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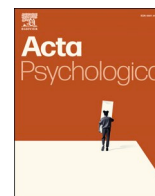
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Post-covid-19 syndrome: Self-compassion and psychological flexibility moderate the relationship between physical symptom load and psychosocial impact

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ABSTRACT

Living with persistent physical symptoms of an acute COVID-19 infection has a substantial impact on individuals' everyday lives. The identification of potential therapeutic targets for Post-COVID-19 Syndrome (PCS) or "Long-COVID" that can be utilised to reduce the impact of symptoms, is necessary to support effective rehabilitation. Self-compassion and psychological flexibility are thought to be important constructs to consider when understanding how individuals approach the management of long-term health challenges. The present study investigated the extent to which self-compassion and psychological flexibility moderate the relationship between physical symptoms and their impact on daily life. One-hundred and five participants (91 females) who were living with PCS after an acute COVID-19 infection, completed measures to assess PCS physical symptom prevalence as well as measures to assess impact on daily life, self-compassion and psychological flexibility. Two parallel moderation analyses showed that self-compassion and psychological flexibility significantly moderated the relationships between physical symptom presentation and their psychosocial impact. This research highlights the buffering effects of self-compassion and psychological flexibility and the need to consider these psychological therapeutic targets, as part of PCS multidisciplinary rehabilitation.

1. Introduction

Coronavirus (COVID-19), caused by acute severe respiratory syndrome coronavirus 2 (SARS-CoV-2) has had an unprecedented global impact. Typically, initial symptoms subside within seven to ten days, however, many individuals report persistent or new symptoms lasting weeks and months following the initial acute COVID-19 infection. This is referred to as post-COVID-19 syndrome (PCS), long-haul COVID-19 or "long-COVID" (Crook et al., 2021). The National Institute for Health and Care Excellence (NICE) define PCS as "signs and symptoms that develop during or after an infection consistent with COVID-19, continue for more than 12-weeks and are not explained by an alternative diagnosis" (NICE, 2020). A recent systematic review and meta-analysis estimated that there are approximately 200 million individuals living with PCS worldwide (Chen et al., 2022).

Findings indicate the occurrence of up to 205 possible PCS symptoms which can affect ten different organ systems (Davis et al., 2021). The

most common symptoms of PCS include profound fatigue, breathlessness, a persistent cough, chest pain, headaches, joint pain, muscle weakness, and psychological and neurocognitive difficulties (Raveendran et al., 2021). The presence of these symptoms can have a profound impact on physical, mental, social, and emotional functioning, affecting several life domains, including working capability, with studies suggesting an estimated 80,000 people have left employment due to PCS (Reuschke & Houston, 2022).

Reflecting the complexity of the condition, current guidelines suggest that rehabilitation should be multidisciplinary, and guided by the physical, psychological, and psychiatric aspects of management (NICE, 2020). A recent service evaluation, examining the effectiveness of a collaborative, interdisciplinary psychology-led 7-week virtual "Recovering from COVID" rehabilitation programme, revealed significant improvements in health-related quality-of-life (HRQoL) (Harenwall et al., 2021). This course combined self-management with additional specialist care, focusing on some core aspects of recovery (optimising sleep, diet,

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breathing, stress management and energy conservation). Despite these encouraging findings, only 3 % of individuals reported a return to full health following the course, emphasising that further work is required to identify potential therapeutic targets to use in future interventions to benefit engagement with self-management strategies and long-term effectiveness of rehabilitation.

Having a long-term health condition is typically accompanied by significant changes in important domains of daily functioning, which can be psychologically demanding as individuals need to face potential loss, threats, and uncertainty, and live a life that is different from that which they had originally imagined (Turner & Kelly, 2000). Two constructs that have been highlighted in the literature which may play an important role in how people deal with potentially stressful events are self-compassion and psychological flexibility. Self-compassion is an attitude of being kind and non-judgmental to one's suffering and entails three overlapping, interactive components: self-kindness, common humanity, and mindfulness (Neff, 2003). Self-kindness refers to an understanding of oneself rather than harshly judgmental and self-critical. Common humanity involves seeing one's experiences as part of the human condition rather than as separating and isolating. Lastly, mindfulness involves awareness and acceptance of painful thoughts and feelings, rather than over-identifying with them. Instead of being critical and unkind, self-compassion allows the same care, tolerance, and concern as we treat significant others who are experiencing difficulties (Beato et al., 2021). Importantly, studies suggest that individuals with high levels of self-compassion show increased health-promoting behaviours (Sirois, 2014), such as nutrition, exercising, or attending regular check-ups; each one a potentially important part of managing a long-term health condition (Kılıç et al., 2021). It is also suggested that high amounts of self-compassion may increase an individual's ability to buffer the perceived impact on their lives due to less negative affect, balanced responses to negative life events, and intensified motivation for staying healthy, which likely explains why self-compassionate individuals are often more resilient when faced with challenges (Leary et al., 2007). A tendency to be self-compassionate has been linked with a diverse range of positive psychological and physical health outcomes in a recent meta-analysis (Ferrari et al., 2019). Indeed, many individuals with chronic fatigue syndrome (CFS), another condition commonly triggered by an acute viral infection and with many overlapping symptoms (Simani et al., 2021), are characterized by an achievement-oriented and perfectionistic personality, and that such tendencies coupled with self-criticism drives these individuals to work beyond the point of exhaustion in a way that may initiate or perpetuate chronic fatigue (Sirois & Molnar, 2014).

Alternatively, psychological flexibility is a dynamic construct referring to an individual's ability to adapt to situational demands, shift mindsets, maintain balance among important life domains, and be open and committed to behaviours that are aligned with their values (Kashdan & Rottenberg, 2010). Psychological flexibility encompasses six core principles: contact with the present moment, values, committed action, self as context, defusion, and acceptance (Hayes et al., 1999). Given the robustness of psychological flexibility as a construct and promoter of psychological health (Kashdan & Rottenberg, 2010), dispositional psychological flexibility has been shown to mitigate the negative effects of the pandemic on mental health and help with better psychological adjustment throughout the first wave of the pandemic (Prudenzi et al., 2022). Like self-compassion, studies have cited psychological flexibility as an important psychological construct to consider when understanding how individuals self-regulate their health behaviours and manage long-term health challenges (Dawson & Golijani-Moghaddam, 2020). Nielsen et al. (2016) suggests that those who are more psychologically flexible are better equipped to employ more adaptive coping strategies which are approach-focused, responsive, and accepting. In contrast, those who are psychologically inflexible are more likely to adopt less advantageous coping strategies and responses, such as avoidance, facilitating poorer health outcomes (Rueda & Valls, 2020).

Around 60 % of relapses in PCS are triggered by stress (Davis et al., 2021), and evidence suggests that enhancing self-compassion and psychological flexibility is effective in reducing stress (Brinkborg et al., 2011; Homan & Sirois, 2017). This is supported by evidence that a brief self-compassion exercise lowers the levels of the stress hormone cortisol and increased heart-rate variability, which is associated with a greater ability to self-soothe when stressed (see Germer & Neff, 2013). Likewise, psychological flexibility during stressful life events can protect individuals from negative feelings, allow the person to adjust to negative situations, and to engage in more approach coping strategies and fewer avoidant coping strategies (Tindle et al., 2022). Furthermore stress reduction is well known to improve immune function (Padgett & Glaser, 2003), which will have knock-on effects in reducing some of the physical presentation associated with PCS. Therefore, it is conceivable that self-compassion and psychological flexibility may help alleviate some of the impact of living with PCS.

The identification of potential therapeutic targets that can be utilised to support individuals with PCS to reduce the clinical presentation and impact of symptoms is necessary to support effective rehabilitation. Self-compassion and psychological flexibility are thought to be important constructs to consider when understanding how individuals approach the management of long-term health challenges. The current study therefore aims to establish whether self-compassion and psychological flexibility moderate the relationship between physical symptoms of PCS and their psychosocial impact. We hypothesized that 1) greater PCS symptom load will be associated with greater impact on daily life. 2) self-compassion will significantly buffer the relationship between symptom load and impact. 3) psychological flexibility will significantly buffer the relationship between symptom load and impact.

2. Methods

2.1. Participants

The sample consisted of 105 people living with PCS (91 females, 13 males and 1 non-binary) with a mean age of 45.14 years (S.D. 10.85; Range = 19–67). Participants were eligible for inclusion if they were aged 18 years or above and had experienced new or ongoing symptoms 12 weeks or more after an acute COVID-19 infection (NICE, 2020). Participants were excluded from the study if they had any previous or current clinically diagnosed psychiatric or neurological disorder. Participants were recruited online via social media “long-COVID” support groups.

2.2. Procedure

Participants completed a series of online questionnaires via Qualtrics and were allowed an unlimited amount of time. There was no financial compensation for completing this study. This study was approved by the Manchester Metropolitan University (EthOS-ID:39774). All participants were provided with an information sheet and were required to give full informed consent.

2.3. Measures

See supplementary material for how to access these measures.

2.3.1. Health-related quality-of-life (HRQoL)

The EuroQol EQ-5D-5L assesses health-related quality-of-life across five dimensions, including mobility, self-care, usual activities, pain/discomfort, and anxiety/depression (Stolk et al., 2019). Each dimension is scored from 1 (no problems) to 5 (extreme problems). The scores from all 5 dimensions are combined and scaled, based on UK norms, to provide an index that represents overall HRQoL ranging from –0.594 to 1 with 1 the best possible quality of life. In addition, there is an overall health self-report visual analog scale (VAS) rating from 0 to 100 where

100 represents the best possible health.

2.3.2. Long-COVID symptoms and impact

Participants were asked about their PCS symptoms and their impact using the long-COVID symptom and impact tools which is a validated scale developed from PCS patients' lived experience (Tran et al., 2022). This tool has two parts (1) *Symptom tools* which scores the number of symptoms patients experienced over the last 30 days and has a range from 0 (no symptoms) to 53. The *Impact Tools* scores impact of PCS on their life, across personal activities, family, profession, social, mental wellbeing and caregivers, and has a range of 0 (no impact) to 60 (maximum impact). In this study, the measure demonstrated good internal consistency ($\alpha = 0.87$).

2.3.3. Self-compassion

Self-Compassion Scale-Short Form (SCS-SF; (Raes et al., 2011) is a 12-item scale measuring self-compassion using a five-point scale from 'almost never' to 'almost always, for example, 'when I fail at something important to me, I become consumed by feelings of inadequacy'. A higher mean score is indicative of greater levels of self-compassion. In this study, the measure demonstrated good internal consistency ($\alpha = 0.89$).

2.3.4. Psychological flexibility

The Psy-Flex (Gloster et al., 2021) is a six-item self-report measure of psychological flexibility. Participants were asked about their experiences in the last seven days and respond to each given statement on a five-point scale ranging from 'very often' to 'very seldom', for example, 'if need be, I can let unpleasant thoughts and experiences happen without having to get rid of them immediately'. All items are summed, and a higher score is interpreted as representing higher psychological flexibility. In this study, the measure demonstrated good internal consistency ($\alpha = 0.89$).

2.4. Data analysis

Data was analysed using IBM SPSS Statistics Version 28 (IBM Corp. Released, 2021) and JASP (JASP Team (2020), version 0.14.1). The statistical significance level was set to $p < 0.05$ (two-tailed). Two parallel moderation analyses were performed; one investigating whether self-compassion moderates the relationship between symptom load and impact and another investigating whether psychological flexibility moderates the relationship between symptom load and impact. To verify the hypothesized conceptual models (Figs. 1 and 2) and the two hypotheses on the moderating role of self-compassion and psychological flexibility in the relationship between physical symptom load and psychosocial impact, we used the Hayes' PROCESS macro (Hayes, 2017), utilising the PROCESS Model 1, which empirically evaluates moderation models. In the analyses, age was included as a covariate as it was significantly correlated with symptom load, whilst 5000 bootstrap samples were used with confidence intervals of 95 %. As long as the confidence intervals do not comprise of zero, then they may be stated to be of statistical value (Hayes, 2017). Five participants had missing data

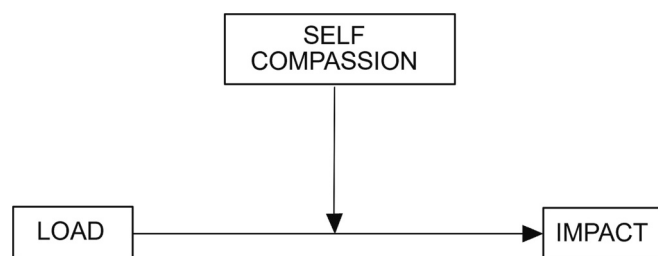


Fig. 1. Conceptual framework of the relationship between symptom load and psychosocial impact, and the moderating role of self-compassion.

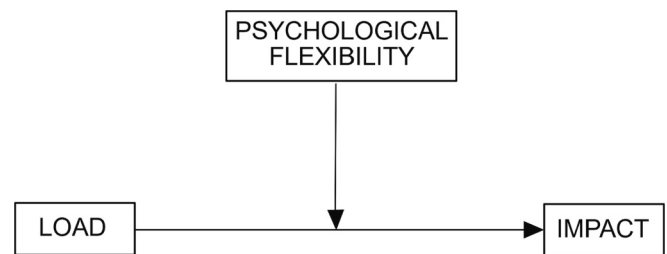


Fig. 2. Conceptual framework of the relationship between symptom load and psychosocial impact, and the moderating role of psychological flexibility.

for self-compassion and 7 had missing data for psychological flexibility, and were therefore removed from the analyses.

3. Results

Participants reported an average HRQoL VAS score of 41.86 (S.D. 10.25) and an Index score of 0.53 (0.27). Fatigue was the most commonly reported symptom (96.2 %) followed by neurological, with 84 % of people experiencing "brain fog" and difficulties concentrating and 60 % experiencing headaches. Sleep problems (66 %) and muscle aches (62 %) were also found to be prevalent in over half the participants.

Participants mean scores for Symptom Tools (M 18.80; $S.D.$ 10.26) and Impact Tools (M 39.15; $S.D.$ 14.31) were comparable with the validation study which demonstrated average scores of 16 and 36 respectively in a PCS sample (Tran et al., 2022). The means, standard deviations, and correlations between research variables are presented in Table 1. Symptom load was significantly correlated with psychosocial impact ($r = 0.50$, $p < 0.001$), showing that greater physical symptom presentation is associated with greater psychosocial impact on daily life. The association between symptom load and self-compassion was negative showing lower self-compassion was related to greater symptom load ($r = -0.22$, $p = 0.027$). Similarly, the association between symptom load and psychological flexibility was negative showing lower psychological flexibility was related to greater symptom load ($r = -0.24$, $p = 0.015$). Finally, both self-compassion ($r = -0.43$, $p < 0.001$) and psychological flexibility ($r = -0.40$, $p < 0.001$) were negatively associated with psychosocial impact, suggesting that greater self-compassion and psychological flexibility is associated with less impact on daily life.

3.1. Moderation analysis

As shown in Table 2, symptom load was found to have a positive significant effect on psychosocial impact (0.592, $p < 0.001$; 95 %CI = 0.348,0.836). The interaction term between symptom load and self-compassion had a significant effect on psychosocial impact (0.357, $p = 0.019$; 95 %CI = 0.005,0.055) suggesting that self-compassion moderates the relationship between symptom load and psychosocial impact. Likewise, the interaction term between symptom load and psychological flexibility had a significant effect on psychosocial impact (0.047, $p = 0.043$; 95 %CI = 0.002,0.093) suggesting that psychological flexibility also moderates the relationship between symptom load and psychosocial impact.

The conditional effects of symptom load on psychosocial impact according to the level of self-compassion, and the conditional effects of symptom load on psychosocial impact according to the level of psychological flexibility are shown in Table 3.

LLCI = lower bound within the 95 % confidence interval; ULCI = upper bound within the 95 % confidence interval.

Self-compassion level and psychological flexibility level was given as three conditions; low, medium and high (16th, 50th, and 84th percentiles). The results show that self-compassion moderates only in two conditions, namely medium and high with (both $ps < 0.001$) although

Table 1
Means, standard deviations, and correlations.

Variable	<i>M</i>	<i>SD</i>	AGE	SYMP	IMP	SC	PF
Age	45.14	10.85	–				
Symptom Tool	18.80	10.26	0.256**	–			
Impact Tool	39.15	14.31	0.100	0.500***	–		
Self-Compassion	2.94	0.85	0.131	–0.216*	–0.434***	–	
Psyc Flexibility	19.70	5.32	0.050	–0.237*	–0.401***	0.673***	–

*** $p < 0.001$.

** $p < 0.01$.

* $p < 0.05$.

Table 2
Moderating effect of self-compassion.

	DV: Psychosocial Impact				
	Coefficient	SE	<i>t</i>	F	R ²
Model 1					
Symptom Load (SL)	0.592	0.123	4.818**		
Self-compassion (SC)	–4.973	1.494	–3.327*	16.759	0.422
SL × SC	0.357	0.150	2.384*		
Model 2					
Symptom Load (SL)	0.632	0.118	5.384**		
Psyc Flexibility (PF)	–1.11	0.233	–4.780**	17.968	0.439
SL × PF	0.047	0.023	2.055*		

* $p < 0.05$.

** $p < 0.001$.

Table 3
Conditional effects of symptom load at values of self-compassion and psychological flexibility.

	Effect	SE	<i>t</i>	<i>p</i>	LLCI	ULCI
Self-compassion						
Low	0.317	0.183	1.731	0.087	–0.047	0.680
Medium	0.584	0.123	4.735	0.000	0.339	0.829
High	0.802	0.138	5.813	0.000	0.528	1.076
Psyc Flexibility						
Low	0.374	0.181	2.063	0.042	0.014	0.733
Medium	0.632	0.118	5.348	0.000	0.397	0.866
High	0.894	0.165	5.428	0.000	0.567	1.221

there was a tend towards significance at low levels ($p = 0.087$). This can be interpreted as follows: When self-compassion is low, it does not significantly moderate the relationship between symptom load and

psychosocial impact but when the level is medium or high, self-compassion significantly moderates the relationship between symptom load and psychosocial impact. This relationship suggests that when symptom load increases, psychosocial impact also increased, however, the lower the self-compassion, the steeper the slope of the increase in psychosocial impact as symptom load increased. These results point towards self-compassion acting as a buffer and reducing the impact of symptoms. Similarly, the results also show that psychological flexibility moderates in all three conditions (all $ps < 0.05$) demonstrating that lower the psychological flexibility, the steeper the slope of the increase in psychosocial impact as symptom load increased (Fig. 3).

4. Discussion

This study aimed to identify potential therapeutic targets for PCS interventions to alleviate the psychosocial impact of living with PCS. Specifically, we sought to investigate whether self-compassion and psychological flexibility moderate the relationship between physical symptoms and their psychosocial impact. In support of the first hypothesis, findings revealed that greater symptom load was associated with greater impact on participants' lives. Second, we found that both self-compassion and psychological flexibility significantly buffer the relationship between physical symptoms and their psychosocial impact.

These findings support previous conclusions from Biber and Ellis (2019) who emphasise the benefit of self-compassion for psychological, emotional, and physical wellbeing, suggesting that self-compassion is an important psychological construct that can help to explain how individuals self-manage long-term health challenges. Finlay-Jones (2017) suggested that being self-compassionate may protect against poor clinical psychological outcomes by enabling adaptive emotion-regulation strategies such as healthy reappraisals, emotional acceptance, and self-soothing. Similarly, psychological inflexibility, can lead to intensified

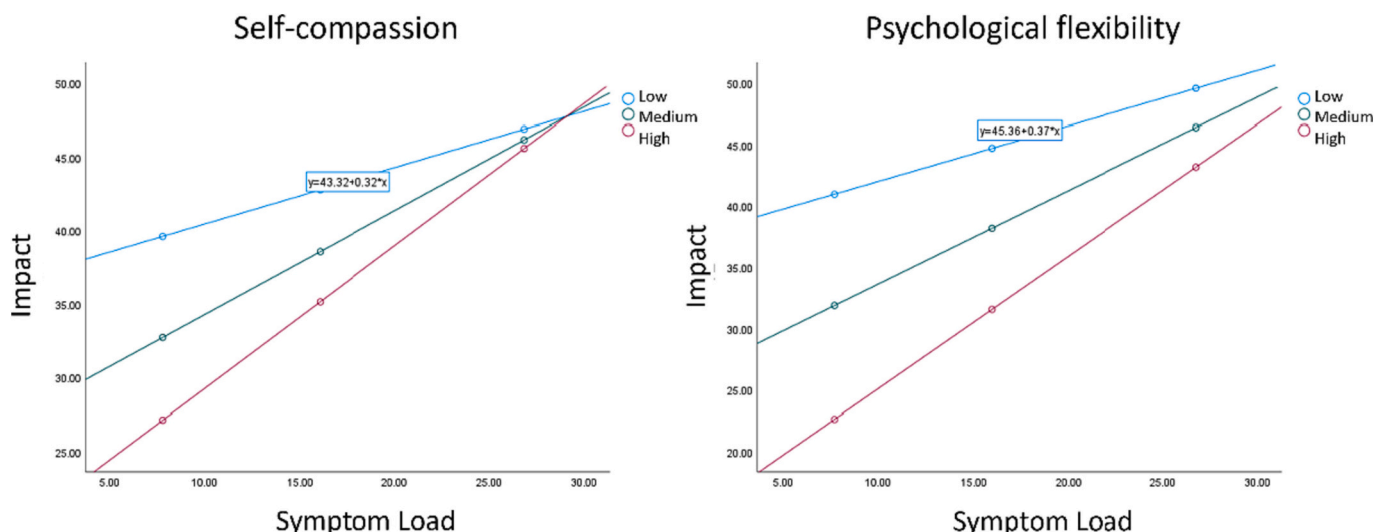


Fig. 3. The moderation effect of self-compassion and psychological flexibility in the relationship between symptom load and psychosocial impact.

emotional responses to stressors and reduced overall well-being (Ford et al., 2018; Mennin et al., 2009). It is therefore possible that the significant psychosocial impact experienced by those with PCS can be alleviated by increasing self-compassion and psychological flexibility during recovery. The findings emphasise the importance of a range of health professionals and specialists within integrated MDTs, highlighting the necessity of clinical and health psychologists who can provide the required support for individuals' psychological health needs (NICE, 2020). Indeed, HRQoL can significantly improve following various intensity psychological interventions for those managing long-term conditions, such as asthma and osteoarthritis, which may require a similar level of long-term management as PCS (Anderson & Ozakinci, 2018).

Given that self-compassion and psychological flexibility may be a potential therapeutic target for rehabilitation in PCS, interventions may draw from the fundamental approaches of compassion-focused therapy (CFT). CFT is a therapeutic framework which places emphasis on compassionate mind training, involving activities that are designed to help individuals to develop compassionate attributes and skills, with the aim of increasing self-compassion and reducing self-criticism, promoting a kind and caring attitude towards the self (Gilbert, 2014). Common activities include compassionate letter writing, building a compassionate image, examining compassionate behaviour, and exploring compassionate ways of thinking (Beaumont & Hollins Martin, 2015). CFT is thought to redress any imbalances within the three affect regulation systems: threat system, drive system, soothing system (Gilbert, 2014), and helps individuals to respond to a threatening situation with kindness and compassion, thus improving psychological wellbeing (Leaviss & Uttley, 2015). CFT may be beneficial for increasing the extent to which individuals are able to buffer the impact of physical symptoms on their daily lives as CFT has been shown to improve psychological outcomes in a variety of transferable clinical populations (Ferrari et al., 2019). A recent systematic review examining the effectiveness of CFT for individuals with long-term conditions, such as persistent pain and diabetes, reported positive health outcomes following therapy, such as reductions in symptoms of depression and anxiety (Austin et al., 2021). Individuals felt more accepting of their condition, could more effectively regulate their emotions, and felt less isolated. Studies also report significant improvements in clinical symptomatology for individuals with diagnosed mental health conditions after receiving a CFT intervention (Beaumont & Hollins Martin, 2015). It has been suggested that through the activation of the parasympathetic nervous system, self-compassion practice leads to physiological and psychological health benefits (Gilbert, 2014).

Alternatively, flexibility is about being aware of thoughts and feelings that unfold in the present moment, and depending on what the situation affords, persisting with or changing behaviour so that a flexible approach to experiences will be associated with health and well-being, even when those experiences are sometimes painful (Kashdan & Rotenberg, 2010). Someone who is psychologically flexible, is more apt to be versatile, showing an awareness of what a situation requires, and an ability to organise and prioritise strategies that fit with the current situation, rather than relying on dominant, default strategies (Fleeson, 2001). Recovering from PCS is likely to require flexibility, particularly for people who would be considered fit and healthy before their acute COVID-19 infection, therefore requiring suitable adaptation to many aspects of their life. Based on this, psychological interventions that are embedded into multidisciplinary rehabilitation for PCS may choose to draw from the core concepts of acceptance and commitment therapy (ACT), in which, practitioners focus on six core processes such as mindfulness, acceptance, commitment, and behaviour change to build psychological flexibility (Ciarrochi et al., 2010). ACT is a pragmatic approach which aims to change how people relate to their experiences to encourage a more effective form of action (Scott & McCracken, 2015). ACT has been shown to be effective in improving functioning and psychosocial outcomes in individuals with long-term conditions that

present similarly to PCS, such as fibromyalgia (Wicksell et al., 2013). In addition to buffering the impact of PCS, increasing self-compassion and psychological flexibility may also positively impact an individuals' ability to engage with key aspects of rehabilitation. Indeed, PCS self-management is essential to rehabilitation and by increasing access to psychological support, it may increase the extent to which individuals are able to self-manage their symptoms, therefore optimising recovery and improving the impact on individuals' lives.

4.1. Limitations

This study has a number of limitations; (1) whilst we sought to investigate the moderating role of self-compassion and psychological flexibility in a sample of individuals who do not have a clinical diagnosis of any psychiatric disorder, this may reduce the extent to which the sample was representative and generalisable to the PCS population, as a proportion of individuals have been clinically diagnosed with comorbid psychiatric disorders alongside PCS (Sampogna et al., 2022). Further studies should therefore investigate the role of self-compassion and psychological flexibility in those living with disorders such as depression and anxiety. (2) The Long-COVID symptom and impact tools, although specifically designed for PCS, do not measure the severity of each symptom, only whether it is present or not. Future studies to seek to establish the relationship between symptom severity and whether the impact of specific symptoms can be buffered by self-compassion and psychological flexibility. (3) The present study is cross-sectional and therefore cannot reveal the relationship between PCS symptoms, impact, self-compassion and psychological flexibility change over time. Future studies may benefit from employing longitudinal designs, to determine whether these associations persist long-term.

4.2. Conclusion

The persistent physical symptoms following an acute COVID-19 infection have a significant impact on individuals' everyday life. This study is the first to explore the moderating roles of self-compassion and psychological flexibility between physical symptom presentation and their psychosocial impact in a PCS population. This research highlights the need to consider psychological therapeutic targets, such as self-compassion and psychological flexibility as part of PCS multidisciplinary rehabilitation.

Declaration of competing interest

None.

Data availability

Data will be made available on request.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.actpsy.2023.104093>.

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