The buffering role of psychological flexibility in the association between symptom severity and mental health in individuals with persistent physical symptoms

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Abstract

Individuals with persistent physical symptoms (PPS) often report a poor quality life and are known to have high comorbidity rates with mental disorders. Occasional evidence suggests psychological flexibility can protect individuals with PPS from the mental burden of their symptoms. However, to inform treatment, there is a need to replicate this finding as well as to identify which components of psychological flexibility buffer the relation between symptom severity and mental health. This study made use of the Flexibility Index Test (FIT-60) to measure psychological flexibility. The aim was to examine (1) the underlying components of psychological flexibility by performing a series of factor analyses on the data of a large sample (N = 1529), and (2) which factor-analytically derived components of psychological flexibility buffered the association between symptom severity and mental health in individuals with PPS (N = 429). Results suggested a two-factor solution, consisting of a mindfulness and acceptance factor and a commitment and behavior change factor. The first factor was found to buffer the association between symptom severity and mental health in individuals with PPS. The study provided insight into the role psychological flexibility components play in the mental health of individuals with PPS and the therapeutic approaches that might be most suitable to preserve mental health. The suggestion that mindfulness and acceptance processes mitigate the consequences of symptom severity on mental health more clearly than commitment and behavior processes, indicates that mindfulness and acceptance based management may be more fruitful than value and action based interventions for individuals with PPS. This should be examined in clinical experimental studies.

Keywords: chronic fatigue syndrome, fibromyalgia, mental health, persistent physical symptoms, psychological flexibility, symptom severity

Persistent physical symptoms (PPS) is the umbrella term given to somatic symptoms that last for a minimum of six months and cause significant suffering to the individual (Henningsen et al., 2018). Previously often referred to as 'medically unexplained symptoms', PPS can comprise pain, fatigue or gastrointestinal symptoms. Individuals with PPS often report a poor quality of life (Koch et al., 2007) and are known to have high comorbidity rates with mental disorders, such as depressive and anxiety disorder (De Waal et al., 2004; Kroenke, 2003; Steinbrecher et al., 2011). Research has shown that a higher somatic symptom count as well as high symptom severity are predictors of such comorbidities (Kroenke, 2003).
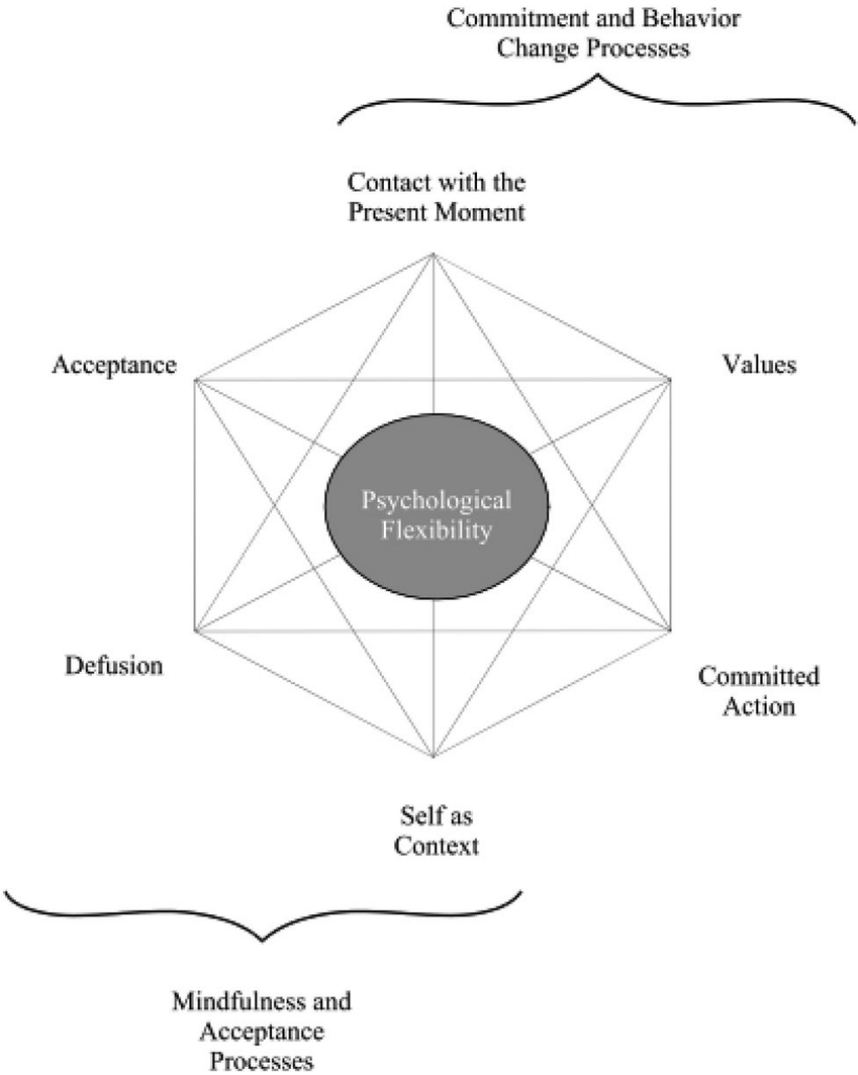
Evidence suggests that enhancing psychological flexibility (PF), which is the focus of the third-wave therapy acceptance and commitment therapy (ACT), may provide support in coping with the mental burden of these somatic symptoms (Merkes, 2010). PF is the ability to fully experience the present moment and to behave in accordance with one's chosen values (Hayes et al., 2006). According to Hayes (2006), PF consists of two overarching second-order processes: (1) *mindfulness and acceptance processes* and (2) *commitment and behavior change processes*. While these are distinct processes, they are interconnected, as can be seen in the Hexaflex model (Figure 1). The two second-order processes can be divided into six sub-processes: (1) *acceptance* (being willing to experience uncomfortable thoughts and feelings without avoiding them), (2) *cognitive defusion* (distancing oneself from negative thoughts and realizing they are not facts that need to be acted upon), (3) *present-focused awareness* (ongoing non-judgmental contact with internal and external experiences), (4) *self-as-context* (being aware of one's experiences without attachment to them), (5) *values* (chosen life directions that guide behavior) and (6) *committed action* (engaging in value-based behavior). While present-focused awareness and self-as-context are theoretically part of both second-order processes, they usually are grouped under acceptance and mindfulness processes when a dichotomy is created in research (e.g. Morin et al., 2020). Although PF is generally seen as the outcome of the interaction of these six sub-processes, it can also be viewed as a set of cognitive and behavioral skills.

Research indicates PF is key to mental health (Kashdan et al., 2020; Kashdan & Rottenberg, 2010; Masuda & Tully, 2012) and that it impacts subsequent mental health, instead of the reverse (Bond & Bunce, 2003). Whether and to what extent an individual with PPS experiences mental health problems as a result of the mental burden of their symptoms will partly depend on their skill level in these PF processes. Both acceptance and mindfulness processes and commitment and behavior change processes have been linked to better mental health in individuals with PPS: Acceptance has been found to play a positive role in psychological well-being in individuals with Chronic Fatigue Syndrome (Van Damme et al., 2006) and has been linked to better mental health in individuals with chronic pain (Viane et al., 2003; Vowles et al., 2011; McCracken, 1998). Mindfulness is associated with better mental health in individuals with fibromyalgia and has been indicated to buffer the relation between disease impact and anxiety (Pleman et al., 2019). A higher skill level in committed action has been associated with a better mental health status in individuals with fibromyalgia (Galán et al., 2019) and is negatively associated with depression symptoms in individuals with chronic pain

(Jensen et al., 2015). Changes in values skill level through an ACT program predicted improved mental health three years later for individuals with chronic pain (Vowles et al., 2011).

Figure 1

The Hexaflex model of the six sub-processes of psychological flexibility

Note. Reprinted from Hayes et al. (2016). Acceptance and commitment therapy: model, processes and outcomes. *Behav Res Ther. 2006; 44*(1), 1-25.

The previous studies focusing on the role of the overarching process of PF or the distinct sub-processes are important. However, it would be beneficial to identify the processes that contribute most to the ability to cope with the mental burden of somatic symptoms. This would facilitate the improvement of interventions, because it gives an indication about the components of ACT or other therapies that may strengthen the identified processes and thus might be most beneficial for individuals with PPS. Therefore, this study includes all six sub-processes of PF. Furthermore, the focus of this study on PPS as a whole will allow results to inform treatment for a broad range of patients.

While various PF questionnaires measure only part of the six processes of PF as theorized by Hayes (2006), the Flexibility Index Test (FIT-60; Batink & Delespaul, 2015) was constructed to measure all six. As with all psychological concepts, research into PF requires proper operationalization and reliable and valid measurement. To ensure methodologically sound research, it needs to be examined whether consistent individual differences show on all six sub-processes and whether they are sufficiently distinguishable from each other. As the six sub-processes of PF are interconnected and do not exist in isolation (Hayes et al., 2006), measurements of the sub-processes should correlate to a certain extent by definition. Worryingly, however, Batink (2017) indicated that the construct validity of the FIT-60 could not be demonstrated by factor analysis: the six sub-processes could not sufficiently be distinguished. While being able to measure the six sub-processes of PF could be of essence for diagnostic purposes and therapeutic use, convergent and divergent validity are essential for research into the role of PF processes in mental health. Therefore, the six-factor solution of the FIT-60 might not do in research.

Whether the overarching process of PF can be grouped into fewer distinct processes has been previously examined: single-factor (e.g. Bond et al., 2011), two-factor (e.g. Polk & Schoendorff, 2014) and three-factor models of PF (Francis et al., 2016; Hayes et al., 2011) have all been theorized or substantiated in empirical research. Studies into the questionnaires that form the building blocks of the FIT-60 show significant correlations with each other in varying degrees. The questionnaires measuring the sub-processes of acceptance and mindfulness consistently show significant correlations ranging from low to high: Experiential avoidance (AAQ-2) correlates low to moderately (r = .30 - .54) with all but one subscale of the mindfulness questionnaire FFMQ (Fledderus et al., 2012) and highly (r = .72 - .87) with cognitive fusion (CFQ-13) (Gillanders et al., 2014), while cognitive fusion (CFQ-13) correlates moderately (r = -.50) with mindfulness (FFMQ) (Gillanders et al., 2014). In contrast, the questionnaire measuring values (VLQ) shows no or negligible correlations with the previously mentioned questionnaires (Franquesa et al., 2017; Gillanders et al., 2014; Wilson et al., 2010). These differences in correlations between these sub-processes indicates the existence of a two-factor model, formed by the two second-order processes of PF.

Next to examining the number of dimensions, thus the structural validity of a questionnaire measuring all PF processes, this study will attempt to construct a shortened version of the FIT-60. The large number of items and sometimes mentally challenging questions of the FIT-60 can make it fairly burdensome to fill it out. A shorter questionnaire with interpretable underlying dimensions and sufficient internal consistency could reduce the response burden on patients and research participants.

To sum up, occasional evidence suggests PF skills protect individuals with PPS from the mental burden of their symptoms. However, to improve treatment it is important to replicate this finding, as well as to identify which specific sub-processes of PF buffer the relation between symptom severity and mental health. Therefore, the present study has a three-fold aim and will examine: (1) whether the six-factor structure of PF as suggested by Hayes (2016) can be replicated with the FIT-60 questionnaire, (2) whether it is possible to create a shortened version of the FIT-60 with sufficient internal consistency and interpretable and distinguishable factors, (3) which factor-analytically derived components of PF form a buffer in the association between symptom severity and mental health in individuals with PPS. It is hypothesized that not six but two factors will be found, formed by the mindfulness and acceptance processes (acceptance, cognitive defusion, present-focused awareness and self-as-context) and the commitment and behavior change processes (values and committed action). Furthermore, it is expected that lower levels of symptom severity and higher levels of the factor-analytically derived components of PF will be associated with higher levels of mental health. Lastly, it is hypothesized that all factor-analytically derived components of PF will form a buffer in the relationship between symptoms severity and mental health.

Method

Procedure

The design of the study is a cross-sectional online survey study. The study was approved by the Ethical Review Board of the faculty of Social and Behavioral Sciences of Utrecht University (FETC20-190). The data was collected in a previous research project (Koppert et al., 2020). Recruitment of participants went through e-mail and social media (Facebook, LinkedIn, local internet sites and Facebook group pages of patient and elderly associations). After reading information on the content of the study, being informed of their voluntary participation and signing an informed consent form, the participants filled out the survey at a secure website of Utrecht University. The medical conditions and diseases of the participants were self-reported.

Participants

Participants with complete assessments on pain, fatigue and PF were selected in the current study. Data from 511 participants were excluded because of incomplete assessments. Information on background variables (e.g., gender, age, education) and medical conditions and diseases was collected from the participants (Table 1). In the survey, respondents could indicate whether they, among other diseases, had fibromyalgia, irritable bowel syndrome, chronic fatigue syndrome, somatoform disorder, chronic headache or chronic pain elsewhere. These diseases were grouped under the term PPS. Because the first part of this study included all participants and the second part focused solely on participants with PPS, the demographics are listed for (1) all participants (with and without PPS) and (2) participants with PPS only.

Table 1

Demographic and medical characteristics of all participants *(N = 1529)* and participants with persistent physical symptoms *(N = 429)*

Characteristics	All participants	Participants with persistent physical symptoms
Age in years, mean *(SD)*	49.12 (14.5)	48.31 (12.6)
Gender, *n* (%)		
Female	1208 (79.0)	407 (94.9)
Male	321 (21.0)	22 (5.1)
Education level, *n* (%) [a]		
Low	225 (16.7)	102 (23.8)
High	1267 (82.9)	324 (75.5)
Missing	7 (0.5)	3 (0.7)
Marital status, *n* (%)		
Single	339 (22.2)	108 (25.2)
With partner	1031 (67.4)	279 (65.0)
Divorced	80 (5.2)	21 (4.9)
Widowed	45 (2.9)	11 (2.6)
Unknown	34 (2.2)	10 (2.3)
Diseases		
mean (*SD*)	1.26 (1.30)	2.42 (1.33)
range	1 - 7	1 - 7
Type of disease, *n* (%)		
Cancer	38 (2.5)	9 (2.1)
Cardiovascular	237 (15.5)	79 (18.4)
Neurological	108 (7.1)	50 (11.7)
Obesity	151 (9.9)	71 (16.6)
Osteoarthritis	170 (11.1)	87 (20.3)
Persistent physical symptoms	429 (28.1)	429 (100)
Psychiatric	195 (12.8)	92 (21.4)
Pulmonary	229 (15.0)	90 (21.0)
Rheumatic	166 (10.9)	52 (12.1)
Skin	63 (4.1)	32 (7.5)
Other	145 (9.5)	48 (11.2)
Self-report measures		
Mental health	68.6 (18.4)	60.6 (19.6)
Symptom severity [b]	0.42 (0.94)	1.27 (0.79)
Psychological flexibility	229.4 (50.1)	210.2 (53.3)

[a] Education level: *Low* lower general secondary education or lower, *High* higher general secondary education or higher

[b] Symptom severity is measured by calculating the average of the *z*-scores of the reversion of the pain and the vitality scales of the SF-36

Materials

Psychological flexibility. Psychological flexibility was assessed with the Flexibility Index Test (FIT-60) (Batink & Delespaul, 2015). Participants rated the extent to which the 60 statements were applicable to them (0 = "Totally disagree, 6 = "Totally agree"). The questionnaire exists of six subscales representing the six sub-processes of PF. To construct these subscales, a selection of 150 items was formed based on ACT-literature and four existing questionnaires each measuring one of the six processes of PF: (1) the Acceptance and Action Questionnaire–II (AAQ-2; Bond et al., 2011) measuring experiential avoidance (the opposite of *acceptance)*, (2) the Cognitive Fusion Questionnaire (CFQ-13; Gillanders et al., 2014) measuring *cognitive fusion* (the opposite of *cognitive defusion*), (3) the Five Facet Mindfulness Questionnaire (FFMQ; Baer et al., 2006) measuring *present-focused awareness* and (4) the Valued Living Questionnaire (VLQ-2; Wilson et al., 2010) measuring *values*. Subsequently, these 150 items were brought down to 90, containing the 15 items per process best representing its core aspects based on item content. Of those, the 10 items per process with the highest reliability were selected to form the six subscales of the FIT-60. Higher scores on the FIT-60 indicate a higher level of PF.

Mental health. To measure mental health, the subscale *mental health* of the Dutch version of the RAND 36-Item Short Form Health Survey (RAND SF-36) was used (VanderZee et al., 1996). The subscale includes 5 items, concerning feelings of depression and nervousness during the past 4 weeks. Participants rated to which extent the items applied to them on a 6-point Likert scale. The raw scale score was transformed to a 0-100 scale. Higher scores on the subscale indicate better mental health. In the present sample, the internal consistency of the subscale was good (α = .88).

Symptom severity. Symptom severity was measured by making use of two subscales of the Dutch version of the RAND SF-36: *pain* and *vitality* (VanderZee et al., 1996). The *pain* subscale contains two items, assessing pain and interference with daily life, on a 6- and 5-point Likert scale. The *vitality* subscale consists of four items, two of which measure fatigue level, and two items that assess energy level. The standardized mean deviation from the norm scores was used to calculate a *z*-score for both scales. The Cronbach's alpha for *z*-scores of the *pain* subscale in the present sample was α = .90, and for the *vitality* subscale it was α = .86 . To come to the measurement of symptom severity, the mean of these *z*-scores was calculated, which had a Cronbach's alpha of α = .74 in the current sample. For the symptom severity scale used in the current study, this mean *z*-score was reversed, so that higher scores indicate a higher level of symptom severity.

Statistical Analyses

All analyses were conducted in SPSS (Version 27). All statistical tests were two-sided and a *p*-value of <.05 was considered statistically significant. The factor structure of the FIT-60 was examined with a series of exploratory factor analyses (EFA) performed on all participants. Principal Axis Factoring (PAF) with direct oblimin rotation was used because the items were expected to correlate (Hayes et al., 2006). The number of factors was determined based on the scree plot, the pattern of factor loadings, internal consistency of the factors and the content of the items. Criteria for excluding an item from further analysis were a factor loading below .45 on any factor (Comrey & Lee, 1992) or

a factor loading above .32 on two or more factors (Costello & Osborne, 2005). Cronbach's alpha was used to analyze the internal consistency of factors. Values of Cronbach's alpha of .80 or higher were considered to be good.

To construct a shorter version of the FIT-60, the item leading to the highest Cronbach's alpha if item deleted was removed, while ensuring the value stayed above .80, after which the Cronbach's alpha was recalculated. This process was repeated until 4 items per subscale were present in the questionnaire. When two or more items would lead to the same highest Cronbach's alpha if item deleted, the least unique item based on content was deleted. To compare the original and shortened FIT-60, a Pearson's correlation was performed between their total scores as well as their factor scores.

Pearson's correlations were calculated to assess the univariate associations between symptom severity, mental health and the PF factors of the shortened FIT-60 for participants with PPS. To examine whether the factors underlying PF moderated the association between symptom severity and mental health, a linear regression analysis with 5000 bootstrap samples was executed using the Process macro (version 3.5) of Hayes (2013). Predictor variables were centered. Gender, age and education level were added as covariates, together with symptom severity, the PF factors, mental health and the two-way interactions between symptom severity and the PF factors. To interpret the association between symptom severity and mental health in the presence of the moderators, graphs were plotted with different levels – low and high – of the PF factors (Aiken & West, 1991).

<div align="center">Results</div>

Factor structure and internal consistency of the FIT-60

In the initial EFA of the series, 10 factors with eigenvalues exceeding 1 were extracted, namely 17.89 (29.8%), 4.34 (7.2%), 2.06 (3.4%), 1.84 (3.1%), 1.66 (2.8%), 1.52 (2.5%), 1.44 (2.4%), 1.21 (2.0%), 1.12 (1.9%) and 1.10 (1.8%). The scree plot presented a break after two factors. This indication is supported by the small additional explained variance of factor 3 to 10. To explore the possibility of a three-factor solution, a subsequent EFA with a restriction of 3 factors was performed. This led to a third factor containing merely two items with significant factor loadings. Based on these statistical considerations, it was concluded that the third factor did not contribute sufficiently in addition to the first two factors. Therefore, the EFA was repeated with a restriction of 2 factors. This led to a first factor containing 24 items and a second factor containing 16 items with significant factor loadings without cross-loadings. The factor loadings of all items on both factors are shown in Table 2. The eigenvalues were 17.31 (28.8%) and 3.72 (6.2%) with a total explained variance of 35.0%. Item 3 showed a significant but negative loading on factor 1 and hence was removed from further analysis.

An additional EFA was conducted after removing the 20 items with unsignificant factor loadings. This led to significant factor loadings of all items on either the first or second factor except for item 25 and 44, which were removed from further analysis. The total explained variance was 42.6% with eigenvalues of 13.89 (34.7%) and 3.14 (7.8%). Subsequently, a final EFA was performed on the remaining 38 items, which led to significant factor loadings without cross-loading of all items

on either of the two factors. The resulting two-factor solution explained a total variance of 43.5% in scores with eigenvalues of 13.52 (35.6%) and 3.02 (8.0%). Factor 1 contained 25 negatively formulated items with significant factor loadings from the subscales acceptance, cognitive defusion, present-focused awareness and self-as-context. Factor 2 contained 14 positively formulated items with significant factor loadings from the subscales values and committed action. The first factor showed strong internal consistency, with a Cronbach's alpha coefficient of α = .95. The second factor's internal consistency was good (α = .89). The intercorrelation between the first and second factor was r = .57 (p < .001). In agreement with the seminal paper of Hayes et al. (2006), factor 1 and 2 will respectively be referred to as the mindfulness and acceptance processes factor and the commitment and behavior change processes factor throughout the rest of the result section.

Table 2

Results from a factor analysis of the Flexibility Index Test (FIT-60)

Items	Item formulation	Factor loading	
		Factor 1	Factor 2
Acceptance			
1. Zorgen staan mijn succes in de weg	Neg	**.51**	.24
10. Het is OK als ik me iets onaangenaams herinner	Pos	.30	.32
14. Ik ben bereid om mijn angst volledig toe te laten	Pos	.12	.24
22. Ik doe mijn best om geen negatieve dingen te hoeven ervaren	Neg	.35	-.10
26. Als ik pijnlijke gevoelens toelaat, dan ben ik bang dat ze niet meer verdwijnen	Neg	**.63**	.15
31. Mijn pijnlijke ervaringen en herinneringen maken het me moeilijk om een waardevol leven te leiden	Neg	**.50**	.32
35. Gedachten die bij me opkomen moet ik onder controle houden	Neg	**.56**	-.10
45. Emoties (zoals boosheid, verdriet) veroorzaken problemen in mijn leven	Neg	**.63**	.13
53. Ik ben bang voor mijn gevoelens	Neg	**.65**	.19
54. Mijn gedachten en gevoelens staan de manier waarop ik wil leven niet in de weg	Pos	.32	.32
Cognitive defusion			
9. Mijn gedachten bezorgen mij ongemak of emotionele pijn	Neg	**.67**	.15
28. Ik heb last van het gevoel dat ik door de bomen het bos niet meer zie	Neg	**.59**	.22
29. Ik heb de neiging mijn pijn erger te maken met mijn gedachten	Neg	**.58**	.07
30. Ik vind het makkelijk om mijn gedachten van een andere kant te bekijken	Pos	.27	.39
32. Als iemand een vervelende opmerking maakt, kan ik daar nog lang last van hebben	Neg	**.65**	.00
39. Sommige woorden kunnen mij heel hard raken	Neg	**.60**	-.09

Table 2 (continued)

Results from a factor analysis of the Flexibility Index Test (FIT-60)

Items	Item formulation	Factor loading	
		Factor 1	Factor 2
42. Ik heb de neiging erg sterk te reageren op mijn eigen negatieve gedachten	Neg	**.80**	-.01
52. Ik schrik soms van de gedachten die ik heb	Neg	**.70**	.05
57. Het is erg moeilijk om verontrustende gedachten los te laten, zelfs wanneer ik weet dat los laten mij zou helpen	Neg	**.75**	.06
58. Van sommige gedachten raak ik van streek	Neg	**.75**	.03
Present-focused awareness			
15. Ik vind het moeilijk om mijn aandacht te houden bij wat er in het hier en nu gebeurt	Neg	**.52**	.11
16. Ik ben snel afgeleid	Neg	.43	.06
18. Het is moeilijk voor me om de woorden te vinden die mijn gedachten beschrijven	Neg	.44	.26
20. Ik observeer mijn gevoelens zonder dat ik me erin verlies	Pos	.34	.36
36. Ik kan goed beschrijven wat ik voel	Pos	.16	.44
38. Ik geloof dat sommige van mijn gedachten abnormaal of slecht zijn en dat ik niet zo zou moeten denken	Neg	**.64**	.09
43. Ik keur mezelf af als ik rare gedachten heb	Neg	**.69**	-.04
44. Ik kan makkelijk mijn overtuigingen en meningen onder woorden brengen	Pos	.19	**.47**
49. Ik kan goed beschrijven wat ik ervaar met mijn zintuigen, zoals wat ik hoor, zie en ruik	Pos	.10	.43
60. Ik denk dat mijn emoties soms slecht of ongepast zijn en dat ik ze niet zou moeten voelen	Neg	**.65**	.08
Self-as-context			
2. Ik voel me vaak beperkt door alles wat ik van mezelf moet	Neg	**.58**	.15
3. Ik kan negatieve gedachten over mijzelf hebben en tegelijkertijd weten dat ik oké ben	Pos	**-.48**	.05
17. Ik vind van mezelf dat ik altijd aardig moet zijn	Neg	**.51**	-.13
19. Ik besef dat mijn zelfbeeld niet zoveel over mij als persoon zegt	Pos	-.25	.01
23. Ik heb last van een negatief zelfbeeld	Neg	**.63**	.17
24. Als ik iets niet goed doe, dan reken ik dat mezelf aan	Neg	**.53**	-.12
33. Ik hoef dingen niet altijd goed te doen van mezelf	Pos	.36	.07
46. Ik sta los van mijn omgeving	Neg	.19	.23
51. De gedachten die ik over mijzelf heb, bepalen niet wie ik ben	Pos	-.11	.16
56. Wanneer ik mezelf vergelijk met andere mensen, lijkt het dat de meesten onder hen hun leven beter in de hand hebben dan ik	Neg	**.58**	.26
Values			
6. Mijn leven is goed in balans	Pos	.31	**.52**
8. Ik heb voldoende vrienden	Pos	.09	**.47**
21. Als ik thuis ben voel ik me op mijn gemak	Pos	.19	.37

Table 2 (continued)

Results from a factor analysis of the Flexibility Index Test (FIT-60)

Items	Item formulation	Factor loading	
		Factor 1	Factor 2
25. Ik besef dat ik de dingen die ik doe, zelf heb gekozen	Pos	.04	**.45**
27. Er zijn een aantal dingen die ik doe, die ik belangrijk vind	Pos	.05	**.50**
34. Mijn werk en/of studie speelt een belangrijke rol in mijn leven	Pos	-.13	**.45**
37. Ik vind mijn leven waardevol	Pos	.21	**.62**
41. Ik besteed regelmatig tijd aan mijn hobby's	Pos	.15	.38
50. Ik vind steun bij de mensen in mijn omgeving	Pos	.09	**.51**
55. Ik vind familie en/of vrienden belangrijk	Pos	-.09	.41
Committed action			
4. Als ik iets wil doen, dan ga ik er voor	Pos	-.01	**.59**
5. Ik ben goed in staat om lange termijn doelen op te delen in korte termijn mogelijkheden	Pos	.15	**.52**
7. Ik vind het moeilijk om doelgericht bezig te blijven	Neg	.29	.27
11. Ik maak regelmatig concrete plannen voor de toekomst	Pos	.00	**.59**
12. Als iets me niet lukt dan zet ik door, en probeer ik het op een andere manier aan te pakken	Pos	.03	**.65**
13. Ik ga graag naar mijn werk	Pos	.01	**.50**
40. Ik ben onderweg om mijn doelen en dromen te bereiken	Pos	-.02	**.68**
47. Ik doe meerdere dingen die ik belangrijk vind	Pos	.06	**.71**
48. Ik vind het leuk om nieuwe uitdagingen aan te gaan	Pos	.02	**.69**
59. Ik ben erop uit om nieuwe dingen te doen	Pos	-.05	**.65**

Note. N = 1529. The extraction method was Principal Axis Factoring (PAF) with direct oblimin rotation. Factor loadings above .45 are in bold. Negative formulated items were reversed for EFA. Items with bold factor loadings were included in the subsequent EFA. The questionnaire instructions were: Indicate for the following statements to what extent they are applicable to you: 'Totally disagree', 'Mostly disagree', 'Somewhat disagree', 'Neutral', 'Somewhat agree'. 'Mostly agree', 'Totally agree'').

Shortened version of the FIT-60

After removing items leading to the highest alpha if item deleted while retaining 4 items per subscale, the mindfulness and acceptance processes factor consisted of 16 items (2, 9, 15, 17, 23, 26, 31, 38, 42, 43, 45, 53, 56, 57, 58, 60) with a strong internal consistency of α = .94. The commitment and behavior change processes factor consisted of 8 items (6, 8, 37, 40, 47, 48, 50, 59) and had a good internal consistency of α = .86. The total score of the original and shortened FIT-60 were found to be strongly correlated (r = .97, p < .001), as were their respective scores on the mindfulness and acceptance processes factor (r = .99, p < .001) and the commitment and behavior change processes factor (r = .96, p < .001).

Correlations between symptom severity, mental health and the factor-analytically derived components of PF

Means, *SD* and correlations between symptom severity, mental health, the mindfulness and acceptance processes factor and the commitment and behavior change processes factor are reported in Table 3. The table shows significant correlations between symptom severity and lower mental health (r = -.52, p <.001), lower levels of the mindfulness and acceptance processes factor (r = -.37, p < .001) and lower levels of the commitment and behavior change processes factor (r = -.55, p <.001). The mindfulness and acceptance processes factor was significantly positively associated with mental health (r = .72, p < .001), as was the commitment and behavior change processes factor (r = .62, p < .001).

Table 3

Descriptive statistics and correlations for mental health, symptom severity and the factor-analytically derived components of psychological flexibility

Variable	*M*	*SD*	1	2	3	4
1. Mental health	60.64	19.63	—			
2. Symptom severity	1.27	0.79	-.52***	—		
3. Mindfulness and acceptance processes factor	3.28	1.36	.72***	-.37***	—	
4. Commitment and behavior change processes factor	3.79	1.16	.62***	-.55***	.55***	—

Note. N = 429.

***p < .001.

The moderator effect of the factor-analytically derived components of PF in the association between symptom severity and mental health

The results from the regression analysis are shown in Table 4. In the regression model, female gender (p = .002), a higher level of symptom severity (p < .001), a lower level on the mindfulness and acceptance processes factor (p < .001) and a lower level on the commitment and behavior change processes factor (p < .001) were associated with lower mental health (F = 92.72, p < .001, R^2 = .64). This illustrates that for any level of symptom severity, those who presented higher levels of the mindfulness and acceptance processes factor of PF revealed a higher level of mental health compared to those who presented lower levels of this factor. Similarly, those who presented higher levels of the commitment and behavior change processes factor of PF revealed a higher level of mental health compared to those who presented lower levels. The two-way interaction between symptom severity and the mindfulness and acceptance processes factor was significant (p = .002) and is shown in Figure 2. The figure shows that the mindfulness and acceptance processes factor functioned as a buffer in the association between symptom severity and mental health. The two-way interaction between symptom severity and the commitment and behavior change processes factor was not significant (p = .414) and is also depicted in Figure 2. The figure shows the absence of a buffering role for the commitment and behavior change processes factor in the association between symptom severity and mental health.
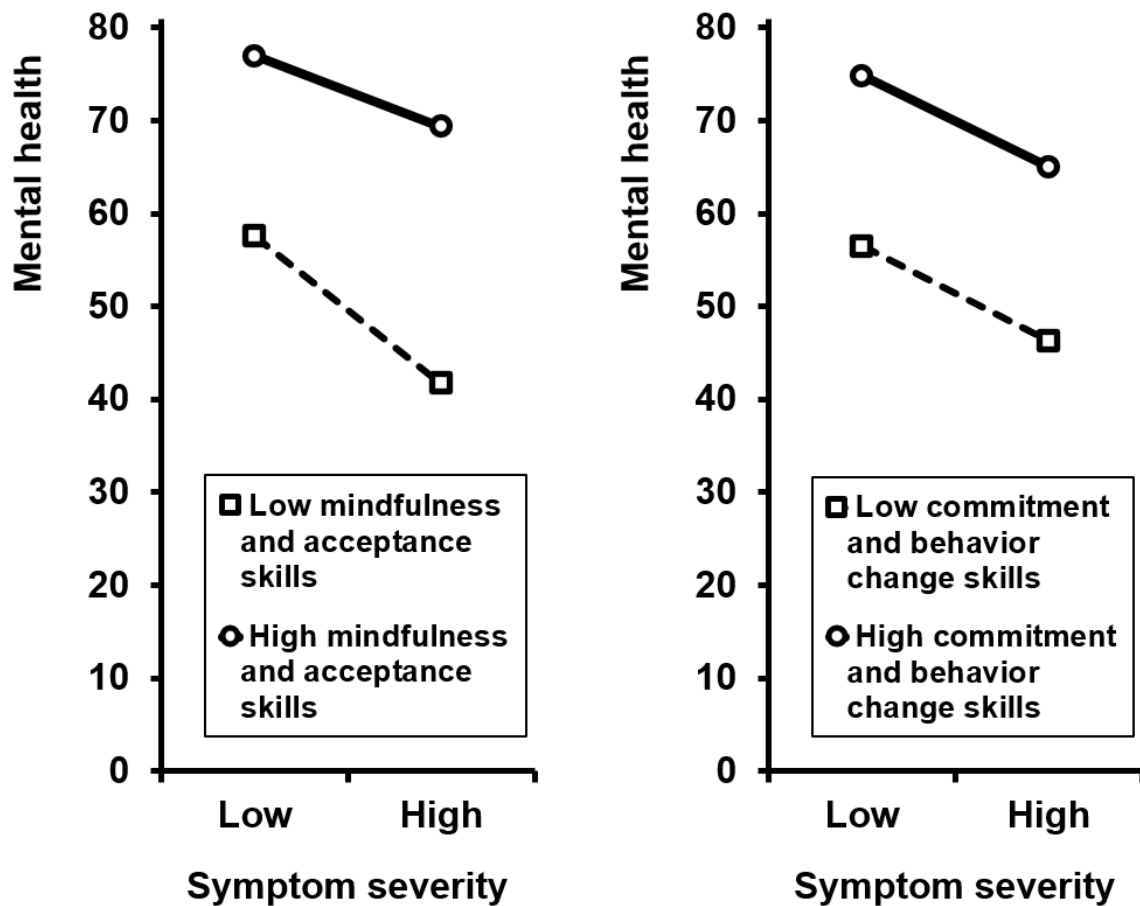
Table 4

Summary of regression analysis for variables predicting mental health

Effect	B	SE B	95% CI		p
			LL	UL	
Constant	66.056	3.811	58.565	73.548	<.001
Demographics					
Gender	-8.089	2.642	-13.282	-2.896	.002
Age	0.036	0.048	-0.058	0.130	.449
Education	1.266	1.396	-1.478	4.011	.365
Symptom severity	-5.148	0.895	-6.906	-3.389	<.001
Mindfulness and acceptance processes factor	7.057	0.534	6.006	8.107	<.001
Commitment and behavior change processes factor	4.034	0.697	2.663	5.405	<.001
Symptom severity x Mindfulness and acceptance processes factor	2.107	0.620	0.766	3.448	.002
Symptom severity x Commitment and behavior change processes factor	-.622	0.761	-2.117	0.873	.414

Note. N = 429. CI = confidence interval; *LL* = lower limit; *UL* = upper limit.

Figure 2

Mental health in relation to symptom severity and the factor-analytically derived components of

psychological flexibility

Note. This figure shows mental health for participants with low (-1 *SD*) and high (+1 *SD*) symptom severity and low (-1 *SD*) and high (+1 *SD*) scores on the mindfulness and acceptance processes factor (left) or the commitment and behavior change processes factor (right). The interaction effect between symptom severity and the commitment and behavior change processes factor was not significant (*p* = .414).

Discussion

The purpose of this study was three-fold: (1) examining the underlying factor structure (and psychometric properties) of the FIT-60, (2) creating a shortened version of the FIT-60 with sufficient internal consistency and interpretable and distinguishable factors and (3) identifying which factor-analytically derived components of PF form a buffer against the association between symptom severity and mental health in individuals with PPS. Results did not confirm the six-factor structure of PF as proposed by Hayes (2006). Instead, two factors were found: (1) a mindfulness and acceptance processes factor and (2) a commitment and behavior change processes factor. The internal consistency of these factors was strong and good respectively. A shorter version of the FIT-60 was constructed while retaining good internal consistency on both factors and a strong correlation between the total scores of the original and shortened version. As expected, symptom severity was negatively associated with mental health. Both factor analytically-derived components of PF were significant predictors of mental health, such that higher levels of the factors were associated with higher mental health levels. Consistent with expectation, the factor formed by the mindfulness and acceptance processes was found to be a moderator of the association between symptom severity and mental health, in such a way that higher levels of the factor buffered the association. Unexpectedly, the same association was not moderated by the factor formed by the commitment and behavior change processes.

The proposed six-factor structure for PF could not be confirmed, which is in line with previous research (Batink, 2017). The results indicate the existence of two factors underlying the FIT-60 items: one factor consisting of items of the subscales measuring mindfulness and acceptance processes (acceptance, cognitive defusion, present-focused awareness and self-as-context) and the other factor consisting of items of the subscales measuring commitment and behavior change processes (values and committed action). Furthermore, what stands out is that the first factor only includes negatively worded items (that hence were reversed for factor-analysis), while the other factor consists solely of positively worded items. The wording may have played a role in the result of the factor analysis. For instance, the first (emotion) factor may reflect the skill to deal with negativity, while the second (motivation) factor reflects a striving for positivity. However, an interpretation in terms of psychological (in)flexibility is possible as well. Next to the Hexaflex model proposing six sub-processes of psychological flexibility (acceptance, cognitive defusion, present moment awareness, self-as-context, values and committed action), Hayes (2006) has also proposed a Hexaflex model of psychological *in*flexibility, consisting of the six opposite sub-processes (experiential avoidance, cognitive fusion, lack of contact with the present moment, self-as-content, lack of contact with values and inaction). These opposite sub-processes are usually viewed as the other extremes of the same dimensions of their counterparts, but previous research suggests that these sub-processes are able to vary independently and could actually be distinct processes (Rogge et al., 2019; Rolffs et al., 2018). Exploratory factor analysis on the Multidimensional Psychological Flexibility Inventory (MPFI), which measures both the six components that make up psychological flexibility and psychological *in*flexibility, found two discrete factors formed by the six sub-processes of psychological flexibility on the one hand and the six sub-processes of inflexibility on the other (Rolffs et al., 2018). Thus, due to

the differences in item wording (i.e. negative and positive) between the factors of the FIT-60, it could be that one factor taps into the process of psychological flexibility, while the other factor taps into psychological inflexibility.

It is worth noting that such a two-factor model contrasting psychological inflexibility processes (experiential avoidance, cognitive fusion, lack of contact with the present moment and self-as-content) and psychological flexibility processes (values and committed action) bears resemblance to the ACT-matrix of Polk & Schoendorff (2014). The ACT-matrix makes a division between psychological inflexibility (constructed by the left side sub-processes of the Hexaflex model) and psychological flexibility (constructed by the right side sub-processes of the Hexaflex model), contrasting "moving away from" what someone is struggling with and "moving toward" what someone values in life. Alternatively, the possibility exist that the found factors are based on the item wording itself (i.e., positive or negative). It could be that the extracted factors are caused by method effects, meaning that items in a questionnaire tend to be answered based on other criteria than the item content. This results in systematic variance that is irrelevant to the concept that is attempted to be measured, which can be the case when two factors are composed exclusively of positive and negative item wordings (Lindwall et al., 2012; Podsakoff et al., 2003). This would mean that the FIT-60 is in fact a unidimensional measure, despite the extraction of the two factors. There is some support for this conclusion because the intercorrelation between the two factors is $r = .57$, which suggests that the two factors represent the same construct (Clark & Watson, 1995). Furthermore, the ratio of the first to the second eigenvalue (i.e., 4.48) may also suggest that the FIT-60 might be interpreted as a unidimensional measure (Slocum-Gori & Zumbo, 2011).

A shorter version of the FIT-60 of 24 items (4 items per subscale) could be constructed while retaining a similar internal consistency on both factors and a strong correlation between the total scores of the original and shortened version. This indicates that despite it being substantially shorter, the short version provides comparable internal reliability and shows excellent congruency with the original FIT-60. Thus, the shortened FIT-60 offers researchers and clinicians a shorter questionnaire that would be more manageable to use in regular assessments in clinical settings or large-scale surveys.

The findings regarding the relationship between symptom severity and mental health are consistent with previous research (Kroenke, 2003). Furthermore, the results regarding the association between mindfulness and acceptance processes and mental health agree with previous findings (Van Damme et al., 2006; Viane et al., 2003; McCracken, 1998; Vowles et al., 2011), as did those about the association between commitment and behavior change processes and mental health (Galán et al., 2019; Vowles et al., 2011). Individuals with PPS with higher skill levels of mindfulness and acceptance processes revealed a higher level of mental health than those with lower skill levels, as did individuals with a higher skill level in commitment and behavior change processes.

In alignment with a previous finding (Pleman et al., 2019), higher skill levels of mindfulness and acceptance processes were found to moderate the association between symptom severity and mental health in individuals with PPS. This may indicate that having a higher level of acceptance and mindfulness skills may serve to weaken the impact of severe symptoms on mental health problems,

particularly in individuals with higher levels of symptom severity. This cross-sectional study does not rule out that a third variable, such as neuroticism, is the primary cause of these findings or that a third variable such as catastrophizing is particularly important here. Most likely, there are mutual relationships such as in a network model. Overall, the finding is consistent with the suggestion that individuals with higher skill levels of mindfulness and acceptance processes may better cope with high levels of symptom severity, buffering its impact on mental health.

Commitment and behavior change skills, however, did not significantly moderate the relationship between symptom severity and mental health, disconfirming the hypothesis. Having a higher level of commitment does not seem to weaken the relationship between symptom severity and the development of mental health problems. This suggests that higher levels of commitment do not help in coping with higher levels of symptom severity. An explanation could be that acceptance and mindfulness processes are more suitable for handling negative (internal and external) experiences, while commitment and behavior processes enable individuals to pursuit positive experiences. Some of these positive experiences may even be non-beneficial regarding physical symptoms by stimulating the persistence of behavior that reduces quality of sleep or increases pain or fatigue. Since pain and fatigue can be seen as a negative internal experience, that would indicate that greater engagement in valued activities would not be beneficial in coping with the burden of the symptoms itself.

Identifying processes that may buffer the impact of the severity of PPS on mental health has the potential to inform treatment. The present study suggests that a higher level of acceptance and mindfulness skills may help individuals cope with the burden of PPS on their mental health, whereas a higher level of commitment and behavior change skills may not. This indicates that therapies cultivating these acceptance and mindfulness skills, such as mindfulness-based therapeutic approaches, might be more beneficial for supporting individuals in coping with their symptoms than approaches that are behavioral or value-oriented.

Strengths of this study include the large sample sizes including a broad group of diseases and disorders that fall under the umbrella term of PPS. Furthermore, where other studies often have a measurement of PF that is limited to one or a few processes underlying PF, this study used a broad measurement encompassing all six sub-processes. This allows for examination of the various facets of PF. Additionally, the examination of the factor structure of the FIT-60 and its internal consistency ensured the construct validity of underlying factors, before using them as a measurement in the study. These results should nonetheless be interpreted with consideration of some methodological limitations. The first limitation is the cross-sectional design of the study, which does not allow inferences about causality on the associations between symptom severity, mental health and PF in individuals with PPS. While significant associations were found, it remains unknown whether higher skill levels of PF impact mental health, or the reverse, or both. Moreover, third variables might explain the observations, for instance neuroticism or catastrophizing. To confirm the results, prospective studies such as clinical experimental studies should be designed to evaluate the associations and moderation found in current study as well as the possible mediating role of PF. The

second limitation is that the sample was a convenience sample, instead of a fully representative sample. Furthermore, the diseases were self-reported.

In conclusion, the present study found two factor-analytically derived components of PF, consisting of mindfulness and acceptance processes and commitment and behavior change processes. The study provides insight into the role these processes play in the mental health of individuals with PPS. Specifically, the findings indicate that a higher skill level of mindfulness and acceptance processes may help buffer the mental burden of the severity of experienced symptoms. Therapies cultivating these skills may be able to support this coping process with the aim of increasing mental health. Further studies are needed to assess whether cultivation of mindfulness and acceptance skills indeed leads to improved coping with the mental burden of PPS. However, current study provides insight into the therapeutic approaches that might be most suitable for individuals suffering from PPS.

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