
29	
30	
31	
32	
33	
34	
35	

Q3: Which of the following best describes your current relationship status?	
Married	
Widowed	
Divorced / Separated	
In a domestic or civil union	

Single, but co-habiting with a significant other	
Single, never married	

Q:4 Type of Farm (you can tick more than one box for this question)	
Dairy	
Beef	
Suckler	
Sheep	
Tillage	
Other:	

Q5: How many years have you worked as a farmer?	
0-5 years	
6-10 years	
11-20 years	
21-30 years	

Q6: On average, how many hours a day do you work on the farm?	
0-3 hours	
4-6 hours	
7-9 hours	
10 – 12 hours	
12 + hours	

Q7: On average, how many hours sleep do you get per night?	
0-3 hours	
4-6 hours	
7-9 hours	
10-12 hours	
12 + hours	

Q8: How many people work on the farm you work on?	
1 (Yourself)	
2	
3	
4+	

Q9: Have you completed a farm Health and Safety Training course?	
Yes	
No	

Q10: When is the most stressful time of the year for you on the farm and why?

Q11: Have you ever been involved in a farm accident?	
Yes	
No	

Q12: If yes, please give brief details on what caused the accident(s)

Q13: Do you always comply with farm safety rules and regulations?	
Yes	
No	

Q15: If no, please state what would stop you from complying with them

Q16: When you are fatigued (tired), do you find that health and safety practice is less of a priority?	
Yes	
No	

Q17: When you are stressed, do you find that health and safety practice is less of a priority?	
Yes	
No	

Q:18 Listed below are some of the things that can contribute to farming related stress. Please answer each question by circling the number in the box most relevant to you (one box for each question)

Stressor	**No Stress**	**A little Stressful**	**Moderately Stressful**	**Very Stressful**
Distance from shopping centres/school/recreation, etc.	1	2	3	4
Lack of close neighbours	1	2	3	4
Farm accidents and injuries	1	2	3	4
The weather (inadequate / too much rainfall, snow, hail, etc.)	1	2	3	4

Market prices for your crops / livestock	1	2	3	4
Limited social interaction opportunities	1	2	3	4
Seasonal variations in workload (planting season, harvest, calving time, marketing time, etc.)	1	2	3	4
Not enough money for day-to-day expenses (purchases, repairs, parts, fence and building maintenance)	1	2	3	4
High debt load	1	2	3	4
Working with bankers and loan officers	1	2	3	4
Not enough time to spend together as family in recreation	1	2	3	4
Concern over the future of the farm	1	2	3	4
Not having the manpower to operate the farm	1	2	3	4
Government export policy	1	2	3	4
Operating hazardous machinery	1	2	3	4
Taxes (high taxes, figuring taxes, etc.)	1	2	3	4
Distance from doctors or hospitals	1	2	3	4

Balancing the many roles I perform as a family member and a farmer	1	2	3	4
Problems with machinery (purchases, repairs, breakdowns)	1	2	3	4
Problems with livestock or crops (illness, disease, noxious weeds, rodents)	1	2	3	4
Not enough cash / capital for unexpected problems (illnesses, health care, breakdowns, other emergencies)	1	2	3	4
Working with extended family members in the farm operation (parents, in-laws, children)	1	2	3	4
Having too much work for one person	1	2	3	4
Financing for retirement	1	2	3	4
Government farm price supports	1	2	3	4
Dealing with non-relative help (incompetent help, finding good help, supervising help)	1	2	3	4
Outsiders not understanding the nature of farming	1	2	3	4

Health care costs (direct costs and / or cost of insurance)	1	2	3	4
Please list any other items you find stressful in relation to farming and rate them.				

Q19: Please answer these questions in relation to your experience of fatigue and strain at work over the last few months. Please answer each question by circling the number in the box most relevant to you (one box for each question).

Stressor	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor Disagree	Slightly Agree	Agree	Strongly Agree
I often feel I'm 'at the end of my rope' with my work	1	2	3	4	5	6	7
I often dread waking	1	2	3	4	5	6	7

up to another day of my work							
I often wonder how long I can keep going at my work	1	2	3	4	5	6	7
I feel that most of the time I'm just "living to work"	1	2	3	4	5	6	7
Too much is expected of me in my work	1	2	3	4	5	6	7
After a typical work period I have little energy left	1	2	3	4	5	6	7

I usually feel exhausted when I get home from work	1	2	3	4	5	6	7
My work drains my energy completely every day	1	2	3	4	5	6	7
I usually have lots of energy to give to my family or friends	1	2	3	4	5	6	7
I usually have plenty of energy left for my hobbies and other activities after I finish work	1	2	3	4	5	6	7

I never have enough time between work shift to recover my energy completely	1	2	3	4	5	6	7
Even if I'm tired from one shift, I'm usually refreshed by the start of the next shift	1	2	3	4	5	6	7
I rarely recover my strength fully between	1	2	3	4	5	6	7

work shifts							
Recovering from work fatigue between work shifts isn't a problem for me	1	2	3	4	5	6	7
I'm often still feeling fatigued from one shift by the time I start the next one	1	2	3	4	5	6	7