



## Changing living arrangements and stress during Covid-19 lockdown: Evidence from four birth cohorts in the UK

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### ABSTRACT

**Background:** The outbreak of Covid-19 in the UK has seen many families unexpectedly brought back together. The circumstances and stories of individual families have been picked up in the press focussing on the difficulties of people adjusting to their changed living arrangements. Yet, there have been few empirical analyses on how such changes might influence people's health and wellbeing. Therefore, this study explored the changing patterns of perceived stress by living arrangements change during the first wave of the Covid-19 pandemic in 2020.

**Methods:** The data used relates to 12,532 cohort members in the special Covid-19 surveys conducted with the participants of the 1958, 1970, 2000-01 British birth cohorts and Next Steps (born in 1989-90) in May 2020. Probit regression models were used to assess the chance of reporting increased stress amongst those who had experienced changes in living arrangements during the pandemic compared to those who had not.

**Results:** The results provide strong evidence that those individuals whose living arrangements changed during the Covid-19 pandemic have a higher likelihood of reported increased stress than those whose living arrangements remained unchanged. This was most clearly seen for older cohorts. Increased interpersonal conflict plays a role in mediating the association, especially for the younger cohort.

**Conclusions:** The findings confirm that during the first lockdown, changing living arrangements were negatively associated with individuals' mental wellbeing. As prolonged periods of stress can lead to serious health problems and policymakers need to be mindful that services may need to take these new, albeit for many temporary, forms of living arrangements into account.

### 1. Introduction

The outbreak of Covid-19 in the UK has seen many families unexpectedly brought back together. School and university closures, the move to remote working, furlough or the loss of employment have all meant that many adult children who had previously left the parental home have returned. Other individuals have moved to provide care and support for a family member or friend who has been 'shielding', and conversely some vulnerable and/or older people have moved in with a younger relative or friend. Concerns around the risk of infection from Covid-19 have also stimulated changes in living arrangements, with key workers moving out of the household to protect their families or to be closer to their job. Others have chosen to move as they did not want to live on their own during such uncertain times, and some have simply been unable to travel back home. The circumstances and stories of

individual families have been picked up in the press (BBC, 2020; Independent, 2020) focussing on the difficulties of people adjusting to their changed living arrangements, alongside the challenges of remote working and home schooling. A recent study of parents living with children under 18 based on the Understanding Society Covid-19 Study found that spending additional time together during lockdown has strengthened family bonds (Perelli-Harris & Walzenbach, 2020). Whether this positive experience is mirrored amongst those older parents 'reunited' with adult children or amongst adult children unexpectedly finding themselves back 'home', is an open question.

Prior to the pandemic, research highlighted that more young adults were living with their parents into their 20s and 30s; some of whom had never left, whereas others were returning to their parents' home (Billari & Liefbroer, 2007; Stone et al., 2011, 2014; Falkingham et al., 2016). Further research had begun to shed light on the possible implications of

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intergenerational co-residence for the health and wellbeing of both older and younger generations (Copp, 2017; Tosi & Grundy, 2018). Some studies indicated a positive impact of co-residence with adult children on parents' well-being (Aranda, 2015; Courtin & Avendano, 2016), whereas others found that older parents living with adult children are more likely to report depressive symptoms or poor quality of life (Aquilino & Supple, 1991; Tosi & Grundy, 2018). One study found young adults returning to the parental home (boomeranging) experienced higher levels of depressive symptoms as compared with living independently, especially among those citing employment problems as a rationale for returning home (Copp, 2017). Changes in living arrangements are stressful regardless of the motives behind them. According to Wheaton and Montazer (2009), a stressor that produces stress can be life events and can also exist as a state, a continuous and persistent problem. Stressors then turn into distress if coping resources are insufficient. Therefore, we might anticipate that adult children or parents may feel stressed if they needed to change their living arrangements during the Covid-19 pandemic and experienced subsequent challenges such as familial conflict. The context of Covid-19 pandemic and lockdown provides a unique opportunity to examine the association between changing living arrangements and mental health. To date however, there have been few empirical analyses on this subject. Using recently collected special Covid-19 cohort data, we aim to explore the changing patterns of perceived stress by living arrangements change relating to the Covid-19 pandemic in Britain in the period from when the first lockdown was announced in March 2020, through to its easing in May 2020.

## 2. Methods

### 2.1. Participants

This study draws upon data from the special Covid-19 web survey conducted in May 2020 with the participants of four nationally representative cohort studies which have been collecting data since childhood (University of Essex, 2020). These were: *The Millennium Cohort Study (MCS)*, born in 2000–2002, followed since birth and now aged 19 years; *Next Steps*, born in 1989–1990, followed since adolescence and now aged 30 years; *1970 British Cohort Study (BCS70)* born in 1970, followed since birth and now age 50 years; *National Child Development Study (NCDS)* born in 1958 and now aged 62 years. The four cohorts are representative of different stages of the life course. The total response rate pooled across cohorts was 35.7%, resulting in a sample size of 13,471. We excluded participants with missing data on any variable used in this study ( $n = 939$ ; missing not a mutual exclusion: 728 of perceived stress change, 334 of employment change, 201 of financial difficulties, 134 of overcrowded accommodation, 762 of interpersonal conflict change). This provided a final analytical sample of 12,532 participants, of which the MCS contributes 2,265 respondents, Next Steps 1,682 respondents, BCS70 3,893 respondents and NCDS 4,692 respondents. All the descriptive results have been weighted, applying combined weight (design weight  $\times$  web survey non-response weight), such that the results are representative of the full cohort of that age. The derived weights considering design and non-response have been shown to be effective in restoring sample representativeness (Brown et al., 2020). There are unique IDs linking the Covid-19 survey data to each of the cohort member's earlier data.

### 2.2. Measures

#### 2.2.1. Outcome variable

The outcome variables in this analysis were perceived stress change, measured by the cohort member (CM)'s self-reported change of stress they have been feeling since the Covid-19 outbreak. If the CM reported 'more than before' the response was coded as 1, if was reported as 'same, no change' or 'less than before', it was coded as 0. The single item of

stress measure has been shown to have satisfactory content, criterion and construct validity for survey research (Elo et al., 2003). Yet, little is known about the measurement of self-reported stress changes, or stress changes before and after any life event.

#### 2.2.2. Explanatory variable

The key Independent variable of living arrangements change was binary. All the CMs were asked: 'Have there been any changes to the people you are living with since the Coronavirus outbreak?'. In the questionnaire, the survey team has further interpreted this variable as 'people living with change because of Covid-19' (University of London, 2020). If the CM reported 'Yes', the living arrangements change variable was coded as 1, if the CM reported 'No', it was coded as 0.

#### 2.2.3. Covariates

In order to account for broad demographic differences that could confound the association between changes in living arrangements and stress, we also included variables for sex (male, female), cohort (NCDS, BCS70, Next Steps and MCS). We also control for adversities or life changes associated with the pandemic (Wright et al., 2020) which could confound the association, e.g. whether the participant had suspected or diagnosed Covid-19 (binary: yes), whether the participant was a keyworker (binary: yes), financial difficulty since the pandemic (binary: worse off), employment change (stable employed/self-employed, stop working including furloughed, in education, stable unemployed or inactive), household care unmet needs since the pandemic (no care needs, care needs unmet, care needs met), overcrowded accommodation (binary:  $>1$  person per room), and interpersonal conflict since the pandemic (binary: more than before).

### 2.3. Analytical strategy

Associations between living arrangements change and perceived stress increase since the Covid-19 pandemic were investigated using bivariate and multivariate probit regression analyses with robust standard errors using 'no change' as the reference group. As the control variables can be hypothesised to operate differently for individuals at different stages of the lifecourse, statistical models were performed for all the cohorts together, with cohort as a control variable, and then for each of the cohorts separately. The following covariates were accounted for in the multivariate statistical models: sex, cohort, whether the participant had suspected or diagnosed Covid-19, whether the participant was a keyworker, financial difficulty since the pandemic, employment change, household care unmet needs since the pandemic, overcrowded accommodation, and interpersonal conflict change since the epidemic. For a clearer interpretation of the results, we extracted the predicted probability of the perceived stress increase according to living arrangements change using average marginal effects. We also examined the possible mediation of the link between changes in living arrangements and perceptions of increased stress by interpersonal conflict, using the STATA package *ldecomp* (Buis, 2010).

The modelling strategy took into account of potential issues of endogeneity and multicollinearity. A key consideration is that the factors driving participants to change their living arrangements might also influence their perceived stress, with the result that the variable of living arrangements change might be endogenous in the binary model. Estimation with an endogenous variable can lead to biased results. In order to consider the potential endogeneity of the variable, we applied extended probit regression (eprobit) introduced in Stata 16 in 2019 (StataCorp, 2019a, 2019b), with an instrument variable (number of family members) used to predict living arrangement change. Moreover, the variables used in the multivariate probit model may suffer from multicollinearity. Therefore, we tested the regression model for multicollinearity using a variance inflation factor (VIF) (Vatcheva et al., 2016).

We carried out several sensitivity analyses to test the robustness of

our results. First, to test whether findings were an artefact of our chosen statistical method, we alternatively used the dependent variable of perceived stress change as an ordinal variable (less than before, same as before and more than before). We repeated the probit regressions using ordered probit models. Second, to test whether the exclusion of participants with missing values on one or more variables might potentially influence the results, we imputed missing data using a multiple imputation by chained equation procedure. Ten cycles were performed by the MI command in Stata (StataCorp, 2019a, 2019b) and then multiply imputed data were analysed with the probit regressions. Third, different household types might influence the health and wellbeing of participants (Hughes and Waite, 2002). In order to compare relationships between living arrangements change and perceived stress increase among participants co-residing with others, we excluded 1,801 participants living in a single-person household and restricted the analytical sample to participants living with someone else. Then the probit regressions were repeated.

Ethics approval is not required for this study. All secondary data used in this study came from the Covid-19 Survey in Five National Longitudinal Cohort Studies: Millennium Cohort Study, Next Steps, 1970 British Cohort Study and 1958 National Child Development Study, and anonymised at the sources by the survey team. As a result, no data was collected directly from human subjects.

### 3. Results

#### 3.1. Descriptive statistics

Descriptive statistics for the sample are shown in Table 1. Around one in six (15.6%) cohort members reported a change in the people they were living with as a result of Covid-19. This varied across cohorts, with nearly a quarter (25.8%) of the MCS (aged 19) reporting a change, compared to over one in ten of the NCDS (aged 62). The dominant patterns of living arrangements change in the four birth cohorts involve either younger cohorts moving back to the parental home, or older cohorts reporting that the living arrangement change involved children moving in. A small number of cohort members reported ‘started living with a partner’, ‘at least one of children moving out’, or ‘a non-parent/child household member moving in’ (Supplementary Appendix Table 1).

Amongst all the cohort members, 37.0% reported feeling more stress than before since the Covid-19 pandemic. CMs of Next Steps had the highest proportion of reporting perceived stress more than before, while CMs of NCDS had the lowest figure (Table 1).

The results of the association between the different patterns of change in living arrangement and perceived stress show that all reported types of living arrangement change were associated with an increased level of perceived stress. (Supplementary Appendix Table 2).

Interestingly, CM from the older cohorts were less likely to report having experienced suspected or diagnosed Covid-19 than younger cohort. Table 1 also shows that a higher proportion of cohort members from Next Steps, aged 30, are keyworkers. Many of these might be front-line workers in the social care or health service sector. Therefore, it is not inconsistent that older cohort members (NCDS, aged 62) are less likely to have suspected or diagnosed Covid-19 than younger cohort members (Next step, aged 30).

#### 3.2. Perceived stress increase by living arrangements change

Binary probit regression models were used to assess the chance of reporting increased stress amongst those respondents who had experienced a change in living arrangements during the pandemic, compared to those who had not. A series of models were performed for all the cohorts together, with cohort as a control variable, and then for each of the cohorts. Model 1 was the bivariate model, with the variable regarding change in living arrangements as the only Independent variable. Model 2, in addition, then added a set of control variables,

**Table 1**  
Characteristics of the sample.

	Total n (%)	NCDS (age 62) n (%)	BCS70 (age 50) n (%)	Next Steps (age 30) n (%)	MCS (age 19) n (%)
<b>Perceived stress since the pandemic</b>					
No change or less than before	7696 (63.0)	3140 (67.6)	2353 (61.0)	903 (54.8)	1300 (62.7)
More than before	4836 (37.0)	1552 (32.4)	1540 (39.0)	779 (45.2)	965 (37.3)
<b>Living arrangement change because of COVID-19</b>					
No	10619 (84.4)	4132 (88.4)	3383 (85.7)	1443 (84.8)	1661 (74.2)
Yes	1913 (15.6)	560 (11.6)	510 (14.3)	239 (15.2)	604 (25.8)
<b>Cohort</b>					
NCDS	4692 (37.2)	–	–	–	–
BCS70	3893 (30.6)	–	–	–	–
Next Steps	1682 (13.5)	–	–	–	–
MCS	2265 (18.6)	–	–	–	–
<b>Sex</b>					
Male	5085 (49.2)	2230 (49.8)	1619 (50.4)	576 (44.5)	660 (49.2)
Female	7447 (50.8)	2462 (50.2)	2274 (49.6)	1106 (55.5)	1605 (50.8)
<b>Had suspected or diagnosed COVID-19</b>					
No	11601 (92.6)	4425 (94.3)	3546 (90.9)	1504 (88.6)	2126 (94.7)
Yes	931 (7.4)	267 (5.7)	347 (9.1)	178 (11.4)	139 (5.3)
<b>Being a keyworker</b>					
No	9562 (77.4)	3812 (81.7)	2533 (68.5)	1129 (67.4)	2088 (90.8)
Yes	2970 (22.6)	880 (18.3)	1360 (31.5)	553 (32.6)	177 (9.2)
<b>Financial difficulty since the pandemic</b>					
About the same or better off	8687 (67.4)	3257 (67.2)	2604 (64.5)	1173 (68.7)	1653 (71.8)
Worse off	3845 (32.6)	1435 (32.8)	1289 (35.5)	509 (31.3)	612 (28.2)
<b>Employment change since the pandemic</b>					
Stable employed/self-employed	5555 (41.7)	1658 (33.9)	2566 (60.2)	1063 (60.1)	268 (13.9)
Stop working including furloughed	2868 (25.2)	1069 (26.0)	948 (25.5)	423 (28.4)	428 (20.9)
In education	1477 (10.9)	1 (0)	10 (0.3)	32 (1.7)	1434 (56.9)
Stable unemployed or inactive	2632 (22.1)	1964 (40.1)	369 (14.0)	164 (9.8)	135 (8.2)
<b>Household care needs unmet since the pandemic</b>					
No care needs	12119 (96.3)	4528 (96.1)	3774 (96.1)	1636 (96.7)	2181 (96.6)
Needs unmet	210 (1.9)	78 (1.9)	67 (2.1)	20 (1.2)	45 (1.9)
Needs met	203 (1.8)	86 (2.0)	52 (1.8)	26 (2.1)	39 (1.8)
<b>Overcrowded accommodation</b>					
<=1 person per room	11631 (91.8)	4602 (97.2)	3694 (93.9)	1497 (87.5)	1838 (80.6)
>1 person per room	901 (8.2)	90 (2.8)	199 (6.1)	185 (12.5)	427 (19.4)
<b>Interpersonal conflict since the pandemic</b>					
No change or less than before	11396 (90.9)	4500 (95.6)	3612 (92.6)	1503 (89.1)	1781 (79.7)
More than before	1136 (9.1)	192 (4.4)	281 (7.4)	179 (10.9)	484 (20.3)
<b>Number of family members</b>					
1	1801 (16.6)	1062 (24.7)	513 (17.8)	204 (11.2)	22 (2.3)
2-3	6680 (52.2)	3195 (64.8)	1776 (45.7)	1066 (62.4)	643 (30.3)

(continued on next page)

**Table 1** (continued)

	Total n (%)	NCDS (age 62) n (%)	BCS70 (age 50) n (%)	Next Steps (age 30) n (%)	MCS (age 19) n (%)
4–5	3510 (26.4)	385 (8.9)	1482 (33.0)	337 (22.4)	1306 (53.2)
6 and more	541 (4.8)	50 (1.5)	122 (3.5)	75 (3.9)	294 (14.2)

Source: authors' analysis, COVID-19 Survey in Four National Longitudinal Cohort Studies (2020). Weighted %, Unweighted N.

including cohort (for the model containing all 4 cohorts), sex, and a range of variables capturing the respondents' experience of events since the pandemic which might lead to increased stress, e.g. had suspected or diagnosed Covid-19, being a keyworker, employment change, financial difficulties, household care needs unmet and overcrowded accommodation. Model 3 further added the variable of experiencing increased interpersonal conflict since the pandemic. The results are presented in Tables 2–6.

The results provide strong evidence that those individuals whose living arrangements had changed during the Covid-19 pandemic had a higher likelihood of reporting increased stress than those whose living arrangements remained unchanged. This was most clearly seen among members of the NCDS (age 62) (Table 3) and the BCS70 (age 50) (Table 4). Among MCS members, the significant bivariate association between living arrangements change and stress was explained away by the covariates, such as increased interpersonal conflict. The coefficient of living arrangements change dropped from 0.107 in Model 2 to 0.067 in Model 3 after the inclusion of the variable capturing interpersonal conflict (Table 6). Furthermore, among members of MCS, the mediation test found a significant indirect effect of changes in living arrangements on increased perceived stress through interpersonal conflict ( $p < 0.001$ ). A similar significant mediation effect was found amongst NCDS

respondents, but not among the other two cohorts. Tables 2–6 show evidence of positive adjusted coefficients and marginal effects of reporting increased levels of stress amongst all cohort members, and among those respondents with changed living arrangements in the NCDS and BCS70. It is recognised that a range of factors may lie behind the changes in living arrangements and that these may also lead to stress, including having had suspected or diagnosed Covid-19, being a key worker, financial difficulties, household care needs. Stopping work, including being furloughed, was negatively associated with increased perceived stress; and this was evident in the model including all cohorts (Table 2) and the separate models for all cohorts except MCS (Tables 2–5).

Issues of potential endogeneity were investigated using the extended binary probit regression model among all cohort members. The statistics, i.e. the error correlation between the errors from the main equation (predicting perceived stress increase) and the auxiliary equation (predicting living arrangements change) indicated no endogeneity issue. Since the variable of living arrangements change can be treated as exogenous, only the results of the simple binary model were presented. The multivariate regression models were tested for multicollinearity by a variance inflation factor (VIF). There were no issues of collinearity between living arrangements change and all the covariates in the multivariate statistic models.

### 3.3. Sensitivity analyses

The sensitivity analyses show our results are robust. When using alternative regression analyses, results were similar (Supplementary Appendix Table 3). When imputing missing data, results were unaffected (Supplementary Appendix Table 4). Similarly, when excluding participants living in a single-household, results showed no meaningful differences (Supplementary Appendix Table 5).

**Table 2**

Results of binary probit models among total participants (N = 12,532).

	Model 1		Model 2		Model 3	
	Unadjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects
<b>Living arrangement change during COVID-19 No (ref)</b>						
Yes	0.222*** (0.031)	0.086***	0.153*** (0.032)	0.056***	0.125*** (0.033)	0.045***
<b>Cohort NCDS (ref)</b>						
BCS70			0.127*** (0.030)	0.046**	0.107*** (0.030)	0.038***
Next Steps			0.279*** (0.038)	0.103***	0.238*** (0.039)	0.086***
MCS			0.130** (0.05)	0.047*	0.025*** (0.051)	0.009
<b>Sex Male (ref)</b>						
Female			0.456*** (0.024)	0.167***	0.447*** (0.025)	0.16***
<b>Had suspected or diagnosed COVID-19 No (ref)</b>						
Yes			0.123** (0.044)	0.045**	0.115** (0.044)	0.042*
<b>Being a keyworker No (ref)</b>						
Yes			0.116** (0.027)	0.043**	0.1** (0.035)	0.036**
<b>Employment change since the pandemic Stable employed/self-employed (ref)</b>						
Stop working including furloughed			-0.125** (0.037)	-0.045**	-0.130** (0.037)	-0.046***
In education			0.067 (0.06)	0.025	0.009 (0.062)	0.011
Stable unemployed or inactive			0.019 (0.039)	0.007	0.009 (0.039)	0.003
<b>Financial difficulty since the pandemic About the same or better off (ref)</b>						
Worse off			0.357*** (0.027)	0.133***	0.334*** (0.027)	0.121***
<b>Household care needs unmet since the pandemic No care needs (ref)</b>						
Needs unmet			0.322*** (0.09)	0.121***	0.284*** (0.091)	0.104**
Needs met			0.299** (0.091)	0.112**	0.284** (0.093)	0.104**
<b>Overcrowded accommodation &lt;=1 person per room (ref)</b>						
>1 person per room			0.05 (0.046)	0.018	0.028 (0.047)	0.01
<b>Interpersonal conflict since the pandemic No change or less than before (ref)</b>						
More than before					0.761*** (0.042)	0.284***

\*\*\* $p < 0.001$ , \*\* $p < 0.01$ , \* $p < 0.05$ , † $p < 0.1$ .

Source: authors' analysis, COVID-19 Survey in Five National Longitudinal Cohort Studies (2020).

**Table 3**  
Results of binary probit models among NCDS (age 62) (N = 4,692).

	Model 1		Model 2		Model 3	
	Unadjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects
<b>Living arrangement change during COVID-19 No (ref)</b>						
Yes	0.289*** (0.057)	0.109***	0.231*** (0.059)	0.083***	0.188** (0.060)	0.065**
<b>Sex Male (ref)</b>						
Female			0.488*** (0.039)	0.17***	0.483*** (0.04)	0.165***
<b>Had suspected or diagnosed COVID-19 No (ref)</b>						
Yes			0.148# (0.081)	0.053#	0.155# (0.082)	0.053#
<b>Being a keyworker No (ref)</b>						
Yes			0.172** (0.066)	0.06*	0.161* (0.067)	0.056*
<b>Employment change since the pandemic Stable employed/self-employed (ref)</b>						
Stop working including furloughed			-0.019 (0.064)	-0.007	0.179 (0.148)	-0.011
In education			-	-	-	-
Stable unemployed or inactive			0.044 (0.058)	0.015	0.044 (0.058)	0.015
<b>Financial difficulty since the pandemic About the same or better off (ref)</b>						
Worse off			0.332*** (0.043)	0.118***	0.333*** (0.044)	0.116***
<b>Household care needs unmet since the pandemic No care needs (ref)</b>						
Needs unmet			0.25# (0.146)	0.09#	0.179 (0.148)	0.063
Needs met			0.409** (0.142)	0.15**	0.418** (0.144)	0.151**
<b>Overcrowded accommodation &lt;=1 person per room (ref)</b>						
>1 person per room			-0.069 (0.14)	-0.024	-0.082 (0.141)	-0.027
<b>Interpersonal conflict since the pandemic No change or less than before (ref)</b>						
More than before					1.072*** (0.102)	0.392***

\*\*\*p<0.001, \*\*p<0.01, \*p<0.05, #<0.1.

Source: authors' analysis, COVID-19 Survey in Five National Longitudinal Cohort Studies (2020).

**Table 4**  
Results of binary probit models among BCS70 (age 50) (N = 3,893).

	Model 1		Model 2		Model 3	
	Unadjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects
<b>Living arrangement change during COVID-19 No (ref)</b>						
Yes	0.238*** (0.060)	0.093***	0.180** (0.061)	0.068**	0.185** (0.062)	0.067**
<b>Sex Male (ref)</b>						
Female			0.391*** (0.043)	0.145***	0.383*** (0.043)	0.138***
<b>Had suspected or diagnosed COVID-19 No (ref)</b>						
Yes			0.071 (0.072)	0.026	0.043 (0.073)	0.015
<b>Being a keyworker No (ref)</b>						
Yes			0.089# (0.052)	0.033#	0.056 (0.052)	0.02
<b>Employment change since the pandemic Stable employed/self-employed (ref)</b>						
Stop working including furloughed			-0.149* (0.059)	-0.054*	-0.151* (0.059)	-0.053*
In education			-0.346 (0.428)	-0.121	-0.367 (0.424)	-0.124
Stable unemployed or inactive			0.054 (0.078)	0.02	0.017 (0.079)	0.006
<b>Financial difficulty since the pandemic About the same or better off (ref)</b>						
Worse off			0.414*** (0.047)	0.156***	0.394*** (0.047)	0.145***
<b>Household care needs unmet since the pandemic No care needs (ref)</b>						
Needs unmet			0.562** (0.162)	0.213***	0.499** (0.169)	0.185**
Needs met			0.261 (0.178)	0.099	0.219 (0.181)	0.08
<b>Overcrowded accommodation &lt;=1 person per room (ref)</b>						
>1 person per room			0.044 (0.093)	0.016	0.007 (0.096)	0.002
<b>Interpersonal conflict since the pandemic No change or less than before (ref)</b>						
More than before					0.946*** (0.085)	0.348***

\*\*\*p<0.001, \*\*p<0.01, \*p<0.05, #<0.1.

Source: authors' analysis, COVID-19 Survey in Five National Longitudinal Cohort Studies (2020).

#### 4. Discussion

This paper contributes to the empirical evidence regarding the scale and nature of household change during the first period of lockdown as a result of the Covid-19 pandemic in the UK. During spring 2020, young people were the most likely to experience a change in their living arrangements and for most, this was a return to the parental home, thereby

also impacting upon the living arrangements of the parents to whom they returned. The analysis also provides evidence of indications of the impact of these changes in living arrangements on one of the key indicators of well-being - increased levels of stress. The findings are stark with a higher chance of reporting increased levels of stress, amongst both the parental generation and the returning young adults. The increased interpersonal conflict played a role in explaining the

**Table 5**  
Results of binary probit models among Next Steps (age 30) (N = 1,682).

	Model 1		Model 2		Model 3	
	Unadjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects
<b>Living arrangement change during COVID-19 No (ref)</b>						
Yes	0.053 (0.088)	0.021	0.035 (0.09)	0.013	0.015 (0.092)	0.005
<b>Sex Male (ref)</b>						
Female			0.481*** (0.068)	0.183***	0.468*** (0.068)	0.174***
<b>Had suspected or diagnosed COVID-19 No (ref)</b>						
Yes			0.191‡ (0.102)	0.072‡	0.187‡ (0.103)	0.069‡
<b>Being a keyworker No (ref)</b>						
Yes			0.038 (0.079)	0.014	0.029 (0.079)	0.011
<b>Employment change since the pandemic Stable employed/self-employed (ref)</b>						
Stop working including furloughed			-0.309** (0.092)	-0.115**	-0.326*** (0.093)	-0.118***
In education			-0.159 (0.24)	-0.06	-0.150 (0.238)	-0.055
Stable unemployed or inactive			0.135 (0.119)	0.051	0.128 (0.121)	0.048
<b>Financial difficulty since the pandemic About the same or better off (ref)</b>						
Worse off			0.411*** (0.076)		0.402*** (0.077)	0.149***
<b>Household care needs unmet since the pandemic No care needs (ref)</b>						
Needs unmet			-0.037 (0.283)	-0.014	-0.031 (0.294)	-0.011
Needs met			0.372 (0.258)	0.14	0.268 (0.265)	0.099
<b>Overcrowded accommodation &lt;=1 person per room (ref)</b>						
>1 person per room			0.145 (0.101)	0.055	0.127 (0.103)	0.047
<b>Interpersonal conflict since the pandemic No change or less than before (ref)</b>						
More than before					0.756*** (0.108)	0.277***

\*\*\*p<0.001, \*\*p<0.01, \*p<0.05, ‡<0.1.

Source: authors' analysis, COVID-19 Survey in Five National Longitudinal Cohort Studies (2020).

**Table 6**  
Results of binary probit models among MCS (age 19) (N = 2,265).

	Model 1		Model 2		Model 3	
	Unadjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects	Adjusted Coefficients (Robust standard errors)	Marginal effects
<b>Living arrangement change during COVID-19 No (ref)</b>						
Yes	0.136* (0.060)	0.053*	0.107‡ (0.061)	0.041‡	0.067 (0.062)	0.025
<b>Sex Male (ref)</b>						
Female			0.486*** (0.06)	0.182***	0.47*** (0.061)	0.172***
<b>Had suspected or diagnosed COVID-19 No (ref)</b>						
Yes			0.095 (0.113)	0.036	0.088 (0.114)	0.033
<b>Being a keyworker No (ref)</b>						
Yes			0.43* (0.17)	0.164*	0.422* (0.172)	0.158*
<b>Employment change since the pandemic Stable employed/self-employed (ref)</b>						
Stop working including furloughed			0.003 (0.156)	0.001	0.009 (0.158)	0.003
In education			0.208 (0.145)	0.078	0.179 (0.147)	0.066
Stable unemployed or inactive			0.017 (0.18)	0.006	0.006 (0.181)	0.002
<b>Financial difficulty since the pandemic About the same or better off (ref)</b>						
Worse off			0.284*** (0.063)	0.108***	0.22** (0.064)	0.082**
<b>Household care needs unmet since the pandemic No care needs (ref)</b>						
Needs unmet			0.251 (0.194)	0.096	0.245 (0.196)	0.091
Needs met			0.065 (0.206)	0.024	0.079 (0.208)	0.029
<b>Overcrowded accommodation &lt;=1 person per room (ref)</b>						
>1 person per room			0.028 (0.069)	0.01	0.014 (0.07)	0.005
<b>Interpersonal conflict since the pandemic No change or less than before (ref)</b>						
More than before					0.529*** (0.067)	0.202***

\*\*\*p<0.001, \*\*p<0.01, \*p<0.05, ‡<0.1.

Source: authors' analysis, COVID-19 Survey in Five National Longitudinal Cohort Studies (2020).

association, especially among the returning young adults.

The term stress was defined by Hans Selye as the non-specific response of the body to any demand for change (Selye, 1956). The situations and pressures causing stress are known as stressors. Common external stressors are widely recognised to include major life changes, financial problems, work, and children and family. Conflicts, demands, fear and time pressures are a few of the components linked to stress.

Stress usually produces both psychological and physiological reactions and long-term exposure to stress can lead to serious health problems. Within a household, members provide and receive emotional, instrumental and financial support. Stress may come from an individual's perception of the imbalance of resources and demands in the form of support (Hughes & Waite, 2002). Previous research has shown that higher demands without corresponding resources may lead to poorer

health through pathways similar to those linked to a lack of social support, whilst when resources equal or exceed demands, household relations may benefit or protect health (Cohen & Wills, 1985).

At first sight, the changes in living arrangements discussed above may be expected to be associated with positive outcomes, as returning young adults benefit from the resources of the parental home. However, unexpectedly returning to the parental home may run countervailing to expectations around the 'normal' developmental path and young adults may feel a loss of independence (Copp, 2017). Furthermore, during the Covid-19 lockdown, for those younger adults who lost their job suddenly and who became dependent on their families to provide for them financially overnight, there was little time to adapt to this situation, leading to familial conflicts and stress (Brooks et al., 2020). For older cohorts, the presence of adult children, and in some cases grandchildren, may also need adjustment, with the time demands from coresident family members likely to increase; finding individual time might be a challenge. For example, existing research has shown that about one-third of NCDS respondents were already 'sandwiched' between caring for both younger and older family members before the pandemic (Vlachantoni et al., 2020). For all cohort members, changes and disruptions in daily life can force a person to use mental and physical energy developing habits that are suited to the new situation (Tosi & Grundy, 2018). Both older and younger cohorts may thus feel that the demands made upon them outweigh the resources available to them. This perceived imbalance then poses stress and conflict and risk to individual health (Hughes & Waite, 2002).

The findings of this study reflect important policy implications in the context of the Covid-19 pandemic. Isolation has been a key concern during the pandemic. However, the results in this paper are a reminder that there are additional challenges for families and policymakers to address, such as changes in one's living arrangements, which might increase stress for older people and younger people. Covid-19 is a significant cause of stress in children, adolescents and adults alike (Brooks et al., 2020). Cohort members' roles at home, work and in the community may have changed tremendously during lockdown because of coronavirus, let alone in the circumstance of changing living arrangements. Spending more time people could result in more arguments or conflicts with those living in close proximity. However, it is possible for families to address such crises and avoid negative effects by dealing with changes in a positive and constructive manner, while decreasing individuals' isolation at the same time (Hagger et al., 2020). Stress management strategies, e.g. stress reappraisal and mindfulness can help, and it is important for formal mental health services provided by family therapists, educators or health care professionals need to take into account of the diversity of distressed families' care needs (Salin et al., 2020). Family coping strategies developed during the Covid-19 lockdown, such as agreements about everyday practices, flexibility in daily routines, family time, and family conversation, are crucial for families' everyday lives which may have been significantly altered during the pandemic (Salin et al., 2020).

#### 4.1. Limitations and conclusions

This study has several strengths, including its large sample size, its longitudinal tracking of participants and its rich inclusion of measures on health and experienced life changes or adversities during Covid-19. However, there are several limitations. First, the Covid-19 survey does not include detailed information on the motives for the change in living arrangements, including whether the move was due to the pandemic itself or was part of life 'as usual'; furthermore the survey does not include any questions regarding the reasons for the change in perceived levels of stress. We interpret the survey questions to reflect changes due to Covid-19. However, given the cross-sectional nature of the study, it is hard to rule out a reverse relationship, meaning that increased perceived stress might lead to living arrangement change. A longitudinal study containing information over time would be helpful to address this issue.

Moreover, this paper focused on perceived stress change; other mental health dimensions such as anxiety have also been noted as being associated with life changes during the pandemic. These remain to be explored further in future studies. Finally, given the data constraints, we were not able to examine the mechanism through which living arrangement change operated on stress. Future research is planned to extend this analysis in order to better understand the complex pathways at play, including changes in financial well-being.

In conclusion, this study confirms the negative association between living arrangement change and mental well-being among four British cohorts during the Covid-19 pandemic. This was most clearly seen for older cohorts. Increased interpersonal conflict plays a role in mediating the association, especially for the younger cohort. The findings nevertheless highlight the need for policymakers to take changes in living arrangements, and the resultant increase in the number of complex intergenerational households, into account when considering the impacts of the Covid-19 pandemic.

#### Ethics statement

Ethics approval is not required for this study. All secondary data used in this study were from the COVID-19 Survey in Five National Longitudinal Cohort Studies: Millennium Cohort Study, Next Steps, 1970 British Cohort Study and 1958 National Child Development Study, and anonymised at the sources by the survey team. As a result, no data was collected directly from human subjects.

#### Author statement

All authors (Maria Evandrou, Jane Falkingham, Min Qin and Athina Vlachantoni) contributed equally to the initial discussion of the idea behind the manuscript, to the design of the manuscript, to the analysis plan and to the finalisation of the manuscript. Min Qin conducted the statistical analysis for the paper and drafted sections of the initial draft of the manuscript.

#### Declaration of competing interest

Authors declare no competing interest.

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#### Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ssmph.2021.100761>.

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