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Health, well-being, and persisting symptoms in the pandemic: What is the role of psychological flexibility?

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ABSTRACT

Finding psychological factors that can reduce the substantial impact of COVID-19 on mental and physical health is important. Here we replicate and expand a previous study regarding the role of psychological flexibility (PF) in this context. We employed a comprehensive and well validated measure of PF and examined its role in relation to health outcomes and persistent post COVID-19 symptoms. 1174 participants completed standardized measures of depression, anxiety, insomnia and the Multidimensional Psychological Flexibility Inventory (MPFI), and reported the presence of persistent symptoms associated with "long COVID." All PF and psychological inflexibility (PI) facets, except for acceptance, correlated with the three mental health outcomes and with persistent symptoms. PF and PI accounted for significant variance in depression, anxiety, and insomnia after adjusting for background and health status variables. A notable finding was the particularly stronger correlations obtained for the PI facets. Our findings emphasize the potentially mitigating effects of PF on mental ill health, as well as the particularly aggravating effects of PI, in the pandemic context. A novel finding is the significant association of PI with persisting symptoms of COVID.

1. Introduction

During the relatively short duration of the pandemic, numerous psychosocial studies have appeared (Mahmud et al., 2021; Mukherjee et al., 2021). Some of these identify psychological flexibility, or the ability to act with openness, awareness, and engagement (Hayes et al., 2006) as an important target in the treatment and recovery of those adversely affected (see Crasta et al., 2020; Daks et al., 2020; Dawson & Golijani-Moghaddam, 2020; Gloster et al., 2017; Kroska et al., 2020; McCracken et al., 2021; Pakenham et al., 2020; Smith et al., 2020). Several of these studies used a comprehensive measure of PF, the Multidimensional Psychological Flexibility Inventory (MPFI, Rolffs et al., 2018). At the time that the study of PF and mental health in the pandemic was conducted in Sweden this measure had not been successfully translated and validated in Swedish. This means that the previous results (McCracken et al., 2021) are limited due to the incomplete representation of all facets of the model and the use of PF measures with known limitations (Ong et al., 2020; Rogge et al., 2019).

Along with other impacts a new long-term health condition, "long COVID," has emerged during the pandemic (Crook et al., 2021). Long COVID includes persisting symptoms, following directly after an infection with the COVID-19 virus (Crook et al., 2021; Nalbandian et al., 2021). In a previous study including 1482 participants surveyed in Sweden 84.5% reported at least one of 25 persistent symptoms, and 49.7% attributing one or more of these to COVID-19 infection (Brocki et al., 2022). Importantly, the role of PF has not been addressed in relation to these symptoms.

The purpose of this study was to replicate our previous study into the role of PF in mental health in the pandemic context in Sweden (McCracken et al., 2021), but to do so with a more adequate and comprehensive assessment of these processes, using the MPFI. The second purpose was to study the role of PF in relation to long COVID symptoms. We predicted that facets assessed by the MPFI would correlate with depression, anxiety, and insomnia, and with persistent physical symptoms. We also predicted that the PF and PI facets would continue to correlate with depression, anxiety, and insomnia in analyses that control for relevant personal background factors and the impact of persistent symptoms on these outcomes. The third purpose was to identify the relative role of PF and PI facets in relation to outcomes, but we made no *a priori* predictions about which would appear most important.

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2. Methods

This study is based on survey data collected in Sweden between 29st June to August 23, 2021. Participants were recruited via social media and via local university and hospital web pages, and data were collected using the electronic survey tool Research Electronic Data Capture (REDCap, Harris et al., 2009, 2019). The study had ethics approval (Swedish national ethical board, dnr 2021–01647) and all participants provided informed consent. The analyses presented here are secondary analyses following a primary study of rates of depression, anxiety, and insomnia in Sweden 18 months after the start of the pandemic (Brocki et al., 2022).

2.1. Participants

A total of 1657 people provided their consent and participated in the survey. Because this study focused specifically on PF, participants were selected only if they completed the MPFI. This yielded a sample size for analysis of 1174 participants, or 70.9% of the total number of consented participants.

For participant characteristics see Table 1. Mean age was 47.8 years (SD = 11.5) and 90.5% of participants were women. Participants were generally well-educated, mainly Swedish, married or in a relationship, working full or part time, economically secure, with good or average overall rated health, and had relatively few co-morbid medical conditions. Nearly half reported that they had experienced mental health problems in the past. About half of the participants reported having had COVID-19, with roughly two thirds of these reporting a confirmed diagnosis and one third a presumptive diagnosis. All participants reported having been vaccinated.

2.2. Measures

Persistent COVID symptoms. All participants reported on the presence of 25 different symptoms presented at the time and based on available literature as potential symptoms of long COVID by the Swedish Agency for Health Technology Assessment and Assessment of Social Services (SBU, 2020). The following symptoms were included: fatigue, sleeping problems, problems with attention, joint pain, memory difficulties, depression, headache, impaired daily functioning, anxiety, shortness of breath, pins and needles, gut problems, heart palpitations, changes in smell, changes in taste, decreased lung function, chest pain/pressure, cough, nausea, skin changes, appetite loss, sore throat, weight loss, fever, and reduced quality of life. Participants were instructed to report any of these symptoms if they had them for at least six weeks. This list of symptoms was used to calculate a summary score. In order to avoid overlap with our mental health outcomes, the summary score for long COVID was adjusted by removing items related to sleep, depression, impaired daily functioning, anxiety, and reduced quality of life, and creating a sum from the remaining 20 items.

Multidimensional Psychological Flexibility Inventory (MPFI). The MPFI is a 60-item measure of the six facets of PF and the six facets of PI (Rolffs et al., 2018). It includes five items for each facet, each item rated on a six-point scale from "never true" to "always true." The facets PF/PI include Acceptance/Experiential Avoidance; Contact with the Present Moment/Lack of Contact with the Present Moment; Self as Context/Self as Content; Defusion/Fusion; Committed Action/Inaction; and Values/Lack of Contact with Values (Rolffs et al., 2018). Studies show that MPFI has adequate validity and reliability (Landi, Pakenham, Crocetti, et al., 2021a, 2021b; Rolffs et al., 2018) and responsiveness to change over time (Rolffs et al., 2018). The instrument has been translated and validated in Swedish and this version has been found to be a reliable instrument with sufficient support for validity (Tabrizi et al., 2022).

Patient Health Questionnaire (PHQ-9). The PHQ-9 is based on the DSM-IV criteria for depression (Kroenke et al., 2001; Kroenke & Spitzer, 2002). The PHQ-9 score ranges from 0 to 27, based on the nine symptom-related items rated on a 4-point rating scale, from 0 = "not at all" to 3 = "nearly every day". The PHQ-9 has shown to have adequate validity and internal consistency, α = 0.89 (0.88 in the current sample) (Kroenke et al., 2001; Kroenke & Spitzer, 2002).

General Anxiety Disorder-7 (GAD-7). The GAD-7 is a measure of anxiety symptoms (Spitzer et al., 2006). It consists of seven items and is commonly used for assessing symptoms of general anxiety in clinical and non-clinical settings and populations (Beard & Björgvinsson, 2014). Scores for the GAD-7 ranges from 0 to 27 based on items rated on a

Table 1
Sample characteristics (N = 1174).

Variable	n	%
Gender		
Female	1062	90.5
Male	107	9.1
Non-binary	5	0.4
Education		
Pre-secondary	24	1.8
Secondary	223	30.4
University	874	59.5
Post graduate	51	4.3
Country of Birth		
Sweden	1027	87.5
Other Scandinavian country	35	3.0
Other European country	84	7.2
Other	28	2.4
Domestic Status		
Married	530	45.1
In a relationship	297	25.3
Single	213	18.1
Divorced/separated	74	6.3
Living apart	54	4.6
Widowed	6	0.5
Work Status		
Working full time	763	65.0
Working part time	181	15.4
Retired	83	7.1
Student	52	4.4
Sick leave	55	4.7
Unemployed	20	1.7
Parental leave	17	1.4
Unpaid work	3	0.3
Self-Rated Economic Status		
Average	540	46.0
Above average	413	35.2
Below average	137	11.7
Much below average	40	3.4
Much above average	44	3.7
Self-Rated Health Status		
Good	422	35.9
Average	415	35.3
Very good	164	14.0
Poor	144	12.3
Very poor	29	2.5
History of a Mental Health Condition		
No	630	53.7
Yes	544	46.3
Relevant Collateral Physical Conditions+		
None	763	66.3
One	279	24.3
Two	79	6.9
Three or more	29	2.6
COVID-19 Vaccine		
Two dose	623	53.1
One doses	299	25.5
Three doses	251	21.4
Infected with COVID-19		
No	555	47.4
Yes, diagnosed	440	37.5
Yes, unconfirmed	117	15.1

Note. + Sum of conditions representing risks for poor outcome of COVID-19: age over 70, hypertension, angina, stroke, heart disease, diabetes, cancer, smoking, respiratory disease, and immune suppressant.

4-point raring scale, from 0 = "not at all" to 3 = "nearly every day." The GAD-7 has shown strong psychometric properties in the general population, including adequate internal consistency, α = 0.89 (0.89 in the current sample) (Löwe et al., 2008; Spitzer et al., 2006).

Insomnia Severity Index (ISI). The ISI is a measure of insomnia (Bastien et al., 2001). It includes seven items designed to assess severity of insomnia. Scores for the ISI ranges from 0 to 28, based on items rated on a 5-point rating scale, with 0 = "no problem" and 4 = "very severe problem." In a population-based sample the validity and internal consistency were good, α = 0.90 (0.91 in current sample) (Bastien et al., 2001).

3. Results

3.1. Preliminary analyses

All skewness and kurtosis values for the MPFI were well within a range from −1 to 1. Table 3 shows means, standard deviations, and Cronbach's alpha values for each of the facets and the overall flexibility and inflexibility dimensions.

There were several significant correlations between the background variables and depression, anxiety, insomnia, and the persistent symptom summary score (see Table 2). Remaining background variables, not included in Table 2, were not significantly correlated with outcomes or symptoms.

3.2. Correlation analyses

Table 3 shows the correlation results demonstrating relations between MPFI scores with depression, anxiety, insomnia, and physical symptoms. The acceptance subscale did not correlate with any of the outcomes. For depression, anxiety, and insomnia, every other facet of flexibility and inflexibility and the overall dimension scores correlated in the expected direction, at $p < .001$. For persistent physical symptoms ten of 14 correlations were significant at $p < .001$. Amongst the flexibility facets seven of 24 correlations were medium-sized, none were large, and the remainder, 13, were small, or less than small, four. Amongst the inflexibility facets, eight of 24 correlations were large, seven were medium, and nine were small.

3.3. Multiple regression analyses

Six hierarchical regression analyses were calculated in two sets (see Tables 4 and 5). In the first set, the PF facets were examined as predictors of depression, anxiety and insomnia. In the second set with the PI facets were predictors. In all analyses the first four blocks of variables entered included (1) age, relationship status, employment, self-rated finances, (2) mental health history, COVID-19 risk factors, (3) COVID-19 infection status, and (4) the persistent physical symptoms summary score. The PF or PI facets were then entered in the fifth and final block.

In the set of regression equations examining the PF facets (see Table 4), the first block including the background variables accounted for a moderate amount of variance, with age being the strongest predictor of both depression and anxiety. In the second block, including health status variables, mental health history was the main significant predictor. The COVID-19 infection variable entered in the third block contributed relatively little additional variance. The fourth block including the persistent symptoms summary accounted for the largest proportion of variance in the equations including 25% for depression, 17% for anxiety, and 16% for insomnia. And finally, the variance accounted for by the psychological flexibility facets entered in the final block was significant in each case, including 7.6% for depression, 8.1% for anxiety, and 3.0% for insomnia. Defusion was clearly the strongest individual predictor with standardized regression coefficients second in magnitude only to those obtained by the persistent physical symptoms. Committed action also obtained a significant coefficient in relation to depression. Total R-square values for the equations were respectable at .54 for depression, 0.43 for anxiety and 0.32 for insomnia.

The analyses of the inflexibility facets were like the analyses of the flexibility facets in that all the ΔR^2 values were the same in the first four blocks, although some of the standardized regression coefficients shrank slightly in the final equation (see Table 5). The coefficients that shrank the most when the inflexibility facets were analyzed, relative to the flexibility facets, were the ones for the mental health history variable, which shrank by approximately 50%. The coefficients for the persistent symptoms in the final equations also were smaller relative to the equations calculated for PF. Another difference was in the final block where variance accounted for at entry was substantially greater, 18% for depression, 23% for anxiety, and 8% for insomnia. This time fusion was a consistent stronger unique predictor for each outcome, and self-*as*-content was also significant in predicting depression and anxiety, as was inaction.

Table 2
Preliminary correlations of depression, anxiety, insomnia, and persistent COVID symptoms with background variables.

	Age	Unemployed	Finances positive	Health positive	Had COVID
Depression	−.18**	.21**	−.15**	−.54**	.15**
Anxiety	−.22**	.17**	−.13**	−.43**	.092*
Insomnia	−.03	.17**	−.07	−.40**	.13**
Persistent symptoms	−.14**	.24**	−.16**	−.46**	.10**

*$p < .01$. **$p < .001$.

4. Discussion

The purpose of the present study was to replicate and improve upon a previous study of the role of psychological flexibility in relation to depression, anxiety, and insomnia during the pandemic in Sweden (McCracken et al., 2021). Our results are consistent with the growing number of studies, showing that psychological flexibility may play a protective role against poor physical and mental health in the pandemic context, and that inflexibility does the opposite (Crasta et al., 2020; Daks et al.,. 2020; Dawson & Golijani-Moghaddam, 2020; Kroska et al., 2020; McCracken et al., 2021; Pakenham et al., 2020; Smith et al., 2020). The results with respect to the failure of the acceptance facet to correlate with mental health outcomes was also found by others (Pakenham et al., 2020), as was our result that inflexibility facets correlate more strongly with outcomes compared to the flexibility facets (Crasta et al., 2020; Pakenham et al., 2020).

Among the flexibility facets, cognitive defusion played the strongest unique role, emphasizing the very important role of cognition in developing mental ill-health. In the analyses of depression and anxiety, the fusion, self as content, and inaction facets all played a significant role, in essence cutting directly across the tripartite PF model of "open, aware, and engaged." Overall, prediction of insomnia was less successful as the variance accounted for in this outcome from the PF and PI facets was much less compared to the results for depression and anxiety.

A new finding in this study relates to the correlations between PF and PI with the set of persistent post COVID symptoms. Here five of the PF facets (with the exception of acceptance) correlated significantly with these symptoms, albeit the correlations were small in size. Consistent with findings from the other outcomes, the PI facets showed stronger relations. This finding is relevant from a clinical and public health perspective as it indicates that the capacity for psychological flexibility is a target for enhancing health and well-being broadly in the pandemic context, both for the generally expected impacts but also for the unexpected persistent post COVID symptoms.

The set of persistent symptoms played a significant role in predicting mental health, accounting for the largest proportions of variance. We note that the unique role of these symptoms appears smaller in the

Table 3
Mean, standard deviation, internal consistency reliability values for MPFI scales and correlations of scales with mental and physical health outcomes.

MPFI Scores	M (SD)	Internal Consistency (α)	Depression	Anxiety	Insomnia	Persistent Symptoms
Acceptance	3.22 (1.16)	.85	.00	.02	.01	.02
Defusion	3.43 (1.23)	.95	−.42**	−.44**	−.30**	−.20**
Awareness	3.70 (1.12)	.90	−.14**	−.14**	−.14**	−.10[a]
Self/context	3.97 (1.15)	.94	−.23**	−.27**	−.19**	−.10[a]
Values	4.39 (1.09)	.93	−.35**	−.33**	−.25**	−.16**
Commit/act	4.16 (1.18)	.94	−.40**	−.37**	−.27**	−.18**
Avoidance	3.43 (1.19)	.94	.12**	.16**	.13**	.10[a]
Fusion	2.90 (1.26)	.96	.61**	.66**	.43**	.28**
Lack contact	2.76 (1.03)	.90	.38**	.32**	.28**	.27**
Self/content	2.27 (1.22)	.95	.54**	.56**	.35**	.26**
Lack values	2.48 (1.08)	.94	.55**	.53**	.41**	.32**
Inaction	2.54 (1.20)	.95	.62**	.60**	.41**	.28**
Flexibility	3.81 (.92)	.96	−.32**	−.33**	−.24**	−.15**
Inflexibility	2.73 (.86)	.96	.64**	.65**	.46**	.34**

Note. The first six scales listed in the left-hand column represent the psychological flexibility facets. The second set of six scales represent the psychological inflexibility facets. The final two scores represent the overall summary dimensions of flexibility and inflexibility, each made up of six facets.
[a] $p < .01$. **$p < .001$.

Table 4
Hierarchical multiple regression analyses of facets of psychological flexibility in relation to mental health outcomes.

Block	Predictor	Dependent Variables					
		Depression		Anxiety		Insomnia	
		ΔR^2	β	ΔR^2	β	ΔR^2	β
1	Background	.094**		.084**		.046**	
	Age		−.12**		−.14**		.003
	In a relationship		−.071*		−.011		−.084*
	Employed		.051		−.030**		−.067**
	Finances above average		−.013		−.10		.032
2	Health status	.089**		.086**		.057**	
	Mental health history		.13**		.14**		.11**
	Physical risk factors		.061*		.045		.061
3	COVID	.027**		.011**		.023**	
	COVID infection		−.038		−.062		−.018
4	Persistent symptoms	.25***		.17**		.16**	
	Symptom total		.50**		.41**		.41**
5	Psychological flexibility	.076***		.081**		.030**	
	Acceptance		.060		.070		.051
	Defusion		−.26**		−.32**		−.17**
	Awareness		.046		.060		−.019
	Self/context		.16**		.059		.059
	Values		−.048		−.023		−.058
	Commit/act		−.17**		−.075		−.039
Total R^2		**.54**		**.43**		**.32**	

Note. Beta is from final equation.
*$p < .01$; **$p < .001$.

equation including the inflexibility facets compared to the flexibility facets, It might be interesting to speculate whether PI especially may play a direct role in reducing mental health as well as an indirect role, through an interaction with persistent symptoms. This could be worth testing in future.

The argument made from the previous studies is that methods to improve psychological flexibility (or reduce psychological inflexibility) might lead to better clinical and population outcome in those suffering from depression, anxiety, or insomnia in the pandemic context (Crasta et al., 2020; Daks et al., 2020; Dawson & Golijani-Moghaddam, 2020; Kroska et al., 2020; McCracken et al., 2021; Pakenham et al., 2020; Smith et al., 2020; Yu et al., 2021). Our results add emphasis to this argument, and extend it. It appears that methods to enhance psychological flexibility may also benefit people who suffer with complex persistent mental and physical health conditions following COVID-19. Further studies are needed to design and test appropriate treatments, at the required scale, preferably without delay.

This study has several limitations. The recruitment via social media seems to have produced a selected sample, possibly a sample of those most affected or most concerned. That 90.5% were women may be a result of some kind of distortion in the recruitment process, but the nature of this is unclear. In any case, generalizability remains a question until further studies are done. The cross-sectional observational methods employed naturally limit conclusions regarding which variables exert influence on which other variables. Of course, self-report measures can be open to bias and distortion (Podsakoff et al., 2003) and we should seek to replicate these findings with other sources of data. Finally, although the persistent symptom measure used in this study represents an evidence-based list of symptoms, it does not constitute a validated psychometric instrument.

On a practical note the MPFI, newly translated and validated in Swedish, appeared to perform well in most respects and we find it highly informative in the way it reflects twelve facets of PF and PI. On the other hand, the results related to the acceptance subscale were not as

Table 5
Hierarchical multiple regression analyses of facets of psychological inflexibility in relation to health outcomes.

Block	Predictor	Dependent Variables					
		Depression		Anxiety		Insomnia	
		ΔR^2	β	ΔR^2	β	ΔR^2	β
1	Background	.094**		.084**		.046**	
	Age		−.096**		−.12**		.009
	In a relationship		−.076**		−.019		−.087**
	Employed		−.048		−.024		−.067[a]
	Finances above average		−.010		.002		.039
2	Health status	.089**		.086**		.057**	
	Mental health history		−.063[a]		−.062[a]		−.064
	Physical risk factors		.044		.026		.049
3	COVID	.027**		.011[a]		.023**	
	COVID infection		−.037		−.055		−.018
4	Persistent symptoms	.25**		.17**		.16**	
	Symptom total		.43**		.33**		.36**
5	Psychological inflexibility	.18**		.23**		.080**	
	Avoidance		−.031		.020		.022
	Fusion		.17**		.32**		.17**
	Lack contact		.024		−.060		.023
	Self/content		.11**		.13**		.022
	Lack values		.013		.042		.085
	Inaction		.24**		.14**		.063
Total R^2		**.64**		**.58**		**.37**	

Note: Beta is from final equation.
[a] $p < .01$; **$p < .001$.

expected. The results obtained suggest either that acceptance is irrelevant in this context, an interpretation that seems unlikely given the weight of evidence to the contrary, or that the subscale requires some revision or refinement. The fact that this has happened in previous research with the MPFI in Italy (Pakenham et al., 2020) suggests that this is not a problem specific to the Swedish translation or context.

The aim here was to replicate and improve upon a previous study of PF in relation to depression, anxiety, and insomnia during the pandemic in Sweden (McCracken et al., 2021) Our findings may not be entirely new but add reliability and generality to the evidence base for PF as an important factor in future treatment designs for mental health and well-being in the pandemic context. Having said this, we do expand previous findings by our novel inclusion of persistent symptoms in relation to PF. Clinically, it is important to provide empirical evidence for such a link in a way that can specifically support a treatment agenda for this condition from which many people suffer. A potential next step in future research could be to use Ecological momentary assessment (EMA) to minimize recall bias and maximize ecological validity and to even better understand the processes underlying mental ill-health in the pandemic context.

Data sharing statement

Data is available upon reasonable request.

Declaration of competing interest

The authors declare that they have no conflict of interest.

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