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Living in rural area: A protective factor for a negative experience of the lockdown and the COVID-19 crisis in the oldest old population?

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Abstract

Objectives: Some factors influence the experience of the COVID-19 pandemic (health, loneliness, digital access...), but what about the living area? The objective was to compare between rural and urban areas, the psychological and social experiences of the older individuals with regard to the COVID-19 crisis during the first French lockdown.

Methods: The sample included participants of three existing population-based cohorts on aging. Telephone interviews conducted by psychologists focused on the lockdown period. Data collected included living environment, professional assistance, social support, contacts with relatives, difficulties encountered, health, and knowledge and representations of the epidemic. The negative experience was defined by the presence of at least two of the following items: high anxiety symptomatology, depressive symptoms, worries or difficulties during the lockdown and insufficient social support.

Results: The sample included 467 participants, aged on average 87.5 years (5.2), 58.9% were female and 47.1% lived in rural areas. Persons living in rural area had better social support, greater family presence, a less frequent feeling of imprisonment (OR = 0.60, 95 CI% = 0.36-0.99), 95% had a garden (vs. 56%), fewer depressive symptoms and lower anxiety scores, but also tended to lower comply with the health measures. Finally, they had an almost twofold lower risk of having a negative experience of the lockdown compared to their urban counterparts (OR = 0.55, 95% CI = 0.33–0.92, p = 0.0223).

Conclusions: The oldest old living in rural area experienced the first lockdown better than the urbans. Living conditions, with access to nature, a greater social support and family presence, could have contributed to these findings.

KEYWORDS
cohort studies, epidemiology, geriatrics, oldest old, rural population, urban population

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Key points

- The large majority of the studies on the COVID-19 pandemic are web-based, which exclude de facto the numerous older adults still in digital divide, also often frail, dependent and in poor health
- Based on three existing cohorts on aging and on telephone interviews, we highlighted that the oldest old living in rural area were less likely to have a negative experience of the first strict lockdown
- Several specificities of this living environment could explain these findings: private outdoor spaces, easy access to nature and greater social support
- However, they could less often rely on digital tools to keep in touch with their entourage and tented to have lower compliance with the barrier measures

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1 | INTRODUCTION

As countries are affected by COVID-19 and enforce lockdowns, curfews, and social isolation to fight the spread of the virus, the older population is still at the heart of the concerns.[1,2] Indeed, this population is clearly paying the heaviest tribute, with 94% of the deaths occurring in the 60 years and older people.[3] Beyond the obvious mortality and health issues, this population may also be more likely to have psychosocial vulnerabilities that exacerbate the risks and difficulties encountered.[2] First, the scourge of social isolation and loneliness, which particularly affected the older population before the pandemic, increased at an impressive pace during this period, because of the barrier measures to limit person-to-person interactions.[4–8] While the population somehow tented to keep in touch with their family and friends mainly with digital communication tools, a substantial part of the older population did not have access to such devices.[7,9] Digital divide, still an issue in the older population,[10] could have exacerbated the effects of the containment measures.[1] In addition, given the psychological specificities of this population, some older people could be less resilient to the effects of this large-scale exogenous shock. Moreover, this population, often affected by multiple health conditions, also had to face reduced access to specialist services and hospitals, delayed presenting for medical care and diminished monitoring and treatment of chronic conditions.[11] Finally, they also had concerns about disruptions to their daily routines,[12] complete cessation of social and leisure activities and increased difficulties to cope with daily life in a context of strict limiting orders, and sometimes stop of caregiver interventions. Given all these considerations, the older population appears to be particularly vulnerable.

Yet, in the COVID-19 pandemic context, the scientific literature provides controversial findings. Several studies suggested that older people would have better emotional regulation and well-being than younger adults, lower stress reactivity,[13,14] lower rates of anxiety, depression, or trauma- or stress-related disorder,[12,15,16] less negative affect and more positive affect,[13,14] a more optimistic outlook[16] and a higher perceived coping efficacy than younger adults.[11,13] A recent review conducted during the initial phase of the pandemic suggests that older people could be more resilient to anxiety, depression, and stress-related mental health disorders than younger populations.[12] However, among the older population itself, some (in a proportion that is still unknown) did not have the required resources to cope with the crisis, for health, economic, material or social reasons. Many factors may modulate (attenuate or aggravate) the impact of the pandemic on individual's well-being, health and mortality, such as social isolation, financial insecurity or living conditions. Since the beginning of the pandemic, a considerable attention has been paid to the impacts on urbanized areas[17] and very few studies examined the specific impacts on rural population. Even less studies have compared the two living places and to our knowledge, none compared the experience of the pandemic between the older populations living in rural area with the urban ones. Yet given their numerous specificities, these two communities may have experienced differently this period. The population living in rural area is generally older,[18] has on average fewer economic resources,[18,19] higher prevalence of underlying medical conditions,[18–20] a more limited access to services (health care, home care and shops),[20] reduced Internet access and is more likely to be in digital divide[10] (preventing them from using tele-health[21] and video calls[19]). In addition, they would have lower compliance with the barrier measures.[22] On the other hand, rural area is characterised by a lower density of population[20] (factor associated with lower prevalence and incidence of infection), a more privileged living environment to face strict lockdown measures (more spacious houses, access to nature, maintained gardening activities…), a lower frequency of social isolation, more developed relationships with family, friends and neighbours and a better mutual aid organisation in daily living[23]; even though these characteristics could differ across countries.[24] It is consequently difficult to disentangle the impact of living area on the experience of the COVID-19 pandemic.

The present study aimed at comparing between rural and urban areas, the psychological and social experiences of the older persons with regard to the COVID-19 crisis during the first lockdown. This research relies on three existing population-based cohorts on aging, with interviews conducted by telephone by psychologists.

2 | MATERIALS AND METHODS

2.1 | The three epidemiological studies

The PACOVID survey[25] was built in the framework of ongoing epidemiological population-based cohorts on aging: PAQUID,[26] AMI[27] and 3C.[28] For 3C, only the Bordeaux sample was considered in this survey. Briefly, these three cohorts aimed at studying cerebral and functional aging in general population. All the participants have been initially randomly chosen in the general population of South-Western France. The participants of the PAQUID cohort have been recruited from the electoral lists of 75 communities of Gironde and Dordogne, two administrative areas of the Region. At baseline, 35% of the initial sample included participants living in rural area. The 3C-Bordeaux sample included exclusively individuals living in urban area, recruited from the conurbation of Bordeaux (Gironde) also from the electoral rolls. And finally, the AMI sample exclusively included older adults living in rural area of Gironde, recruited from the National Farmer Health Insurance rolls. Thanks to similar design, data collection procedures and variables explored, these cohorts were easily comparable, despite some differences (synthesized in Supplemental Table S1). For each study, participants were interviewed at home at the baseline visit and approximately every 2–3 years over the follow-up (30 years for PAQUID, 17 years for 3C and 10 for AMI).

2.2 | The PACOVID sample

In the PACOVID survey,[25] all the participants still followed up within these three studies were contacted by telephone by a trained psychologist to propose a new interview on the manner they perceived and lived the pandemic. The first wave was conducted during the first lockdown between March and May 2020. If the participants could not respond directly to the questionnaire, an authorized contact or staff member for those living in institution was invited to answer for them.

2.3 | Collected data of the PACOVID study

As previously published,[25] a 45-min phone interview of the first wave of the PACOVID survey included questions about the living conditions during the lockdown (own home, living alone, access to a garden, professional home care and support services), social support, digital communication tools and knowledge about the pandemic and the health and safety measures. In addition, functional status (Instrumental and basic activities of daily living (ADL), using the Lawton's[29] and Katz's scale,[30] respectively) and health (subjective health and chronic diseases) have also been explored. Coping strategies set up by the older persons to cope with the pandemic were also assessed with free answers, afterwards classified by two independent raters. Self-reported worries and difficulties met during the lockdown were collected and grouped under the main categories (supply of provisions, social isolation, boredom, lack of leisure activities, feeling of imprisonment, worry for their next of kin, for themselves and for the country, stop of professional care, lockdown-related health troubles, and others). The short version of the STAI-state scale was used to assess anxiety symptoms (10 items for a score ranging from 10 to 40; the threshold of 23 was applied to define high anxiety symptomatology).[31] Depressive symptoms were evaluated using three items of the Center for Epidemiological Studies Depression (CES-D) scale[32] related to the last week: Did you feel depressed? Sad? Alone? Each item, initially rated on a 4-point scale, was dichotomised by grouping "Often" or "All the time" answers, and "Never" or "Occasionally" on the other hand.

2.4 | Negative experience of the pandemic during the lockdown

The four following items directly related to this period were considered: high anxiety symptomatology, depressive symptoms (at least one out of the three), at least one self-reported difficulty or worry during the lockdown and feeling of insufficient support to face the episode. They reflect emotional distress or materiel difficulties due to the lockdown. We considered the experience as negative when at least two of these four items were present.

2.5 | Statistical analyses

Older persons living in rural area were compared to their urban counterparts using χ^2 tests, analyses of variance and mean comparisons, as appropriate. In order to take into account the differences by age and gender between the two compared groups (urban vs. rural), descriptive analyses were systematically controlled for these two potential important confounders using logistic and linear regressions, as appropriate. Finally, the risk of negative experience of the lockdown associated to the living area was estimated using logistic regression controlled for age, gender, living alone, and chronic diseases (at least 1). Analyses were performed using SAS, version 9.4 (SAS Institute, Inc., Cary, NC).

3 | RESULTS

Among the 719 participants contacted at the first wave of the PACOVID survey, 480 (66.8%) responded by themselves. After exclusion of 13 persons because of missing data, the present sample included 467 older adults, aged on average 87.5 years (SE = 5.2), 58.9% were women and 47.1% were living in rural area (N = 220).

3.1 | General description by living area

The group of participants living in rural area differed significantly from their urban counterparts, being: younger, less often women, less

likely to live alone, had lower educational level (69.1% vs. 27.9%) and almost all having a garden (vs. 56.1% in urban area) (Table 1). Very few people in both living areas had changed their place of residence to face the first French lockdown (6 and 3, in urban and rural area, respectively).

3.2 | Social and professional support

A large majority of the sample (93%) reported being sufficiently supported by their entourage during the lockdown, but people living in rural area were three fold more likely to feel supported than their urban counterparts, after controlling for age and gender (OR = 3.09, 95%CI 1.11–8.59) (Table 2). When looking at the contacts during this period, no differences were observed regarding phone calls, but persons living in rural area had significantly more visits than urban individuals, and mainly by relatives. Indeed, despite the strict lockdown, rural older adults received on average 3.3 visits (SD = 6.5) during the last week compared to only 1.0 (2.6) in urban ones ($p < 0.0001$) and this difference persists after adjustment on age and gender. In addition, rural participants had four times higher odds of family visits than urban ones (OR = 3.93, 95% 2.41–6.42). When analysing the data available in the last follow-up visit of the cohorts, we observed a greater geographic proximity to the family, since 42% of the persons living in rural area had family living nearby (i.e. less than 15 min' walk) versus only 20% in the urban sample.

When taking age and gender into account, we observed that rural older adults were less likely than urban ones to use digital device to keep in touch with their entourage (OR = 0.38, 95% CI 0.20–0.73). Finally, half of the older persons living in urban area

benefited from professional assistance and care (nurse, personal care assistant, meal delivery…) versus only 30.1% of the persons in rural area. However this difference did not persist after adjustments, particularly on age ($p = 0.5911$).

3.3 | Worries and difficulties met during the lockdown

As presented in Table 3, two thirds of the participants reported difficulties or worries related to the pandemic and the lockdown, with no differences by living area. Nonetheless, when looking specifically at the different difficulties and worries reported, some differences appeared, with for people living in rural area, more worries for their entourage because of the situation and more difficulties because of the stop of the leisure activities (not significant). However, they reported less often feeling of imprisonment and fewer difficulties in getting their supplies. Yet, when analysing the IADL item of shopping, we observed greater risk of disability among the people living in rural area after controlling for age and gender (OR = 1.60, 95% CI 0.98–2.61, $p = 0.0586$). These results were probably explained by the lower accessibility of stores and shops in rural area (e.g. the grocery store is within walking distance in 8.9% of the cases in rural area compared to 66.5% in urban place).

3.4 | Coping strategies to face the lockdown

The Table 4 presents the differences by living area on how participants coped with the pandemic. Differences were significantly observed for the three main coping strategies. People living in rural

TABLE 1 Baseline characteristics of the sample according to living area

	Urban (n = 247) n (%)	Rural (n = 220) n (%)	p
Mean age (SD)	90.4 (3.5)	84.3 (4.9)	<.0001
Female gender	168 (68.0%)	107 (48.6%)	<.0001
Living conditions			<.0001
Living alone	137 (57.8%)	73 (36.9%)	
Couple	68 (28.7%)	98 (49.5%)	
With family	25 (10.5%)	11 (5.6%)	
Others	7 (3.0%)	16 (8.1%)	
Low level of education	69 (27.9%)	152 (69.1%)	<.0001
Unusual place of residence	6 (2.5%)	3 (1.4%)	0.5098
Access to private outdoor spaces			
None	19 (7.8%)	1 (0.5%)	<.0001
Hallway or balcony	88 (36.1%)	11 (5.0%)	
Garden	137 (56.1%)	206 (94.5%)	

TABLE 2 Social and professional support during the first lockdown according to the living area

	Urban n (%)	Rural n (%)	p	Regressions adjusted on age and gender OR (95%CI)	p
Good perceived social support	202 (89.0%)	204 (97.1%)	0.0009	3.09 (1.11–8.59)	0.0310
Phone calls					
Family	221 (93.6%)	202 (94.8%)	0.5893	0.89 (0.35–2.27)	0.8059
Friends	160 (68.1%)	157 (74.1%)	0.1651	0.96 (0.58–1.58)	0.8603
Neighbours	71 (30.2%)	66 (31.1%)	0.8333	0.77 (0.46–1.30)	0.3325
Visits					
Family	74 (31.8%)	127 (59.6%)	<.0001	3.93 (2.41–6.42)	<.0001
Mean number of family visits/week	1.0 (2.6)	3.3 (6.5)	<.0001	3.37 (0.56)[b]	<.0001
Friends	8 (3.4%)	18 (8.5%)	0.0218	2.20 (0.79–6.14)	0.1318
Neighbours	29 (12.3%)	26 (13.2%)	0.7837	1.50 (0.78–2.89)	0.2241
Volunteers	1 (0.4%)	5 (2.4%)	0.0742	3.68 (0.29–46.72)	0.3147
Use of digital communication device	56 (24.1%)	39 (18.4%)	0.1406	0.38 (0.20–0.73)	0.0034
Professional services[a]	121 (50.2%)	66 (30.1%)	<.0001	0.88 (0.55–1.41)	0.5911

[a]Nurse, personal care assistant, meal delivery ....
[b]Linear regression, parameter estimate (standard error).

TABLE 3 Worries and difficulties met during the first lockdown: Rural-urban differences

	Urban n (%)	Rural n (%)	p	Logistic regressions adjusted on age and gender OR (95%CI)	p
At least one difficulty/worry	161 (65.2%)	143 (65.0%)	0.9671	0.84 (0.52–1.34)	0.4585
Feeling of imprisonment	86 (34.8%)	51 (23.2%)	0.0058	0.60 (0.36–0.99)	0.0469
Isolation	54 (21.9%)	54 (24.6%)	0.4924	1.18 (0.68–2.04)	0.5540
Supply of provisions	33 (13.4%)	12 (5.5%)	0.0039	0.16 (0.06–0.43)	0.0003
Boredom	12 (4.9%)	19 (8.6%)	0.1016	1.63 (0.63–4.17)	0.3118
Worry for their next of kin	16 (6.5%)	26 (11.8%)	0.0440	2.63 (1.23–5.80)	0.0128
Worry for themselves	8 (3.2%)	14 (6.4%)	0.1116	1.02 (0.29–3.55)	0.9738
Worry for the country	5 (2.0%)	8 (3.6%)	0.2905	2.58 (0.71–9.36)	0.1496
Stop of professional care	6 (2.4%)	4 (1.8%)	0.6489	0.37 (0.05–2.49)	0.3034
Lack of leisure activities	3 (1.2%)	10 (4.6%)	0.0290	3.73 (0.81–17.27)	0.0917
Lockdown-related health troubles	7 (2.8%)	3 (1.4%)	0.2732	1.00 (0.23–4.31)	0.9965
Others	5 (2.0%)	7 (3.2%)	0.4300	0.39 (0.06–2.50)	0.3175

area were more likely to engage in distraction activities (diverting attention doing leisure activities such as reading, watching TV, gardening...) (OR = 1.54, p = 0.0865), less likely to simply maintain their daily activities or routines (OR = 0.58) and markedly less likely to strictly observe the safety measures to cope with the pandemic (barrier gestures, physical distancing, organization for shopping...) (OR = 0.21, p < 0.0001).

3.5 | Health characteristics

Table 5 presents the health differences by living area in terms of subjective health, chronic conditions (at least one), IADL- and ADL-disability, anxiety (high symptomology and mean score) and depressive symptoms. Globally when taking age and gender into account, we did not observe significant differences between rural

TABLE 4 Coping strategies to cope with the lockdown and the crisis situation

	Urban n (%)	Rural n (%)	p	Logistic regressions adjusted on age and gender OR (95%CI)	p
Distraction	150 (62.0%)	156 (72.9%)	0.0133	1.54 (0.94–2.51)	0.0865
Activities of daily living	81 (33.5%)	34 (15.9%)	<.0001	0.58 (0.34–0.98)	0.0418
Compliance to the sanitary measures	67 (27.7%)	28 (13.1%)	0.0001	0.21 (0.11–0.42)	<.0001
Acceptance of the lockdown situation	41 (16.9%)	33 (15.4%)	0.6601	0.80 (0.42–1.50)	0.4863
Health behaviors	28 (11.6%)	22 (10.3%)	0.6600	0.99 (0.49–2.02)	0.9834
Seeking social support	16 (6.6%)	11 (5.1%)	0.5065	0.73 (0.26–2.05)	0.5531
Non–compliance to the sanitary measures	10 (4.1%)	6 (2.8%)	0.4416	0.59 (0.16–2.19)	0.4299
Seeking information	7 (2.9%)	2 (0.9%)	0.1336	0.56 (0.11–2.96)	0.4972
Negative affects	1 (0.4%)	7 (3.3%)	0.0287	5.54 (0.49–62.26)	0.1654
Refusal of information	3 (1.2%)	2 (0.9%)	0.7549	0.82 (0.10–6.84)	0.8514
Religious coping	3 (1.2%)	1 (0.5%)	0.3774	0.32 (0.02–5.99)	0.4453

TABLE 5 Rural-urban differences of health parameters during the lockdown

	Urban n (%)	Rural n (%)	p	Regressions adjusted on age and gender OR (95%CI)	p
Good self-reported health	136 (56.0%)	135 (63.8%)	0.1381	0.89 (0.55–1.40)	0.5790
Chronic diseases[a]	167 (67.6%)	161 (73.2%)	0.1888	1.33 (0.81–2.20)	0.2609
IADL disability	124 (51.5%)	84 (38.9%)	0.0071	1.61 (0.98–2.63)	0.0608
ADL disability	48 (19.8%)	17 (7.9%)	0.0002	0.70 (0.36–1.35)	0.2886
Depressive symptoms[b]	79 (33.3%)	42 (19.7%)	0.0011	0.54 (0.31–0.93)	0.0274
High anxiety symptomatology[c]	74 (31.2%)	46 (22.6%)	0.0413	0.86 (0.50–1.48)	0.5908
Mean anxiety STAI score (SD)	19.7 (7.5)	17.6 (5.7)	0.0012	−1.51 (0.85)[d]	0.0757

[a]At least one among diabetes, hypertension, myocardial infarction, stroke, cancer, chronic respiratory disease, or others.
[b]At least one depressive symptom (feel depressed, sad or alone).
[c]A STAI score (short version scale) ≥23.
[d]Linear regression, parameter estimate (standard error).

and urban older adults, except for depressive symptoms, more frequent in the urban sample (33.3% versus 19.7% in urban and rural older adults respectively, $p = 0.0011$). This difference persisted after controlling for age and gender; people living in rural area had an approximately twofold lower risk of having depressive symptoms than urban ones (OR = 0.54, 95%CI 0.31–0.93, $p = 0.0274$). Regarding high anxiety symptomatology, the observed difference in the prevalence (31.2% of the urban older adults vs. 22.6% of their urban counterparts, $p = 0.0413$) did not persist after adjustment on age and gender ($p = 0.5908$). However, if we consider the mean score, persons living in urban area had 2.1 points more on average and this difference was nearly significant after controlling for age and sex ($p = 0.0757$).

3.6 | Negative experience of the pandemic during the lockdown period

We analysed four criteria directly linked to the first lockdown period: depressive symptoms, anxiety, self-reported difficulties or worries, feeling of insufficient support. More criteria on average were reported by urban participants than their counterparts (1.41 criterion (1.14) versus 1.12 (1.12) respectively, $p = 0.0045$). Defined by the presence of at least two criteria, 41.6% of the urban participants ($n = 97$) had a negative experience during the lockdown according to this definition compared to only 27.1% in rural area ($n = 56$). After controlling for age, gender, living alone and presence of a chronic disease, older adults living in rural area had an approximately twofold

lower risk of having a negative experience of the first lockdown than the urbans (OR = 0.55, 95% CI 0.33–0.92, p = 0.0223).

4 | DISCUSSION

This study is the first to compare the psychological and social experience of the oldest old with regard to the COVID-19 crisis living in rural and urban areas. The analysed data have been collected at the very beginning of the epidemic in France, during the first lockdown (i.e. between March and May 2020). During this period, people living in rural area were significantly less likely to live this experience as negative than their urban counterparts, having an approximately twofold lower risk. To face this lockdown period, they have had a more favourable living environment; almost all having private outdoor spaces and access to nature. In addition, they also benefited from greater social support, reporting more physical contacts with their family despite strict lockdown orders. They were less likely to have depressive symptoms than the urban older adults, and tented to have lower score of anxiety. Nonetheless, they could less often rely on digital tools to be informed and to keep in touch with their entourage than the urbans.

Some studies suggested that rural older adults would be at high risk in this pandemic period, not being able to meet their needs due to pre-existing rural/urban inequities in terms of health, health and social care, financial resources and reduced access to technology and online connectivity.[18,19] Yet, some studies, especially those conducted in high-income countries, suggest that on the contrary, living in rural area could be a protective factor at least during the first phase of the pandemic. For instance, according to a study conducted within the Oxford Royal College of General Practitioners (RCGP) Research and Surveillance Centre primary care network on 3,802 SARS-CoV-2 test results, people living in urban areas were significantly more likely to test positive than their rural counterparts (OR = 4.59, 95% CI 3.57–5.90).[33] In addition, another study conducted on administrative data sources for 34 member countries of the Organization for Economic Cooperation and Development (OECD) showed that living in rural area was significantly associated with a decreased case fatality rate of COVID-19 (p = 0.039).[18] As for the rural/urban differences in the psychological and social experiences of the lockdown, the literature is scarce, particularly in the oldest old. Worldwide, social isolation is one of the main strategies to contain the spread of the virus in order to avoid over-burdened health systems. However, it is well known that social isolation is a serious public health concern, particularly in the older population.[4,5,34] But did this scourge affect similarly people living in rural areas and the urban ones during the lockdown? A study conducted during the first lockdown in 38,217 United Kingdom adults showed that living in rural area was protective against higher loneliness levels compared to urban area (OR = 0.76, SE = 0.07, p < 0.001).[23] In our study we showed that older adults living in rural area were less likely to use digital tool to communicate with family (OR = 0.38), but were more likely to report having social support during the lockdown

period (OR = 3.09, 95% CI 1.11–8.59) and were four-times more likely to receive family visits at home (on average 3.3 per week, compared to 1.0 among urbans, p < 0.0001). Interestingly, the individuals living in rural area less often reported difficulties in getting their supplies during the lockdown (with a risk reduced by 84% compared to the urbans), whist they were more likely to be disabled for this task. This disability, pre-existing before the epidemic, was mainly due to lower access to shops and stores in rural areas. Nevertheless, probably thanks to a stronger family support, rural individuals have been less impacted by the situation than their urban counterparts for this tricky daily task in the heart of the crisis. Our results also highlight that older people living in rural area were less likely to apply the physical distancing with their families despite strict stay-at-home orders. They also less often rely on the strict application of the safety measures to cope with the situation. Other studies suggested that people living in rural area less applied barrier measures and had lower knowledge about Coronavirus disease that could have a health impact at longer-term.[22]

The living conditions to face the first strict lockdown constituted another important difference. While only 56% of the urbans had a garden, it concerned almost all the rural participants, who also benefited more largely from an access to nature. Despite a context of strict lockdown, people reported that they continued their outside activities (gardening, walking…), that was obviously more limited for people living in urban areas. In addition, they significantly less suffered from feeling of imprisonment during this period (risk reduced by 40% compared to the urbans). Noemi AS. explained that being outside was suddenly not just nice, it was potentially life-saving; outdoor spaces becoming a coping space to face the situation.[35] An online study conducted on 5,218 persons from nine countries showed that nature contact "buffered" the negative effect of lockdown on mental health. People perceived that nature helped them to cope better with lockdown and that access to outdoor spaces and nature views was associated with more positive emotions.[36] Particularly in the urban populations, people felt safer outdoors, but also seemed to be enjoying the outdoors more, discovering the beauty and joy that nature has to offer.[35]

Regarding mental health, the literature on the COVID-19 now largely reports that older adults presented lower rates of anxiety, depression and stress-related disorders than younger ones.[15,16,37] But only few studies compared the situation by living area. A study reported that COVID-19-related fear was most pronounced in older participants and that generalized anxiety was more prevalent in rural communities, whilst COVID-19-related fear was elevated in metropoles.[38] Our findings showed that older people living in rural area had a lower risk of presenting depressive symptoms, a lower anxiety mean score, but no differences in terms of high anxiety symptomatology.

Regarding the methodological aspects, the large majority of the population-based researches on the COVID-19 pandemic were web-based that exclude de facto all the people in digital divide, who are still so numerous in the oldest old. This selection bias is particularly prejudicial to work on old populations, because of the lower-inclusion

of the most vulnerable, dependent and in poor health persons. Our data were collected by telephone by a trained psychologist and from oldest old participants (mean age 88 years) already involved in existing cohorts, which should also have reduced the potential selection bias. In future researches dealing with the old fragile population, such follow-up could be supplemented using Artificial Intelligence technology applied to simple phone call, as proposed by König et al.[39] Moreover, thanks to comparable designs and procedures between the three cohorts, comparative analyses could be easily conducted. However, our study also has some limitations. First, the two groups compared significantly differed by age (the urban participants being 6 years older on average than the rural ones) and gender (the AMI cohort, from which 98% of the rural participants come from, over-represented males because of the selection procedures of the initial sample). To take these specificities into account, we systematically provided descriptive analyses controlled for age and gender. Second, the indicator of a negative experience of the crisis was based on four factors, two focused on negative affects during lockdown (three depressive symptoms and a short version of the STAI anxiety) and two related to the psychosocial impact of lockdown (self-reported worries and difficulties during the period and a question on feeling of an insufficient social support to face the lockdown). The choice of the threshold of at least two items out of the four is arbitrary. Sensitive analyses were also conducted applying other thresholds and items, but they were limited by the small sample size, which is one of the main limitations of our study.

This study is the first to show that in very old age, living in rural area would reduce the psychological and social impact of the lockdown and the pandemic compared to living in urban area. Living conditions, with access to nature, lower routine disruption, activities of daily life less impacted by the lockdown (cinema, restaurant, museum…), greater family presence and social support could have contributed to these findings. However, these results only concern the first strict lockdown period and further researches are necessary to investigate after several months of restrictive measures, the consequences of the health, economic and social crisis.

CONFLICT OF INTEREST

None to report.

AUTHOR CONTRIBUTIONS

Karine Pérès: Conceptualization and design, data analysis and interpretation, original draft, and writing. Camille Ouvrard: Literature search, data collection and interpretation, review and editing. Michèle Koleck: Data collection, analysis and interpretation, review and editing. Nicole Rascle: Data collection and interpretation, review and editing. Jean-François Dartigues: Data interpretation, review and editing. Valérie Bergua: Literature search, data collection and interpretation, review and editing. Hélène Amieva: Conceptualization and study design funding acquisition, data interpretation, review and editing.

ETHICS STATEMENT

For each of the three cohorts, an ethics committee approved the research according to the principles embodied in the Declaration of Helsinki: for Paquid the ethics committee of the University Hospital of Bordeaux (France); for 3C the Ethical Committee of the University Hospital of Kremlin-Bicêtre (Paris, France) and Sud-Méditerranée 3 (Nîmes, France); for AMI the committee of the University Hospital of Bordeaux (France).

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.