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From lockdown to Liberation: How inflexible thinking, obsessive-compulsive and affective symptoms shape pandemic adjustment

Aaron T. Clarke [a,*], Naomi A. Fineberg [a,b,c], Luca Pellegrini [a,b,d,e], Rodolfo Leuzzi [b,f], Keith R. Laws [a]

[a] School of Health, Medicine and Life Sciences, University of Hertfordshire, Hatfield, United Kingdom
[b] Hertfordshire Partnership University NHS Foundation Trust, Welwyn Garden City, United Kingdom
[c] University of Cambridge School of Clinical Medicine, Cambridge, United Kingdom
[d] Department of Medicine, Surgery and Health Sciences, University of Trieste, Trieste, Italy
[e] Department of Mental Health, Psychiatric Clinic, Azienda Sanitaria Universitaria Giuliano-Isontina – ASUGI, Trieste, Italy
[f] Department of Biomedical and Clinical Sciences "Luigi Sacco", University of Milan, Milan, Italy

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ABSTRACT

Background: The COVID-19 pandemic significantly disrupted daily life, and the transition to post-pandemic living presented additional psychological challenges. Previous research shows that individuals with obsessive-compulsive traits and pre-existing mental health histories were vulnerable to adjustment difficulties, which appear to be mediated by depression, anxiety, and stress.
Aims: This study examined the relationship between post-pandemic adjustment and mental health variables in a population-based cohort during the final lifting of COVID-19 restrictions, tracking outcomes over six months to assess causality. The study was pre-registered on the Open Science Framework (https://osf.io/v4c28).
Method: A cohort of 343 UK adults was assessed online at baseline, three, and six months. Self-report measures included the Obsessive-Compulsive Inventory-Revised (OCI-R), Compulsive Personality Assessment Scale (CPAS), Depression, Anxiety, and Stress Scale-21 (DASS-21), Post-Pandemic Adjustment Scale (PPAS) and COVID-19 Safety Behaviour Scale. Cognitive flexibility was assessed using the Wisconsin Card Sorting Test (CST: at baseline) and the Intradimensional-Extradimensional Set-Shifting Task (IDED: at 3 months).
Results: Approximately 28 % of participants were identified as poor adjusters. Mediation analysis revealed that obsessive-compulsive symptoms, compulsive personality traits, and a history of mental health disorders predicted post-pandemic adjustment difficulties indirectly via depression, anxiety, and COVID-19 safety behaviours. While we found no evidence that adjustment was linked to cognitive flexibility on the WCST, exploratory analyses showed that poorer adjustment was linked to reversal learning issues on the IDED task.
Conclusion: This study replicated our prior findings, identifying obsessive-compulsive symptoms and traits, mental health histories, and cognitive inflexibility as key risk factors for poor post-pandemic adjustment. Moreover, depression, anxiety, and stress mediated these difficulties, suggesting potential markers for identifying at-risk individuals and guiding interventions for future public health crises.

1. Introduction

The COVID-19 pandemic introduced a new way of living imposing sanctions on various aspects of everyday life (Haleem and Javaid, 2020). Social distancing and mask mandates were implemented, those considered high-risk went into shielding, as a protective retreat from social engagement, and non-vital vocations were 'furloughed', as a form of paid leave. A gradual easing of lockdown restrictions took place from March 23, 2020, transitioning to a "living with COVID" phase, which ended in the UK on July 19, 2021 when all pandemic-related restrictions were lifted (Brown et al., 2021; Sherrington, 2022; Home Office gov.uk, 2024).

Adjustment to the "new normal" post-pandemic lifestyle imposed additional pressures beyond the initial disruption caused by the pandemic with societal implications. Some of these adjustment difficulties may have stemmed from societal factors predating the lifting of

* Corresponding author.School of Health, Medicine and Life Sciences, University of Hertfordshire, Hatfield, AL10 9AB, United Kingdom.
E-mail address: ac21aes@herts.ac.uk (A.T. Clarke).

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restrictions, including controversial differences in the stringency of regulations introduced across different countries, with some jurisdictions imposing more extreme measures than others (Hans et al., 2020; Song and Choi, 2023), as well as changes made to the regulations relating to social distancing and shielding within jurisdictions over the course of the pandemic. It is recognized that those with pre-existing mental health conditions may have been particularly badly affected by the pandemic and its contingencies (Breslau et al., 2021), not least as mental health care and support was heavily impacted by the pandemic (Pereira-Sanchez et al., 2020; Foye et al., 2021; Duden et al., 2022). Similarly, those at risk of developing mental health conditions may have had new disorders triggered by the stress of the pandemic and its consequences (World Health Organisation, 2022).

Fineberg et al. (2021) found that individuals with a personal or family history of mental disorders, OCD symptoms, obsessive-compulsive personality traits, depressive, anxious or stress symptoms struggled to adjust to post-pandemic life. Specifically, in a population-based survey of post-pandemic adjustment in over 500 adults, OCD symptoms predicted adjustment difficulty and crucially, this was mediated by depression, anxiety and stress and COVID-19-related anxiety (Fineberg et al., 2021). The same study also demonstrated that OCPD traits, in particular perfectionism and over-conscientiousness, correlated with poorer adjustment to the lifting of lockdown restrictions and that a subgroup of those with poorer adjustment showed cognitive inflexibility, measured objectively using the intra-extradimensional set-shifting task (Owen et al., 1991). This form of cognitive inflexibility is seen in a various mental disorders associated with compulsive behaviour (Patel et al., 2009; McAnarney et al., 2011; Jefferies-Sewell et al., 2016; Grant and Chamberlain, 2023) and is a particularly prominent feature of OCD (Chamberlain et al., 2021; Clarke et al., 2024).

The findings of Fineberg et al. (2021, 2022) are however limited. A follow up was incorporated a short duration after the main procedural screening, though was conducted on a relatively small sample (n = 40). Hence, these findings merit replication and substantiation in a longitudinal study as, if the direction of causality is confirmed, these symptoms and cognitive factors may be used as predictive markers to identify at-risk individuals who may benefit from preventative interventions in future pandemics.

This study therefore employed a longitudinal design to assess the following research questions.

- Is poor adjustment to the easing of (COVID-19) restrictions predicted by a personal or familial history of mental disorders, or obsessive-compulsive symptoms or traits?
- Does cognitive inflexibility, as measured by an online set-shifting task, predict post-pandemic adjustment?
- Do self-ratings of mental health measures change over six months post-pandemic?

2. Method

2.1. Institutional review board approval

This research was approved by the University of Hertfordshire Health, Science, Engineering and Technology Ethics Committee with Delegated Authority (ECDA) (protocol number: LMS/PGR/UH/04554). It was pre-registered on the Open Science Framework (https://osf.io/v4c28) and reported according to the Checklist for Reporting Results of Internet E-Surveys (CHERRIES, Eysenbach, 2004, 2012).

2.2. Design

The study followed a longitudinal design, with participants who completed baseline assessments being offered the opportunity to continue in the study with follow-up assessments at 3-months and 6-months after baseline. The survey was hosted on the experiment building software *Gorilla* (Anwyl-Irvine et al., 2020).

2.3. Sample

We recruited 343 members of the UK public over a 15-month period between May 2021 to April 2022 (pandemic related restrictions in the UK officially ended July 2021).

Participants were recruited from social media platforms (Twitter, Facebook, and LinkedIn); survey-sharing sites such as SurveyMonkey and Survey Circle and from the University of Hertfordshire, at which students were allocated study course credits for completing the survey. This was the only incentive used in the recruitment process. Owing to differing COVID-19 regulations across different countries, the current study focused solely on UK residents aged 18 years and above. Two follow-up assessments took place 3 months and 6 months after recruitment (October 2021 to July 2022 and March 2022 to October 2022 respectively). See Fig. 1 for participation flow through the study.

2.4. Measures, variables, and outcomes

2.4.1. Baseline assessment

2.4.1.1. Post-pandemic adjustment scale (PPAS: Fineberg et al., 2021). The PPAS is a 7-item self-rated scale assessing post-pandemic adjustment difficulties on a 5-point Likert scale (1 = 'Completely disagree' to 5 = 'Completely agree'). The first item measures global adjustment problems, with scores of 1 or 2 indicating good adjusters and 4 or 5 indicating poor adjusters, following Fineberg et al. (2021); see Appendix A. The PPAS shows excellent internal consistency (α = .87).

2.4.1.2. Obsessive-Compulsive Inventory-Revised (OCI-R: foa et al., 2002). The OCI-R is an 18-item self-report tool measuring OCD symptom severity, validated in clinical and general populations (Huppert et al., 2007). It has good internal consistency (α = .84), with a score of 21 or higher indicating probable OCD (Foa et al., 2002).

2.4.1.3. Compulsive Personality Assessment Scale (CPAS: Fineberg et al., 2015). The CPAS is an 8-item self- or observer-rated scale measuring DSM-5 obsessive-compulsive personality traits (American Psychiatric Association, 2013). It differentiates individuals with OCPD in both university and clinical samples and has excellent internal consistency (α = .86).

2.4.1.4. Depression, anxiety, and Stress Scale (DASS-21: Lovibond and Lovibond, 1995). The DASS-21 contains 21 items across three 7-item subscales assessing depression, anxiety, and stress. It has excellent internal consistency (α = .92) and is validated in clinical and general populations (Henry and Crawford, 2005).

2.4.1.5. COVID-19 safety behaviour scale. The Covid-19 Safety Behaviour Scale is a 15-item self-rating scale describing the range of safety behaviours used during the COVID-19 lockdown period (see Appendix B), which we created for the purposes of this study, as no similar measure existed. The scale was developed from the first of 10 sections of the UK COVID-19 questionnaire Timpson et al., 2020), which includes questions relating to safety behaviours that members of the public adopted during the pandemic. We re-worded these questions to explore the current use of each of these safety behaviours and added a 5-point Likert scale (0–4): 'Never', 'Hardly ever', 'Often', 'Most of the time', and 'All of the time' to each item, to quantify each item. We removed two items from the questionnaire relating to being a student or a parent as not all participants would be able to rate these items. The internal consistency of this scale in this study was good (α = .83).

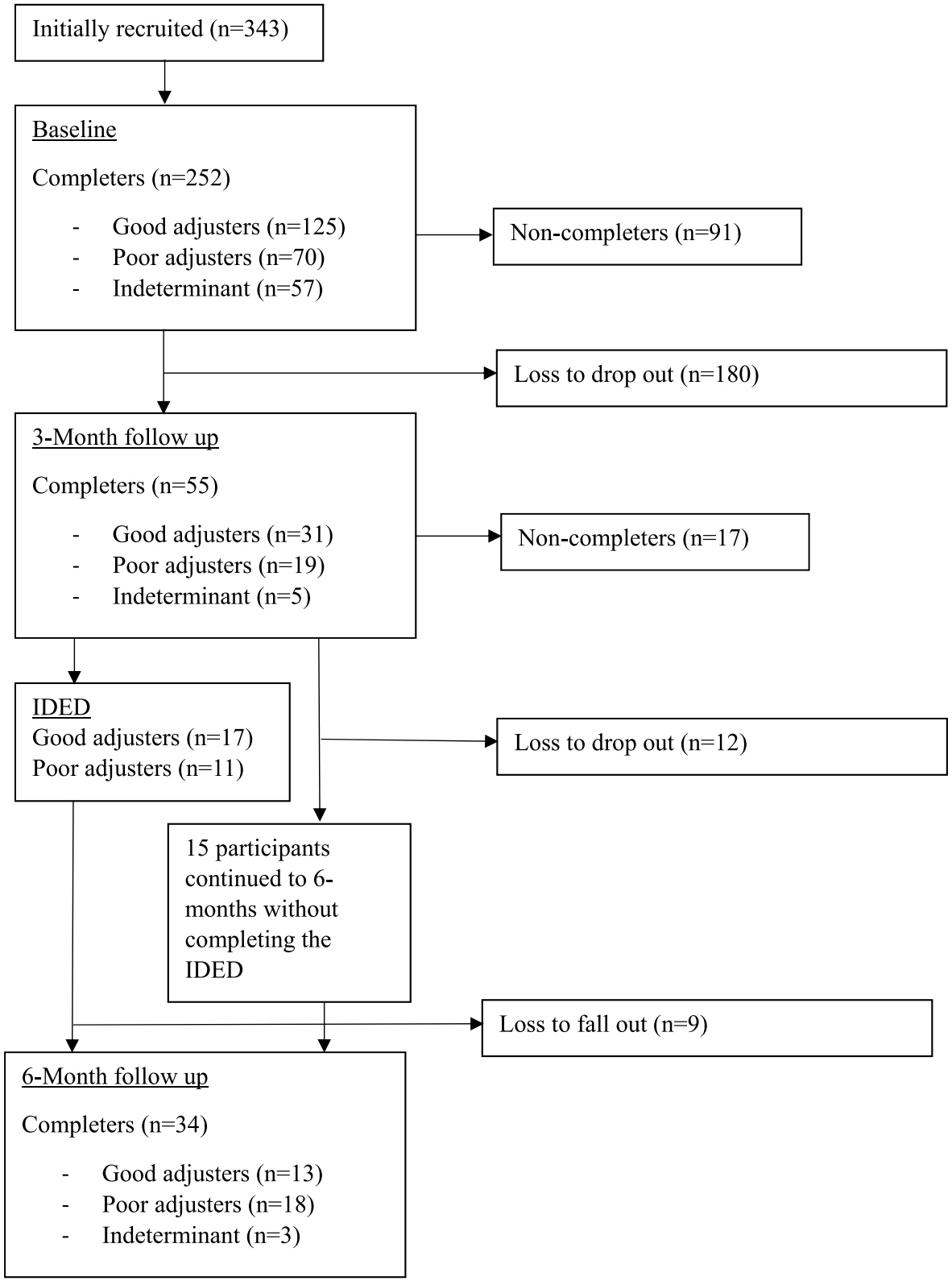

Fig. 1. Sample sizes across Baseline, 3-month follow up, and 6-month follow up.

2.4.1.6. Wisconsin Card Sorting Test (WCST: Milner, 1963). A digital version of the WCST assessed cognitive flexibility by asking participants to match cards based on shape, colour, or number, with rules changing unpredictably after 8 correct trials. The task involved 64 trials with 8 rule changes. Key outcomes included total errors, perseverative errors (continuing a previous rule), failure to maintain set, and random errors.

2.4.2. Three-month follow-up

The first follow-up repeated all baseline questionnaires (PPAS, OCI-R, CPAS, DASS-21, and COVID-19 Safety Behaviour Scale) but replaced the WCST with the Intra-Extradimensional Set-Shifting task (IDED: Owen et al., 1991), part of the Cambridge Neuropsychological Test Automated Battery (CANTAB; Sandberg, 2011) to avoid learning issues

inherent in repeated testing paradigms (Kopp et al., 2019). The IDED task was added post-registration, but before data collection began and so, we consider the analyses to be exploratory.

2.4.2.1. Intra-extradimensional set-shifting task (IDED; Owen et al., 1991). The IDED task tests cognitive flexibility through rule acquisition and reversal learning across nine stages. Participants match paired images by shape or line rules, which shift without warning. At Stage 6 (intra-dimensional shift), participants reverse a learned rule. Stage 8 (extra-dimensional shift) tests attentional set-shifting by changing the relevant dimension (e.g., from shapes to lines). The final stage assesses reversal following the extra-dimensional shift. Key outcomes include errors, trials per stage, and stages completed (see Fig. 2).

2.4.3. Six-month follow-up

This follow-up repeated all baseline and 3-month questionnaires (PPAS, OCI-R, CPAS, DASS-21, and COVID-19 Safety Behaviour Scale). No neurocognitive tasks were included.

2.5. Statistical analysis

Sample size was estimated using G*Power ($\alpha = .01$, effect size d = 0.40, power = 0.90). To account for a 30 % dropout rate (Fineberg et al., 2021), we aimed to recruit 500 participants.

Analyses were conducted using JASP 0.16.3 (JASP team, 2022) and SPSS v28 (IBM Corp. Released, 2021) after all three data collections had completed.

We used mediation analysis as a confirmatory replication of the Fineberg et al. (2021) model of post-pandemic adjustment. As per Fineberg et al. (2021), predictor variables were OCI-R, CPAS, and mental health history; mediators were DASS-21 (M1) and COVID-19 Safety Behaviour Scale (M2); and the outcome variable was post-pandemic adjustment difficulty.

3. Results

3.1. Baseline assessment

Of the 343 participants recruited, 252 completed all baseline assessments (see Appendix Cfor demographic details). Age, gender, and ethnicity did not differ between baseline completers and non-completers. At the 3-month follow-up, 55 participants (22 %) completed the questionnaire assessment, of whom 28 (51 %) also completed the IDED and 34 (62 % of the 3-month sample) went on to complete the 6-month follow-up assessment.

The OCI-R screening threshold for possible OCD (a score of ≥21) was exceeded by 151 (59.9 %) participants, of whom 78 (51.66 %) reported a personal history of mental health disorders. Importantly, those with a personal history of mental health disorder scored significantly higher on the OCI-R (31.82; SD = 15.61) compared to those without (21.10; SD = 14.11); t (250) = 5.71, $p < .001$, $d = 0.72$. Moreover, the mean OCI-R scores reported here (25.69; SD = 15.67) was also considerably lower than that reported in Fineberg et al. (35.50; SD = 11.70). The same can be observed in DASS-21 scores recorded here (22.20; SD = 14.23) compared to our previous analysis (32.20; SD = 15.70), suggesting the current sample experienced less obsessive-compulsive, depression, anxiety and stress symptoms (see Table 1).

3.2. Mediation analysis

Replicating the model described by Fineberg et al. (2021), we designated the OCI-R, CPAS, and personal history of mental health disorders as predictor variables; and DASS-21 and COVID-19 safety behaviour scale scores were designated as mediator variables, with PPAS as the outcome variable (see Table 2).

Our mediation model (Fig. 3) accounted for 35 % of the variance observed in PPAS (adjustment) scores. Where Fineberg et al. (2021) showed that no predictor variables had a direct effect on adjustment

Table 1
Baseline descriptives of clinical measures and WCST outcome metrics.

	Mean	SD
Post-Pandemic Adjustment Scale (PPAS)	20.38	8.35
Obsessive-Compulsive Inventory-Revised (OCI-R)	25.69	15.67
Compulsive Personality Assessment Scale (CPAS)	11.12	6.42
Depression, Anxiety, and Stress Scale-21 (DASS-21)	22.00	14.23
COVID-19 Safety Behaviour Scale (C-19 SBS)	30.49	12.02
WCST perseverative errors	13.40	6.60
WCST failure to maintain set	2.98	2.58
WCST random errors	9.19	4.88
WCST total errors	25.26	9.48

Note: WCST=Wisconsin Card Sorting Task.

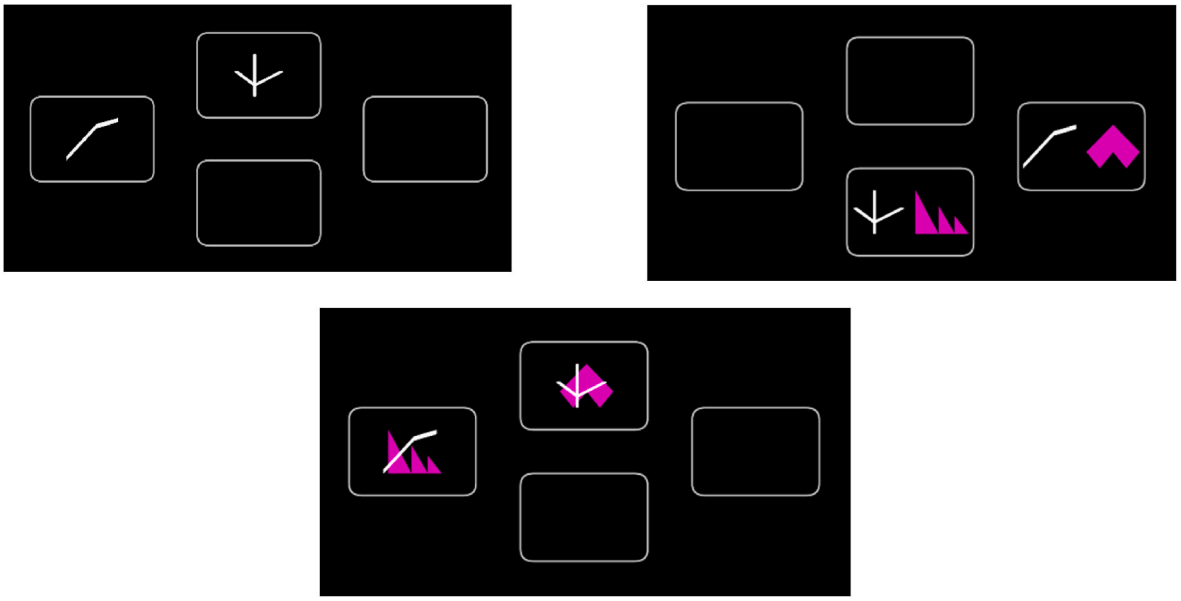

Fig. 2. Example stimuli of the Intra-Extradimensional set-shifting task.

Table 2
Mediation analysis of PPAS scores (n = 252).

Type	Effect	Estimate	SE	95 %CI Lower	95 %CI Upper	β	Z	p
Indirect	**OCI-R ⇒ DASS-21 ⇒ PPAS**	**0.02**	**0.01**	**0.00**	**0.04**	**0.05**	**2.08**	**0.04**
	OCI-R ⇒ COVID-19SBM ⇒ PPAS	**0.04**	**0.01**	**0.03**	**0.06**	**0.09**	**2.80**	**0.01**
	CPAS ⇒ DASS-21 ⇒ PPAS	**0.07**	**0.03**	**0.01**	**0.13**	**0.07**	**2.18**	**0.03**
	CPAS ⇒ COVID-19SBM ⇒ PPAS	0.01	0.03	−0.05	0.07	0.01	0.32	0.75
	PH-MHD⇒ DASS-21 ⇒ PPAS	**−0.53**	**0.25**	**−1.02**	**−0.03**	**−0.08**	**−2.10**	**0.02**
	PH-MHD⇒COVID-19SBM ⇒PPAS	0.52	0.30	−0.07	1.12	0.08	1.73	0.08
Component	**OCI-R ⇒ DASS-21**	**0.26**	**0.06**	**0.15**	**0.37**	**0.29**	**4.73**	**<0.001**
	DASS-21 ⇒ PPAS	**0.08**	**0.04**	**0.01**	**0.15**	**0.18**	**2.31**	**0.02**
	OCI-R ⇒ COVID-19SBM	**0.21**	**0.07**	**0.08**	**0.33**	**0.27**	**3.13**	**0.01**
	COVID-19SBM ⇒ PPAS	**0.18**	**0.03**	**0.13**	**0.24**	**0.34**	**6.30**	**<0.001**
	CPAS ⇒ DASS-21	**0.86**	**0.13**	**0.60**	**1.12**	**0.39**	**6.48**	**<0.001**
	CPAS ⇒ COVID-19SBM	0.05	0.16	−0.26	0.37	0.03	0.32	0.75
	PH-MHD⇒ DASS-21	**−6.51**	**1.32**	**−9.09**	**−3.94**	**−0.46**	**−4.95**	**<0.001**
	PH-MHD⇒ COVID-19SBM	2.85	1.58	−0.25	5.94	0.24	1.80	0.07
Direct	**OCI-R ⇒ PPAS**	**0.08**	**0.03**	**0.02**	**0.15**	**0.20**	**2.63**	**0.01**
	CPAS ⇒ PPAS	0.06	0.08	−0.10	0.22	0.06	0.78	0.45
	PH-MHD ⇒ PPAS	−0.39	0.77	−1.89	1.12	−0.06	−0.50	0.61
Total	**OCI-R ⇒ PPAS**	**0.14**	**0.03**	**0.08**	**0.21**	**0.34**	**4.36**	**<0.001**
	CPAS ⇒ PPAS	0.14	0.08	−0.02	0.30	0.14	1.74	0.08
	PH-MHD ⇒ PPAS	−0.39	0.79	−1.94	1.16	−0.06	−0.50	0.62

Note: Confidence intervals computed with method: Standard (Delta method).
Betas are completely standardised effect sizes. Significant findings are in bold.

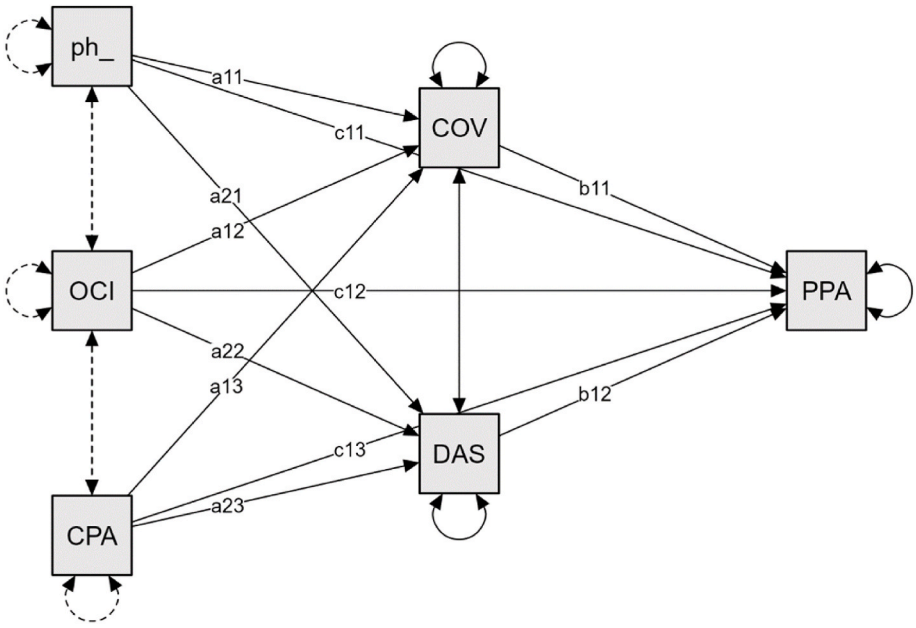

Fig. 3. Mediation model used to predict post-pandemic adjustment (after Fineberg et al., 2021).
Note. Ph = Personal history of mental health disorders; OCI=Obsessive-Compulsive Inventory-Revised; CPA=Compulsive Personality Assessment Scale; COV=COVID-19 Safety Behaviour Scale; DAS = Depression Anxiety Stress Scale-21; PPA = Post Pandemic Adjustment Scores.

difficulty, here we show that OCI-R scores did have a direct effect on adjustment difficulties. Moreover, CPAS scores had an indirect effect on adjustment difficulty via DASS-21 scores ($Z = 2.18$, $p < .05$), as was also the case for a personal history of mental health disorders ($Z = -2.10$, $p < .05$), whereas OCI-R predicted changes in adjustment via DASS-21 ($Z = 2.08$, $p < .05$) and COVID-19 safety behaviour scale scores ($Z = 2.80$, $p < .001$), the latter being the stronger mediator of the relationship between OCI-R scores and PPAS scores.

3.3. Comparison of good and poor adjusters

Participants were categorised as good or poor adjusters based on their Post-Pandemic Adjustment Scale (PPAS) item 1 score ('I am having great difficulty adjusting to the easing of the COVID-19 pandemic restrictions'). Consistent with Fineberg et al. (2021), an a-priori criterion was used to determine good adjusters if participants scored 1 or 2 on this item and poor adjusters as those who scored 4 or 5. According to our *a priori* criterion established by response to Question 1 of the PPAS, 70/252 participants (27.78 %) were identified as 'poor adjusters' using, 125/252 (49.60 %) were identified as 'good adjusters'; 57/252 (22.10 %) were considered as indeterminate responders and the latter were excluded from subsequent analyses.

Good and poor adjusters did not differ significantly on: age ($\chi^2 = 4.37$, $p = .49$), sex ($\chi^2 = 5.22$, $p = .07$), ethnicity ($\chi^2 = 1.93$, $p = .75$), education ($\chi^2 = 5.78$, $p = .22$), or occupation ($\chi^2 = 1.92$, $p = .59$), contraction of COVID-19 ($\chi^2 = 4.95$, $p = .08$), or COVID-19 related

bereavements ($\chi^2 = 0.04$, $p = .84$). Compared to good adjusters, however, poor adjusters reported a higher level of personal ($\chi^2 = 8.37$, $\varphi = -0.21$, $p < .05$) and familial ($\chi^2 = 4.55$, $\varphi = -0.15$, $p < .05$) histories of mental health disorders.

3.4. WCST performance – good adjusters versus poor adjusters

Good and poor adjuster groups showed no statistically significant difference in perseverative errors ($U = 4187.00$, $p = .62$, $d = 0.00$), failures to maintain set ($U = 4373.00$, $p = 1.00$, $d = 0.07$), random errors ($U = 4589.00$, $p = .57$, $d = 0.14$), or total errors ($U = 4263.50$, $p > .05$, $d = 0.07$); WCST metrics were additionally not correlated with PPAS scores.

3.4.1. Exploratory analysis of the IDED at the 3-month follow-up

Of the 31 participants that completed the IDED at 3-month testing, 17 were identified as *good adjusters* and 11 as *poor adjusters*; the remaining 3 were identified as *indeterminant* on the PPAS. As shown in Fig. 4, poor adjusters made significantly more errors than good adjusters at stage 6 (intra dimensional shift: IDS) and stage 9 (extra dimensional shift reversal stage: EDSR) of the IDED. No other differences on IDED test metrics between adjustment groups reached significance.

3.5. Longitudinal data

At the 6-month end point, a total of 34 participants had completed all three assessment time-points (13 good adjusters, 18 poor adjusters and 3 participants identified as indeterminant). Repeated-measures ANOVAs were conducted to assess differences between the two adjustment groups across the three time points (see Appendix D). Analyses revealed a main effect of group and a main effect of time for COVID-19 safety behaviour scores, with poor adjusters scoring significantly higher than good adjusters on the range of safety behaviours used during the pandemic. A main effect of time showed that OCI-R scores decreased significantly over time. Further, a main effect of group was revealed for DASS-21 scores; good adjusters scored significantly lower than poor adjusters. No significant main effects of group or time were revealed for CPAS scores. No significant group-by-time interactions emerged on any variables.

4. Discussion

4.1. Is poor adjustment to the easing of (COVID-19) restrictions predicted by obsessive-compulsive symptoms, traits, or a personal or familial history of mental disorders?

This longitudinal study builds upon previous work by identifying psychological and neurocognitive predictors of post-pandemic adjustment. A central finding was that depression, anxiety, and stress mediated poor adjustment, replicating the finding of our earlier model (Fineberg et al., 2021) from the initial lockdown period. Furthermore, the current analyses of this later Covid period now shows that OCI-R scores also predict adjustment directly as well as indirectly through affective symptoms. This suggests that OC symptoms, which may act as vulnerability factors, and the psychological distress they provoke drive adjustment problems. The finding of a direct relationship between obsessive-compulsive symptoms and post-pandemic adjustment differs from our earlier model, suggesting that the ongoing nature of the pandemic may have strengthened the impact of obsessive-compulsive symptoms on adjustment over time.

A critical finding was that depression, anxiety, and stress, as measured by the DASS-21, emerged as significant mediators of adjustment difficulties. OCI-R scores were both directly and indirectly associated with poorer adjustment through both DASS-21 and COVID-19 safety behaviours, while CPAS scores and personal histories of mental health disorders also influenced adjustment via DASS-21 scores. These results underscore the central role of obsessive-compulsive and affective symptoms in adjustment, with obsessive-compulsive symptoms additionally contributing indirectly through psychological distress. Importantly, no direct relationship emerged for personal mental health histories and adjustment, reinforcing the idea that these factors set the stage for distress rather than drive adjustment problems independently

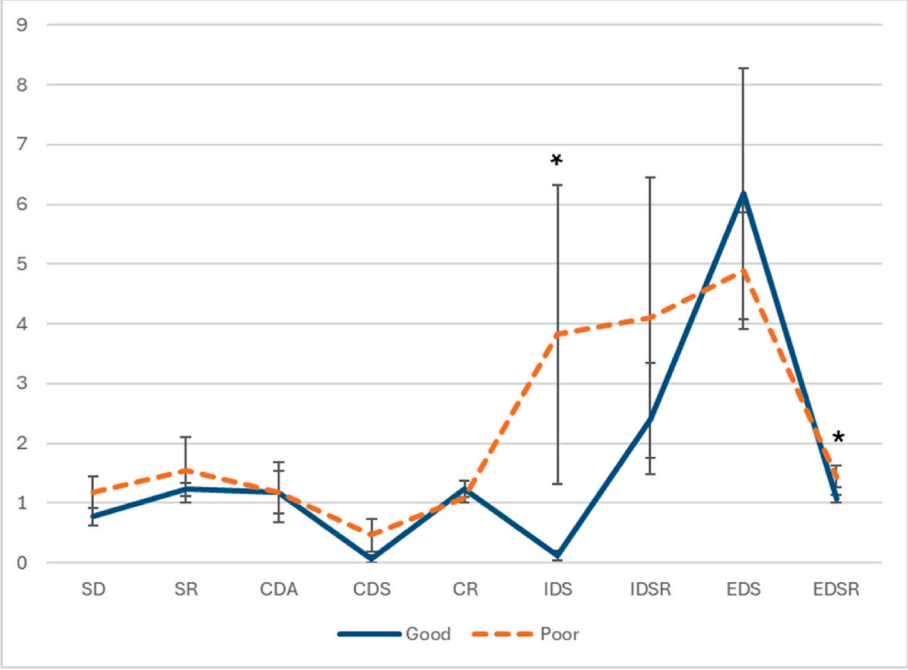

Fig. 4. Mean errors for good (n = 17) and poor (n = 11) adjusters on each stage of the IDED task.
Note. Error bars represent standard error
SD = Simple discrimination; SR = Simple reversal; CDA = Compound Discrimination Adjacent; CDS = Compound Discrimination Superimposed; CR = Compound Reversal; IDS = Intradimensional Shift; IDSR = Intradimensional Shift Reversal; EDS = Extradimensional Shift; EDSR = Extradimensional Shift Reversal.

(D'Urso et al., 2023).

Consistent with the broader literature (see Grant et al., 2022; Pozza et al., 2024 for a meta-analysis), a large proportion (60 %) of our sample scored above the clinical threshold for OCD at baseline. This exceeds the 21 % rate reported in our earlier study (Fineberg et al., 2021) of a large general population sample (n = 514) during the easing of the first UK lockdown (June 2020). In the current study, 51 % of those without a mental health history scored above this threshold, highlighting how the pandemic may have amplified OC symptomatology in those without prior clinical diagnoses. Nonetheless, OC symptoms did decline over time, aligning with meta-analytic findings (Prati and Mancini, 2021), which suggest that mental health impacts of lockdowns may be transient. By contrast, CPAS scores remained stable across all time points, consistent with the view that compulsive personality traits reflect enduring vulnerabilities rather than state-dependent fluctuations.

4.2. Does cognitive inflexibility, as measured by cognitive tasks, predict ability to adjust?

Cognitive inflexibility was examined using both the WCST at baseline and the IDED at the 3-month follow-up. WCST results showed no significant differences between good and poor adjusters, nor did WCST scores correlate with PPAS adjustment outcomes. However, exploratory IDED analyses revealed that poor adjusters made significantly more errors at the intra-dimensional shift (IDS) and extra-dimensional shift reversal (EDSR) stages, suggesting deficits in both set-shifting and reversal learning. These findings imply that cognitive inflexibility, particularly difficulties with reversal learning, may hinder adaptation to post-lockdown changes — a pattern also noted in our previous study on vaccine hesitancy (Pellegrini et al., 2024). The discrepancy between WCST and IDED results likely reflects task-specific differences. While both tests assess cognitive flexibility, the IDED may capture more nuanced forms of inflexibility, such as reversal learning, that the WCST overlooks. This aligns with research showing that WCST focuses more on set-shifting, whereas reversal learning tasks better detect rigid responses to environmental change (Monni et al., 2022). Notably, reversal learning deficits are linked not only to OCD, but also to depression (Remijnse et al., 2006; Apergis-Schoute et al., 2024), suggesting cognitive inflexibility in poor adjusters may be compounded by affective symptom.

Our longitudinal data revealed only modest improvement in adjustment over time. Nonetheless, poor adjusters maintained consistently higher DASS-21 scores than good adjusters throughout the duration of the study. This persistence of psychological distress suggests that, for some, the end of lockdown did not bring immediate relief, but rather prolonged emotional strain. While OCI-R scores did decrease across the duration of the study, the consistently elevated DASS-21 scores in poor adjusters appears to highlight that emotional distress may present the greatest barrier to post-pandemic recovery.

Public health implications arise from these findings. The identification of obsessive -compulsive symptoms as predictors of adjustment suggest measures should be taken during a pandemic and in its immediate aftermath to proactively identify those struggling with these symptoms to lessen their impact. Identification of depression, anxiety and stress as mediators of adjustment suggests that interventions targeting these symptoms could help alleviate broader adjustment difficulties. It is well known that people with obsessive-compulsive disorders tend to present late for treatment, and the duration of untreated illness adversely affects clinical outcomes (Fineberg et al., 2019; Pellegrini et al., 2025). In our study, many individuals endorsed significant obsessive-compulsive symptomatology, but around 50 % of them did not consider themselves to have a mental disorder. Psychoeducation and even the use of brief, easy-to-use screeners (Fineberg and Roberts, 2001; Kühne et al., 2021; Kühne et al., 2022), may be helpful at a population-level to support timely recognition and intervention with treatments tailored to symptom-severity and functional disability(NICE, 2005).

In addition, the use of cognitive-behavioural interventions to enhance cognitive flexibility (especially reversal learning), may better support those struggling post-pandemic (Ludlow et al., 2023). Given the stability of compulsive personality traits (CPAS), long-term strategies addressing these vulnerabilities such as transient obsessive-compulsive or affective symptom changes — possibly through resilience training or tailored psychological therapies — could further mitigate future adjustment problems.

4.3. Limitations

Limitations of this study must be acknowledged. High attrition rates reduced the sample sizes for follow-ups, limiting the generalisability of our longitudinal findings. Notably, poorer cognitive flexibility (as measured by WCST errors) was associated with baseline dropouts, suggesting that our follow-up sample may underestimate the full extent of cognitive inflexibility in poor adjusters (see Appendix E). Future research will need to consider how to address and account for this relationship between cognitive inflexibility and attrition rates in longitudinal analyses, as those that are dropping out may resemble marginalised and under-represented cohorts that are not receiving adequate support. Additionally, while IDED results highlighted key cognitive differences, these analyses were exploratory and warrant cautious interpretation.

4.4. Future directions for public health policy

Future research should build on these findings by integrating neurocognitive, obsessive-compulsive and affective data to develop predictive models of adjustment. Exploring whether targeted exposure therapy or emotion regulation strategies can improve post-pandemic adaptation would be a valuable next step. Moreover, examining how cognitive inflexibility, obsessive-compulsive and affective symptoms interact over longer periods could uncover mechanisms driving persistent adjustment difficulties.

4.5. Conclusion

In conclusion, this study extends prior research by demonstrating that obsessive-compulsive symptoms, depression, anxiety, and stress — with compulsive traits acting as a vulnerability factor — drive post-pandemic adjustment difficulties. Cognitive inflexibility, particularly deficits in reversal learning, further distinguishes poor adjusters. These findings offer critical insights for public health strategies, advocating for interventions that address obsessive-compulsive symptoms, emotional distress and cognitive rigidity to foster better long-term adaptation.

CRediT authorship contribution statement

Aaron T. Clarke: Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation. **Naomi A. Fineberg:** Writing – review & editing, Supervision, Resources, Conceptualization. **Luca Pellegrini:** Writing – review & editing, Formal analysis, Data curation. **Rodolfo Leuzzi:** Writing – review & editing. **Keith R. Laws:** Writing – review & editing, Supervision, Conceptualization.

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Declaration of competing interest

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Appendix A Post-Pandemic Adjustment Scale (PPAS: Fineberg et al., 2021)

1. I am having great difficulty adjusting to the easing of the COVID-19 pandemic restrictions.
2. I am finding it harder to manage my fears about COVID now that the COVID-19 pandemic restrictions are easing than I did when the restrictions were fully in force.
3. I am finding it very stressful going out of the house now that the COVID-19 pandemic restrictions are easing.
4. I am thinking too much about contracting or spreading coronavirus now that the COVID-19 pandemic restrictions are easing.
5. I am thinking too much about other risks to my or others' physical health now that the COVID-19 pandemic restrictions are easing.
6. I am finding it hard to stop physical distancing or avoiding contact with people now that the COVID-19 pandemic restrictions are easing.
7. I am finding it hard to stop disinfecting behaviours (e.g. handwashing, use of sterile wipes, use of gloves, masks, etc.) that are no longer officially recommended now that the COVID-19 pandemic restrictions are easing.

These items were assessed on a 5-point Likert scale; 1 = completely disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = completely agree.

Appendix B Covid-19 Safety Behaviour Scale

	Never 0	Hardly ever 1	Often 2	Most of the time 3	All of the time 4
I cancel my usual social activities					
I do not go to work					
I do not go shopping for non-essential things					
I do not go to grocery stores or pharmacies					
I do not leave the house					
I comply with wearing face mask recommendations when outside my home					
I try to avoid physical contact with people					
I follow handwashing recommendations					
I use hand sanitizer more than usual					
I follow coughing and sneezing recommendations					
I use tissues more than usual					
I wear gloves while going out of my house					
I avoid public transport					
I avoid going to restaurants/bars/pubs					
I avoid going for walks or exercise outside					

Appendix C Participant demographic information (n = 252)

Gender	%				
Male	28.6				
Female	69.8				
Non-binary	1.6				
Age range	**%**	**Ethnicity**	**%**	**Level of Education**	**%**
18-27	60.3	White	59.5	GCSE's	0.8
28-37	14.7	Black	8.7	A-Levels	18.7
38-47	10.7	Mixed	6.7	Undergraduate	57.9
48-57	9.1	Asian	24.2	Postgraduate/MSc	14.3
58-67	4.4	Other	0.8	Doctorate/PhD	8.3
68+	0.8				
Living status	**%**	**Occupation**	**%**		
Own property	10.3	Employed	31.3		
Mortgage	13.5	Unemployed	4.8		
Renting	26.2	Health workers	12.7		
Living with parents	33.3	Students	50.8		
University dorms	15.1				
Other	1.6				

Appendix D. Mean questionnaire scores for good (n = 13) and poor (n = 18) adjusters across baseline, 3-months and 6 months

Measure	Time	Good Adjusters (n = 13) Mean (SD)	Poor Adjusters (n = 18) Mean (SD)	Main effect (Time)	Main effect (Group)	Interaction effect
PPAS						
	Baseline	13.23 (5.67)	24.89 (6.82)	**p < .001**	**p < .001**	n.s.
	3-month	13.46 (5.35)	22.28 (7.05)			
	6-month	11.85 (7.34)	19.11 (7.46)			
OCI-R						
	Baseline	26.08 (15.65)	26.11 (15.39)	**p < .001**	n.s.	n.s.
	3-month	16.46 (13.41)	17.67 (12.49)			
	6-month	17.15 (15.17)	17.50 (13.02)			
CPAS						
	Baseline	11.00 (7.59)	11.06 (6.78)	n.s.	n.s.	n.s.
	3-month	11.54 (6.16)	11.00 (6.44)			
	6-month	10.46 (8.16)	10.33 (6.28)			
DASS-21						
	Baseline	15.38 (8.58)	29.44 (16.77)	n.s.	**p < .05**	n.s.
	3-month	15.53 (8.58)	25.89 (13.93)			
	6-month	13.69 (10.53)	25.17 (13.81)			
C-19 SBS						
	Baseline	26.15 (11.82)	36.00 (10.68)	**p < .001**	**p < .05**	n.s.
	3-month	22.46 (11.16)	32.71 (14.77)			
	6-month	11.77 (7.43)	21.76 (9.65)			

Appendix E. ANOVA of completers against non-completers

	Dropped out after baseline assessment N = 194 Mean (SD)	Dropped out after 3-month assessment N = 24 Mean (SD)	Completed all assessments N = 34 Mean (SD)		
PPAS	18.54 (6.22)	19.71 (7.78)	20.38 (8.35)	F (2,249) = 1.37, ηp^2 = 0.01	
OCI-R	25.69 (15.87)	23.63 (13.46)	27.12 (16.28)	F (2,249) = 0.35, ηp^2 = 0.00	
CPAS	11.02 (6.25)	10.75 (5.83)	11.88 (7.80)	F (2,249) = 0.30, ηp^2 = 0.00	
DASS-21	21.73 (13.72)	20.17 (15.27)	24.82 (16.28)	F (2,249) = 0.90, ηp^2 = 0.01	
C-19 SBS	29.87 (11.87)	32.00 (12.99)	32.97 (12.10)	F (2,249) = 1.18, ηp^2 = 0.01	
WCST					
P-Errors	14.02 (6.90)	11.08 (3.22)	11.53 (5.97)	**$F(2,249) = 3.79$, $\eta p2 = 0.03$***	*No group differences revealed*
FTMS-Errors	3.25 (2.72)	2.13 (1.90)	2.06 (1.79)	**$F(2,249) = 4.70$, $\eta p2 = 0.04$***	1 × 3 **$t = 2.52$, $d = 0.47$***
R-Errors	9.51 (5.00)	8.46 (4.01)	7.88 (4.58)	F (2,249) = 1.91, $\eta p2$ = 0.02	
T-Errors	26.47 (9.65)	21.25 (7.01)	21.15 (8.13)	**$F(2,249) = 7.29$, $\eta p2 = 0.06$****	1 × 2 **$t = 2.61$, $d = 0.57$*** 1 × 3 **$t = 3.10$, $d = 0.58$***

Note: PPAS=Post-Pandemic Adjustment Scale, OCI-R=Obsessive = Compulsive Inventory-Revised, CPAS=Compulsive Personality Assessment Scale, DASS-21 = Depression, Anxiety, and Stress Scale-21, C-19 SBS=COVID-19 Safety Behaviour Scale, WCST=Wisconsin Card Sorting Test, P-Errors = Perseveration errors, FTMS-Errors = Failure To Maintain Set errors, R-Errors = Random errors, and T-Errors = Total errors. *$p < .05$, **$p < .001$.

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