

# Endogenous and Exogenous Factors of Farm Households and Their Relation to Farmers' Feeling of Stress – Empirical Evidence From Austria

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**Abstract:** The family farm is a unique institution where the farm household balances family members' needs with farm business demands. Building on the farm household model, this study identifies and characterizes distinct farmer types based on their perceptions of endogenous and exogenous factors. Social capital is considered a crucial resource in this process, helping farmers manage challenges and secure the farm's future. Using survey data (n = 482) from Styrian farmers, we identified three distinct farmer types: 'financially strong and satisfied with vocation', 'struggling and overworked' and 'farming for family heritage and tradition'. Our analysis reveals that the 'struggling and overworked' type, which is characterized by higher levels of debt and lower social capital, reports significantly higher levels of stress. This type is also more likely to suffer work-related accidents and less likely to engage in stress-mitigating behaviors such as taking vacations or exercising. In contrast, the 'financially strong and satisfied with vocation' type is associated with higher social capital, lower levels of stress and a greater propensity for stress-mitigating behaviors. This research contributes to a better understanding of the factors influencing farmers' feeling of stress and highlights the crucial role of social capital as a stress-mitigating factor.

**Keywords:** Stress, Family Farm, Socio-Economic Perceptions, Social Capital, Work-Related Accidents, Survey, Austria

## 1 Introduction

Family farms remain the predominant ownership and management structure in agricultural production across Europe despite a steady decline in numbers due to political, economic, environmental, and social changes (Besser et al., 2017; Holloway et al., 2021; Larcher et al., 2019; Suess-Reyes, Fuetsch, 2016). Characterised by family ownership, the intertwining of workplace and home, and the reliance on family labour, these farms often span generations, with succession being a primary goal (Besser et al., 2017; Calus, Van Huylenbroeck, 2010; Engelhart et al., 2012; Larcher, Vogel, 2019; Scheyett et al., 2024; Suess-Reyes, Fuetsch, 2016). The farm household is at the core of this unique structure, constantly balancing the economic necessities of the farm enterprise with needs of the family members (Calus, Van Huylenbroeck, 2010; Ellis, 1993; Larcher, 2009; Larcher, Vogel, 2010; Suess-Reyes, Fuetsch, 2016).

The intricate balance exposes family farmers to a wide array of possible stressors, ranging from exogenous factors such as unpredictable weather, bureaucracy and fluctuating market prices (Alpass et al., 2004; Brennan et al., 2022; Deary et al., 1997; Kallioniemi et al., 2016; Nichols, Davis, 2024; Truchot, Andela, 2018) to endogenous factors like heavy workloads, financial difficulties, levels of social capital and family relationship conflicts (Grocke-Dewey et al., 2023; Nichols, Davis, 2024; Truchot, Andela, 2018). Indeed, farming is widely recognised as a highly stressful and demanding occupation, that can lead to negative impacts on mental and physical health, and a high incidence of work-related injuries (Eurofound, 2007; Furey et al., 2016; Glasscock et al., 2006; ILO, 2000). Despite these challenges, farmers often take minimal health-related absences or vacations, highlighting a deeply ingrained work ethic and practical difficulties in organising breaks (Kallioniemi, Kymäläinen, 2012; O’Shaughnessy et al., 2022; Roy et al., 2017).

While extensive research addresses stress in agriculture as well as farmers’ subjective feeling of stress (Grocke-Dewey et al., 2023; Hagen et al., 2021; Scheyett et al., 2024; Nichols and Davis, 2024), research specifically linking feeling of stress to the interplay of endogenous and exogenous farm household factors remains rare (Strempl, 2012). Furthermore, within the Austrian context, research into farmers’ stress remains rather limited, with existing work primarily looking at stress in the context of farm transfer (Larcher, Vogel, 2019), social sustainability and resilience (Darnhofer 2010; Scheurich et al., 2021), and physical strain (Quendler et al., 2017). This article addresses this research gap by empirically exploring the linkages between endogenous and exogenous farm household factors, and farmers’ feeling of stress and stress-related issues in Austria.

Drawing on survey data of farmers in the Austrian federal state Styria from 2019, our research aims to contribute to a deeper understanding of the complex dynamics within which family farms operate.

Specifically, we pursue the following research goals:

1. To identify farmer types based on farmers’ perceptions of the following endogenous and exogenous farm household factors: vocational satisfaction, workload, financial situation, policy evaluation, evaluation of long-term survivability of the farm.
2. To characterize these farmer types using socio-demographic variables, farm characteristics, and social capital (differentiating between “inner family social capital” and “social capital in the farming community”).
3. To describe farmers’ feeling of stress and stress-related issues and analyse differences across socio-demographic and farm characteristics.
4. To analyse the relationships between farmer types, farmers’ feeling of stress, and stress-related issues.

The article is structured as follows: Section 2 presents the conceptual framework underpinning our study. Section 3 outlines the materials and methods, including data collection and analytical procedures. Section 4 presents our empirical findings, followed by Section 5 discussing our findings. Section 6 offers conclusions and policy recommendations, and Section 7 discusses limitations and outlook.

## 2 Conceptual Framework

The intricate interplay between the farm enterprise and the family members is central to understanding the unique dynamics within the family farm. One of the earliest economic theories on the functioning of family farms was developed by Chayanov (1888-1939, Harrison, 1975). In his Theory of Peasant Economy, Chayanov argued that the household is the primary decision-making unit, driven not solely by profit maximization of the farm enterprise, but by the aim to satisfy the needs of the members. This perspective introduced the subjective dimension of family members’ needs and abilities into the analysis of economic decision-making on farms.

In doing so, he shifted the analytical focus from the farm assessing and reacting to external market conditions (such as price fluctuations, weather events, legislative and policy changes) to farms balancing these external factors with subjective internal expectations, needs and capabilities of its members (Tschajanow, 1923; Chayanov, 1966).

Building upon Chayanov's foundational work, Larcher (2009) developed the farm household model, conceptualizing the family farm through three interconnected structural elements: family members, the farm household, and the farm operation. The farm household serves as the central decision unit, responsible for both operative short-term choices and strategic mid- to long-term farm development. These decisions are influenced by exogenous and endogenous factors. Exogenous factors are external to the family farm and largely beyond its direct control. These encompass infrastructure and technological advancements (Barrios, 2008), broader economic, political, and social policy conditions (Becot, Inwood, 2020; Ellis, 1993; Taylor, Adelman, 2003), as well as environmental conditions (Larcher, 2009). Endogenous factors by contrast originate within the family members and farm operation, and are, to some extent, under the farm household's control. These include the family members' skills and abilities, motivations and preferences, their emotional connectedness to the land and tradition, role models within the family, particularly concerning farm succession and the early socialization of offspring and the type and level of social capital available to family members within their family and community (Larcher, Vogel, 2019; Larcher et al., 2019; Suess-Reyes, Fuetsch, 2016).

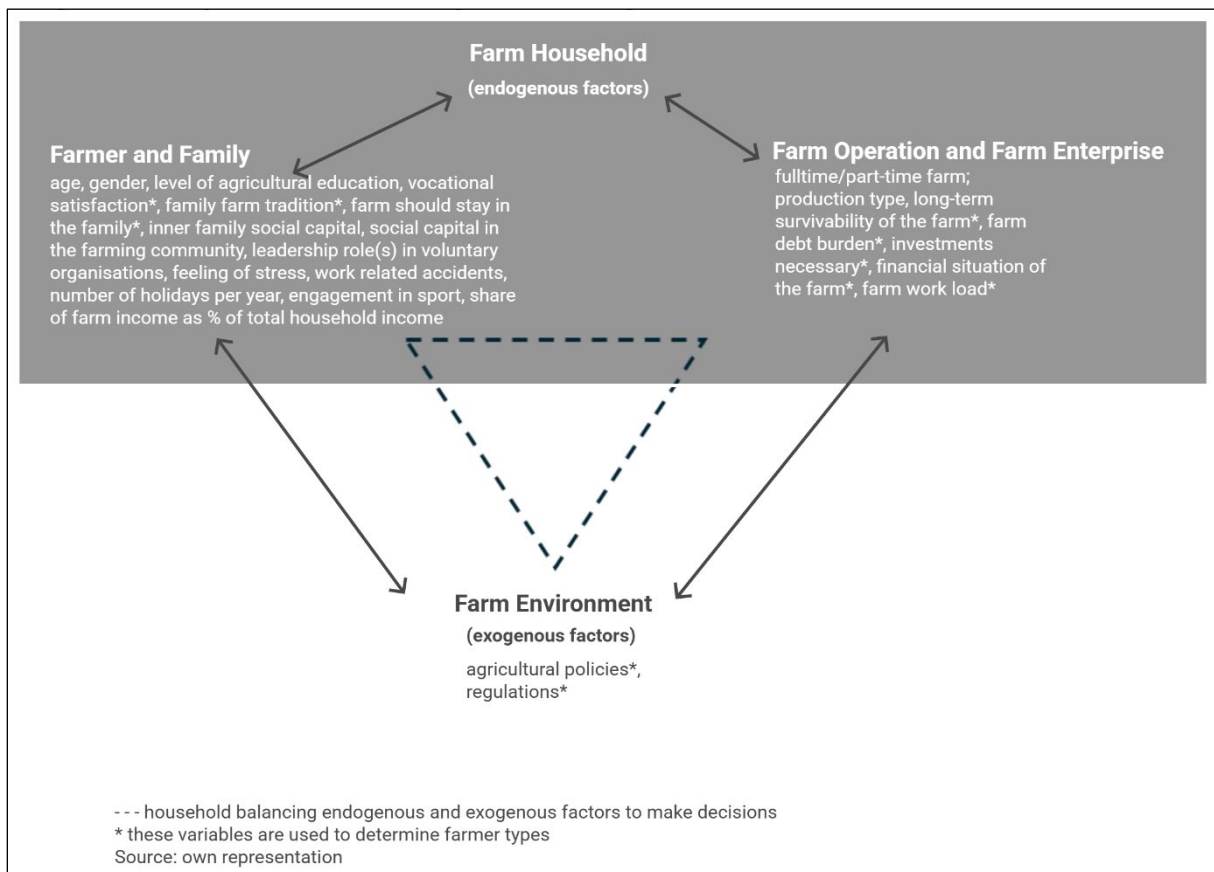
Empirical work informing our theoretical framework, i.e. the farm household model, includes a longitudinal analysis of 74 farming families in organic agriculture with repeated qualitative interviews whereby the subjective perspectives of the farmers were reconstructed as development patterns and household strategies (Bichlbauer, Vogel, 1993; Larcher, 2009; Larcher, Vogel, 2010). On basis of this extensive qualitative work about the long-term development of farm households and their farms, subsequent quantitative empirical work with a focus on social capital, succession planning and professionalisation strategies demonstrated that farmers' subjective perceptions of specific endogenous and exogenous factors are critical determinants in explaining farm household behaviour (Engelhart et al., 2018; Larcher et al., 2019; Vogel et al., 2018). Central to understanding how the farm household makes decisions is its ability to effectively balance these factors. The involvement and consideration of family members' needs is highly dependent on the farm's specific household composition and the level of "inner family social capital".

Social capital can be understood as the ability of the family or wider community to cooperate and work together for a mutually beneficial goal (Putnam, 1995), aiding in satisfying the farm family needs and facilitating farm succession (Larcher et al., 2019). Social capital encompasses norms and expectations of reciprocity within social networks, fostering shared information, trust, and mutually beneficial collective opportunities (Woolcock, 1998). According to Coleman (1988, 1990), social capital is embedded in relationships, characterized by trustworthiness and mutual obligations, with shared norms and closed social structures (like family units or community) supporting its formation. Its importance in agriculture encompasses various aspects, including conflict resolution, information sharing, marketing and value chain development (Działek, 2014; Gómez-Limón et al., 2014; Rivera et al., 2019; Schermer et al., 2011).

We understand social capital as a potential for direct social support but distinguish it from social support which is the actual provision of emotional, informational, or tangible assistance from others helping the individual cope with life's challenges (Cohen and Wills, 1985). In essence, while social capital is the potential resource embedded in social ties, social support is the direct benefit that can be drawn from social capital when needed. In the context of the farm household, we consider social capital as a critical resource that enables family members to effectively balance the members' needs with farm interests (Engelhart et al., 2012). Our study distinguishes between two key dimensions: "Inner family social capital" refers to connections within the family. Low levels of "inner family social capital", including family conflict or isolation, is

known to contribute significantly to farmer stress (Deary et al., 1997; Gunn, Hughes-Barton, 2022; Nichols, Davis, 2024; Truchot, Andela, 2018). “Social capital in the farming community” refers to reciprocal transactions typical of broader social networks, including extended family, neighbours, and fellow farmers (Larcher et al., 2019; Woolcock, 1998). Social networks and attachments have been shown to influence stress levels by either preventing stressful situations or buffering the impact of stress appraisal (Gerich, 2014). Active engagement in voluntary organizations, for instance, can help overcome social isolation and foster community (Thompson, Bono, 1993) and “provide (...) resources to fight against stress” (Chen et al., 2014). In Section 3 we will describe our empirical approach to assess social capital which encompasses the direct measurement of “inner family social capital” and “social capital in the farming community”. In addition, we include farmers’ leadership role(s) in voluntary organisations as an indicator and therefore indirect measurement tool for social capital in the community.

Figure 1 illustrates our conceptual framework of the farm household, which guides our empirical investigation into the complex relationships between farmers’ perceptions of endogenous and exogenous factors, and their social capital within the Austrian farming context.



**Figure 1. Conceptual framework: endogenous and exogenous factors of the farm household**

Stress as a multifaceted concept has been defined as a physiological or psychological response to environmental demands (Pearlin, 1989), or a subjective experience shaped by an individual’s appraisal of whether demands exceed their resources (Lazarus, Folkman, 1984). In the agricultural context, conceptualization of stress often extends to the unique interplay of exogenous factors (e.g., climate, market volatility, bureaucracy) and endogenous family dynamics (e.g., workload, succession, conflict), highlighting its distinct impact on farmer well-being (Deary et al., 1997; Kallioniemi et al., 2016).

Stressors can be considered as endogenous or exogenous (Larcher et al., 2019). Endogenous stressors commonly include heavy workload and time constraints, relationship conflicts or lack of trust/family cohesion, financial difficulties, or the absence of a successor (Amarapurkar,

Danes, 2005; Engelhart et al., 2012; Gunn, Hughes-Barton, 2022; Kallioniemi et al., 2016; Larcher, Vogel, 2010; Truchot and Andela, 2018). Exogenous stressors typically involve unpredictable weather, volatile input costs and market prices, or changes in agricultural regulations, laws, and subsidies (Alpass et al., 2004; Brennan et al., 2022; Deary et al., 1997; Grocke-Dewey et al., 2023; Kallioniemi et al., 2016; Nichols, Davis, 2024; Truchot, Andela, 2018).

The demanding nature of farm work, coupled with limited opportunities for breaks and vacations due to a prevailing strong work ethic, further exacerbates farmers' feeling of stress (Amrapurkar, Danes, 2005; Kallioniemi, Kymäläinen, 2012; Roy et al., 2017). Personal coping mechanisms such as exercise or taking vacations have been identified as stress mitigation strategies (Grocke-Dewey et al., 2023; Salmon, 2001). Farm-related accidents have been included as a domain in studies such as the Farm Stress Survey developed by Deary et al. (1997) and in studies on stress in farming (Furey et al., 2016; Glasscock et al., 2006; Grocke-Dewey et al., 2023).

In our research we integrate farmers' subjective indications of feeling of stress as indicator of their stress levels. As stress-related factors we integrate farmers' mitigating strategies such as exercise and vacation days taken as well as work-related accidents in our analyses. We do not consider work-related accidents as a measurement of stress but as a possible behavioral consequence of stress.

### **3 Materials and Methods**

#### **3.1 Data Collection and Study Area**

The data for this study was collected in cooperation with the Styrian branch of the Farmers' Accident and Health Insurance (SVB). Styria was specifically selected due to the established cooperation with the SVB's Styrian branch. An online survey was published on the Styrian SVB's website between April and September 2019. The questionnaire was openly accessible. To maximize reach, the survey link was also distributed to members via circular letters by agricultural organizations and working groups. A total of 482 completed questionnaires were collected. Due to the nature of the distribution of the questionnaire, it is difficult to determine the exact response rate for our survey. The Styrian SVB estimated that approximately 4,000 family farms were reached through this distribution network (Streppl, 2020).

The aim of our study was to target primarily farmers residing in Styria. However, because the survey was openly available through the Styrian SVB's website, approximately 20% of respondents resided outside of Styria. We decided post-hoc to include non-Styrian responses in our analysis for two reasons: first, the administrative boundaries of Styria, one of Austria's nine federal states (covering 16,440 km<sup>2</sup> with a population of about 1.24 million people), do not always align with geographical and social realities, as farming communities may extend across provincial borders (e.g., to Lower Austria, Burgenland, Slovenia, Upper Austria, Salzburg, and Tyrol). Farmers in these border regions often use services based on accessibility rather than administrative belonging. Second, and more critically, our study is of an exploratory nature and achieving statistical representativeness of the broader farming population of Styria was not the primary goal. Our aim was to undertake a first empirical attempt at understanding the complex relationships between farmers' subjective feeling of stress, stress-related issues, and the endogenous and exogenous factors of the farm household.

This study was conducted against a backdrop of significant structural changes in the agricultural sector, including in Styria. Consistent with broader European and Austrian trends, Styria has experienced a steady decline in the number of farms. For instance, the total number of farms decreased from 73,403 in 1970 to 42,370 in 2009, further declining to 36,534 in 2016. This reduction is particularly pronounced among smaller holdings, with farms under 5 hectares disappearing, while larger farms (exceeding 50 hectares) have seen an increase in numbers.

These trends highlight the increasing pressures on remaining farms, including consolidation, efficiency demands, and evolving labour dynamics, which are all pertinent to the context of farmers' stress and well-being (Landwirtschaftskammer Steiermark, 2021; Das Land Steiermark, 2010).

### 3.2 Survey Instrument and Variable Measurement

The questionnaire included questions to gather socio-demographic information, farm characteristics, farmers' perceptions of endogenous and exogenous factors of the farm household, social capital ("inner family social capital" and "social capital in the farming community"), leadership role(s) in honorary organisations, feeling of stress and stress-related issues. The Appendix provides an overview of all survey items, while this section details the background and measurement of the multi-item scales.

Based on the farm household model outlined in the conceptual framework section, we included 10 statements (listed in Table 1) capturing farmers' perceptions of endogenous and exogenous factors. The quantitative scales used to assess "inner family social capital" (7 items) and "social capital in the farming community" (3 items) were developed from a multi-stage process. Initial qualitative interviews with 23 farmers (Engelhart et al., 2012) resulted in 45 statements, which were then validated in a standardized survey (N = 113) to establish uni-dimensionality and internal consistency through factor analysis, yielding the two primary dimensions used here. The seven-item scale for "inner family social capital" was subsequently used in a survey with 388 farmers, proving high internal consistency and reliability (Cronbach's Alpha of 0.850; Larcher et al., 2019). The statements for both scales are presented in Table 1 and 2. In the survey, we have further included a question on holding one or more leadership roles in voluntary organizations. While the former two scales directly measure social capital, this variable serves as an indirect indicator of "social capital in the farming community", capturing engagement in formal networks outside the immediate farming context (Larcher et al., 2019).

**Table 1. Endogenous and exogenous factors of the farm household**

Item (1=fully agree, 5 = fully disagree)
My farm can survive on the long-term.
The farm should stay in the family.
For the successful continuation of the farm, large financial investments are necessary.
I am farmer due to family tradition.
My farm is in a difficult financial situation.
Agricultural policies hinder planning.
Regulations (environmental, building permits...) hinder my farm endeavours.
The workload on our farm is very high.
I am satisfied with my vocation as a farmer.
I am satisfied with the financial situation of my farm.

Source: Larcher et al., 2019; Engelhart et al., 2012; Engelhart et al., 2018; Vogel et al., 2018

For the purposes of our survey, we adopted the direct subjective measure ("Do you feel stressed?") from Strempl (2012) to assess overall stress levels. In his study Strempl (2012; N = 919) found higher subjectively indicated stress levels showed positive significant correlations with higher levels of a total of 28 psychological, physical, farm-related, and social stressors and negative statistically significant correlations with 30 different resources from these same areas. This direct self-report question assesses the farmers' cognitive appraisal of their own stress levels, also aligning with the transactional model of stress by Lazarus and Folkman (1984). In addition to this subjective component, we also examined "stress-related issues" as indirect behavioral indicators of strain and its consequences. These measures - work-related

accidents, vacation days taken, and exercise - are widely used in the agricultural stress literature (e.g., Furey et al., 2016; Deary et al., 1997; Glasscock et al., 2006; Grocke-Dewey et al., 2023). Specifically, we included (a) work-related accidents which serve as a proxy for the behavioral consequences of stress, as high stress, fatigue, and distraction are known to increase the likelihood of such incidents. (b) Vacation days taken act as an indicator of coping resources and a heavy workload, which are statistically significant stressors in farming. (c) Exercise, which is not a stressor but is a known coping mechanism or a stress-mitigation strategy. A lack of exercise may therefore indicate a lack of time for self-care, a common manifestation of a high-stress, high-demand lifestyle. This combined approach allows for a more comprehensive understanding of stress, capturing both the subjective feeling of stress and the observable consequences of unmitigated stress and important mitigation behaviors.

**Table 2. Items measuring the dimensions of social capital**

Inner family social capital (7 items)	We have great understanding for the issues of each individual family member
	Our family lacks time for mutual conversations
	Social cohesion works without fail in our family
	Our family rarely adheres to what was agreed upon.
	In our family we speak openly about our worries.
	Apart from our work we don't have a lot in common that we can talk about in our family.
	Our family lacks a good basis for communication.
Social capital in the farming community (3 Items)	The local community has a high degree of appreciation for us farmers.
	We live in a tolerant and honest community.
	In our community, farmers have each other's back.

Source: Larcher et al., 2019; Engelhart et al., 2012; Engelhart et al., 2018; Vogel et al., 2018

### 3.3 Data Analysis

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS; IBM, 2021). The minimum level of statistical significance was set at  $p \leq 0.05$ .

Factor analysis was employed to identify "farmer types" underlying the 10 items measuring farmers' perceptions of endogenous and exogenous farm household factors. Specifically, the Principal Components method was used for extraction, as it is robust for identifying latent constructs that maximize the variance explained by the smallest number of factors. This was followed by a Varimax rotation with Kaiser Normalization. Varimax rotation was selected as an orthogonal method to simplify the interpretation by minimizing the number of variables highly loading on each factor, yielding a clearer and more distinct separation of the identified farmer types. Kaiser Normalization was applied during rotation because it standardizes the factor loadings before rotation is performed. This standardization ensures that all variables are given equal weight in the rotation process, preventing variables with large variances (and thus large loadings) from dominating the solution. By equalizing the influence of all variables, normalization aids in achieving a more rapid and stable convergence to a maximally simple structure (Kaiser, 1958).

Factors with an Eigenvalue greater than 1.0 were extracted, as this criterion retains factors that explain more variance than a single original variable. Only factor loadings greater than 0.450 were considered for assigning an item to a specific factor, ensuring a robust contribution of the item to that particular latent type. All items to measure endogenous and exogenous factors as well as inner familial capital and "social capital in the farming community" were re-coded so that higher numerical values correspond to the greater manifestations of the respective content or concept (see also Appendix).

To examine bivariate relationships between the identified farmer types, the various dimensions of social capital (inner family and farming community), leading role(s) in voluntary organisations, socio-demographic characteristics, and the measures of feeling of stress and stress-related issues, Gamma ( $\gamma$ ) correlation coefficients were calculated. Gamma, a non-parametric measure of association, was chosen for its suitability in assessing the strength and direction of association between ordinal variables, which constitute a prevalent portion of our dataset.

## 4 Results

### 4.1 Comparison of the Sample with Population

Table 3 compares selected socio-demographic variables and farm characteristics of our survey sample with those of the broader Styrian farming population, highlighting key differences in gender, socio-economic farm type, farm size, share of mountain farms and share of organic farms. As Table 3 shows, our sample is not representative of the general Styrian farming population. Obviously, the survey attracted more interest amongst full-time farmers with larger farms. Furthermore, the proportion of farms in mountainous areas and organic farms in the sample is more than twice as high as in the population as a whole.

Despite these differences, our sample is appropriate for the exploratory purpose of this study. The primary goal was not to achieve statistical representativeness to generalize findings to the entire Styrian farming population. Instead, we aimed to undertake a first empirical attempt at understanding the complex relationships between farmers' feeling of stress, and various endogenous and exogenous factors of the farm household, including their social capital. The data, therefore, provides a valuable foundation for identifying key relationships and developing hypotheses to inform future, more targeted research.

**Table 3. Comparison of survey sample with farm population in Styria**

	Survey		Population*	
Farmer	482	100 %	35.300	100 %
Male	362	75.2 %	24,000	67.99 %
Female	120	24.8 %	11,300	32.01 %
Socio-economic farm type	482	100 %	33,412	100 %
Full-time	326	67.7 %	11,245	33,66 %
Part-time	156	32.3 %	22,167	66,34 %
Farm size	482	100 %	36,399	100 %
Under 20 ha	69	19.01 %	23,783	65 %
20 to under 50 ha	157	43.25 %	8,208	23 %
50 to under 100 ha	95	26,17 %	2,867	8 %
More than 100 ha	42	11.57 %	1,541	4 %
Mountain farms (all classifications)	237	51.1 %	**12,164	**28.69 %
Organic farms	129	28.2 %	3,858	10.56 %

Source: \*all data from 2016 (Landwirtschaftskammer Steiermark, 2021) except where indicated, \*\*2009 (Das Land Steiermark, 2010)

## 4.2 Farmer Types

Using Factor Analysis, on basis of the 10 items measuring farmers' perceptions of endogenous and exogenous farm household factors, we identified the following distinct farmer types: The "Financially strong and satisfied with vocation" farmer type, the "Struggling and overworked" farmer type and the "Farming for family heritage and traditions" farmer type. As shown in Table 4, these three types collectively account for 53.56% of the total variance in the underlying farmers' perceptions of endogenous and exogenous factors of the farm household.

**Table 4. Farmer types based on farmers' perceptions of endogenous and exogenous factors of the farm household**

Farmer type	Total variance explained: 53.56%	Items	Rotated factor loading
Financially strong and satisfied with vocation	24.83%	I am satisfied with the financial situation of my farm	0.82
		My farm can survive on the long-term	0.80
		I am satisfied with my vocation as a farmer	0.59
		For the successful continuation of the farm, large financial investments are necessary	-0.57
		My farm is in a difficult financial situation	-0.59
Struggling and overworked	15.42%	Regulations (environmental, building permits...) hinder my farm endeavors	0.84
		The workload on our farm is very high	0.60
Farming for family heritage and tradition	13.32%	The farm should stay in the family	0.74
		I am farmer due to family tradition	0.72

Factor Analysis (Principal Component, Varimax rotation) with Eigenvalue >1.0 criterion. Only factor loadings of >0.45 were considered. The item "Agricultural policies hinder planning" did not load on any factor and was therefore excluded from the analysis.

Source: own calculations

## 4.3 Characterization of Farmer Types with Socio-Demographic Variables, Farm Characteristics and Social Capital

The statistical analyses resulted in relative high significances between two farmer types ("Financially strong and satisfied with vocation" and "Struggling and overworked") and socio-demographic variables, farm characteristics, and social capital, including leadership role(s) in voluntary organizations.

Although the relationship is stronger with the farmer type "Financially strong and satisfied with vocation", farmers of both types are more likely to run their farm full-time. With exception of this similarity, Table 5 shows two quite distinct profiles: The farmer type "Financially strong and satisfied with vocation" is characterized by having a high share of farm income relative to total household income. The strong correlation with the "level of debt burden" indicates that this group is more likely to have no or a low level of debt load. Farmers of this farmer type dispose of higher levels of "inner family social capital" and "social capital in the farming community", as well as a greater likelihood of holding one or more leadership role(s) in voluntary organizations.

**Table 5. Characterization of farmer types**

	<b>Financially strong and satisfied with vocation</b>	<b>Struggling and overworked</b>	<b>Farming for family heritage and tradition</b>
Gender	-0.389	2.621**	1.334
Age	-0.529	1.981*	-1.393
Agricultural education	0.923	2.484*	0.419
Full-time vs part-time farm	-4.896***	-2.635**	-0.361
Farm income as % of household income	5.783***	0.912	0.697
Level of debt burden	-3.591***	3.320***	-0.151
Inner family social capital	4.526***	-4.963***	1.748
Social capital in the farming community	4.654***	-5.019***	0.710
Leadership role(s) in voluntary organizations	3.849***	-0.823	-0.159

Gamma ( $\gamma$ ) \*\*\* $p \leq 0.001$ , \*\* $p \leq 0.01$ , \* $p \leq 0.05$   
Source: own calculations

The farmer type “Struggling and overworked” presents a different profile. The share of male farmers in this group is higher and farmers of this farmer type tend to be older and have a higher level of agricultural education. These farmers report a higher level of debt burden and dispose of considerably less “inner family social capital” and also less “social capital in the farming community”. As the findings highlight, social capital and financial stability are key distinguishing factors between these two farmer types.

The farmers of the farmer type “Farming for family heritage and tradition” are more likely to be male and tend to be younger. They are characterized by higher levels of “inner family social capital” compared to farmers of the “Struggling and overworked” farmer type, albeit these relationships are not statistically significant.

#### **4.4 Feeling of Stress and Stress-Related Issues**

Our analysis revealed a high prevalence of self-reported stress among farmers. In our sample, 20.9% of respondents reported feeling stressed a lot, and an additional 58.4% reported feeling stressed a little, while only 20.7% reported not feeling stressed.

For stress-related issues, 19.6% of farmers reported having at least one work-related accident in the last three years, while 80.4% had none. Among those who did, 11 percentage points had one accident, 4.7 had two, and 3.9 had three or more work-related accidents. A substantial portion of the farmers reported limited vacation days: 17.3% do not take vacations, 21.7% on average take less than five days per year, 25.9% take five to nine days, and 35.1% take ten or more days of vacation on average per year.

A majority of farmers reported limited exercise, a key coping mechanism. 38.2% reported no exercise at all, 19.6% rarely exercise (once a month), 24.3% indicated that they exercise occasionally (2-3 times a month), and only 17.8% exercise regularly (at least once a week).

## 4.5 Characterization of Feeling of Stress and Stress-Related Issues with Socio-Demographic Variables and Farm Characteristics

To better understand the subjective feeling of stress and stress-related issues (vacation days, work-related accidents, and exercise), we used Gamma ( $\gamma$ ) correlation coefficients to analyze associations with socio-demographic variables and farm characteristics. Table 6 presents the results of the statistical analyses.

**Table 6. Associations of feeling of stress and stress-related issues with socio-demographic variables and farm characteristics**

	Feeling of stress	Vacation days per year	Work-related accidents	Exercise
Gender	1.062	-0,974	1.732	-3.302***
Age	0.073	-1.261	1.098	1.988*
Agricultural education	0.002	2.445*	0.102	0.011
Full-time vs part-time farm	-0.398	-0.312	-0.877	2.875**
“Farm income as % of household income”	-0.288	-0.281	0.014	-1.443
Level of debt burden	2.450*	-2.000*	1.689	-4.189***

Gamma ( $\gamma$ ) \*\*\* $p \leq 0.001$ , \*\* $p \leq 0.01$ , \* $p \leq 0.05$

Source: own calculations

The only statistically significant relationship of feeling of stress with the characteristics we examined is with the level of debt burden indicating that farmers with higher level of debt reported higher levels of feeling of stress. Our data also shows that male farmers are feeling more stressed compared to female farmers although the relationship is not statistically significant.

Regarding stress-related issues, we found more and stronger associations. Younger farmers and farmers with higher levels of agricultural education take more vacations per year. Farmers with a higher level of debt burden tend to take fewer vacation days. Male farmers, older farmers and farmers with higher levels of debt burden are more likely to suffer work-related accidents, although the relationship between the variables is not statistically significant. Several strong associations were found for exercise. Older farmers, women, and part-time farmers were more likely to exercise. The most statistically significant correlation was a strong negative association of exercise with the level of debt burden, indicating that farmers with a lower level of debt burden are more likely to engage in regular exercise. Further, high levels of “farm income as % of household income” are related with lower levels of exercise, albeit the relationship is not statistically significant. These findings suggest that while feeling of stress has few clear associations with socio-demographic variables and farm characteristics, stress-related issues are more strongly connected.

## 4.6 Associations of Feeling of Stress and Stress-Related Issues with Farmer Types and Social Capital

Analyses of the association of the feeling of stress and stress-related issues with farmer types and social capital are presented in Table 7.

**Table 7. Associations of feeling of stress and stress-related issues with farmer types and social capital**

	Feeling of stress	Vacation days per year	Work-related accidents	Exercise
Financially strong and satisfied with vocation	-7.080***	6.122***	-1.125	3.219***
Struggling and overworked	12.251***	-5.537***	2.209*	-3.209***
Farming for family heritage and tradition	0.414	-0.151	-0.635	-0.956
Inner family social capital	-5.932***	4.676***	-0.688	3.836***
Social capital in the farming community	-4.961***	3.918***	-0.750	2.920**
Leadership role(s) in voluntary organizations	2.157	-2.604*	-0.932	-0.270

Gamma ( $\gamma$ ) \*\*\* $p \leq 0.001$ , \*\* $p \leq 0.01$ , \* $p \leq 0.05$   
Source: own calculations

Our analysis revealed strong associations between feeling of stress and stress-related issues with two of the farmer types: the farmer type “Financially strong and satisfied with vocation” is less likely to report feeling of stress and more likely to take vacation days and engage in exercise. Conversely, the farmers of the farmer type “Struggling and overworked” showed a clear pattern of feeling more stressed, were more likely to report one or more work-related accident(s), took fewer vacation days, and exercised less. These findings are particularly critical, as they identify this group as the most vulnerable.

Furthermore, our results confirmed that higher levels of “inner family social capital” and “social capital in the farming community” were associated with lower levels of feeling of stress, with more vacation days, and with greater engagement in exercise. Leadership role(s) in voluntary organizations are also associated with lower levels of feeling of stress and more vacation days.

## 5 Discussion

The identification of farmer types has been useful in understanding the complex relationships of exogenous and endogenous factors of the farm household with feeling of stress and stress-related issues. Therefore, the discussion centers around the characterization of the identified three farmer types “Financially strong and satisfied with vocation”, “Struggling and overworked”, and “Farming for family heritage and tradition” with levels of farmers’ feeling of stress and stress-related issues (vacation, work-related accidents, and exercise).

A significant percentage of farmers report taking no vacation days (17.3%) or less than five days per year (21.7%). This low uptake of time off aligns with the literature describing the relentless work ethic prevalent among farmers (Kallioniemi, Kymäläinen, 2012; Roy et al., 2017). The difficulty in taking time off is a strong indicator of the high-demand, high-stress lifestyle often found in agricultural households. Specifically, farmers belonging to the farmer type “Struggling and overworked” are less likely to take holidays and are also significantly more likely to feel stressed. Conversely, farmers belonging to the type “Financially strong and satisfied with vocation” are more likely to take vacation and less likely to feel stressed. Our findings indicate that farmers facing the greatest workload and financial strain are least able to take vacations, which is a crucial coping mechanism.

While some literature suggests that female farmers report higher levels of stress (Grocke-Dewey et al., 2023, Deary et al., 1997), our findings differ in so far as gender was not significantly correlated with feeling of stress. This difference is partially explained by the fact that women are less likely to belong to the “Struggling and overworked” farmer type. Our results

instead suggest a more complex mediated relationship between gender, feeling of stress and stress-related issues. For instance, in our sample women were more likely to engage in exercise, a known stress mitigator. This suggests that while women may face similar objective or role-based stressors, they might be using more effective strategies to mitigate the feeling of stress. The finding emphasizes that the ability to cope, rather than demographic status alone, is the crucial determinant of subjective well-being.

While farming generally is considered physically demanding and active, recent technological advancements have led to farmers being less active during work (Haider et al., 2022; Loughman et al., 2022). Agricultural work does not therefore replace physical exercise per se and often represents a one-sided physical strain. Research has demonstrated that high levels of physically active leisure activities can help dissipate or mitigate stress (Salmon, 2001), and exercise has been identified as a topic farmers were interested in as a stress management strategy (Grocke-Dewey et al., 2023). Our findings confirm that farmers belonging to the farmer type “Financially strong and satisfied with vocation” are more likely than farmers belonging to the farmer type “Struggling and overworked” to engage in exercise. This highlights a vicious cycle where the most stressed farmers, lack the time and energy to engage in this effective coping strategy.

The strong association between low levels of “inner family social capital” (e.g., family conflict or loneliness) and higher levels of feeling of stress is consistent with existing literature, which highlights the farm family as a primary source of both support and strain (Truchot, Andela, 2018; Kallioniemi et al., 2016). Similarly, the importance of family cohesion for farmers to be able to organize a vacation has been highlighted in the literature (Kallioniemi, Kymäläinen, 2012; Roy et al., 2017). Farmers of the “Struggling and overworked” farmer type in particular exhibit lower levels of “inner family social capital” compared to farmers of the other farmer types. This suggests that low levels of support within the family likely compound their overall feeling of stress in addition to their low engagement in other coping strategies discussed above.

Furthermore, our results suggest that engagement with the broader community is vital for overcoming the entrenched work ethic. Leadership in voluntary organizations was positively correlated with taking more vacation days, suggesting that engagement with the broader community may help normalize taking breaks from the farm. Roy et al. (2017) found that the relentless work ethic and social pressure particularly amongst older farmers made vacation days seem an illegitimate endeavor. By actively participating in community roles, farmers may gain the “social capital in the community”, external validation, and organizational skills necessary to step away from the farm temporarily. Consistent with our findings, farmers of the “Financially strong and satisfied with vocation” farmer type are significantly more likely to engage in voluntary roles, supporting the mechanism that community engagement facilitates positive coping behaviors like taking holidays.

Against our expectations, the farmer type “Farming for family heritage and tradition” showed no substantive association with socio-demographic variables, farm characteristics, levels of feeling of stress and stress-related issues. This non-finding is valuable, as it suggests that the mere commitment to tradition, independent of financial and workload pressures, is a neutral factor with respect to stress and well-being. We expected these farmers, however, to be particularly involved in the community and the living of traditions which is organized via social groups. Therefore, we assumed that being “farmer for family heritage and tradition” would be closely related to social capital and via lifestyle choices and self-identity of these farmers also to feeling of stress and stress-related issues. An explanation for the lack of such relations in the results, i.e. for the relative structural independence of this farmer type might be, that it may be understood as habitus in the sense of Bourdieu (1976, 1994). According to this, a person's habitus comprises stable patterns of thought, perception, orientation and behavior that are adopted within the framework of objective, class-specific socialization conditions and remain stable and effective even when conditions change. In relation to agriculture and the variables

of our study, a traditional habitus in agriculture would be characterized by the inseparable connection between household and farm, the upbringing towards agriculture regarding the farm inheritance and the special orientation of the family towards generational succession (Vogel and Wiesinger, 2003). We believe that farmers who belong to this type draw a great deal of strength from the tradition of family farming and that this element is part of a larger set of values in which, for example, the preservation of nature as the basis of family farming might play a greater role.

## **6 Conclusions and Policy Recommendations**

In family farm households, short-, medium-, and long-term decisions that are important for home and farm are made through a process of balancing endogenous and exogenous factors of the farm household considering the economic needs of the farm and the subjective needs of the family. In this article, with a data set from a survey of Styrian farmers from 2019, we identified farmer types on basis of farmers' perceptions of selected endogenous and exogenous factors of the farm household. In our conceptual framework we considered farmers' social capital as an additional important endogenous factor of the farm household, distinguishing between "inner family social capital", "social capital in the farming community" and farmers' engagement in leading role(s) in voluntary organizations. Furthermore, we assessed farmers' feeling of stress and stress-related issues such as work-related accidents, vacation days taken, and exercise. The overall aim of our present study is the analysis of associations between farmer types, social capital, feeling of stress and stress-related issues.

Based on survey data from 482 farmers in Styria, our analysis revealed a high prevalence of feeling of stress, with 79.1% of respondents feeling a little or a lot stressed.

The study identified three farmer types: "Financially strong and satisfied with vocation", "Struggling and overworked" and "Farming for family heritage and tradition". A correlation between feeling of stress and levels of debt burden was found, but not with other socio-demographic variables or farm characteristics. Feeling of stress, however, was strongly associated with farmer types. Farmers of the farmer type "Struggling and overworked" were markedly more likely than those of the farmer type "Financially strong and satisfied with vocation" to feel stressed, to report work-related accidents, to exercise less and to take fewer vacation days.

We found that high levels of social capital, both within the family and in the farming community, were consistently and strongly linked to lower stress levels and positive coping behaviors such as taking more vacation days or engaging in more exercise. The very strong correlation between the level of social capital in the family and in the farming community and feelings of stress and stress-related issues assigns social capital the role of a stress-mitigating factor. This, together with the strong association of levels of social capital with farm types, which include a number of endogenous and exogenous factors of the farm household, let us assign great importance to the role of family and household in counseling strategies. Therefore, based on our analyses, in addition to the traditional farm counseling in financial and debt management we can reinforce approaches such as the farmers' family counseling and initiatives like the farmers' telephone helpline supporting farm households to balance economic and family needs.

Our data suggests that high levels of debt are associated with feeling of stress. The provision of accessible and subsidized financial counseling and debt restructuring services should be specifically tailored to the unique realities of agricultural households. This would directly address a core stressor experienced by the "Struggling and overworked" farmer type. Given that farmers of this type are statistically significantly more likely to experience higher levels of feeling of stress and are more likely to suffer work-related accidents, supporting stress-mitigating behaviors (e.g. exercise), or access to short-term skilled labor for hire would allow farmers to

better manage periods of heavy workload (e.g., planting or harvesting seasons) or family emergencies or to take a much-needed vacation. Providing a subsidized network of temporary, skilled agricultural workers would directly address the practical difficulties of organizing absences from the farm, which our data highlights as a major issue.

Social capital emerged as a crucial protective factor against stress. While strengthening existing rural social networks and promoting mutual support groups is important, our findings highlight the additional benefit of engagement with the wider community. The positive correlation between involvement in voluntary organizations and a higher number of vacation days suggests that exposure to non-farming peers may normalize the act of taking breaks, helping to overcome the entrenched work ethic common in agricultural communities.

The identification and character of the distinct farmer types suggests that a one-size-fits-all approach is insufficient. Interventions should be tailored to address specific needs. For example, support for farmers of the “Struggling and overworked” type should focus on reducing bureaucratic burden and providing direct support for workload management, while policies aimed at the “Financially strong and satisfied with vocation” type could reinforce existing positive behaviors and promote their role as mentors or community leaders.

## 7 Limitations and Outlook

It is difficult to determine the exact response rate for our survey as it was available online on the website of the Styrian SVB and distributed via circular letter. While the responses of 482 completed questionnaires were sufficient for the goals of our study and results are meaningful as information about the relation between concepts of the study, the results should not be generalized to the broader farming population of Styria or Austria. We found the formation of farmer types based on socio-economic perceptions of endogenous and exogenous factors of the agricultural household and the integration of social capital to be useful in gaining a better understanding of farmers feeling of stress and stress related issues. Future studies could widen the set of endogenous and exogenous factors of the farm household, especially with farmers’ environmental concerns and actual farming problems, i.e. farmers’ plans or actions around adaptive strategies to climate change.

## Data Availability Statement

Legal and ethical approval restrictions apply to the data that support the findings of this study. Data can only be made available to other researchers working at or in collaboration with BOKU University.

## Competing Interests

The authors declare no competing interests.

## Author Contributions

**Elisabeth Gotschi:** Conceptualization, Investigation, Formal Analysis, Data Curation, Writing (original draft, review & editing). **Manuela Larcher:** Conceptualization, Methodology, Investigation, Validation. **Andreas Strempl:** Methodology, Funding Acquisition. **Stefan Vogel:** Conceptualization, Methodology, Investigation, Writing (original draft, review & editing), Visualization, Resources, Supervision, Validation.

## References

- Alpass, F., Flett, R., Humphries, S., Massey, C., Morriss, S., and Long, N. (2004): Stress in Dairy Farming and the Adoption of New Technology. *International Journal of Stress Management* 11 (3): 270-281. <https://doi.org/10.1037/1072-5245.11.3.270>.
- Amarapurkar, S.S., Danes, S.M. (2005): Farm Business-Owning Couples: Interrelationships among Business Tensions, Relationship Conflict Quality, and Spousal Satisfaction. *Journal of Family and Economic Issues* 26 (3): 419-441. <https://doi.org/10.1007/s10834-005-5905-6>.
- Barrios, E. B. (2008): Infrastructure and rural development: Household perceptions on rural development. *Progress in Planning* 70 (1): 1-44. <https://doi.org/10.1016/j.progress.2008.04.001>.
- Becot, F.A., Inwood, S.M. (2020): The case for integrating household social needs and social policy into the international family farm research agenda. *Journal of Rural Studies* (77): 185-198. <https://doi.org/10.1016/j.jrurstud.2020.05.005>.
- Besser, T., Jurt, C., Mann, S. (2017): Agricultural structure and farmers' interconnections with rural communities. *International Journal of Social Economics* 44 (3): 362-376. <https://doi.org/10.1108/IJSE-09-2015-0237>.
- Bichlbauer, D., Vogel, S. (1993): Umstellung auf biologischen Landbau. Projektbericht. Universität für Bodenkultur, Wien.
- Bourdieu, P. (1976): Entwurf einer Theorie der Praxis. Auf der ethologischen Grundlage der kabyliischen Gesellschaft. Suhrkamp, Frankfurt am Main.
- Bourdieu, P. (1994): Die feinen Unterschiede. Kritik der gesellschaftlichen Urteilskraft. Suhrkamp, Frankfurt am Main.
- Brennan, M., Hennessy, T., Meredith, D., Dillon, E. (2022): Weather, Workload and Money: Determining and Evaluating Sources of Stress for Farmers in Ireland. *Journal of Agromedicine* 27 (2): 132-142. <https://doi.org/10.1080/1059924X.2021.1988020>.
- Calus, M., Van Huylenbroeck, G. (2010): The Persistence of Family Farming: A Review of Explanatory Socio-economic and Historical Factors. *Journal of Comparative Family Studies* 41 (5): 639-XIII. <https://doi.org/10.3138/jcfs.41.5.639>.
- Chayanov, A.V. (1966): *The Theory of Peasant Economy*. The American Economic Association, Illinois.
- Chen, C.-M., Yeh, C.-Y., Chang, C.-H. (2014): Volunteering and Life Satisfaction: an Investigation of Endogeneity. *Hitotsubashi Journal of Economics* 55 (1): 21-32. <https://doi.org/10.15057/26815>.
- Cohen, S., Wills, T. A. (1985): Stress, social support, and the buffering hypothesis. *Psychological Bulletin* 98 (2): 310-357. <https://doi.org/10.1037/0033-2909.98.2.310>.
- Coleman, J. (1988): Social Capital in the Creation of Human Capital. *American Journal of Sociology* 94 (1): S95-S120. <http://www.jstor.org/stable/2780243>.
- Coleman, J. (1990): *Foundations of Social Theory*. Belknap, Cambridge.
- Darnhofer, I. (2010): Strategies of family farms to strengthen their resilience. *Environmental Policy and Governance* 20 (4): 212-222. <https://doi.org/10.1002/eet.547>.
- Das Land Steiermark (2010): Der GRÜNE BERICHT Steiermark. Bericht über die Lage der Land- und Forstwirtschaft in der Steiermark. [https://gruenerbericht.at/cm4/jdownload/send/13-gr-bericht-steiermark/2005-steiermark\\_gb\\_2008-2009](https://gruenerbericht.at/cm4/jdownload/send/13-gr-bericht-steiermark/2005-steiermark_gb_2008-2009), accessed 22.7.2025.
- Deary, I., Willock, J., McGregor, M.M. (1997): Stress in Farming. *Stress Medicine* 13 (2): 131-136.
- Działek, J. (2014): Is social capital useful for explaining economic development in Polish regions? *Geografiska Annaler. Series B, Human Geography* 96 (2): 177-193. <http://www.jstor.org/stable/43299492>.
- Ellis, F. (1993): *Peasant economics: Farm households in agrarian development*. Cambridge University Press, Cambridge.

- Engelhart, R., Vogel, S., Larcher, M. (2012): Sozialkapital in bäuerlichen Familien – eine explorative Untersuchung im Bezirk St. Pölten. Social Capital in Farming Families – an Explorative Study in the Region of St. Pölten. *Jahrbuch der Österreichischen Gesellschaft für Agrarökonomie* 21 (2): 165-174. <http://oega.boku.ac.at>.
- Engelhart, R., Vogel, S., Larcher, M. (2018): Determinanten familiärer Hofnachfolge in Österreich – eine multivariate Analyse mit betrieblichen, sozialen sowie emotionalen Faktoren. *Berichte über Landwirtschaft* 96, Bundesministerium für Ernährung, Landwirtschaft. <https://d-nb.info/1216133182/34>.
- Eurofound (2007): Fourth European Working Conditions Survey; European Foundation for the Improvement of Living and Working Conditions. Office for Official Publications of the European Communities, Luxembourg. <https://www.eurofound.europa.eu/publications/report/2007/working-conditions/fourth-european-working-conditions-survey>.
- Furey, E.M., O'Hora, D., McNamara, J., Kinsella, S., 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: 126-126. <https://doi.org/10.3389/fpubh.2016.00126>.
- Gerich, J. (2014): Effects of Social Networks on Health from a Stress Theoretical Perspective. *Social Indicators Research* 118 (1): 349-364. <https://doi.org/10.1007/s11205-013-0423-7>.
- Glasscock, D.J., Rasmussen, K., Carstensen, O., Hansen, O. N. (2006): Psychosocial factors and safety behaviour as predictors of accidental work injuries in farming. *Work & Stress* 20 (2): 173-189. <https://doi.org/10.1080/02678370600879724>.
- Gómez-Limón, J.A., Vera-Toscano, E., Garrido-Fernández, F.E. (2014): Farmers' Contribution to Agricultural Social Capital: Evidence from Southern Spain. *Rural Sociology* 79 (3): 380-410. <https://doi.org/10.1111/ruso.12034>.
- Grocke-Dewey, M., Brennan, A., Freeman, B., Weas, H., Gutheil, J., Stallones, L., McMoran, D. (2023): Perceived Stress, Stressors, and Preferred Stress Management Strategies Among Western Agricultural Producers. *Journal of rural mental health* 47 (3): 152-162. <https://doi.org/10.1037/rmh0000233>.
- Gunn, K.M., Hughes-Barton, D. (2022): Understanding and addressing psychological distress experienced by farmers, from the perspective of rural financial counsellors. *Australian Journal of Rural Health* 30 (1): 34-43. <https://doi.org/10.1111/ajr.12815>.
- Hagen, B.N.M., Sawatzky, A., Harper, S.L., O'Sullivan, T.L., Jones-Bitton, A. (2021): What Impacts Perceived Stress among Canadian Farmers? A Mixed-Methods Analysis. *International journal of environmental research and public health* 18 (14): 7366. <https://doi.org/10.3390/ijerph18147366>.
- Haider, S., Wakolbinger, M., Rieder, A., Winzer, E. (2022): Obesity, Fruit and Vegetable Intake, and Physical Activity Patterns in Austrian Farmers Compared to the General Population. *International Journal of Environmental Research and Public Health* 19 (15): 9194. <https://doi.org/10.3390/ijerph19159194>.
- Harrison, M. (1975): Chayanov and the economics of the Russian Peasantry. *The Journal of Peasant Studies* 2 (4): 389-417. <https://doi.org/10.1080/03066157508437947>.
- Holloway, L.A., Catney, G., Stockdale, A., Nelson, R. (2021): Sustainable Family Farming Futures: Exploring the Challenges of Family Farm Decision Making through an Emotional Lens of 'Belonging'. *Sustainability* 13 (21): 12271. <https://doi.org/10.3390/su132112271>.
- IBM (2021): Statistical Package for the Social Sciences (SPSS) 27.
- International Labour Organisation (ILO) (2000): Safety and Health in Agriculture. ILO code of practice. ILO, Geneva. <https://www.ilo.org/media/309496/download>.
- Kaiser, H.F. (1958): The varimax criterion for analytic rotation in factor analysis. *Psychometrika* 23 (3): 187-200. <https://doi.org/10.1007/BF02289233>.
- Kallioniemi, M.K., Kymäläinen, H.-R. (2012): Women on Finnish dairy farms: Hard work in the midst of traditions and changes. *Rural Society* 22 (1): 78-89. <https://doi.org/10.5172/rsj.2012.22.1.78>.

- Kallioniemi, M.K., Simola, A., Kaseva, J., Kymäläinen, H.-R. (2016): Stress and Burnout Among Finnish Dairy Farmers. *Journal of Agromedicine* 21 (3): 259-268. <https://doi.org/10.1080/1059924X.2016.1178611>.
- Landwirtschaftskammer Steiermark (2021): Die steirische Landwirtschaft in Zahlen 2021. <https://stmk.lko.at/downloads+2400++1302705+2980?env=ZnVsbHRleHRfc2VhcmNoP-SUyQSZucGZfY2FjaGU9bm8mcGFnZT0xJnNob3J0X25ld18xPTEwMDAzNTg>, accessed 22.7.2025.
- Larcher, M. (2009): Haushaltsstrategien und langfristige Entwicklung landwirtschaftlicher Bio-betriebe in Österreich. Guthmann-Peterson, Vienna.
- Larcher, M., Engelhart, R., Vogel, S. (2019): Agricultural Professionalization of Austrian Family Farm Households the Effects of Vocational Attitude, Social Capital and Perception of Farm Situation. *German Journal of Agricultural Economics* 68 (1): 28-44. <https://www.econstor.eu/bitstream/10419/305054/1/GJAE-2123-2018.pdf>.
- Larcher, M., Vogel, S. (2010): Qualitative Analysen von Haushaltsstrategien und Entwicklungsrichtungen biologisch wirtschaftender Familienbetriebe in Österreich. *Qualitative Analysis of Household Strategies and Developments of Austrian Family Farms engaged in Organic Agriculture. German Journal of Agricultural Economics* 59 (2): 106-116. <https://doi.org/10.52825/gjae.v59i2.1787>.
- Larcher, M., Vogel, S. (2019): Hofnachfolgesituation in Österreich 2018. Deskriptive Ergebnisse einer Befragung von Betriebsleiter/innen. Diskussionspapier DP-71-2019, University of Natural Resources and Life Sciences, Vienna. [https://boku.ac.at/fileadmin/data/H03000/H73000/H73100/Diskussionspapiere\\_ab\\_2004/712019.pdf](https://boku.ac.at/fileadmin/data/H03000/H73000/H73100/Diskussionspapiere_ab_2004/712019.pdf).
- Lazarus, R., Folkman, S. (1984): *Stress, Appraisal, and Coping*. Springer, New York.
- Loughman, T.M., Flaherty, G.T., Houlihan, A., Dunne, D. (2022): A Cross-Sectional Analysis of Physical Activity Patterns, Aerobic Capacity and Perceptions about Exercise among Male Farmers in the Mid-West Region of Ireland. *Journal of Agromedicine* 27 (1): 87-97. <https://doi.org/10.1080/1059924X.2021.1879699>.
- Nichols, C.E., Davis, J. (2024): The Women Farmer Stress Inventory: Examining women farmer stress in the United States Corn Belt. *The Journal of Rural Health* 40 (3): 457-466. <https://doi.org/10.1111/jrh.12808>.
- O'Shaughnessy, B.R., O'Hagan, A.D., Burke, A., McNamara, J., O'Connor, S. (2022): The prevalence of farmer burnout: Systematic review and narrative synthesis. *Journal of Rural Studies* 96: 282-292. <https://doi.org/10.1016/j.jrurstud.2022.11.002>.
- Pearlin, L.I. (1989): The Sociological Study of Stress. *Journal of Health and Social Behavior* 30 (3): 241-256. <https://doi.org/10.2307/2136956>.
- Putnam, R. (1995): Bowling alone: America's declining Social Capital. *Journal of democracy* 6 (1): 65-78. <https://doi.org/10.1353/jod.1995.0002>.
- Quendler, E., Mayrhofer, M., Prinz, B., Nimmerichter, A. (2017): Comparative determination of physical stress and strain on milkers in milking parlours on dairy farms in Upper Austria, using ECG, an activity sensor and spirometer. *Annals of Agricultural and Environmental Medicine* 24 (1): <https://doi.org/10.5604/12321966.1235179>.
- Rivera, M., Knickel, K., María Díaz-Puente, J., Afonso, A. (2019): The Role of Social Capital in Agricultural and Rural Development: Lessons Learnt from Case Studies in Seven Countries. *Sociologia Ruralis* 59 (1): 66-91. <https://doi.org/10.1111/soru.12218>.
- Roy, P., Tremblay, G., Robertson, S., Houle, J. (2017): "Do it All by Myself": A Salutogenic Approach of Masculine Health Practice Among Farming Men Coping With Stress. *American Journal of Men's Health* 11 (5): 1536-1546. <https://doi.org/10.1177/1557988315619677>.
- Salmon, P. (2001): Effects of physical exercise on anxiety, depression, and sensitivity to stress: A unifying theory. *Clinical Psychology Review* 21 (1): 33-61. [https://doi.org/10.1016/S0272-7358\(99\)00032-X](https://doi.org/10.1016/S0272-7358(99)00032-X).

- Schermer, M., Renting, H., Oostindie, H. (2011): Collective Farmers' Marketing Initiatives in Europe: Diversity, Contextuality and Dynamics. *The International Journal of Sociology of Agriculture and Food* 18 (1): 1-11. <https://doi.org/10.48416/ijisaf.v18i1.253>.
- Scheurich, A., Penicka, A., Hörtenhuber, S., Lindenthal, T., Quendler, E., Zollitsch, W. (2021): Elements of Social Sustainability among Austrian Hay Milk Farmers: Between Satisfaction and Stress. *Sustainability* 13 (23): 13010. <https://doi.org/10.3390/su132313010>.
- Scheyett, A., Hollifield, S., Scarrow, A., Garcia, A., Marburger, I. (2024): "A Great Life, if You Can Stand It": Stress and Farm Women. *Journal of Rural Mental Health* 48 (3): 191-204. <https://doi.org/10.1037/rmh0000264>.
- Strempfl, A. (2012): Herausforderungen, Belastungen, Überforderungen. Ursachen und Bewältigung von Stress in steirischen bäuerlichen Familien. Universität für Bodenkultur, Wien.
- Strempfl, A. (2020): Determination of Study Population. (Farmers' Accident and Health Insurance), personal communication, e-mail.
- Suess-Reyes, J., Fuetsch, E. (2016): The future of family farming: A literature review on innovative, sustainable and succession-oriented strategies. *Journal of Rural Studies* 47: 117-140. <https://doi.org/10.1016/j.jrurstud.2016.07.008>.
- Taylor, J.E., Adelman, I. (2003): Agricultural Household Models: Genesis, Evolution, and Extensions. *Review of Economics of the Household* 1 (1): 33-58. <https://doi.org/10.1023/A:1021847430758>.
- Thompson, A.M., Bono, B.A. (1993): Work without Wages: The Motivation for Volunteer Firefighters. *The American Journal of Economics and Sociology* 52 (3): 323-343. <https://www.jstor.org/stable/3487155>.
- Tschajanow, A. (1923): Die Lehre von der bäuerlichen Wirtschaft. Versuch einer Theorie der Familienwirtschaft im Landbau. Verlagsbuchhandlung Paul Parey, Berlin.
- Truchot, D., Andela, M. (2018): Burnout and hopelessness among farmers: The Farmers Stressors Inventory. *Social Psychiatry and Psychiatric Epidemiology* 53 (8): 859-867. <https://doi.org/10.1007/s00127-018-1528-8>.
- Vogel, S., Engelhart, R., Larcher, M. (2018): Ehrenamtliches Engagement, Einstellungen zu Beruf und betrieblicher Entwicklung sowie Hofnachfolge als Faktoren landwirtschaftlicher Professionalisierung – eine empirische Analyse. Honorary Functions, Attitudes towards Farm Development and Farming as well as Farm Succession as Factors of Agricultural Professionalization – an Empirical Analysis. *Austrian Journal of Agricultural Economics and Rural Studies* 27 (22): 175-185. [https://doi.org/10.15203/OEGA\\_27.22](https://doi.org/10.15203/OEGA_27.22).
- Vogel, S., Wiesinger, G. (2003): Der Familienbetrieb in der Agrarsoziologie - ein Blick in die Debatte. *Ländlicher Raum* 5: 1-18. [https://www.bmluk.gv.at/dam/jcr%3A7644181a-a830-42e6-bdeb-4aa1e5e6878b/Vogel\\_end%5B1%5D.pdf](https://www.bmluk.gv.at/dam/jcr%3A7644181a-a830-42e6-bdeb-4aa1e5e6878b/Vogel_end%5B1%5D.pdf).
- Woolcock, M. (1998): Social Capital and Economic Development: Toward a Theoretical Synthesis and Policy Framework. *Theory and Society* 27 (2): 151-208. 03042421, 15737853. <https://www.jstor.org/stable/657866>.

## Appendix

### Survey Questions and Coding

#### 1. Socio-demographic variables

**How old are you?** ..... years (numerical value)

**What is your gender?**

- Female (1)
- Male (2)

**Your farm is located in**

- Germany
- Switzerland
- Austria, please specify your postcode ..... (numerical value)

#### 2. Farm characteristics

**What is your farm operating status?**

- Full-time farm (1)
- Part-time farm (2)

**Is your farm certified organic?**

- Yes (1)
- No (0)

**Is your farm classified as a mountain farm?**

- No (0)
- Yes group 1 (1-90 BHK points) (1)
- Yes group 2 (91-180 BHK points) (2)
- yes group 3 (181-270 BHK points) (3)
- yes group 4 (more than 270 BHK points) (4)

**What is the estimated contribution of income from your farm to your overall household income?**

- Less than 25% (1)
- 25% to less than 50% (2)
- 50% to less than 75% (3)
- 75% to less than 100% (4)
- 100 % (5)

**How would you perceive the level of debt burden on your farm?**

- Very low (1)
- Rather low (2)
- Medium (3)
- Rather high (4)
- Very high (5)
- I have no debt (0)

**What is the highest level of agricultural education you have completed?**

- Solely practical experience (1)
- Mid-level agricultural education (2)
- Advanced agricultural education (3)
- Other non-agricultural education (please specify): missing value .....(string)

**3. Farmers' perceptions of endogenous and exogenous factors of the farm household and social capital questions (inner family social capital ifsc, social capital of the farming community scfc)**

**To what extent do the following statements apply to you?** Please select the option that best reflects your situation.

	fully agree (1)	rather agree (2)	partially agree / disagree (3)	rather disa- gree (4)	fully dis- agree (5)
My farm can survive on the long-term					
The farm should stay in the family					
For the successful continuation of the farm, large financial investments are necessary*					
We have great understanding for the issues of each individual family member (IFSC)					
The local community has a high degree of appreciation for us farmers (SCFC)					
I am farmer due to family tradition					
Our family lacks time for mutual conversations (IFSC*)					
My farm is in a difficult financial situation*					
Social cohesion works without fail in our family (IFSC)					
Agricultural policies hinder planning					
Our family rarely adheres to what was agreed upon (IFSC*)					
Regulations (environmental, building permits...) hinder my farm endeavors					
In our family we speak openly about our worries (IFSC)					
The workload on our farm is very high					
I am satisfied with my vocation as a farmer					
Apart from our work we don't have a lot in common that we can talk about in our family (IFSC*)					
We live in a tolerant and honest community (SCFC)					
Our family lacks a good basis for communication (IFSC*)					
I am satisfied with the financial situation of my farm					
In our community, farmers have each other's back (SCFC)					

**Do you hold one or more leadership role(s) in voluntary organization(s)?**

- No (1)
- Yes (2) how many? (numerical value)

#### 4. Farmers' feeling of stress and stress-related issues

**Overall, do you feel stressed?**

- No (1)
- Yes, a little (2)
- Yes, a lot (3)

**Have you experienced any work-related accidents in the last three years?**

- No (1)
- Yes (2), how many? \_\_\_\_\_ (numerical value)

**On average, how many days of holiday do you take per year?**

Number of days: \_\_\_\_\_ (numerical value)

**Do you practice sport?**

- No, I do not exercise (1)
- Rarely (1x per month) (2)
- Occasionally (2-3 times per month) (3)
- Regularly (at least 1x per week) (4)