



**University of  
Zurich**<sup>UZH</sup>

**Zurich Open Repository and  
Archive**

University of Zurich  
University Library  
Strickhofstrasse 39  
CH-8057 Zurich  
[www.zora.uzh.ch](http://www.zora.uzh.ch)

---

Year: 2023

---

**Social support, distress and well-being in individuals experiencing Long-COVID: a  
cross-sectional survey study**

Lüscher, Janina ; Scholz, Urte ; Bierbauer, Walter

DOI: <https://doi.org/10.1136/bmjopen-2022-067166>

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-252218>

Journal Article

Published Version




The following work is licensed under a Creative Commons: Attribution-NonCommercial 4.0 International (CC BY-NC 4.0) License.

Originally published at:

Lüscher, Janina; Scholz, Urte; Bierbauer, Walter (2023). Social support, distress and well-being in individuals experiencing Long-COVID: a cross-sectional survey study. *BMJ Open*, 13(3):e067166.

DOI: <https://doi.org/10.1136/bmjopen-2022-067166>

# BMJ Open Social support, distress and well-being in individuals experiencing Long-COVID: a cross-sectional survey study

Janina Lüscher <sup>1</sup>, Urte Scholz,<sup>2,3</sup> Walter Bierbauer<sup>2,3</sup>

**To cite:** Lüscher J, Scholz U, Bierbauer W. Social support, distress and well-being in individuals experiencing Long-COVID: a cross-sectional survey study. *BMJ Open* 2023;**13**:e067166. doi:10.1136/bmjopen-2022-067166

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2022-067166>).

Received 03 August 2022  
Accepted 26 January 2023



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

<sup>1</sup>Swiss Paraplegic Research, Nottwil, Switzerland

<sup>2</sup>Department of Psychology, University of Zurich, Zurich, Switzerland

<sup>3</sup>University Research Priority Program “Dynamics of Healthy Aging”, University of Zurich, Zurich, Switzerland

## Correspondence to

Dr Janina Lüscher;  
[janina.luescher@paraplegie.ch](mailto:janina.luescher@paraplegie.ch)

## ABSTRACT

**Objectives** Increasingly attention of the COVID-19 pandemic is directed towards its long-term effects, also known as Long-COVID. So far, Long-COVID was examined mainly from a medical perspective, leaving psychosocial effects of Long-COVID understudied. The present study advances the current literature by examining social support in the context of Long-COVID. The study not only examines received support reported by individuals with Long-COVID, but also provided support reported by relatives of individuals with Long-COVID.

**Design** Cross-sectional study.

**Setting** The study was conducted from June to October 2021 in Austria, Germany and the German-speaking part of Switzerland.

**Participants** We examined 256 individuals with Long-COVID ( $M_{Age}=45.05$  years, 90.2% women) and 50 relatives of individuals with Long-COVID ( $M_{Age}=48.34$  years, 66.1% female) in two separate online surveys, assessing social support, well-being and distress.

**Primary outcome measures** Primary outcomes were positive and negative affect, anxiety and depressive symptoms and perceived stress.

**Results** For individuals with Long-COVID, receiving emotional support was related to higher well-being (positive affect:  $b=0.29$ ,  $p<0.01$ ; negative affect:  $b=-0.31$ ,  $p<0.05$ ) and less distress (anxiety:  $b=-1.45$ ,  $p<0.01$ ; depressive symptoms:  $b=-1.04$ ,  $p<0.05$ ; perceived stress:  $b=-0.21$ ,  $p<0.05$ ) but no effects emerged for receiving practical support. For relatives of individuals with Long-COVID, providing emotional support was only related to lower depressive symptoms ( $b=-2.57$ ,  $p<0.05$ ). Again, provided practical support was unrelated to the outcomes considered.

**Conclusions** Emotional support is likely to play an important role in well-being and distress of patients and relatives, whereas practical support does not seem to make a difference. Future research should clarify under what conditions different kinds of support unfold their positive effects on well-being and distress in the context of Long-COVID.

The COVID-19 pandemic had been going on for more than 2 years now, with emerging aspects of COVID-19 including long-term effects, as a considerable number of patients with COVID-19 are affected by lasting symptoms weeks or even months after an acute

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The present study advances the current literature on Long-COVID by presenting a psychosocial perspective of this disease from the perspectives of individuals with Long-COVID and additionally of relatives of individuals with Long-COVID.
- ⇒ The study had a cross-sectional design. Conclusions regarding causality cannot be drawn. However, data from cross-sectional studies are important to gain an initial understanding in under researched areas, as is the case for social support in the context of Long-COVID.
- ⇒ All constructs assessed in the present study were self-reported only. Self-reports of support receipt and provision are common in this research domain, and well-being indicators are also most often based on the subjective estimation of target persons.
- ⇒ The sample of individuals with Long-COVID might be a selective sample in that severely ill individuals are likely under-represented. Nonetheless, the mean psychological burden of participants was at the upper end of the scale.

COVID-19 infection.<sup>1</sup> Addressing long-term consequences is critical for health, and well-being as the number of patients (not) recovering from COVID-19 continues to rise.<sup>2</sup> Approximately 20% of affected individuals show persistent symptoms weeks or months after the acute COVID-19 illness.<sup>3</sup> To date, there is a lack of a consistent definition of Long-COVID, also termed ‘post-acute COVID-19 syndrome’ or ‘long-haul COVID-19’.<sup>4,5</sup> It is often referred to patients with COVID-19 who have overcome the acute phase of illness but are still affected by persistent symptoms.<sup>6</sup> Long-COVID is already spoken of when symptoms persist for more than 4 weeks, but a delimitation of 8 or 12 weeks is also common.<sup>7</sup> Affected individuals experience long-term damage not only in their lungs but also in their heart, immune system, brain, etc.<sup>8</sup> Symptoms can vary in severity and appearance, with exhaustion and fatigue, muscle pain, sleep disturbances, cough and heaviness among the most commonly



mentioned. Also reported are difficulty concentrating, exercise intolerance, dyspnoea and anosmia leading to impairments in social, occupational or other important areas of functioning and, consequently, reduced quality of life.<sup>4-9</sup> Recent systematic reviews and meta-analyses showed that mental health and distress, in general, were worse compared with before the outbreak of COVID-19.<sup>10-11</sup> In particular, individuals with Long-COVID who participated in a qualitative study described the disease as a heterogeneous condition with not only physical but also emotional consequences.<sup>12</sup> Whether Long-COVID establishes itself in individuals is not necessarily related to the course of the acute COVID-19 disease, pre-existing conditions or age<sup>13</sup> which makes potential risk factors leading to Long-COVID currently unclear. Indeed, even young adults without chronic health conditions and mild disease courses can develop long-term consequences.

To date, the Long-COVID disease has been studied mainly from a medical perspective (ie, onset, course, symptoms), but psychosocial factors that might serve a buffering function for people's well-being (ie, social support) of this new disease have been mostly neglected. Moreover, the impairments of those affected can also place a significant burden on the relatives of individuals with Long-COVID, as recently shown in a systematic review.<sup>14</sup>

One important factor is social support. Social support is an interactive process between a provider and a receiver, referring to the provision and receipt of resources intended to benefit a receiver's ability to cope in times of need.<sup>15</sup> Received and provided social support comprise retrospective reports of actual support transactions between two partners.<sup>16</sup> Functions of support can, for example, be emotional (eg, comforting) or instrumental (eg, practical assistance).<sup>16</sup>

The stress-buffering hypothesis of social support assumes that psychosocial resources help to cope with stress.<sup>17</sup> According to this hypothesis, people only benefit from social support in times of stress, and only then is social support assumed to be effective for the support receiver's well-being.<sup>16</sup> Research has also shown that providing support is beneficial for the provider because of rewarding and stress-reducing functions of giving support.<sup>18-19</sup> In line with this, a recent cross-sectional study demonstrated a positive association of family support with mental health-related quality of life in patients with multiple chronic health conditions, and also in their caregivers.<sup>20</sup> A recent systematic review showed that individuals experiencing long-term symptoms of COVID-19 largely felt understood and supported by general practitioners and family members.<sup>14</sup> If this was not the case, they often turned to support groups, for example, on social media, to share their experiences with others in a similar situation. Moreover, in another qualitative study on factors shaping mental health and well-being in individuals with Long-COVID, having supportive and understanding friends, family and health professionals was described as important for participants' well-being and mental health.<sup>21</sup>

So far, however, quantitative research on the well-being and stress-buffering effects of receipt of social support in individuals with Long-COVID and of provision of social support in relatives of individuals with Long-COVID is largely missing. Thus, the present study aimed at shedding light on the psychosocial perspective of Long-COVID by investigating the role of social support in two independent samples of individuals with Long-COVID and relatives of individuals with Long-COVID during the ongoing COVID-19 pandemic for their well-being and distress. We expect received support in individuals with Long-COVID and provided support of relatives of individuals with Long-COVID to be beneficially related to their own emotional well-being, anxiety and depressive symptoms and perceived stress. The specific hypotheses of this project were preregistered (<https://osf.io/wsxum>) as follows:

*Hypothesis 1:* Received emotional and practical social support reported by individuals with Long-COVID are positively associated with their positive affect and negatively associated with their negative affect, anxiety and depressive symptoms and perceived stress.

*Hypothesis 2:* Provided emotional and practical social support reported by relatives of individuals with Long-COVID are positively associated with their positive affect and negatively associated with their negative affect, anxiety and depressive symptoms and perceived stress.

## METHOD

### Design and participants

The project 'Psychosocial consequences of Long-COVID' comprised a cross-sectional design and examined individuals with Long-COVID and relatives of individuals with Long-COVID in two separate online surveys (<https://osf.io/wrb48/>). The samples of patients and relatives were independent of each other. That is, reports of patients on their received support from relatives do not refer to the sample of relatives of this study. The reports of relatives on their provision of support do not refer to the sample of patients of this study. The study was approved by the Ethics Committee of the Faculty of Arts and Social Sciences of the University of Zurich (reference number: 21.4.3).

**Patient and public involvement:** individuals with Long-COVID, relatives of individuals with Long-COVID or the public were not involved in the design, conduct, reporting or dissemination plans of our research.

Recruitment took place between June and October 2021 in Austria, Germany and the German-speaking part of Switzerland via online platforms, such as a Long-COVID self-help website, Long-COVID support groups on Facebook and other social media sources, such as Twitter or LinkedIn. Participants of the patient sample were adult individuals (18 years or older) with Long-COVID who contracted the acute COVID-19 disease at least 12 weeks previously and who suffered from long-term symptoms after the acute COVID-19 infection. Participants of

the relative sample were adult (18 years or older) relatives of individuals with Long-COVID (eg, family members, friends, colleagues, roommates, physicians, etc) and defined by the fact that they were in close contact with a patient with Long-COVID and did not themselves have acute COVID-19 or Long-COVID. If participants met all inclusion criteria and gave informed consent, they completed an online questionnaire either for individuals with Long-COVID or relatives of individuals with Long-COVID. For calculating response rates, we divided the number of completed survey responses by the number of individuals who viewed or started the online survey, resulting in a response rate of 64.9% for the online survey of individuals with Long-COVID and 38.8% for the online survey of relatives of individuals with Long-COVID.

The patient sample consisted of N=256 individuals with Long-COVID. The mean age of patients with Long-COVID was M=45.05 years (SD=12.16, range=18–83), and the majority were women (90.2%). A total of 201 (65%) were married or in a romantic relationship, and the majority had children (54%). Most patients with Long-COVID had a higher education (56%) and were currently employed (81.3%). On average, the acute COVID-19 infection was 39.96 weeks ago (SD=17.68, range=14–80). The majority (57.5%) reported that they had moderately severe symptoms during their acute COVID-19 infection, only 10.7% were hospitalised. On average, 15.04 Long-COVID symptoms (SD=5.57, range=3–32) were reported, and the overall self-reported burden of Long-COVID symptoms was, on average, 8.55 (SD=1.72) on a scale ranging from 1=not at all burdened to 10=extremely burdened. A total of 29.1% rated their health as bad, and 47.5% as not good.<sup>22</sup>

Individuals with Long-COVID most often named their romantic partner (69.7%) as the most important support provider, followed by a close friend (12.4%), parent (7.2%), child (6%), sibling (2.4%), work colleague (1.6%) and acquaintances (0.8%). Support providers were mostly men (63.1%), and patients reported to feel very close to them (M=9.06, SD=1.81, range 0–10).<sup>23</sup>

The sample of relatives of individuals with Long-COVID consisted of N=50 people in total. The mean age of relatives of individuals with Long-COVID was M=48.34 years (SD=14.97, range=24–81), and the majority was women (66.1%). Most relatives of individuals with Long-COVID had a higher education (60.3%) and were currently employed (70.7%). A total of 44.8% of the relatives rated their own health status as good.<sup>22</sup> Relatives of individuals with Long-COVID were mostly romantic partners (46.9%), followed by parents (30.6%), siblings (18.4%) and friends (4.1%), and they reported feeling very close to the patients with Long-COVID they provided support to (M=9.43, SD=1.35, ranging from 1=not at all close to 10=very close).<sup>23</sup>

## Measures

**Table 1** shows the descriptive statistics and reliabilities of the main variables.

*Received social support.* To assess received social support with regard to Long-COVID, individuals with Long-COVID first read the following description: ‘in the questions that follow now, we are interested in a relative who is close to you. This person may help you with everyday matters (eg, going shopping) or is a person you can talk to about anything if something is bothering you. To make the following questions more personal, we would like to ask you to enter the name of this person (eg, first name, nickname, initials) here. The following questions will then always appear with that name/nickname/initials’. For the indicated relative, individuals with Long-COVID then answered six items each for emotional and practical support adapted for the context of Long-COVID from the Berliner Social Support Scales (BSSS)<sup>24</sup> with a response format ranging from 0 (not at all true) to 5 (completely true). For example, individuals with Long-COVID were asked to rate their received emotional support with the item ‘XY showed me that they liked and accepted me, even though I was burdened by my Long-COVID disease’ or received practical support with the item ‘XY has done a lot for me because of my Long-COVID disease’.

**Table 1** Descriptive statistics and reliabilities of the main variables

Individuals with Long-COVID	Relatives of individuals with Long-COVID					
	M	SD	Cronbach's alpha	M	SD	Cronbach's alpha
Emotional support	4.34	0.74	0.86	4.30	0.77	0.89
Practical support	3.79	0.86	0.78	3.76	0.90	0.85
Positive affect	2.36	0.94	0.80	3.48	0.73	0.81
Negative affect	2.10	1.01	0.73	1.64	0.94	0.71
Anxiety	7.87	4.05	0.82	7.33	4.20	0.86
Depressive symptoms	8.49	3.98	0.81	6.02	4.03	0.86
Perceived stress	2.15	0.80	0.82	2.25	0.72	0.72

For individuals with Long-COVID emotional and practical support were measured as received support; for relatives of individuals with Long-COVID emotional and practical support were measured as provided support.



*Provided social support.* To assess provided social support with regards to Long-COVID, relatives of individuals with Long-COVID first read the following description: ‘in the questions that now follow, we are interested in a person close to you who suffers from Long-COVID. In order to make the following questions more personal, we would like to ask you to enter the name of this person (eg, first name, nickname, initials)’. For the indicated patient, relatives of individuals with Long-COVID then answered six items each for emotional and practical support adapted for the context of Long-COVID from the BSSS<sup>24</sup> with a response format ranging from 0 (not at all true) to 5 (completely true). For example, relatives of individuals with Long-COVID were asked to rate their provided emotional support with the item ‘I showed XY that I liked and accepted them, even though they were burdened by their Long-COVID disease’ or provided practical support with the item ‘I did a lot of work for XY because of their Long-COVID disease’.

*Well-being* reported by individuals with Long-COVID and relatives of individuals with Long-COVID was assessed with the 10-item short form of the PANAS scales<sup>25</sup> with 5 items for positive and 5 items for negative affect with a response format ranging from 0 (not at all true) to 5 (completely true).

*Anxiety and depressive symptoms* reported by individuals with Long-COVID and relatives of individuals with Long-COVID were measured with the Hospital Anxiety and Depression Scale (HADS)<sup>26</sup>, including 14 items representing the subscales anxiety and depressive symptoms on a four-point response scale ranging from 0 to 21. Higher scores indicate higher anxiety and more depressive symptoms.

*Perceived stress* reported by individuals with Long-COVID and relatives of individuals with Long-COVID was measured with the Perceived Stress Scale (PSS)<sup>27</sup>, including 4 items with a response format ranging from 0 (never) to 4 (very often).

## Data analysis

Power analysis was performed with G\*Power for sample size estimation.<sup>28</sup> Because this was the first study examining associations between social support and different outcomes (ie, well-being, distress) in the context of Long-COVID, we conservatively assumed small effect sizes, drawing on previous meta-analyses from different health and illness contexts.<sup>29–31</sup> Based on a power of 0.90, an assumed effect size of 0.15, and a two-tailed type 1 error probability of 0.05, a minimal sample of N=73 individuals with Long-COVID and N=73 relatives of individuals with Long-COVID was found to be appropriate to detect a small effect of social support on different outcomes.

Analyses were conducted with IBM SPSS V.27. Bivariate associations between central study variables were examined by Pearson correlation analyses. To test the hypotheses, we conducted hierarchical regression analyses.<sup>32</sup> For each outcome (positive affect, negative affect, anxiety, depressive symptoms, perceived stress), and for both samples (individuals with Long-COVID and relatives of individuals with Long-COVID), we conducted separate regression analyses. We considered age and gender as covariates as they were reported to be associated with the central outcomes over and above our primary indicators.<sup>33–35</sup> All predictors were grand-mean centred except for gender (0 for men and 1 for women) to allow for a meaningful interpretation of the intercept.

## RESULTS

**Table 2** displays all bivariate correlations between the main study variables and covariates separated for individuals with Long-COVID (above diagonal) and relatives of individuals with Long-COVID (below diagonal). For individuals with Long-COVID, there was a positive association between received emotional support and positive affect, whereas a negative association between received emotional support and negative affect, anxiety, depressive symptoms and perceived stress emerged. Higher received practical support was related to lower anxiety

**Table 2** Correlations of the main variables of the study and covariates

	1	2	3	4	5	6	7	8	9
1 Emotional social support	–	0.71***	0.17**	–0.13*	–0.23***	–0.19**	–0.14*	0.01	–0.02
2 Practical social support	0.68***	–	0.08	–0.03	–0.13*	–0.12†	–0.06	–0.08	–0.02
3 Positive affect	0.26†	0.22	–	–0.23***	–0.16**	–0.47***	–0.26***	0.15**	0.02
4 Negative affect	–0.18	–0.08	–0.38**	–	0.62***	0.46***	0.37***	–0.11†	–0.02
5 Anxiety	0.06	0.05	–0.31*	0.76***	–	0.55***	0.42***	–0.08	–0.05
6 Depressive symptoms	–0.43**	–0.27†	–0.49***	0.43**	0.52***	–	0.46***	–0.09	–0.05
7 Perceived stress	–0.11	–0.02	–0.52***	0.59***	0.69***	0.70***	–	–0.09	0.07
8 Age	0.32*	0.13	0.37**	–0.35**	–0.26†	–0.13	–0.12	–	–0.07
9 Gender (0=men, 1=women)	–0.10	–0.19	–0.17	0.31*	0.28†	0.16	0.27†	–0.18	–

†p>0.10, \*p<0.05, \*\*p<0.01, \*\*\*p<0.001; above diagonal correlations for individuals with Long-COVID, below diagonal correlations for relatives of individuals with Long-COVID.

and to lower depressive symptoms (at the 10% level). For relatives of individuals with Long-COVID providing emotional support related to more positive affect (at the 10% level) and to less depressive symptoms whereas practical support was related to lower depressive symptoms (at the 10% level).

### Associations between received social support, well-being and distress in individuals with Long-COVID

Results of the regression analyses on the associations between received emotional and practical social support with well-being and distress in individuals with Long-COVID are displayed in table 3. Hypothesis 1 stated that received emotional and practical social support reported by individuals with Long-COVID are positively associated with their positive affect and negatively associated with their negative affect, anxiety, depressive symptoms and perceived stress. This could be confirmed for received emotional social support but not for received practical social support.

### Associations between provided social support, well-being and distress in relatives of individuals with Long-COVID

Results of the regression analyses on the association between provided social support with well-being and distress in relatives of individuals with Long-COVID are displayed in table 4. Hypothesis 2 stated that provided emotional and practical social support reported by relatives of individuals with Long-COVID are positively associated with their positive affect and negatively associated with their negative affect, anxiety, depressive symptoms and perceived stress. Partly in line with this hypothesis, more provided emotional social support was associated with less depressive symptoms in relatives of individuals with Long-COVID but no association emerged with positive affect, negative affect, anxiety and perceived stress. Moreover, no significant association between provided practical social support and any of the outcome variables was found.

## DISCUSSION

The present study advances the current literature on Long-COVID by presenting a psychosocial perspective of this disease from the independent perspectives of individuals with Long-COVID and of relatives of individuals with Long-COVID. To date, there is little quantitative research on psychosocial consequences or resources for coping with Long-COVID in both patients and relatives. This was the aim of the present study.

Our findings for individuals with Long-COVID are in line with the stress-buffering hypothesis of social support<sup>17</sup> in that social support can help to cope with distress and emotional well-being in times of hardship. Moreover, the results are in line with qualitative findings describing the importance of support from family and friends for reducing distress and fostering emotional well-being of individuals experiencing Long-COVID.<sup>21</sup>

**Table 3** Coefficients of regression analysis for the prediction of positive and negative affect, anxiety, depressive symptoms and perceived stress of individuals with Long-COVID

	Positive affect			Negative affect			Anxiety			Depressive symptoms			Perceived stress		
	b	SE	$\beta$	b	SE	$\beta$	b	SE	$\beta$	b	SE	$\beta$	b	SE	$\beta$
Intercept	2.27***	0.19		2.16***	0.21		8.48***	0.81		9.13**	0.79		1.62***	0.17	
Gender	0.06	0.20	0.02	-0.04	0.22	-0.01	-0.57	0.86	-0.04	-0.62	0.83	-0.04	-0.05	0.20	0.18
Age	0.02**	0.01	0.18	-0.01*	0.01	-0.14	-0.03	0.02	-0.10	-0.04*	0.02	-0.10	-0.12	-0.01	0.004
Intercept	1.31***	0.39		2.90***	0.44		13.74***	1.68		13.56***	1.64		2.29***	0.35	
Gender	0.08	0.20	0.03	-0.05	0.22	-0.02	-0.64	0.84	-0.05	-0.67	0.82	-0.05	-0.05	0.19	0.17
Age	0.01**	0.01	0.17	-0.01*	0.01	-0.13	-0.03	0.02	-0.09	-0.04†	0.02	-0.09	-0.12	-0.01	0.004
Received emotional social support	0.29**	0.11	0.23	-0.31*	0.13	-0.22	-1.45**	0.48	-0.27	-1.04*	0.47	-0.20	-0.20	-0.21*	0.10
Received practical social support	-0.08	0.10	-0.08	0.17	0.11	0.14	0.29	0.42	0.06	0.03	0.41	0.01	0.01	0.07	0.09

Gender: 0=men, 1=women; b=unstandardized regression coefficients, SE b=standard errors,  $\beta$ =standardised regression coefficients; \*\*\*p<0.001, \*\*p<0.01, \*p<0.05, †p<0.10.  
 Positive affect (N=251): 1. step:  $R^2=0.03$ ,  $F(2, 248) = 4.12$ ,  $p=0.017$ ; 2. step:  $\Delta R^2=0.03$ ,  $F(2, 246) = 4.39$ ,  $p=0.002$ .  
 Negative affect (N=252): 1. step:  $R^2=0.02$ ,  $F(2, 249) = 2.58$ ,  $p=0.078$ ; 2. step:  $\Delta R^2=0.03$ ,  $F(2, 247) = 2.93$ ,  $p=0.021$ .  
 Anxiety (N=252): 1. step:  $R^2=0.01$ ,  $F(2, 249) = 1.45$ ,  $p=0.237$ ; 2. step:  $\Delta R^2=0.05$ ,  $F(2, 247) = 4.14$ ,  $p=0.003$ .  
 Depressive symptoms (N=252): 1. step:  $R^2=0.02$ ,  $F(2, 249) = 2.19$ ,  $p=0.114$ ; 2. step:  $\Delta R^2=0.04$ ,  $F(2, 247) = 3.50$ ,  $p=0.008$ .  
 Perceived stress (N=252): 1. step:  $R^2=0.02$ ,  $F(2, 249) = 1.93$ ,  $p=0.148$ ; 2. step:  $\Delta R^2=0.02$ ,  $F(2, 247) = 2.38$ ,  $p=0.062$ .

**Table 4** Coefficients of regression analysis for the prediction of positive and negative affect, anxiety, depressive symptoms and perceived stress of relatives of individuals with Long-COVID

	Positive affect			Negative affect			Anxiety			Depressive symptoms			Perceived stress		
	b	SE b	β	b	SE b	β	b	SE b	β	b	SE b	β	b	SE b	β
Intercept	3.61***	0.18		1.26***	0.22		5.84***	0.96		5.19***	1.01		1.37***	0.16	
Gender	-0.21	0.22	-0.13	0.49†	0.27	0.25	1.84	1.20	0.22	1.10	1.26	0.13	0.31	0.20	0.23
Age	0.02*	0.01	0.36	-0.02*	0.01	-0.33	-0.07†	0.04	-0.25	-0.02*	0.04	-0.09	-0.004	0.01	-0.09
Intercept	2.91***	0.65		1.58†	0.81		2.06	3.54		15.23***	3.41		1.73**	0.60	
Gender	-0.17	0.23	-0.11	0.50†	0.28	0.25	1.88	1.23	0.22	0.96	1.18	0.11	0.32	0.21	0.23
Age	0.02*	0.01	0.34	-0.02†	0.01	-0.30	-0.08†	0.04	-0.31	0.02†	0.04	0.06	-0.002	0.01	-0.05
Provided emotional social support	0.08	0.20	0.08	-0.14	0.24	-0.11	1.00	1.06	0.19	-2.57*	1.02	-0.49	-0.14	0.18	-0.17
Provided practical social support	0.09	0.16	0.11	0.07	0.20	0.07	-0.14	0.89	-0.03	0.28	0.86	0.06	0.07	0.15	0.09

Gender: 0=men, 1=women; b=unstandardised regression coefficients, SE b=standard errors, β=standardised regression coefficients; \*\*\*p<0.001, \*\*p<0.01, \*p<0.05, †p<0.10.  
 Positive affect (N=48): 1. step: R<sup>2</sup>=0.16, F(2, 45) = 4.29, p=0.020; 2. step: ΔR<sup>2</sup>=0.03, F(2, 43) = 2.48, p=0.058.  
 Negative affect (N=48): 1. step: R<sup>2</sup>=0.19, F(2, 45) = 5.23, p=0.009; 2. step: ΔR<sup>2</sup>=0.01, F(2, 43) = 2.60, p=0.049.  
 Anxiety (N=48): 1. step: R<sup>2</sup>=0.12, F(2, 45) = 3.16, p=0.052; 2. step: ΔR<sup>2</sup>=0.03, F(2, 43) = 1.88, p=0.131.  
 Depressive symptoms (N=48): 1. step: R<sup>2</sup>=0.03, F(2, 45) = 0.66, p=0.522; 2. step: ΔR<sup>2</sup>=0.18, F(2, 43) = 2.84, p=0.035.  
 Perceived stress (N=48): 1. step: R<sup>2</sup>=0.07, F(2, 45) = 1.55, p=0.223; 2. step: ΔR<sup>2</sup>=0.01, F(2, 43) = 0.91, p=0.468.

Specifically, individuals with Long-COVID who received emotional support showed higher positive affect, lower negative affect, less anxiety, fewer depressive symptoms and less perceived stress, whereas received practical support was unrelated to all tested outcome variables. Moreover, patients reported high mean levels of received emotional than practical support. The diverging results for emotional and practical support imply that it is particularly sympathy, comfort and heartiness<sup>16</sup> that are part of emotional but not practical support that is needed for patients with Long-COVID's mental health. This is consistent with the findings of a qualitative study of individuals affected by Long-COVID: being listened to and feeling validated by family and friends was reported as vital for well-being and mental health.<sup>21</sup>

Contrary to our assumptions, practical support, such as financial aid or helping with household chores, did not follow the expected positive functions for well-being and distress indicators. One possible explanation is that emotional but not practical support is a better match for the emotional distress experienced due to the disease, as stated by optimal matching theory.<sup>36</sup> Another explanation might be a selection bias in our sample, in that severely affected individuals did not participate in the current study. Those individuals, however, might be in greater need of practical support from their network than the current sample, when the execution of activities of daily living (eg, preparing meals, shopping) is restricted.

Research on differences in the effectiveness of different sources of support is almost non-existent.<sup>16</sup> However, family members seem most frequently responsible for providing emotional support.<sup>37</sup> This was also the case in this sample for the context of Long-COVID. The online questionnaire allowed patients to write open comments at the end of the questionnaire, and many individuals with Long-COVID thanked their spouses, partners, family members and other support sources for their endless support emphasising the importance of emotional support in this sample. This nicely aligns with another recent study with individuals with Long-COVID, heavily emphasising the importance of psychosocial support.<sup>38</sup>

Previous studies have shown that providing support can be beneficial for the provider because of the stress-reducing function of giving support.<sup>18 19</sup> In the present study, relatives of individuals with Long-COVID reported high mean levels of provided emotional and practical support, indicating that they are actively engaged in the disease management of individuals with Long-COVID. Contrary to our hypothesis, provided emotional support was only related to fewer depressive symptoms but not to positive and negative affect, anxiety and perceived stress and provided practical support was unrelated to all outcome variables. This mirrors the results for emotional support in individuals with Long-COVID. Moreover, this is in line with previous results showing that the provision of emotional but not practical support more consistently predicted providers' well-being.<sup>39</sup> If, as we assumed, receiving emotional support better matches the

recipients' needs, participants might also display greater gratitude for this particular type of support. Gratitude for providing support has in turn been shown to enhance providers' well-being.<sup>40</sup> This provides a possible explanation for this study's results on the effects of the provision of emotional support. Moreover, another explanation for the diverging results on the provision of emotional and practical support could be that providing emotional support might allow more emotional benefits than practical support, for example, by increasing closeness, intimacy or relationship satisfaction between support provider and recipient.<sup>41</sup> This explanation is backed up by several comments written by the relatives at the end of the questionnaire: they reported that providing emotional support to individuals with Long-COVID made them feel close to the patients. Future studies could investigate these possible explanations and the different functions of received or provided emotional versus practical support.

The main limitation of the study relates to the cross-sectional design, where conclusions regarding causality cannot be drawn. Despite the many limitations associated with cross-sectional studies, data from cross-sectional studies are essential to gain an initial understanding in underresearched areas, as is the case for psychosocial consequences and resources in the context of Long-COVID in afflicted patients themselves as well as in relatives of individuals with Long-COVID. According to our results, the experiences of individuals with Long-COVID should continue to be explored from a psychosocial perspective. Future studies may want to apply an intensive longitudinal design to capture a more fine-grained picture of time-dependent relations between recipients' needs, received and provided social support and well-being and distress indicators. Additionally, knowledge acquired from the present study might inform future intervention studies, which provide social network partners of individuals with Long-COVID with strategies for optimal support. Thus, healthcare professionals could provide education and social support materials (especially pointing to the importance of emotional support strategies for emotional well-being and distress) to supportive network members helping afflicted individuals regulate well-being and mental health capabilities and maintain or adapt to changed social roles because of their illness.

A second limitation is that all constructs were self-reported. Self-reports of support receipt and provision are common in this research domain, and well-being indicators are usually based on the subjective estimation of target persons. Alternatively, future studies on psychosocial factors in the context of Long-COVID could add objective measures such as heart rate as a stress measure<sup>42</sup> or follow individuals with Long-COVID and also relatives of individuals with Long-COVID in their everyday life via audio recordings to capture their social support exchanges.<sup>43</sup> A third limitation is the relatively low sample size of 50 relatives of individuals with Long-COVID, which might result in insufficient statistical

power detecting effects in the analyses of this group.<sup>44</sup> Fourth, individuals with Long-COVID could only specify one source providing social support to them even though participants may rely on different individuals for different types of support. Thus, results on practical support may have been more pronounced for an additional support receipt. Another limitation was that our survey did not contain any compulsory questions (except for the inclusion criteria). For example, participants who did not have a support provider or did not provide support were able to avoid the social support questions. A downside of this procedure is, however, that we cannot distinguish between missings due to a lack of support and missings for other reasons. Finally, the sample of individuals with Long-COVID might be a selective sample. Severely ill patients are likely under-represented in this study. Nonetheless, the mean psychological burden of patients was at the upper end of the scale. Moreover, female individuals with Long-COVID represent the majority (90.2%) in the current study. Recent literature points towards the female sex acting as a predictor of the long-term effects of COVID-19.<sup>45–48</sup> However, to date, it is not clear if women are more frequently affected by long-term effects of a COVID-19 infection compared with men or if this is rather due to a selection bias that women participate more frequently in online surveys.<sup>46</sup>

Despite these limitations, the present study is one of the first to examine psychosocial factors and outcomes in individuals with Long-COVID and relatives of individuals with Long-COVID (as demanded by previous studies on Long-COVID<sup>12</sup>) and showed the importance of emotional social support for both recipients' and providers' well-being indicators in the context of Long-COVID. Overall, the present study provides evidence for the usefulness of engaging in a psychosocial perspective in the context of Long-COVID.

**Acknowledgements** We thank our study participants for making this study possible.

**Contributors** JL, US and WB are the principal investigators of the study. JL acts as guarantor. JL analysed the data and drafted the manuscript. US and WB contributed to the study and the manuscript. All authors read and approved of the final manuscript.

**Funding** The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

**Competing interests** None declared.

**Patient and public involvement** Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

**Patient consent for publication** Not applicable.

**Ethics approval** This study involves human participants and was approved by Ethics Committee of the Faculty of Arts and Social Sciences of the University of Zurich (reference number: 21.4.3). Participants gave informed consent to participate in the study before taking part.

**Provenance and peer review** Not commissioned; externally peer reviewed.

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

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially,



and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

#### ORCID iD

Janina Lüscher <http://orcid.org/0000-0003-2453-1925>

#### REFERENCES

- Mandal S, Barnett J, Brill SE, et al. "Long-COVID": a cross-sectional study of persisting symptoms, biomarker and imaging abnormalities following hospitalisation for COVID-19. *Thorax* 2021;76:396–8.
- Rao S, Benzouak T, Gunpat S, et al. Fatigue symptoms associated with COVID-19 in convalescent or recovered COVID-19 patients; a systematic review and meta-analysis. *Ann Behav Med* 2022;56:219–34.
- Venkatesan P. NICE guideline on long COVID. *Lancet Respir Med* 2021;9:129.
- Nath A. Long-haul COVID. *Neurology* 2020;95:559–60.
- Callard F, Perego E. How and why patients made long covid. *Soc Sci Med* 2021;268:113426.
- Mahase E. Covid-19: what do we know about "long covid"? *BMJ* 2020;370:m2815.
- Sudre CH, Murray B, Varsavsky T, et al. Attributes and predictors of long COVID. *Nat Med* 2021;27:626–31.
- Marshall M. The lasting misery of coronavirus long-haulers. *Nature* 2020;585:339–41.
- Malik P, Patel K, Pinto C, et al. Post-Acute COVID-19 syndrome (PCS) and health-related quality of life (hrqol) –A systematic review and meta-analysis. *J Med Virol* 2022;94:253–62.
- Robinson E, Sutin AR, Daly M, et al. A systematic review and meta-analysis of longitudinal cohort studies comparing mental health before versus during the COVID-19 pandemic in 2020. *J Affect Disord* 2022;296:567–76.
- Schafer KM, Lieberman A, Sever AC, et al. Prevalence rates of anxiety, depressive, and eating pathology symptoms between the pre- and peri-COVID-19 eras: A meta-analysis. *J Affect Disord* 2022;298:364–72.
- Kingstone T, Taylor AK, O'Donnell CA, et al. Finding the "right" GP: a qualitative study of the experiences of people with long-COVID. *BJGP Open* 2020;4:bjgpopen20X101143.
- Gorna R, MacDermott N, Rayner C, et al. Long COVID guidelines need to reflect lived experience. *Lancet* 2021;397:455–7.
- Macpherson K, Cooper K, Harbour J, et al. Experiences of living with long COVID and of accessing healthcare services: a qualitative systematic review. *BMJ Open* 2022;12:e050979.
- Cohen S, Gottlieb B, Underwood L, eds. *Measuring and intervening in social support. social relationships and health*. New York: Oxford University Press, 2000: 3–25.
- Lüscher J, Scholz U. Soziale Unterstützung. In: Kohlmann C-W, Salewski C, Wirtz M, eds. *Psychologie in der Gesundheitsförderung*. Hogrefe, 2018.
- Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychol Bull* 1985;98:310–57.
- Orehek E, Inagaki TK. On the benefits of giving social support: when, why, and how support providers gain by caring for others. *Curr Dir Psychol Sci* 2017;26:109–13.
- Berli C, Scholz U. Long-term and transfer effects of an action control intervention in overweight couples: a randomized controlled trial using text messages. *Front Psychol* 2021;12:754488.
- De Maria M, Tagliabue S, Ausili D, et al. Perceived social support and health-related quality of life in older adults who have multiple chronic conditions and their caregivers: a dyadic analysis. *Soc Sci Med* 2020;262:113193.
- Burton A, Aughterson H, Fancourt D, et al. Factors shaping the mental health and well-being of people experiencing persistent COVID-19 symptoms or "long COVID": qualitative study. *BJPsych Open* 2022;8:e72.
- Ware J, Kosinski M, Keller SD. A 12-Item short-form health survey: construction of scales and preliminary tests of reliability and validity. *Med Care* 1996;34:220–33.
- Fletcher GJO, Simpson JA, Thomas G. *Perceived relationship quality components inventory (PRQC)*. APA PsycTests, 2000.
- Schulz U, Schwarzer R. Soziale Unterstützung bei Der Krankheitsbewältigung: die Berliner social support skalen (bss). *Diagnostica* 2003;49:73–82.
- Thompson ER. Development and validation of an internationally reliable short-form of the positive and negative affect schedule (panas). *Journal of Cross-Cultural Psychology* 2007;38:227–42.
- Herrmann-Lingen C, Buss U, Snaith RP. *Hospital anxiety and depression scale, deutsche version (HADS-D)*. Huber, 2011.
- Cohen S, Williamson G. Perceived stress in a probability sample of the united states. In: Spacapan S, Oskamp S, eds. *The social psychology of health*. Sage, 1988: 31–68.
- Faul F, Erdfelder E, Lang AG, et al. G\*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods* 2007;10(3758/bf03193146):17695343.
- DiMatteo MR. Social support and patient adherence to medical treatment: A meta-analysis. *Health Psychology* 2004;23:207–18. [10.1037/0278-6133.23.2.207](https://doi.org/10.1037/0278-6133.23.2.207) Available: <https://doi.org/10.1037/0278-6133.23.2.207>
- Prati G, Pietrantonio L. Optimism, social support, and coping strategies as factors contributing to posttraumatic growth: A meta-analysis. *Journal of Loss and Trauma* 2009;14:364–88. [10.1080/15325020902724271](https://doi.org/10.1080/15325020902724271) Available: <https://doi.org/10.1080/15325020902724271>
- Schwarzer R, Leppin A. Social support and health: A meta-analysis. *Psychology & Health* 1989;3:1–15. Available: <https://doi.org/10.1080/08870448908400361>
- Jacob C, Patricia C, Stephen G W, et al. *Applied multiple regression / correlation analysis for the behavioral sciences*. 3 ed. Mahwah, NJ: Lawrence Erlbaum Associates, 2003.
- Muise A, Harasymchuk C, Day LC, et al. Broadening your horizons: self-expanding activities promote desire and satisfaction in established romantic relationships. *J Pers Soc Psychol* 2019;116:237–58.
- Dragano N, He Y, Moebus S, et al. Two models of job stress and depressive symptoms. results from a population-based study. *Soc Psychiatry Psychiatr Epidemiol* 2008;43:72–8.
- Gordillo V, Fekete E, Platteau T, et al. Emotional support and gender in people living with HIV: effects on psychological well-being. *J Behav Med* 2009;32:523–31.
- Cutrona CE, Russell DW. Type of social support and specific stress: toward a theory of optimal matching. In: Sarason BR, Sarason IG, Pierce GR, eds. *Social support: An international view*. John Wiley & Sons, 1990: 319–66.
- Tay L, Tan K, Diener E, et al. Social relations, health behaviors, and health outcomes: a survey and synthesis. *Appl Psychol Health Well Being* 2013;5:28–78.
- Vanichkachorn G, Newcomb R, Cowl CT, et al. Post-COVID-19 syndrome (long haul syndrome): description of a multidisciplinary clinic at Mayo clinic and characteristics of the initial patient cohort. *Mayo Clinic Proceedings* 2021;96:1782–91.
- Morelli SA, Lee IA, Arnn ME, et al. Emotional and instrumental support provision interact to predict well-being. *Emotion* 2015;15:484–93.
- Grant AM, Gino F. A little thanks goes a long way: explaining why gratitude expressions motivate prosocial behavior. *J Pers Soc Psychol* 2010;98:946–55.
- Wright DL, Aquilino WS. Influence of emotional support exchange in marriage on caregiving wives' burden and marital satisfaction. *Family Relations* 1998;47:195.
- Kim H-G, Cheon E-J, Bai D-S, et al. Stress and heart rate variability: a meta-analysis and review of the literature. *Psychiatry Investig* 2018;15:235–45.
- Mehl MR, Pennebaker JW, Crow DM, et al. The electronically activated recorder (ear): a device for sampling naturalistic daily activities and conversations. *Behav Res Methods Instrum Comput* 2001;33:517–23.
- McClelland GH, Judd CM. Statistical difficulties of detecting interactions and moderator effects. *Psychol Bull* 1993;114:376–90.
- Jensen A, Alex WC, Maria TF, et al. Sex and gender differences in the neurological and neuropsychiatric symptoms of long COVID: A narrative review. *The Italian Journal of Gender-Specific Medicine* 2022;8:18–28.
- Goërtz YMJ, Van Herck M, Delbressine JM, et al. Persistent symptoms 3 months after a SARS-cov-2 infection: the post-COVID-19 syndrome? *ERJ Open Res* 2020;6:00542-2020.
- Nittas V, Gao M, West EA, et al. Long COVID through a public health lens: an umbrella review. *Public Health Rev* 2022;43:1604501.
- Menges D, Ballouz T, Anagnostopoulos A, et al. Burden of post-COVID-19 syndrome and implications for healthcare service planning: a population-based cohort study. *PLoS One* 2021;16:e0254523.