



EMPIRICAL STUDIES

Informal care burden during the COVID-19 pandemic in Flanders, Belgium: The role of perceived threat, personality and resilience

David De Coninck PhD, Postdoctoral researcher¹  | Shauni Van Doren MSc,
PhD student²  | Koen Matthijs PhD, professor¹ | Anja Declercq PhD, professor^{1,2}

¹Centre for Sociological Research, KU Leuven, Leuven, Belgium

²LUCAS Centre for Care Research and Consultancy, KU Leuven, Leuven, Belgium

Correspondence

David De Coninck, Centre for Sociological Research, KU Leuven, Belgium, Parkstraat 45 box 3601, 3000 Leuven, Belgium.
Email: david.deconinck@kuleuven.be

Abstract

Background: In this study, we investigate how socio-demographic characteristics (age, gender and education) and informal care relationship characteristics (e.g., time spent on care, number of informal caregivers, professional care) are linked with informal care burden during the COVID-19 pandemic. In addition, we expect this burden to differ by personality characteristics, degree of resilience, and—in this specific context—perceived the COVID-19 threat.

Method: We used the fifth wave of a longitudinal study to identify 258 informal caregivers. These online survey data came from a five-wave longitudinal study in Flanders, Belgium that ran from April 2020 to April 2021. Data were representative of the adult population by age and gender. Analyses include *t*-tests, ANOVA, SEM and binomial logistic regression.

Results: We found that the informal care burden was strongly linked with a socio-economic gradient, time investment changes in care since the start of the pandemic, and whether there was more than one informal caregiver. Personality traits such as agreeableness and openness to experience, and the perceived threat of COVID-19 were also related to care burden.

Conclusions: During the pandemic, informal caregivers were put under extra considerable pressure: restrictive government measures sometimes led to the temporary suspension of some or all professional care for persons with care needs, which may have resulted in a growing psychosocial burden. We recommend that, in the future, the focus should be on supporting the mental wellbeing and social participation of caregivers along with measures to protect caregivers and their relatives from COVID-19. Support structures for informal caregivers should be kept running during crises now and in the future, but it is also important to adopt a case-by-case basis to consider support for informal caregivers.

KEYWORDS

coronavirus, COVID-19, informal care, informal care burden, pandemic, perceived threat, personality, resilience

INTRODUCTION

Throughout 2020, COVID-19 rapidly spread across the world. On 11 March 2020, the Director-General of WHO characterised the COVID-19 situation as a pandemic based on the alarming levels of spread and severity [1, 2]. In order to respond to this crisis, many countries—including Belgium, the site of this study—combined containment and reduction measures to delay major surges of patients in hospitals, while protecting the most vulnerable from infection. As the pandemic progressed, the mental health outcomes of these restrictions became the subject of much societal debate and academic interest [3–6]. Although adverse mental health outcomes have been reported in the general population in various countries [4], certain societal subgroups are likely to be more affected than others. Informal caregivers constitute one such example, given that lockdown measures complicated the continuity of (professional) care for specific clients. An informal caregiver can be described as someone who has “a significant personal relationship with, and provides a broad range of assistance for, a person in need of care” [7, p. 2]. This assistance is non-professional and unpaid [7, 8].

Although numbers vary, around 30% of the Belgian population aged 18 years or older is estimated to provide informal care on a monthly basis [9, 10]. Specifically, there are about 600,000 informal caregivers in Flanders, the northern region of Belgium [11]. Studies have shown that people who care for a person with chronic and complex care needs can experience considerable physical and psychosocial stress. These informal caregivers show increased symptoms of depression, anxiety, and other adverse mental health outcomes than individuals who do not provide informal care [7, 9, 12]. Although empirical evidence of informal caregivers' mental health outcomes during the pandemic is still limited, some findings indicate they report a higher burden on their mental (and also physical) health [7, 13]. Additionally, psychosocial well-being worsened and higher rates of depression are reported in a variety of (mostly European) countries during the COVID-19 pandemic [3, 7, 14, 15]. Research shows that caregivers' adverse (mental) health outcomes can be attributed to a wide array of factors. Not all informal caregivers are equally susceptible to feelings of distress [16]. Building on the Informal Caregiving Integrative Model (ICIM), a number of key stressors are identified: (1) caregiver characteristics (e.g., sociodemographic factors), (2) the caregiving setting (e.g., the type and complexity of care needs of the person who they are taking care of), and (3) the social environment [17]. The rationale behind the ICIM is to consider different determinants of informal caregiver burnout, which is in turn theorised to affect caregiver outcomes such as low well-being or greater

caregiving burden [17]. The model also highlights a number of mediators between the three stressors and adverse mental health outcomes. For example, the caregiver's personality characteristics and their degree of resilience may mediate the relationship between these stressors and the subjective level of burden. During the current crisis, it is also possible that these latter relationships may be mediated by informal caregivers' perceived threat of COVID-19 [18]. In their study on the link between the Big Five personality traits and informal care burden, Melo et al. [19] showed that neuroticism was related to greater depressive symptoms, while agreeableness and extraversion showed the opposite effect. For resilience, which can be described as a positive adaptability to “face adversity, flexibility, psychological well-being, strength, healthy life, burden, social network, and satisfaction with social support” [20, p. 12] various studies have shown that greater resilience among informal caregivers is associated with lower burden [21, 22].

THE CURRENT STUDY

The aim of the present study is to investigate the relationship between informal care burden and care relationship characteristics, perceived threat, personality traits, and resilience of the caregiver during the COVID-19 pandemic in Flanders, Belgium. In line with previous studies and building on the ICIM [17], we hypothesize that the additional care burden that the pandemic presents will be stronger among those with a higher care involvement, i.e., those being the sole informal caregiver, those who invest more time, those depending on the living situation of the person with care needs and those who indicate a lack of and/or dissatisfaction with professional help. At the same time, we expect differences in care burden by a perceived threat, personality traits, and resilience even after controlling for age, gender, educational attainment, perceived financial situation, and paid work [12]: those with a high degree of perceived COVID-19 threat and with low resilience are expected to report high-informal caregiver burden. For the relationship between personality and informal caregiver burden, we base our expectations on the findings by Melo et al. [19]: neuroticism is expected to be related to the greater burden, while agreeableness and extraversion are expected to be linked to lower burden.

DATA AND METHODOLOGY

We collected data through an online survey among a sample of the adult population aged 18 to 70 years in Flanders, the northern region of Belgium. The survey

was fielded from 17 March 2021 to 5 April 2021. During this period, a third wave of COVID-infections hit Belgium exactly 1 year after the first, and restrictive governmental measures—or scarring effects of previous measures (e.g., temporary suspension of professional care services)—continued to play a large role in daily life in Belgium. This data collection were the last in a five-wave longitudinal online survey study on the Flemish public's fears and attitudes regarding the COVID-19 pandemic. We collaborated with a polling agency which collected responses from 1000 respondents in the middle of March 2020, with four additional waves throughout 2020 among the same participants. Information regarding informal caregiving was collected in this fifth wave only. The survey consisted of two parts: a core module that was repeated in each wave and a number of rotating modules that appeared in a few or only one wave. Due to panel attrition, participation rates fluctuated throughout the study. In the fourth wave of the study (in August 2020), 505 of the initial 1000 respondents participated. Because we anticipated a greater drop-out in the fifth wave due to a seven-month gap between waves four and five, we supplemented the longitudinal sample with new respondents [22].

In the fifth wave of this study, the polling agency gathered 1646 responses (cooperation rate: 32%; 404 longitudinal participants and 1242 new participants) from their opt-in online panel that used quotas by gender, age, education and province, to ensure the data were representative for these characteristics in Flanders. In order to maximise the cooperation rate, the emails that included the invitation to participate emphasised that each respondent would receive a number of digital points for completing the survey that could be exchanged for discounts on popular Belgian internet webstores.

From these respondents, 258 (16%) indicated that they were informal caregivers for at least one person. Respondents were given the following definition of informal caregiving: “You are a family caregiver when you: provide care to someone who needs support because of illness, disability or old age; have an emotional or social bond with the person you are caring for; provide help and care to that person seeking care on a regular basis; take up care outside the context of your professional or volunteer work”. This subsample was used in the analyses. Respondents were contacted by e-mail, and the survey was distributed via the polling agency's own survey tool. The survey language was Dutch. Each question in the survey was presented on a different page, and there was no option to return to previous questions and change any answers. All the respondents who recorded partial data were removed by the survey agency prior to delivering the final, fully anonymized, dataset. Ethical review

and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. All the data were collected in line with General Data Protection Regulation regulations. The participants provided their written informed consent to participate in this study [23].

Measures

Informal care indicators

As dependent variables in the analyses, we used two indicators on informal care burden. The first item assessed the extent to which the caregiver had difficulty to provide informal care at the moment (1 = not at all difficult, 11 = very difficult). A second item asked whether this burden had changed since the start of the pandemic (1 = easier now, 2 = remained the same, 3 = more difficult now).

As independent variables, we considered the relationship with the main person with care needs (1 = partner, 2 = (step)child, 3 = (step)parent; 4 = other family, 5 = non-family), whether they were the only informal caregiver for this person (1 = yes, always been, 2 = yes, since coronavirus pandemic, 3 = no), time spent on informal care compared to before COVID-19-pandemic (1 = more time than before, 2 = less time than before, 3 = same amount of time), whether the main person with care needs to receive professional care (and which type of care), and whether respondents were satisfied with this professional care (1 = very dissatisfied, 5 = very satisfied).

Big five personality characteristics

We used a brief measure of the Big Five personality characteristics containing 10 items. Each item contained a personality characteristic, and people were asked to indicate to what extent it applied to them (1 = does not apply at all, 5 = fully apply). The 10 items covered both poles of each personality dimension of the Big Five: extraversion, conscientiousness, agreeableness, openness to experiences and emotional stability. We used a validated Dutch translation [24] of the version originally developed by Gosling et al. [25]. It reached adequate levels in terms of: (a) convergence with widely used Big Five measures, (b) test-retest reliability, (c) patterns of predicted external correlates and (d) convergence between self and observer ratings [25]. Five of the 10 items on the opposite pole of each personality dimension were reversely coded to obtain uniform scores for all dimensions.

Brief Resilience Scale

To measure the degree of resilience in respondents, we used the Brief Resilience Scale developed by Smith et al. [26] and translated into Dutch by Zimmermann [27]. The scale contains six items, and for each item, respondents were asked to indicate to what extent it applied to them (1 = fully disagree, 5 = fully agree). The Dutch version of this scale was a screening instrument with acceptable reliability (Cronbach's $\alpha = 0.74$).

Perceived COVID-19 threat

To measure the perceived threat of COVID-19 among caregivers, we used a validated 10-item threat scale developed by Kachanoff et al. [18]. Five items assess realistic threats regarding one's physical or financial security, while the other items assess symbolic threats to one's sociocultural identity (1 = no threat at all, 5 = great threat). Both the realistic threat (Cronbach's $\alpha = 0.68$) and symbolic threat factor (Cronbach's $\alpha = 0.82$) showed acceptable reliability.

Socio-demographic characteristics

Respondents were asked to indicate the birth year (recoded to age), gender (1 = male, 2 = female), educational attainment (1 = higher secondary education or lower, 2 = higher non-university education or higher), perceived financial situation (1 = very difficult to make ends meet, 6 = not at all difficult to make ends meet), whether they had engaged in paid work in the last week (1 = full-time, 2 = part-time, 3 = temporarily or permanently halted work and 4 = no). A descriptive overview of the sample can be found in Appendix: [Table A1](#).

Analytic strategy

Depending on the types of variables under investigation, we used independent samples *t*-tests, one-way ANOVA's, Pearson correlations, and Chi-squared tests to test the link between sociodemographic characteristics (age, gender, educational attainment, perceived financial situation and paid work), informal care characteristics, and informal care burden. Subsequently, we ran a structural equation model to investigate the relationship between general informal care burden, informal care characteristics, personality characteristics, and resilience. This method also allows us to look at the mediating role of perceived threat. For care burden since the pandemic, we conducted a binomial logistic regression with 0 = the same or less burden

since the start of the pandemic and 1 = more care burden since the pandemic. In these analyses, we controlled for relevant socio-demographic characteristics. All metric variables were z-standardised.

RESULTS

[Table 1](#) shows the associations between sociodemographic characteristics and both indicators for informal care burden. Most notable differences in care burden, both in general and specifically since COVID-19, were found in educational attainment and perceived financial situation. The general care burden is higher for individuals with at least a tertiary degree ($M = 5.82$) than for those with a secondary degree or lower ($M = 5.02$). However, the role of perceived financial difficulties presented the opposite effect: individuals who had no trouble to make ends meet reported a lower burden than individuals who had more financial difficulties ($r = -0.22$). Similar associations were found for informal care burden since COVID-19. Respondents with a tertiary degree were more likely to report that providing care was more difficult since COVID-19 (47%) than those with a secondary degree or lower (31%).

In [Table 2](#), we linked informal care relationship characteristics with informal care burden. These analyses showed that individuals who became the sole informal caregiver during the pandemic reported a greater care burden ($M = 6.46$) than those who had always been the sole informal caregiver ($M = 5.85$) or those who were not the sole informal caregiver ($M = 4.67$). Time spent on informal care was strongly associated with a greater informal care burden since the pandemic: those who spent more time on informal care since the pandemic reported a greater burden ($M = 0.49$) than those who reported to spend less ($M = 0.31$) or the same amount of time ($M = 0.24$) on informal care. Although the living situation and presence of professional care were not significantly related to the burden in the current sample, respondents' satisfaction with (the collaboration with) professional caregivers was important: individuals who were satisfied with (their collaboration with) professional caregivers reported lower care burden (informal care burden in general: $r = -0.27$; informal care burden since COVID-19: $F = 6.26$).

[Table 3](#) shows that perceived threat was associated with personality and resilience among informal caregivers. Greater degree of resilience was associated with a lower realistic threat ($b = -0.31$; $p < 0.001$) and symbolic threat ($b = -0.23$; $p < 0.01$). At the same time, only one personality trait was linked with a perceived threat: extraversion was positively associated with the symbolic threat ($b = 0.22$; $p < 0.01$).

TABLE 1 Association tests between sociodemographic indicators and informal care burden

	Scores				Mean (SD)
	<i>F</i>	<i>t</i>	<i>r</i>	<i>p</i> -value	
Informal care burden					
Gender		0.46		0.65	
Male					5.39 (2.99)
Female					5.23 (2.70)
Age (years)	0.61			0.54	
18–34					5.57 (2.52)
35–54					5.45 (2.84)
55–70					5.09 (2.87)
Educational attainment		–2.19		0.03	
Secondary education or lower					5.02 (2.76)
Tertiary education					5.82 (2.84)
Paid work	0.44			0.72	
Full-time					5.37 (2.83)
Part-time					5.54 (2.48)
Temporarily halted					4.55 (3.31)
No					5.24 (2.81)
Financial situation			–0.22	0.00	–
	Percentages				
	Less burden	Same burden	More burden	χ^2	<i>p</i> -value
Informal care burden since COVID-19					
Gender					
Male	1.9	55.2	42.9	3.18	0.20
Female	2.6	65.4	32.0		
Age (years)					
18–34	6.5	51.6	41.9	4.13	0.39
35–54	1.0	64.7	34.3		
55–70	2.4	60.8	36.8		
Educational attainment					
Secondary education or less	2.4	66.9	30.7	7.12	0.02
Tertiary education	1.1	51.6	47.3		
Paid work					
Full-time	3.0	58.6	38.4	4.25	0.64
Part-time	5.9	55.9	38.2		
Temporarily halted	0.0	69.2	30.8		
No	0.9	64.5	34.5		
Financial situation	4.51	4.16	3.96	1.65	0.19

The results in Table 4 indicate that perceived symbolic threat mediates the link between burden and personality/resilience. The symbolic threat was positively associated with increased care burden ($b = 0.30$; $p < 0.05$), while resilience and extraversion (that were directly linked with the threat in the Table 3) were not significantly associated

with it. However, individuals with high agreeableness reported lower burden ($b = -0.30$; $p < 0.05$), while those with high openness to experience reported higher burden ($b = 0.23$; $p < 0.05$). Greater care burden since the beginning of the pandemic was also linked with openness to experience ($OR = 1.63$; $p < 0.05$).

TABLE 2 Association tests between informal care indicators and informal care burden

	Scores	p-value	Mean (SD)
Informal care burden			
Relationship with main person			
Partner	$F = 0.76$	0.55	5.25 (2.87)
Child			5.04 (2.62)
Parent			5.40 (2.94)
Other family			5.70 (2.54)
Friends/neighbour			4.38 (2.87)
Sole informal caregiver			
Yes, always have	$F = 7.09$	0.00	5.85 (2.89)
Yes, since COVID			6.46 (2.84)
No			4.67 (2.61)
Time spent on informal care since COVID			
More time	$F = 2.89$	0.06	5.75 (3.04)
Less time			5.73 (2.56)
About the same			4.91 (2.65)
Professional care pre-COVID			
Yes	$t = 0.53$	0.60	5.35 (2.79)
No			5.64 (3.16)
Professional care during COVID			
Yes	$t = -0.40$	0.69	5.47 (2.75)
No			5.31 (2.97)
Main person lives with respondent pre-COVID			
Yes	$t = -0.71$	0.48	5.54 (2.71)
No			5.26 (2.83)
Main person lives with respondent during COVID			
Yes	$t = -1.54$	0.13	5.93 (2.53)
No			5.21 (2.84)
Satisfaction with professional caregivers			
Satisfied with professional care	$r = -0.27$	0.00	–
Satisfied with collaboration	$r = -0.27$	0.00	–

	Percentages			χ^2	p-value
	Less burden	Same burden	More burden		
Informal care burden since COVID-19					
Relationship with main person					
Partner	0.0	68.0	32.0	7.78	0.46
Child	2.0	54.9	43.1		
Parent	1.5	66.2	32.3		
Other family	5.7	48.6	45.7		
Friends/neighbour	5.9	58.8	35.3		
Sole informal caregiver					
Yes, always have	0.0	57.3	42.7	16.74	0.00
Yes, since COVID	0.0	35.3	64.7		
No	4.6	67.9	27.5		

TABLE 2 (Continued)

	Percentages			χ^2	p-value
	Less burden	Same burden	More burden		
Time spent on informal care since COVID					
More time	4.1	43.3	52.6	32.65	0.00
Less time	9.5	47.6	42.9		
About the same	0.0	75.7	24.3		
Professional care pre-COVID					
Yes	3.4	60.0	36.6	3.36	0.19
No	0.0	48.5	51.5		
Professional care during COVID					
Yes	3.4	60.3	36.2	0.91	0.63
No	2.2	55.9	41.9		
Main person lives with respondent pre-COVID					
Yes	0.0	68.1	31.9	4.66	0.10
No	3.9	56.6	39.5		
Main person lives with respondent during COVID					
Yes	0.0	65.9	34.1	1.89	0.39
No	3.3	58.9	37.8		
	Mean scores			F-score	p-value
Satisfaction with professional caregivers					
Satisfied with professional care	4.33	4.29	3.79	6.26	0.00
Satisfied with collaboration	3.61	4.28	3.68	10.43	0.00

Note: Satisfaction with professional caregivers was only presented to respondents who indicated their main person with care needs received professional care ($n = 205$).

TABLE 3 Direct effects of resilience and personality on perceived threat

	Realistic threat	Symbolic threat
	b (SE)	b (SE)
Resilience	-0.31 (0.08)***	-0.23 (0.08)**
Personality characteristics		
Emotional stability	0.02 (0.09)	-0.03 (0.09)
Agreeableness	0.06 (0.07)	-0.04 (0.07)
Openness to experience	0.03 (0.07)	0.09 (0.07)
Extraversion	0.06 (0.06)	0.22 (0.07)**
Conscientiousness	0.08 (0.07)	0.02 (0.07)
R^2	0.07	0.09

** $p < 0.01$; *** $p < 0.001$.

As expected, we observe that informal care relationship characteristics were also associated with care burden. Individuals who were not the only informal caregiver reported a lower burden in general ($b = -0.26$; $p < 0.05$), but were also less likely to report that their care burden had

increased since the beginning of the pandemic ($OR = 0.34$; $p < 0.05$) than individuals who had always been the sole informal caregiver. When individuals were forced to spend more time on informal care than before the pandemic, both the overall care burden ($b = 0.21$; $p < 0.05$) and care burden since COVID were higher ($OR = 3.40$; $p < 0.001$). Furthermore, the overall care burden was also higher when the respondents lived with the main person they care for ($b = 0.35$; $p < 0.05$).

Our findings also point to a socio-economic gradient in care burden. Both educational attainment and (perceived) financial situation were linked with care burden in different ways. Respondents with a tertiary degree reported greater overall care burden ($b = 0.23$; $p < 0.05$) and greater care burden since the pandemic ($OR = 2.60$; $p < 0.05$) than those with a secondary degree or lower. Conversely, individuals who reported no difficulties in making ends meet were linked with a lower overall care burden ($b = -0.28$; $p < 0.05$). Finally, individuals who worked part-time ($OR = 2.35$; $p < 0.05$) reported a higher care burden since the pandemic started than those who worked full-time.

TABLE 4 Model relating threat, personality, resilience and care factors with informal care burden

	General burden		Burden since COVID-19	
	Model 1	Model 2	Model 1	Model 2
	<i>b</i> (SE)	<i>b</i> (SE)	OR (SE)	OR (SE)
Age	-0.14 (0.21)	-0.04 (0.23)	1.00 (0.02)	0.99 (0.02)
Gender (ref: Male)				
Female	-0.07 (0.22)	0.11 (0.24)	0.90 (0.38)	0.65 (0.44)
Education level (ref: Secondary education or lower)				
Tertiary education	0.23 (0.25)*	0.23 (0.26)*	2.71 (0.40)*	2.60 (0.44)*
Financial situation	-0.38 (0.12)**	-0.28 (0.14)*	0.71 (0.17)*	0.78 (0.21)
Paid work (ref: full-time)				
Part-time	0.20 (0.51)	0.23 (0.53)	1.78 (0.58)*	2.35 (0.62)*
Temporarily/permanently stopped	-0.13 (0.51)	-0.10 (0.49)	0.63 (0.93)	0.46 (0.50)
No	0.28 (0.35)	0.24 (0.36)	1.12 (0.50)	1.12 (0.40)
Relationship person (ref: partner)				
Child	0.03 (0.38)	0.01 (0.37)	2.25 (0.54)	2.14 (0.59)
Parent	0.19 (0.34)	0.20 (0.33)	0.79 (0.45)	0.80 (0.20)
Other family	0.16 (0.44)	0.12 (0.44)	0.58 (0.89)	0.86 (0.91)
Friends/neighbour	-0.02 (0.69)	-0.00 (0.66)	0.87 (0.87)	0.95 (0.84)
Sole informer caregiver (ref: yes, always)				
Yes, since COVID	0.12 (0.56)	0.09 (0.55)	0.73 (0.78)	0.70 (0.84)
No	-0.24 (0.22)*	-0.26 (0.23)*	0.37 (0.40)*	0.34 (0.43)*
Time spent on care (ref: the same)				
More now	0.24 (0.23)*	0.21 (0.22)*	3.04 (0.37)**	3.40 (0.42)**
Less now	0.06 (0.40)	-0.03 (0.43)	2.62 (0.61)	2.09 (0.68)
Living with respondent during COVID	0.25 (0.30)*	0.17 (0.30)	0.47 (0.55)	0.42 (0.60)
Professional care	-0.12 (0.40)	-0.12 (0.40)	0.92 (0.40)	0.90 (0.43)
Satisfaction professional care	-0.11 (0.12)	-0.15 (0.12)	0.67 (0.18)*	0.60 (0.20)*
Resilience		-0.12 (0.16)		1.08 (0.26)
Personality characteristics				
Emotional stability		-0.01 (0.16)		0.85 (0.25)
Agreeableness		-0.30 (0.12)*		1.42 (0.24)
Openness to experience		0.23 (0.12)*		1.85 (0.22)**
Extraversion		-0.07 (0.12)		0.86 (0.15)
Conscientiousness		0.17 (0.12)		1.16 (0.22)
Perceived threat				
Realistic threat		-0.03 (0.13)		1.63 (0.24)*
Symbolic threat		0.30 (0.13)*		0.72 (0.24)
(Nagelkerke) <i>R</i> ²	0.30	0.40	0.28	0.38

Note: For burden since COVID-19, binomial logistic regressions were conducted with 'less' and 'the same' burden = 0, 'more burden' = 1.

p* < 0.05; *p* ≤ 0.01.

DISCUSSION

In this study, we investigated to what extent informal care burden during the COVID-19 pandemic was linked with informal care relationship characteristics,

personality traits, degree of resilience, and perceived threat of the coronavirus in Flanders, Belgium. Given the often emotional and/or personal relation to the persons with care needs, informal caregivers have been found to experience considerable psychosocial stress. Previous

studies, both prior and during the COVID-19 pandemic have shown that informal caregivers report increased symptoms of depression, anxiety and other adverse mental health outcomes than individuals who do not provide informal care [7, 9, 12, 13]. In this study, we focused on factors directly related to the caregiver, although it is important to acknowledge that the type and complexity of care needs of the person who they are taking care of, also play a major role in informal care burden [28]. Building on the ICIM, we expect that the additional burden of the pandemic will be stronger among caregivers with a higher care involvement (e.g., being the sole informal caregiver, greater time investment). At the same time, we also expect to find differences in this burden by individual characteristics such as perceived threat, personality traits, and resilience [18, 19, 22].

A first look at the findings shows that informal caregivers in the sample are predominantly female, aged around 53 years, with a large share holding a secondary degree or lower. This distribution resembles findings of recent large-scale studies of the informal caregiver population during the COVID-19 pandemic in Flanders (see [11]). At the time of this study, just over half of informal caregivers report that their main person with care needs for whom they provide informal care, is their parent(–in-law). One in two caregivers reports that they are the sole caregiver for this person. The impact of the pandemic seems limited in this regard, as only a small share of this group reports that they became the sole caregiver since the pandemic. In terms of time engagement, 38% of all caregivers indicate that they spend more time on caregiving now than before COVID-19. Our findings also reflect the effects of restrictive governmental measures that sometimes included the suspension of (some or all) professional care: 84% of caregivers report that their main person with care needs received professional care before the pandemic, while this is only 56% when asked about the situation during the pandemic. However, the overall level of satisfaction of informal caregivers with the professional care that their main person with care needs receives is very high, and linked with a lower care burden.

A first key finding is that there is a clear socioeconomic gradient between care-related factors and informal care burden. Both the general burden of informal care and the change in care burden since COVID-19 are linked with educational attainment: highly educated respondents report a greater care burden than the lower educated. A possible explanation may be that many highly educated respondents work in jobs that, during the pandemic, were mainly performed from home. As a result, they may have felt an additional burden of combining this new work regime with care responsibilities and other domestic tasks. For those who were unable to work from

home, either their daily routines did not change much or they went into (temporary) unemployment, which may cause considerable financial strain but may alleviate the time constraints on providing care. Financial strain is not unimportant: those who easily make ends meet tend to report lower care burden than those who state they have financial difficulties. A second key finding highlights the role of the pandemic: as expected, individuals who are the sole informal caregiver report a significantly higher burden than those who are not the sole caregivers [29]. Here, the pandemic does play a role: those who became the sole caregiver during the pandemic reported far higher care burden than those who were the sole caregiver prior to the pandemic as well. This highlights the need to provide additional support to this (relatively small) group. This finding, coupled with the fact that greater time investment in informal care is also linked with a greater care burden since COVID-19, indicates that the pandemic poses clear threats to informal caregivers' position, especially when they are 'forced to' adopt a more active role in caregiving.

With these results, we have provided additional support for the ICIM [17]. Our analyses indicate that all three stressors highlighted by this model (caregiver traits, caregiving setting and social environment) were related to informal caregiver burden in general. Although it remains unclear to what extent these factors are interrelated, the current findings appear to support the idea that they significantly affect caregiver outcomes (in this case: burden).

We consider the role of personality, perceived threat and resilience. The analysis shows that several personality traits and threat perceptions are related to care burden. In particular, agreeableness was linked to lower burden, while openness to experience and conscientiousness was linked to higher burden (the latter only during COVID-19). These findings largely mirror Melo et al.'s [19] findings regarding personality, who also identified the role of agreeableness and openness. Agreeableness can be characterised as the way in which an individual thinks and behaves which ranges from compassionate to antagonistic. High scores on this trait indicate that someone is "soft-hearted, good-natured, trusting, helpful, forgiving, gullible", and low scores are people who tend to be "cynical, rude, suspicious, uncooperative, vengeful, ruthless, irritable, manipulative" [30, p. 19]. In this study, high agreeableness was linked to a lower care burden. Therefore, informal caregivers with lower agreeableness scores may have had greater difficulty in recognising the care needs and potential suffering of their main person with care needs, and in ascribing a positive meaning to their role as a caregiver [19]. Individuals with high openness to experience, i.e., who tend to be open-minded and imaginative, may have an easier time recognising the positive meaning

of their care. However, conscientiousness was not linked to care burden in this study. Although there is limited literature on the role of this personality trait on a burden during the pandemic, a study by Venkatesh et al. [31] on the role of conscientiousness of workers on perceived job strain prior and during the pandemic did find that conscientious workers reported higher strain of their employment during the COVID-19 pandemic, while the opposite effect was found prior to the pandemic. In terms of threat, the greater symbolic threat of COVID-19—the fear that COVID-19 threatens Belgium's democratic system, what it means to be Belgian, etc.—is related to a greater burden.

Although we have provided new insights into this important issue, this study also has a number of limitations. First, we did not include information on a key element of caregiving burden: the type and complexity of care needs of the person who they are taking care of. It should be expected that caregivers for persons with complex and/or chronic care needs may experience a greater burden than when these care needs are somewhat less complex [29]. In addition, it is also possible that individuals who did not provide informal care prior to the pandemic may have been forced to take up this role, with potentially far-reaching consequences on their perceived burden. Second, we also did not include information about whether or not caregivers are caring for more than one individual. Recent information indicates that about a third of informal caregivers in Flanders provide care to multiple people [11], and this could also place a higher burden on caregivers' time investment and their psychosocial well-being as a result. Third, the use of online panels for data collection also has key limitations. More specifically, literature has shown that there continues to be a consistent underrepresentation of individuals in precarious socio-economic positions and/or with a migration background in these panels [32]. Although we included a quota for low education groups, we cannot exclude the possibility that there may be an underrepresentation of low-income or migrant respondents. Bearing in mind Belgium's ethnocultural diversity (30% of its population has a migration background [33]), the current findings must therefore be interpreted with these considerations in mind. Finally, our use of cross-sectional data does not allow us to make any definite claims regarding the direction of the effects. Based on the literature and the societal context during the COVID-19 pandemic, we made some assumptions regarding the directionality of the effects but reverse causality is also possible. For example, it is possible that those who report a high-care burden feel it is their (familial or societal) 'duty' to spend a lot of time on informal caregiving, rather than that a lot of time spent on informal caregiving leads to greater care burden.

CONCLUSION

The findings of this study highlight the additional care burden experienced by informal caregivers during the COVID-19 pandemic in spring 2021 in Flanders, Belgium. During this time, informal caregivers were put under extra pressure: restrictive government measures sometimes led to the temporary suspension of some or all professional care for persons with care needs in Flanders. As a result, a large share of informal caregivers was forced to increase their care investment which may have resulted in a growing psychosocial burden—although this care burden may differ based on characteristics such as personality traits, resilience and perceived threat of COVID-19. Also, our results indicate that informal care burden during the pandemic was strongly linked with a socio-economic gradient, time investment changes in care since the start of the pandemic, and whether there was more than one informal caregiver. However, personality traits of agreeableness, openness to experience, and conscientiousness, and perceived symbolic threat of COVID-19 were also found to affect the burden. We recommend that, in the future, the focus should be on supporting the mental well-being and social participation of the caregivers along with measures that protect the caregivers and their relatives from COVID-19. In conclusion, support structures for informal caregivers should be kept running during crises now and in the future, but it is also important to adopt a case-by-case basis to look at support for informal caregivers.

AUTHOR CONTRIBUTIONS

DDC, KM, and AD were involved in the study design and data collection. DDC analyzed the data and wrote the first draft with SVD, KM and AD supervised the project and critically revised the paper.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

ETHICS STATEMENT

All data were collected in accordance with the General Data Protection Regulations (GDPR). All responses were fully anonymized.

ORCID

David De Coninck  <https://orcid.org/0000-0003-3831-266X>

Shauni Van Doren  <https://orcid.org/0000-0003-3968-2734>

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APPENDIX A

TABLE A1 Descriptive overview of study sample ($N = 258$)

	Frequency	Percentage
Gender		
Male	104	40.4
Female	154	59.6
Paid work		
Full-time	100	38.7
Part-time	34	13.2
Temporarily or permanently halted	14	5.4
No	110	42.8
Education		
Secondary degree of lower	166	64.4
Tertiary degree	92	35.6
Informal care burden since COVID		
Less burden	6	2.2
The same burden	158	61.3
More burden	94	36.5
Relationship with main care person		
Partner	25	9.8
Child	51	19.9
Parent	130	50.4
Other family	35	13.7
Friends/neighbour	16	6.2
Sole informal carer		
Yes, always have	110	42.7
Yes, since COVID	17	6.6
No	131	50.7
Time spent on informal care since COVID		
More time	97	37.5
Less time	21	8.2
About the same	140	54.3
Professional care pre-COVID		
Yes	175	84.1
No	33	15.9
Professional care during COVID		
Yes	116	55.5
No	93	44.5
Main care person lives with respondent pre-COVID		
Yes	72	32.1
No	152	67.9
Main care person lives with respondent during COVID		
Yes	44	19.7
No	179	80.3

(Continues)

TABLE A1 (Continued)

	Min	Max	Mean	SD
Informal care burden	1	11	5.29	2.81
Age	23	71	53.37	11.61
Perceived financial situation	1	6	4.09	1.02
Satisfaction professional carers				
Satisfied with professional care	1	5	4.10	1.02
Satisfied with collaboration	1	5	4.03	0.98