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Abstract: The study of farmers' mental health according to their production model (organic vs. conventional) suggests that organic farming was associated with better mental health than conventional farming. However, to our knowledge, no research has been conducted to examine the social psychological factors responsible for these differences. This research aims to investigate the role of job content and values on farmers' mental health according to their production model. To this end, an online questionnaire study on these dimensions was conducted on a sample of farmers. The results revealed that organic farmers scored significantly lower in anxiety and higher in positive emotions than conventional farmers. Psychological demand and conformity value appeared to be the most important explanatory factors related to the effect of farmers' production model on mental health. Implications for the response rate and farmers' mental health were discussed.

Keywords: farmers; organic farming; conventional farming; mental health; psychological demand; values

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1. Introduction

Agriculture is associated with many issues, including environmental issues due to its environmental impact [1], economic issues, or even societal issues due to its close link with animal welfare [2]. As an example, around 30% of global climate change is caused by the agricultural sector [3]. Also, there is an increasing focus on agriculture for reasons of productivity, sustainability, product quality and consumer concerns [3,4]. To meet these challenges and promote sustainable development, we need to make the transition to more respectful agricultural models. Organic farming and agroecology are two interesting models that are part of the agroecological transition. As defined by the International Federation of Organic Agriculture Movements [5], organic farming is a production model that aims to preserve the health of ecosystems by relying on ecological processes and biodiversity, rather than on the use of inputs whose impact on the environment is emphasized. This type of agriculture combines tradition, specific agronomic knowledge, innovation and science for the benefit of the environment, promoting equitable relations and a good quality of life for all concerned [5]. This model of production differs from the conventional approach by using no synthetic fertilizers, genetically modified organisms (GMOs) or pesticides to grow abundant crops while combating insects and disease [6]. Following on from organic farming, agroecology is the application of ecology to the study, design and management of sustainable agrosystems [7]. Agroecology relies on a better integration of ecological

processes in agricultural systems, replacing chemical and energy inputs by natural processes and building on biogeochemical cycles (minerals, energy, water) in order to reduce environmental impacts [8].

Based on these definitions, organic farming and agroecology appear to be the most appropriate models for facing the various challenges that agriculture is confronted with. These production models are particularly relevant to the issues of sustainable development and demand for organic food [3,4]. Meanwhile, the focus on conventional farming is more related to the use of chemicals, and to animal welfare. Then, all these agricultural models need to be studied in all their dimensions. Fortunately, both organic and conventional farming have been the subject of numerous comparisons, whether in terms of their impact on the environment [9], soil quality [10,11], greenhouse gas emissions [12,13], product quality [14–16], or the physical [17–20] and psychological [21,22] farmers' health. In order to favor the transition to more respectful agricultural models, we need to be sure that these models are beneficial for environment, animals, and humans including both consumers and farmers. Thus, a focus on farmers' health is an important issue for sustainable development.

With regard to farmers' mental health, a recent literature review showed that the observed differences were broadly in favor of organic farming and agroecology [23]. Thus, several studies reported that conventional farmers had a higher occurrence of depression [24,25], anxiety and stress [26,27], neurological symptoms [22]. Organic farming and agroecology were more associated with life satisfaction [26,28], job satisfaction [21,29,30], job control [21], wellbeing [31], and some values [31,32]. While these differences have not been systematically observed, particularly with regard to depression [22,24,33], no data in the literature have suggested a disadvantage of organic farming and agroecology over conventional farming on mental health [23]. However, to our knowledge, no theoretical model to explain these differences has been tested. Thus, two categories of social psychological factors usually studied in occupational psychology will be investigated in this article: job content dimensions [34] and Schwartz's value model [35,36].

Karasek's first stress model [37] presents two dimensions as defining different work situations: decision latitude (i.e., autonomy and control in decision-making, development and use of skills) and psychological demand (i.e., psychological load associated with the quantity and complexity of work, depending on time constraints, unforeseen events, interruptions, etc.). Four work situations are distinguished by the crossing of these dimensions (cf. Figure 1). A worker may be in an active situation (high decision latitude and high psychological demand), a passive situation (low decision latitude and low psychological demand), a relaxed situation (high decision latitude and low psychological demand) or a stressful situation (low decision latitude and high psychological demand). The dimension of social support was subsequently added [34,38], taking into account support from colleagues and hierarchy.

Schwartz's value model [35,36] describes 10 human values grouped into 4 higher-order values. The formers are self-transcendence, self-enhancement, openness to change, and conservatism. Self-transcendence represents concern for the welfare and interests of others and nature. This higher-order value groups benevolence (i.e., concern for people's welfare) and universalism (i.e., tolerance, protection toward people and nature) values. Self-enhancement is described as the pursuit of self-interests, and groups power (i.e., seeking prestige, dominance over people) and achievement (i.e., seeking personal success) values. Openness to change groups self-direction (i.e., independent actions and thoughts, creativity), stimulation (i.e., seeking novelty and challenge) and hedonism (i.e., pleasure, gratification for oneself) values, and is described as a preference for new experiences and independent actions and thoughts. Finally, conservatism represents resistance to change and preference for order and restriction. Conservatism groups security (i.e., safety and stability of society and relationships), conformity (i.e., respect for social expectations or norms) and tradition (i.e., acceptance of traditional culture or religion) values. Furthermore, Schwartz [35,36] places the four higher-order values on two orthogonal dimensions, where self-transcendence is opposed to self-enhancement while openness to change is opposed to conservatism. In addition, as part of the study of wellbeing, Dambrun et al. [39] showed

that self-transcendence was positively associated with authentic-durable happiness, a kind of happiness related to decreasing levels of cortisol. Self-enhancement was positively associated to fluctuating happiness, a kind of happiness characterized by an alternance of wellbeing and illbeing phases.

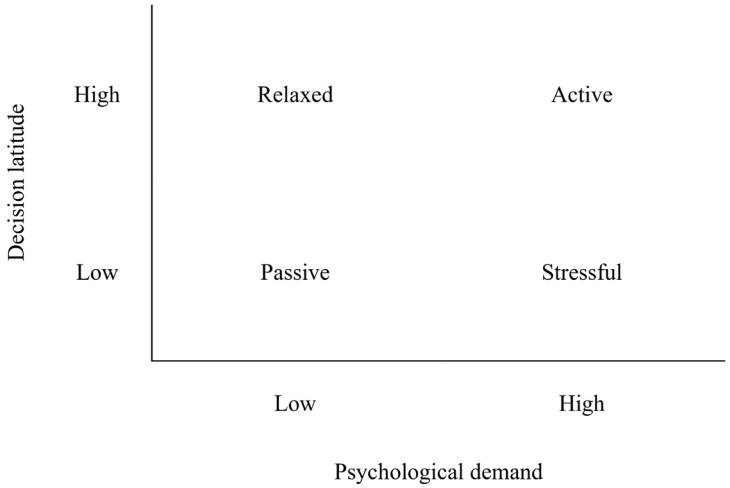

Figure 1. Job situations described by the crossing of the dimensions of decision latitude and psychological demand [37].

The literature on farmers' psychological health echoes these patterns. While both organic and conventional farmers portrayed a dependence on the natural environment (particularly the climate), the former reported a greater sense of social responsibility (i.e., acting for the benefit of society) and environmental responsibility (i.e., protecting the environment [40]). They also perceived more freedom [41] and control in their work [21]. In addition, workload is among the risk factors for both types of farming [40] but organic farming is more associated with developing new skills as well as stimulating learning [29]. Developing one's own resources is also seen as an important value for organic farmers [42]. Taken as a whole, these data could be analysed in terms of the decision latitude dimension, since it evaluates autonomy and competence. The data would therefore suggest a higher degree of decision latitude among organic farmers. Then, Loake's [43] work on farmers' energy expenditure, as well as the workload and work–life balance mentioned by Brigance et al. [40], would be related to the psychological demand dimension of Karasek and Theorell's model [34]. Overall, these data suggest a larger psychological demand among conventional farmers. In addition, the protective factors for wellbeing specific to organic farming listed by Brigance et al. [40] included interconnections, social networks, cohesion, and sense of community. These factors may correspond to the social support dimension of Karasek and Theorell's model [34], which seem to be higher in organic farming. Thus, these differences in job content dimensions suggest an "active"-like job situation for organic farmers and a "stressful"-like job situation for conventional farmers, which would result in mental health issues unfavorable to conventional farmers.

Concerning values, the work of McCann et al. [44] shows that financial aspects are used to define success in their profession by both organic and conventional farmers, but aspects such as soil quality or community are found only among organic farmers. In addition, organic farmers mentioned environmental cleanliness and providing resources for their families as important values for their wellbeing [42]. Other values concerning religion and spirituality [31] and nutrition [32] were identified as more present among organic farmers. Added to the community factors set out by Brigance et al. [40], these data can be grouped as personal, social and environmental elements in relation to wellbeing. This brings us closer to the self-transcendent dimension of Schwartz's model [35]. Also, of the four visions of agriculture identified by Cayre et al. [45], the ecological-intensive and holistic visions are presented as best corresponding to agroecology. Peer-to-peer exchanges

as well as consideration for the environment are found in both ideologies, and holism places particular importance on connections with nature [45], which can be particularly related to the universalism value. These data suggest that self-transcendent values would by higher among organic farmers than conventional farmers. The reversed would be expected with self-enhancement, as this higher-order value is opposed to self-transcendence. Finally, as organic farming implies new practices while conventional farming would be more restricted and linked to traditions, we expect more conservatism among conventional farmers and more openness to change among organic farmers. Thus, due to their relationship with happiness [39], higher values in organic farmers (especially self-transcendent values) would be beneficial to their mental health. Conversely, higher values in conventional farmers, especially self-enhanced values, would be detrimental to their mental health.

The aim of the present study was to investigate the underlying social psychological variables that explain the differences in mental health between conventional and organic farmers. The survey presented in this article was carried out targeting the population of French farmers. This work on relationships between health and agricultural models was integrated in the framework of sustainability, as it promoted the identification of the best practices for sustainable development. From the standpoint of the selected models and the literature, we predicted that the job content would refer to an active situation for organic farmers, and a stressful one for conventional farmers. Moreover, organic farmers should share more self-transcendent and open to change values, while conventional should share more conservative and self-enhanced values. These differences would be responsible for better mental health among organic farmers than conventional farmers.

We hypothesize that organic farmers will have higher positive mental health (i.e., authentic-durable happiness, life satisfaction, positive affects), psychological wellbeing, and job satisfaction scores and lower negative mental health (i.e., anxiety, depression, negative affects) scores than conventional farmers. These differences will be associated with higher scores of self-transcendence and openness to change among organic farmers. Higher self-enhancement and conservatism scores among conventional farmers were also expected. The job content of organic farmers will be characterized by a "high decision latitude, high psychological demand, high social support" structure, while conventional farmers' job content will be closer to a "low decision latitude, high psychological demand, low social support" structure. Analysed separately, job content dimensions should show the following differences: higher decision latitude and social support scores, and lower psychological demand score among organic farmers than conventional farmers. Mediations will be tested with variables identified as significantly different according to the production model. These hypotheses are summarized in Table 1.

Table 1. Synthesis of study hypotheses.

Variables	Hypotheses (Organic vs. Conventionnel)
Mental health	
Positive mental health indicators	$\mu_O > \mu_C$
Psychological wellbeing	$\mu_O > \mu_C$
Job satisfaction	$\mu_O > \mu_C$
Negative mental health indicators	$\mu_O < \mu_C$
Explanatory models	
Job content	
Decision latitude	$\mu_O > \mu_C$
Psychological demand	$\mu_O < \mu_C$
Social support	$\mu_O > \mu_C$
Schwartz human values	
Self-transcendence	$\mu_O > \mu_C$
Self-enhancement	$\mu_O < \mu_C$
Openness to change	$\mu_O > \mu_C$
Conservatism	$\mu_O < \mu_C$

2. Method

2.1. Participants

The population of interest was French farmers, particularly livestock breeders (mainly on farms with cows, pigs or poultry). Participants were recruited by distributing the questionnaire via social networks, breeders' associations or groups, without reward. The questionnaire was consulted by 218 farmers or breeders, with complete or partial answers. Figure 2 show the evolution of the response rate from the consultation of the survey to the final sample. To test our hypotheses, we needed to select and categorize participants as either conventional or organic farmers. To do this, participants were invited to answer the following question: "What is your production model? You can check several options." Participants could answer the following: (a) agroecology, (b) organic farming, (c) conventional farming, (d) in conversion, (e) farming with a quality label or (f) other. Participants who checked "conventional farming" without checking neither "organic farming" nor "agroecology" were grouped in the category of conventional farmers. Participants who checked "organic farming" and/or "agroecology" without checking "conventional farming" were grouped in the category of organic farmers. Other participants were excluded from analyses (the remaining answer choices were used to prevent participants from guessing the study objectives). After this process, the final sample comprised 51 participants (26 females; 1 unknown; M = 44.88 years; SD = 8.32).

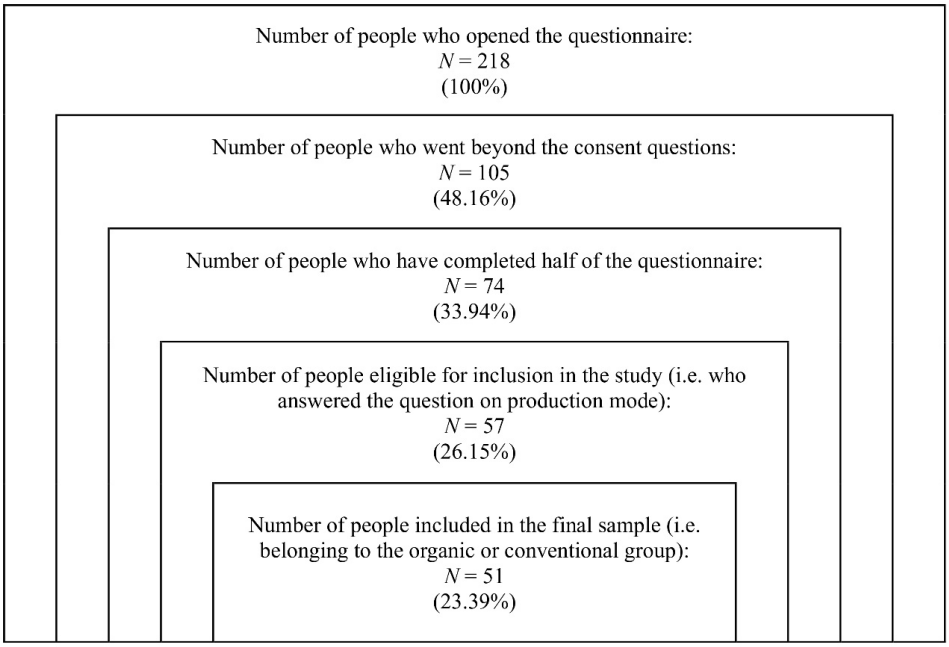

Figure 2. Number of study respondents by questionnaire completion level.

Thirty-two participants were grouped in the category of organic farmers, while the remaining nineteen were grouped in the category of conventional farmers. The year of installation ranged from 1982 to 2021 (M = 2006). Twenty-nine installations were family-run, while twenty-one were non-family-run. The most common agricultural training was the "advanced technician's certificate" (n = 17). The most common production system was dairy cattle (n = 24).

2.2. Material

The questionnaire was designed using Qualtrics software. It included an information note with a non-opposition form, socio-demographic (diploma, gender and age) and farms questions, and psychometric measures. Questions about farms focused on year of setting up, type of establishment (i.e., within or outside the family context), number of human worker units (HWU), utilized agricultural area (UAA), livestock units, type of system (e.g.,

dairy bovine, dairy ovine, etc.), and production model (e.g., organic, conventional, etc.). Psychometric scales for social psychological factors and mental health included the Job Content Questionnaire [46], the Portrait Value Questionnaire (PVQ [36]), the Subjective Authentic-Durable Happiness Scale [39], the Hospital Anxiety and Depression scale [47], the Psychological Wellbeing Scale [48], the Positive and Negative Affect Scale (PANAS [49]), the Satisfaction With Life Scale [50] and the Job Satisfaction Scale [51]. In sum, participants were asked to answer 124 questions.

Job content. The job content questionnaire [46] was a four-point Likert scale (ranging from 1 [Strongly disagree] to 4 [Strongly agree]), consisting of 29 items divided into 3 constructs. This scale was translated into French for the study. The first construct ($\alpha = 0.68$) measured the decision latitude dimension in nine items. Item 4 was reversed. Items 2 and 8 were removed from the analyses due to their low correlation with the construct. Niedhammer et al. [52] suggested a threshold of 70 for this dimension, but with the removal of 2 items, the threshold for this study was adapted to 46. The second construct ($\alpha = 0.72$) measured the psychological demand dimension in nine items. Items 12, 13 and 14 were reversed. The threshold score for this dimension was 21 [52]. The third construct ($\alpha = 0.91$) measured social support and included five items on support from hierarchy and six items on support from colleagues. Items 21 and 26 were reversed. The threshold score for this dimension was 24 in Niedhammer et al.'s version, which comprised 8 items. In the current 11-item version, the threshold was adapted to 36.

Values. The Portrait Value Questionnaire [36] was a seven-point semantic differentiator scale (ranging from 1 [Not like me at all] to 7 [Very much like me]) composed of 21 items presenting descriptions of individuals corresponding to values. Benevolence value in two items and universalism in three items were grouped into a dimension of self-transcendence ($\alpha = 0.72$). Achievement and power values, both assessed by two items, were grouped into a self-improvement dimension ($\alpha = 0.75$). Security value in two items, conformity in two items and two-item tradition were grouped into a conservatism dimension ($\alpha = 0.60$). Finally, self-direction, stimulation, and hedonism values, each assessed by two items, were combined in a dimension of openness to change ($\alpha = 0.73$).

Authentic-durable happiness. The Authentic-Durable Happiness Scale [39] was a 7-point semantic differentiator scale (ranging from 1 [Very low] to 7 [Very high]) composed of 16 items. Of these items, 13 assessed durable happiness and 3 assessed durable unhappiness. Only durable happiness items were used in this study ($\alpha = 0.98$). Two dimensions were measured by these items: a contentment dimension ($\alpha = 0.97$) measured in eight items and an inner peace dimension ($\alpha = 0.95$) measured in five items.

Anxiety and depression. The Hospital Anxiety and Depression scale [47] presented 14 multiple-choice questions rated from 0 to 3 points, to measure a seven-item anxiety dimension ($\alpha = 0.82$) and a seven-item depression dimension ($\alpha = 0.72$). A score less than or equal to 7 indicated no symptomatology, a score between 8 and 10 indicated doubtful symptomatology, and a score greater than or equal to 11 indicated definite symptomatology.

Psychological wellbeing. The psychological wellbeing scale [48] was a seven-point Likert scale (ranging from 1 [Strongly disagree] to 7 [Strongly agree]), composed of 18 items assessing six dimensions of wellbeing. The autonomy dimension ($\alpha = 0.72$) was measured by three items. The environmental mastery dimension ($\alpha = 0.70$) was measured by three items. The personal growth dimension ($\alpha = 0.64$) was measured by three items. The dimension of positive relationships with others ($\alpha = 0.59$) was measured by three items. The dimension of self-acceptance ($\alpha = 0.83$) was measured by three items. Finally, the dimension of purpose in life ($\alpha = 0.29$) was measured by three items.

Positive and negative affects. The PANAS scale [47,49] was a 5-point semantic differentiator scale (ranging from 1 [Very little or not at all] to 5 [Extremely]), consisting of 10 items in its abbreviated version [53]. This scale measured a positive affect construct ($\alpha = 0.69$) with items 5, 7, 8 and 9. Item 3 was removed from the analyses due to its low correlation with the construct. A negative affect construct ($\alpha = 0.79$) was also measured, with items 1, 2, 4, 6 and 10.

Life satisfaction. The satisfaction with life scale [50,54] was a seven-point Likert scale (ranging from 1 [Strongly disagree] to 7 [Strongly agree]) composed of five items ($\alpha = 0.88$).

Job satisfaction. The satisfaction with work scale [51] was a seven-point Likert scale (ranging from 1 [Strongly disagree] to 7 [Strongly agree]) composed of five items ($\alpha = 0.85$).

2.3. Procedure

Farmers were invited to complete the questionnaire as part of a study on wellbeing at work conducted by the Laboratoire de Psychologie Sociale et Cognitive (LAPSCO) and the Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement (INRAE). The questionnaire was self-administered by participants. It was also possible to pause the questionnaire and resume it later. The questionnaire was the same for each participant, with no randomization of scale order. After certifying their majority and consent, participants were first asked to complete the scales presented in the order shown in the previous section. They then completed the socio-demographic and farm questions. Data were collected in spring 2022.

2.4. Statistical Analysis

Statistical analyses were performed on Jamovi (Version 2.3.6). The alpha level used for significance was 0.05. For all following tests, the normality of the data was verified by the Kolmogorov–Smirnov test. All variables fell within the validity framework for normality ($p > 0.05$).

Group equivalence was checked with binomial logistic regressions on the binomial dependent variable "Production model" (Organic vs. Conventional). Due to the amount of socio-demographic and farm variables, two binomial logistic regressions were performed. A first regression model regrouped as predictors only socio-demographic variables (i.e., age, gender, and diploma). A second regression model regrouped farm variables (i.e., year of installation, type of installation, human worker units, utilized agricultural area, livestock units, type of system).

Differences in mental health were investigated using Multivariate Analyses of Covariance. The factor 2 "Production model" (Organic vs. Conventional) was tested on three models: (a) authentic-durable happiness, positive affects, and life satisfaction (i.e., positive mental health model), (b) autonomy, positive relations with others, self-acceptance, environmental mastery, personal growth, and purpose in life (i.e., psychological wellbeing model), and (c) anxiety, depression, and negative affects (i.e., negative mental health model). These MANCOVAs were performed using Pillai's trace, as this parameter is better for small sample sizes. In addition, difference in job satisfaction was examined using Student's independent samples means comparison test because it was the only work-specific measure of health.

Job content dimensions were examined with Student's independent samples means comparison test, conducted with the factor 2 "Production model" (Organic vs. Conventional) on decision latitude, psychological demand, and social support scores. These tests were carried out to test differences between groups. In addition, for each group, each job content dimension was compared to its threshold score with Student's one sample t-test. These analyses aimed to determine the job situation of each group (cf. Figure 1).

Concerning human values, four MANCOVAs were conducted to examine differences in values between groups. Each model represented one dimension of Schwartz's circumplex model. Thus, the factor 2 "Production model" (Organic vs. Conventional) was tested on the following: (a) benevolence and universalism values (i.e., self-transcendence value model), (b) power and achievement values (i.e., self-enhancement value model), (c) stimulation, hedonism, and self-direction values (i.e., openness to change value model), and (d) security, tradition, and conformity values (i.e., conservatism value model). These MANCOVAs were still performed using Pillai's trace.

In the final stage, mediation analyses were performed with the factor 2 "Production model" (Organic vs. Conventional) as the independent variable. Dependent variables were

mental health indicators identified as significantly different between groups in previous analyses. Similarly, mediators were psychosocial indicators identified as significantly different between groups. In these tests, only indirect effects were checked. Indeed, total effects were redundant with previous analyses and direct effects were unnecessary due to the outdated terminology of partial and total mediations [55]. When a significant indirect effect was identified, the reversed model was also tested (i.e., a model in which the dependent variable and the mediator were reversed). For all these mediation tests, confidence intervals were used to indicate significance (i.e., significant effect when the CI did not contain 0).

3. Results

3.1. Group Equivalence

Equivalence between the group of organic farmers (i.e., the "Organic" group) and the group of conventional farmers (i.e., the "Conventional" group) was checked for socio-demographic factors and various farm variables. As shown in Table 2, of the 19 variables tested, 4 (i.e., type of installation, advanced technician's certificate, master's degree in Engineering, livestock unit) suggested trend differences in the production model, but without reaching the significance threshold. The other 15 variables showed no effect.

Table 2. Characteristics of organic (n = 32) and conventional (n = 19) farmer groups.

Variables	**«Organic» Group**	**«Conventional» Group**	***p*-Value ***
Gender			0.30
Male	n = 17	n = 9	
Female	n = 14	n = 10	
Age	M = 44.84	M = 44.95	0.71
Year of setting up	M = 2007	M = 2005	0.97
Type of establishment			0.09
In a family context	n = 14	n = 15	
Outside the family context	n = 17	n = 4	
Diploma			
Advanced technician's certificate	n = 13	n = 4	0.07
High school diploma	n = 9	n = 5	0.31
Vocational agricultural course	n = 6	n = 4	0.84
Master's degree in Engineering	n = 5	n = 1	0.06
Other	n = 10	n = 7	0.18
Human worker units	M = 2.22	M = 2.11	0.24
Utilized agricultural area	M = 74.01	M = 147.11	0.47
Livestock units	M = 52.60	M = 143.56	0.06
Type of system			
Dairy bovine	n = 18	n = 6	0.70
Suckling bovine	n = 9	n = 14	0.78
Dairy ovine	n = 1	n = 1	1.00
Suckling ovine	n = 3	n = 1	0.99
Dairy capri	n = 6	n = 1	0.99
Equine	n = 1	n = 1	0.99
Other	n = 6	n = 2	0.54

Notes. * p-value from binomial logistic regression (see Section 2.4. Statistical Analysis).

3.2. Mean Comparison Tests

3.2.1. Mental Health

The hypotheses of this study predicted higher scores of positive mental health indicators (i.e., authentic-durable happiness, positive affects, life satisfaction), psychological wellbeing, and job satisfaction, and lower scores of negative mental health indicators (i.e.,

anxiety, depression, negative affects) for organic farmers compared to conventional farmers. The results are presented in Table 3.

Table 3. Mean differences in mental health between organic and conventional farmers.

Variables	M_O (*SD*)	M_C (*SD*)	Pillai's Trace	*F*	*t*
Positive mental health			0.18	3.34 *	
Authentic-durable happiness	4.30 (1.36)	3.95 (1.18)		0.79	
Positive affects	4.09 (0.47)	3.68 (0.72)		8.05 **	
Life satisfaction	23.75 (6.36)	21.50 (6.45)		1.99	
Psychological wellbeing			0.09	0.65	
Autonomy	16.47 (3.79)	16.22 (2.58)		0.09	
Positive relations with others	14.74 (3.87)	14.00 (4.00)		0.78	
Self-acceptance	15.63 (4.09)	14.61 (3.18)		0.86	
Environmental mastery	14.75 (3.40)	13.67 (3.25)		1.84	
Personal growth	16.13 (3.75)	14.76 (3.36)		1.60	
Purpose in life	16.71 (2.70)	14.94 (3.26)		3.10	
Job satisfaction	24.39 (6.34)	22.33 (4.74)			1.19
Negative mental health			0.17	2.90 *	
Negative affects	2.10 (0.68)	2.52 (0.97)		3.08	
Anxiety	9.00 (4.18)	11.11 (4.01)		4.07 *	
Depression	7.34 (4.12)	6.74 (2.94)		0.51	

Notes. M_O = Mean for the organic group; M_C = mean for the conventional group; * $p < 0.05$; ** $p < 0.01$.

As depicted, an overall difference in positive mental health was identified ($p = 0.027$). Precisely, in this model, the positive affect score was significantly higher among organic farmers than conventional farmers ($p = 0.007$). In addition, the negative mental health model showed a significant difference between groups ($p = 0.045$). In this model, anxiety was lower among the organic group ($p = 0.050$). These differences were consistent with our hypotheses. The other indicators and the psychological wellbeing model did not differ between groups.

3.2.2. Psychosocial Factors

The hypotheses predicted that the job situation of organic farmers would be a "high decision latitude, high psychological demand, high social support" combination, while that of conventional farmers would be a "low decision latitude, high psychological demand, low social support" combination. Additional hypotheses predicted that organic farmers would score higher on decision latitude and social support, and lower on psychological demand, than conventional farmers. Then, it was expected that scores of self-transcendence and openness to change values would be higher among organic farmers, in contrast to scores of self-improvement and conservatism values. The results are presented in Table 4.

As depicted, the decision latitude score of the "Organic" group ($M_O = 60.31$) was significantly higher than the threshold score of 46 ($t(31) = 10.1$; $p < 0.001$), as was the score of the "Conventional" group ($M_C = 57.68$; $t(18) = 6.43$; $p < 0.001$). The psychological demand score of the "Organic" group ($M_O = 22.03$) did not significantly exceed the threshold score of 21 ($t(31) = 1.22$; $p = 0.24$). The "Conventional" group score ($M_C = 25.18$) was significantly higher than the threshold ($t(16) = 4.54$; $p < 0.001$). The social support score of the "Organic" group ($M_O = 33.85$) was not significantly different from the threshold of 36 ($t(19) = -1.30$; $p = 0.21$). The score of the "Conventional" group ($M_C = 34.50$) also did not differ from the threshold ($t(7) = -0.93$; $p = 0.38$). Then, these results describe a "high decision latitude, moderate psychological demand, moderate social support" type of job situation for the "Organic" group, and a "high decision latitude, high psychological demand, moderate social support" type of job situation for the "Conventional" group. These results were thus weakly in line with the hypotheses expecting an "active" situation for the "Organic" group and a "stressful" situation for the "Conventional" group.

Table 4. Mean differences in job content and values between organic and conventional farmers.

Variables	M_O (*SD*)	M_C (*SD*)	Pillai's Trace	*F*	*t*
Decision latitude	60.31 (8.03)	57.68 (7.92)			1.14
Psychological demand	22.03 (4.77)	25.18 (3.80)			−2.35 *
Social support	33.85 (7.38)	34.50 (4.57)			−0.23
Self-transcendence			0.02	0.55	
Benevolence	5.88 (0.78)	5.76 (1.02)		0.18	
Universalism	5.93 (0.98)	5.63 (0.87)		1.11	
Self-enhancement			0.05	1.21	
Achievement	2.88 (1.42)	3.50 (1.36)		2.22	
Power	2.30 (1.26)	2.71 (1.11)		1.28	
Conservatism			0.29	5.93 **	
Security	3.55 (1.44)	4.47 (1.40)		3.62	
Conformity	3.66 (1.23)	5.09 (1.02)		17.53 ***	
Tradition	3.44 (1.22)	4.22 (1.57)		4.35 *	
Openness to change			0.06	1.01	
Self-direction	5.91 (0.85)	5.47 (0.72)		2.91	
Stimulation	4.24 (1.47)	4.03 (1.58)		0.22	
Hedonism	5.00 (1.27)	4.56 (1.29)		1.29	

Notes. M_O = Mean for the organic group; M_C = mean for the conventional group; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Moreover, consistent with additional hypotheses, the psychological demand score was significantly lower among organic farmers than conventional farmers ($p < 0.05$). Decision latitude and social support scores did not differ between groups ($p = 0.26$ and $p = 0.82$, respectively), which was not consistent with our hypotheses. Once again, the results were weakly in line with predictions.

To sum up, Figure 3 presents the statistical comparisons between groups for each job content dimension. The threshold for each dimension is also illustrated as a visual support of the previous results.

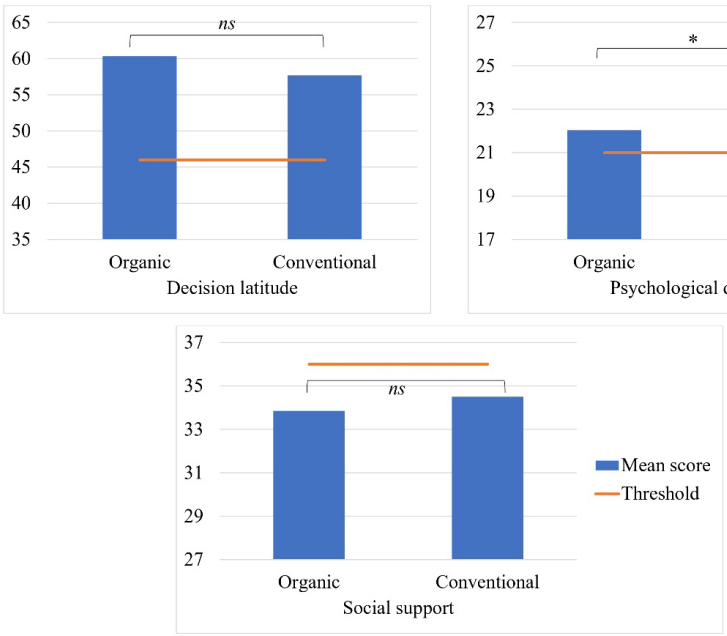

Figure 3. Mean scores for decision latitude, psychological demand and social support according to production model (organic vs. conventional). Notes. * Significant difference between groups at $p < 0.05$. *ns* = non-significant difference between groups.

Finally, a significant difference was identified in the conservatism values model ($p = 0.002$). In more detail, tradition and conformity values were significantly lower among organic farmers (respectively $p = 0.043$, and $p < 0.001$). These effects were particularly salient when representing the results with Schwartz's circumplex model, as illustrated in Figure 4. This figure shows the scores of the two groups for each value of Schwartz's circumplex. The more a group's curve is on the outside of the circumplex, the higher the value score is for that group. Moreover, a significative difference between the two curves indicates a gap between the group values. The range between organic and conventional farmers' curves appears more accentuated for conformity and tradition scores than for other values. These effects were consistent with our hypotheses. The other indicators and models did not differ between groups.

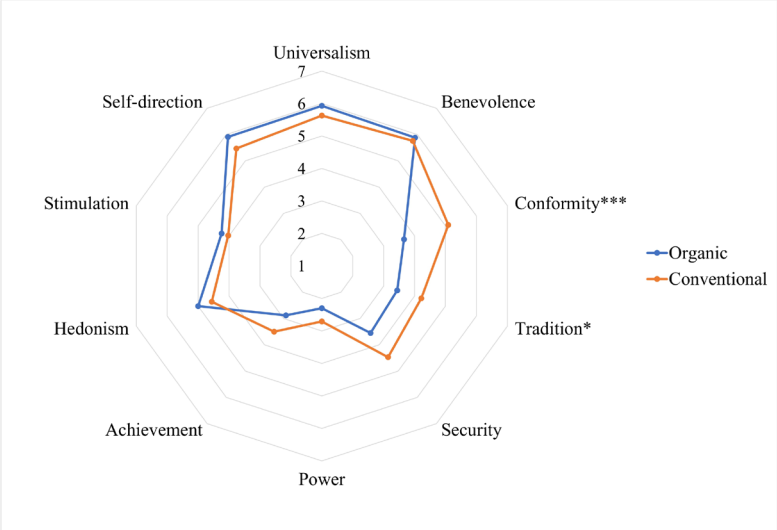

Figure 4. Organic and conventional farmers' values represented as Schwartz's circumplex model. Notes. * $p < 0.05$, *** $p < 0.001$.

3.3. Mediation Tests

Among the psychosocial factors tested (decision latitude, psychological demand, social support, human values), the dimensions of psychological demand, conformity, and tradition differed significantly according to the production model. In addition, out of 13 mental health factors measured, the dimensions of positive affect and anxiety were significantly different between production models. On this basis, mediation analyses were carried out with these three psychosocial factors as mediators of the effect of factor 2 "Production mode" on each of the two mental health indicators identified. The tested models are summarized in Figure 5.

As depicted in Table 5, mediation analyses revealed a significant indirect effect of conformity on positive affects (i.e., Model 2). The reversed model (i.e., effect of production model on conformity with positive affect score as mediator) was not supported by the data, i.e., the indirect effect was not significant ($b = 0.27$; $se = 0.16$; 95% $CI = -0.04, 0.58$). Also, analyses showed a significant indirect effect of psychological demand on anxiety score (i.e., Model 4). Once again, the indirect effect of the reversed model was not significant ($b = 1.35$; $se = 0.86$; 95% $CI = -0.33, 3.03$). These two indirect effects were consistent with the hypotheses. The other indirect effects were not significant.

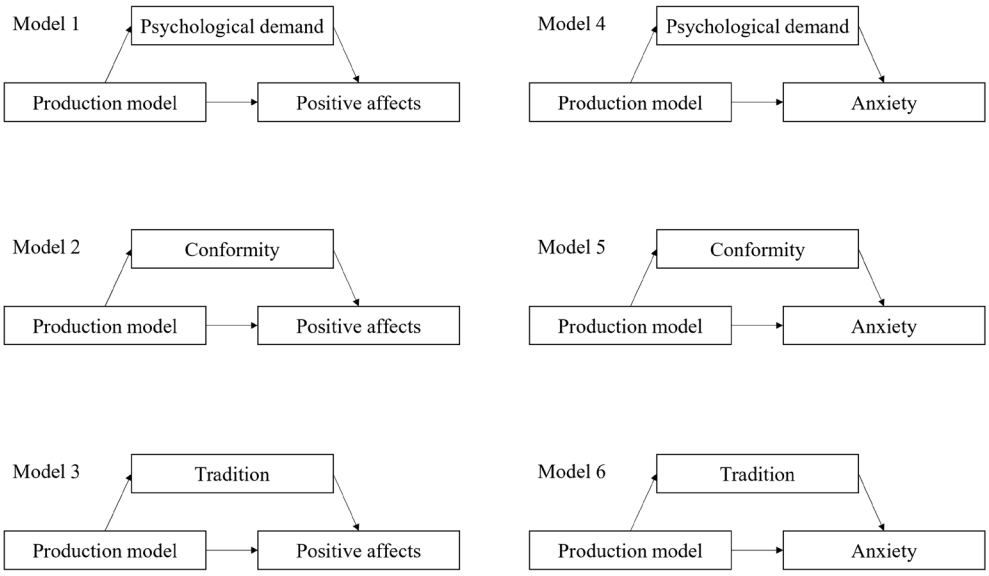

Figure 5. Tested mediation models.

Table 5. Results concerning the tested mediation models.

	Indirect Effect	**Direct Effect**	**Total Effect**
Dependent Variable: Positive affects			
Model 1	$b = -0.11$ *CI*: −0.25, 0.03	$b = -0.32$ *CI*: −0.66, 0.02	$b = -0.41$ *CI*: −0.73, −0.08
Model 2	$b = -0.25$ *CI*: −0.47, −0.03	$b = -0.12$ *CI*: −0.48, 0.24	$b = -0.41$ *CI*: −0.73, −0.08
Model 3	$b = 0.03$ *CI*: −0.07, 0.13	$b = -0.40$ *CI*: −0.74, −0.05	$b = -0.41$ *CI*: −0.73, −0.08
Dependent Variable: Anxiety			
Model 4	$b = 1.84$ *CI*: 0.21, 3.47	$b = 0.16$ *CI*: −1.81, 2.13	$b = 2.11$ *CI*: −0.21, 4.42
Model 5	$b = 0.23$ *CI*: −1.22, 1.67	$b = 2.06$ *CI*: −0.74, 4.85	$b = 2.11$ *CI*: −0.21, 4.42
Model 6	$b = -0.50$ *CI*: −1.34, 0.34	$b = 3.00$ *CI*: 0.51, 5.50	$b = 2.11$ *CI*: −0.21, 4.42

Notes. Contrast used for independent variable: Organic group = 0, conventional group = 1. Significant indirect effects appear in bold.

4. Discussion

The aims of this research were to examine differences in mental health between organic and conventional farmers, as well as to investigate these differences with regard to two theoretical models: the job content model [34,37,46] and Schwartz's value model [35,36]. This work was set to improve the knowledge about agricultural practices and their effects on health, key elements for sustainability. Organic farmers were expected to score higher on positive mental health (i.e., authentic-durable happiness, positive affects, life satisfaction), psychological wellbeing, and job satisfaction, and lower on negative mental health (i.e., anxiety, depression, negative affects) than conventional farmers. These differences were expected to be explained by (i) an active-type job situation in organic farmers and a stressful-type job situation in conventional farmers, (ii) higher levels of self-transcendence and openness to change and lower levels of self-enhancement and conservatism in the same farmers. An online questionnaire study was carried out to test these hypotheses. The main results showed broadly consistent support for these hypotheses, particularly with regard to values, despite a general lack of significance.

The study data highlighted the effect of the production model on two indicators of mental health: positive affect and anxiety. These data were in line with the literature regarding anxiety [26,27] but lack support regarding life satisfaction [26,28], job satisfaction [21,29,30] and wellbeing [31]. In addition, the effect sizes observed correspond to average effects according to Cohen's classification [56], which was in line with what is usually observed in the literature [23]. With regard to the absence of differences in depression, these results were in line with those of Cross et al. [24], Khan et al. [22], and Nankongnab et al. [33]. Thus, these data show several differences in the advantage of organic farmers on some dimensions and no difference on other dimensions. Moreover, no dimension showed a trend in favor of conventional farming, in line with the literature [23].

Job content analysis based on Karasek and Theorell's model [34] revealed a "high decision latitude, moderate psychological demand, moderate social support" type of job situation for organic farmers, referring to an active situation. The combination of dimensions was of the "high decision latitude, high psychological demand, moderate social support" type for conventional farmers, referring to an active situation. In addition, the results revealed a higher level of psychological demand among conventional farmers. The other two dimensions did not differ. The differences in mental health cannot therefore be attributable to social support, being similar between groups despite suggestions in the literature [40], nor were these differences attributable to decision latitude, which also showed no differences contrary to what the literature suggested [21,29,40–42]. It is important to remember that this article is about decision latitude and social support as applied to the workplace. Indeed, these dimensions taken in a broader sense (i.e., autonomy in one's global life, presence and support of friends and family) could still differ according to the production model and participate in mental health issues. The study of farmers' living environment beyond their simple working conditions could provide further light on these issues. Coming back to the workplace, only the effect of psychological demand can be put forward as an explanatory lead for differences in mental health according to production model, despite the weak existing data on this side [40,43]. This is all the more relevant as psychological demand has emerged as a mediator of the effect of the production model on anxiety. In other words, the higher intensity and workload in conventional farming could promote anxiety. However, it remains important to gather more data on this subject, given the correlational nature of the data.

With regard to Schwartz's value model, although literature data on the physical and social environment [40,42] as well as on values and spirituality [31,32,45] suggest higher self-transcendence and openness to change values among organic farmers, the study data did not support this hypothesis. In addition, no differences were found in self-enhancement, contrary to the hypotheses. Despite this, the observed differences in the conservatism dimension were consistent with the hypotheses. Indeed, these effects suggest higher levels of these values among conventional farmers, especially conformity, which was consistent with the predictions. Thus, despite partial empirical support, the question of values should be the subject of further investigation, especially since we were comparing a group with a pro-environmental orientation (i.e., organic farming and agroecology) with a group without such an orientation (i.e., conventional farming). Several studies have in fact already been carried out in the context of pro-environmental attitudes and behavior, highlighting the explanatory role of some values [57,58]. The role of conformity was particularly interesting being associated with the largest effect sizes and appearing as a mediator of the relationship between production mode and positive affects. This highlights notions such as the importance of respecting shared, compliant traditions and practices. These notions are found in the perceived norm dimension of the theory of planned behavior [59] and could be mobilized in the explanation of reluctance to convert to organic farming. This could also favor a more general restriction of one's behaviors and thus engender difficulties in engaging in actions in line with one's values, reflecting a loss of psychological flexibility [60]. However, this loss of flexibility could also play a part in the origin of differences in mental health.

Finally, beyond the differences between organic and conventional farmers, the sample's results on Zigmond and Snaith's Hospital Anxiety and Depression scale [47] show worrying average scores. The sample's mean score on the depression dimension was $M = 7.12$, and that on the anxiety dimension was $M = 9.78$. As a reminder, the threshold for doubtful symptomatology on this scale was 8, and that for definite symptomatology was 11 [47]. Anxiety scores therefore correspond to doubtful symptomatology, while depression scores were very close to this category. These data echo work highlighting the high incidences of anxiety, depression and even suicide in the farming environment compared to other occupational settings [61–64]. It thus remains important to consider the agricultural environment as a high-risk profession, particularly in the wake of the COVID-19 pandemic, whose negative impacts on farmers' mental health have already been demonstrated [65,66].

Despite the adequate reliability of the scales used and the relative consistency of the data with those in the literature, this research faces two main limitations. Firstly, the scale used to evaluate job content dimensions [34] was limited due to some items that seemed to be too general to be applicable to the agricultural environment. This limit concerns particularly the social support construct. As the latter assesses dimensions of support from colleagues and hierarchy, it is not certain that the items concerned apply to farmers, who do not necessarily have colleagues or hierarchy. Although this scale showed good internal validity with satisfactory reliability in the study (as a reminder, $\alpha = 0.91$), external validity is called into question. It therefore appears necessary to develop a measurement instrument that better reflects working conditions, using the term "associate" rather than "colleague" or "hierarchy", for example.

The second main limitation of this research was the small number of participants. Indeed, as shown in Figure 2, only 57 participants provided answers that could be processed in the study. In addition, only 51 participants could be included in the results out of 218 questionnaire openings, i.e., 23.39% of openings. This means that around half of the individuals who started the questionnaire did not go beyond the consent questions. Such a low participation rate calls into question the statistical power and external validity of the study. Indeed, despite the identification of some effects in line with the literature [23], we can suggest that the weak power of this study led to an underestimation of differences between groups in mental health. This problem of a weak response rate has already been noted in several studies [28,67]. An international survey conducted by Harzing [68] placed France among the countries with the lowest response rates, with a proportion of around 13%, alongside the USA (11%) and Germany (14%), compared with around 26% in the Netherlands, 31% in Ireland and 41% in Denmark. The survey in question was carried out in the Netherlands and was presented to respondents as such, which differs from the present study where the questionnaire was purely national. However, the findings of Harzing [68] remain interesting. Three factors have been shown to be negatively related to response rate: the number of questionnaires received in general, the perceived distance from the sender, and the sensitivity of the topic addressed [68]. Interest in the subject, on the other hand, was a factor positively associated with response rate. In this research, the presentation of the studies being in partnership with INRAE and an engineering school may have favorably reduced the perceived distance factor. On the other hand, as we mentioned and noted in the results, agriculture is an occupational environment at risk for its effects on physical and psychological health [62,63]. It is therefore conceivable that the topic of the present research (i.e., farmers' mental health) was perceived as quite sensitive. The low participation rate could thus be a sign of this sensitivity and of the difficulties encountered in the farming community. Finally, the lack of participation could also be due to the survey format. This type of questionnaire (i.e., online) is indeed uncommon in this professional milieu, compared with face-to-face interviews. In short, the low participation rate may reflect both the sensitivity of the subject and the unusual survey format. Conducting face-to-face interviews would enable us to obtain more information on this subject, so as to design the most appropriate material possible, both for the population (e.g., preferred modalities) and for the needs of the research (e.g., costs, social desirability).

5. Conclusions

To conclude, the promotion of sustainable development implies the adoption of respectful agricultural models and practices. Therefore, it is necessary to identify the best models in terms of environmental and animal health, economy, and human health. In addition, alongside the work on consumers' health, the study of farmers' health appears to be central. The current study was integrated in this framework. Analysing the differences in mental health between organic and conventional farmers, we found little to moderate effects in favor of organic farming, consistent with the literature. Thus, despite the need for more studies on largest samples, our preliminary results confirmed that more respectful agricultural models are beneficial for both environmental and human health. To overcome some limitations, future studies using shorter materials and conducted directly in the ground seem to be more appropriate and would bring deeper advances to the research field. The study of indicators broader than those specific to working conditions could also represent an enriching prospect to be explored.

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Informed Consent Statement: All participants gave their informed consent for inclusion before they participated in the study. The protocol of this study was approved by the Université Clermont Auvergne's ethics committee (IRB00011540-2022-07).

Data Availability Statement: The data presented in this study are available upon request from the corresponding author.

Conflicts of Interest: The authors report there are no competing interests to declare.

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