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**Tracking Psychological Flexibility in College Students with the Psy-flex and Choice Point:
Reliability and Validity**

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Abstract

Introduction. Research indicates that psychological flexibility is an important component of mental health. However, used measures for psychological flexibility suffer from several limitations. Considering these shortcomings, a new measure for psychological flexibility is developed, the Psy-flex. The aim of this study was to investigate the Psy-flex as an adequate assessment tool to measure psychological flexibility and change after an intervention, the Choice Point, in the population of college students.

Method. A mixed-method design was used, consisting of a questionnaire study for the first part and an intervention for the second part. The target sample for the questionnaire study consisted of 128 college students, whereas two participants completed the intervention. A quantitative data-analysis was conducted to assess the reliability and the validity of the Psy-flex and a qualitative text-analysis was used to analyze the answers to evaluation questions regarding the intervention.

Results. The results of the quantitative data-analysis indicated that the Psy-flex was a reliable and valid measure for psychological flexibility. The qualitative data indicated that all core processes were used during the intervention. For participant 2 progress in the processes values and committed action were made after the Choice Point intervention and perceived academic procrastination was reduced.

Discussion. The present study indicated that the Psy-flex is an adequate tool for measuring psychological flexibility in the population of college students. Given its association with psychopathological problems and well-being, the Psy-flex can be used as a screening tool for ACT in the clinical setting. Future research should explore the underlying mechanisms of psychological flexibility to get a better understanding of the core processes and targets for treatment.

Keywords: Psychological flexibility | Psy-flex | Choice Point intervention | questionnaire study | academic procrastination | college students

Introduction

Over the past two decades, there has been an increased interest in third-wave psychotherapies within the field of clinical psychology (Dimidjian et al., 2016; Öst, 2014). Contrary to the specific focus to eradicate pathological symptoms, third-wave therapies have a holistic focus on personal functioning with the inclusion of general well-being (e.g. Kashdan et al., 2020; Hofmann & Hayes, 2019). According to recent findings, Acceptance and Commitment Therapy (ACT; Hayes et al., 1999) has received the most attention and has the greatest level of scientific evidence among third-wave therapies thus far (Dimidjian et al., 2016; Cherry et al., 2021). ACT has proven to be an effective treatment for a wide scope of constructs ranging from psychopathological variables, like depression and anxiety disorders, to variables related to well-being across both clinical and non-clinical populations (e.g. Twohig & Levin, 2017; A-Tjak et al., 2015; Bai et al., 2020; Howell & Passmore, 2019; van Agteren et al., 2021; Gloster et al., 2020).

Particular focus of existent research on ACT has been on the population of college students (e.g. Grégoire et al., 2018; Wang et al., 2017; Ma et al., 2021). A phenomenon that frequently arises in the population of college students is academic procrastination (van Eerde & Klingsjeck, 2018; Kim & Seo, 2015). Academic procrastination is defined as the deliberate delay in completing academic-related tasks without rational reasons or important external causes despite awareness of the negative consequences (Steel, 2007). According to research, 80-95% of the college students engage in academic procrastination (Kim & Seo, 2015), academic procrastination occurs from 30-60% of the time (Glick & Orsillo, 2015) and leads to negative outcomes such as psychological problems like anxiety and depression (van Eerde, 2003; Kim & Seo, 2015). Given the high prevalence and negative consequences in the population of college students, academic procrastination is therefore a relevant topic of interest for research purposes and a suitable intervention is essential to reduce academic procrastination among college students. Although the effectiveness of ACT on academic procrastination in college students has been examined in some studies (e.g. Wang et al., 2017), there is controversy about the underlying mechanisms of ACT (Cherry et al., 2021; Hofmann & Asmundson, 2008).

The central focus of debate about the underlying mechanisms of ACT has been on the construct psychological flexibility (Cherry et al., 2021). Psychological flexibility is known to be the central construct in ACT and is defined as “the ability to be aware of and open to internal and external stimuli as they occur while choosing to act in ways that are consistent with what a person deeply cares about” (Hayes et al., 2011). Psychological flexibility consists of six interrelated processes: acceptance, defusion, present moment awareness, stable self-awareness, values, and committed action (Gloster et al., 2021). An ACT intervention that targets all the core skills of psychological flexibility is the Choice Point model (Harris, 2017). The primary aim of the Choice Point is to diminish psychological inflexible behavior by increasing values-consistent choices

(Harris, 2017). Consistent with ACT, research indicates that psychological flexibility is an important determinant of mental well-being with psychological inflexibility as its counter component. It is associated with various pathological problems, such as depression and anxiety (Gloster et al., 2017; Kashdan et al., 2020). Thus far, psychological flexibility has been prone to inadequate and inconsistent definitions and measurements in research (Cherry et al., 2021; Vaughan-Johnston et al., 2017). In particular, there has been quite some criticism on the Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011), which has been used to measure psychological inflexibility (Cherry et al., 2021). Research indicates that the AAQ-II has limitations in terms of validity and reliability (Gámez et al., 2011; Kashdan et al., 2020; Tyndall et al., 2019; Wolgast, 2014) and some researchers have stated that the AAQ-II assesses global emotional disturbance and negative emotionality rather than psychological inflexibility (Landi et al., 2021; Tyndall et al., 2019; Ong et al., 2019). Moreover, the AAQ-II lacks contextual sensitivity (Ong et al., 2019; Gloster et al., 2021). Since third wave therapies, such as ACT, are bound to increase context-sensitive behavior adaptively, a contextual measure of psychological flexibility is important (Ong et al., 2019; Gloster et al., 2021). Therefore, a valid measure for psychological flexibility which is contextually sensitive and includes all the six core processes is required.

Considering the shortcomings of current measures for psychological flexibility, a new measure was developed recently, the Psy-Flex (Gloster et al., 2021). The Psy-Flex is a short questionnaire that assesses all six core processes of psychological flexibility. Each item corresponds to a particular core process and is measured in a time- and context-sensitive way (Gloster et al., 2021). In the study by Gloster & colleagues (2021) the Psy-Flex is conducted across four samples, with the inclusion of both clinical and non-clinical populations. The findings from this study are promising. Results indicate that the Psy-flex has good psychometric properties and is a valid and reliable measure to assess psychological flexibility (Gloster et al., 2021). Moreover, results indicate that the Psy-flex is correlated to both pathological problems, like depression and anxiety, and mental well-being which is consistent with research on ACT (Gloster et al., 2021). Given the promising results, it is of great interest for the knowledge about psychological flexibility to utilize the Psy-Flex in further research as well. Since the prevalence of academic procrastination in college students is high, the Psy-flex is examined in the population of college students in the current paper.

The purpose of the present study is to test whether the Psy-Flex is an adequate measure to assess psychological flexibility in the population of college students. The following research question is central: "Is the Psy-flex a reliable and valid instrument to measure change in the population of college students regarding academic procrastination?". From this research question three hypotheses are formulated. The first hypothesis is: "The Psy-flex is a reliable measure for psychological flexibility". This will be assessed by the internal consistency. The second hypothesis is: "The Psy-flex is a valid measure for psychological flexibility". This will be assessed with the

internal and external construct validity. Finally, the third hypothesis is: “The Psy-flex can measure change in the population of college students regarding academic procrastination by using the Choice Point as an ACT-intervention.” However, due to the high drop-out rate in the Choice Point intervention the sample size was too small to test this hypothesis quantitatively. Alternatively, a qualitative text analysis of the evaluation questions for the intervention was conducted. Since the decision to use an alternative analysis was made after collecting the data, no alternative third hypothesis is formulated and the qualitative analysis is regarded as an exploratory analysis.

Method

Design

This study was based on both a quantitative- and qualitative design and was part of a research project with fellow students. First, a questionnaire study was administered to the participants to examine psychological flexibility and related constructs. Only the questionnaires that met the purpose of this study were used for the data-analysis. For the second part of the study, an intervention was provided to test whether the participants improved their psychological flexibility and reduced their academic procrastination.

Ethical approval for the study was obtained by the Ethical Review Board of the Faculty of Social and Behavioural Sciences of Utrecht University on 28 December 2021 (FETC, 21-2344).

Participants

Participants were recruited from SONA-systems and various social media platforms (Facebook groups, WhatsApp groups, Instagram, LinkedIn and Reddit). Participation in the study was voluntary and out of 376 participants, 374 filled out an informed consent before their involvement. Only participants who filled out all the questionnaires and were selected for the data-analysis. The target population (34.0% of all participants) consisted of 128 participants and were students ranging in age from 18 to 45 ($M = 23.8$, $SD = 5.1$). From this sample 28 participants were male (21.9%), 99 participants were female (77.3%) and 1 participant abstained from answering the sex assigned at birth (0.8%). From the target population, 23 participants applied for the intervention. Only 4 participants completed the first part of the intervention (dropout rate 82.6%) and 2 participants completed the second part of the intervention (dropout rate 91.3%).

Measures

Demographic information. An eight-item demographic measure asking about age, nationality, gender, sex, gender status, student status, diagnosis status and diagnosis was administered.

Psy-flex. Psychological flexibility was assessed with the Psy-flex (Gloster et al., 2021). The Psy-flex is a self-report measure that consists of 6 items. All items used a 5-point Likert-type scale ranging from 1 (*Very seldom*) to 5 (*Very often*). An example of an item is “I determine what's important for me and decide what I want to use my energy for”. Items are focused on psychological flexibility and each item reflects one core process of psychological flexibility. The total score is calculated by adding up the scores on the single items, resulting in total scores ranging from 6 to 30 (Gloster et al., 2021). Higher scores on the Psy-flex indicate higher psychological flexibility. The internal consistency in the current sample was adequate ($\alpha = .83$; $\omega = .84$).

Multifaceted Measure of Academic Procrastination – Behavioral Procrastination Scale (MMAP-BPS). Academic procrastination was measured with the MMAP-BPS (Haghbin, 2015). The MMAP-BPS is a self-report measure and consists of 10 items. All items used a 6-point scale ranging from 1 (*Never*) to 6 (*Always*). An example of an item is “I don't intend or plan to work on academic tasks, and I do other fun things instead”. The items focused on the degree of academic procrastination of the current quartile. The total score is calculated by adding up the scores on the single items, in which the total scores range from 10 to 60 (Haghbin, 2015). Higher scores on the MMAP-BPS indicate a higher degree of academic procrastination. The internal consistency of the MMAP-BPS in the current study was excellent ($\alpha = .92$; $\omega = .92$).

Patient Health Questionnaire-9. Depressive symptoms were assessed with the PHQ-9 (Kroenke et al., 2001). The PHQ-9 is a self-report screening instrument that consists of 9 items. For the items a 4-point scale was used ranging from 0 (*Not at all*) to 3 (*Nearly every day*). An example of an item is “Little interest or pleasure in doing things”. The total score is calculated by the sum score of all the items, resulting in total scores ranging from 0 to 27 (Kroenke et al., 2001). Higher scores on the PHQ-9 indicate more severe depressive symptoms. The internal consistency in the current sample was excellent ($\alpha = .90$; $\omega = .90$).

Short form of the Spielberger State-Trait Anxiety Inventory. State anxiety was measured with the state anxiety subscale of the STAI-5 (Zsido et al., 2020). The STAI-5 is a self-report measure and the subscale consists of 5 items. All items used a 4-point scale ranging from 1 (*Not at all*) to 4 (*Very much so*). The total score is calculated by the sum score of all items, resulting in total scores ranging from 5 to 20. Higher scores on the subscale indicate more state-anxiety. The internal consistency in the current sample was adequate ($\alpha = .84$; $\omega = .84$).

Mental Health Continuum Short Form. Mental well-being was assessed with the

subscale psychological well-being on the MHC-SF (Lamers et al., 2011). The MHC-SF is a self-report instrument and the subscale consists of 6 items. All items are measured on a 6-points scale ranging from 0 (*Never*) to 5 (*Every day*). The total score is calculated with the sum score of all items, resulting in total scores ranging from 0 to 30. Higher scores on the subscale indicate a better state of psychological well-being. The internal consistency in the current sample was adequate ($\alpha = .86$; $\omega = .86$).

Acceptance and Action Questionnaire-II. Experiential avoidance was measured with the AAQ-II (Bond et al., 2011). The AAQ-II is a self-report instrument that consists of 7 items. All items are measured on a 7-point Likert-type scale ranging from 1 (*Never true*) to 7 (*Always true*). The total score is calculated with the sum score of all items, resulting in total scores ranging from 7 to 49 (Bond et al., 2011). Higher scores on the AAQ-II indicate a higher extent of experiential avoidance. The internal consistency in the current sample was excellent ($\alpha = .94$; $\omega = .94$).

Procedure

The first part of the study consisted of an online survey on Qualtrics. After opening the link to the survey, informed consent was presented to the participants. When consent to participate in the study was given, the following questionnaires were administered: a demographic questionnaire, the GMSR, the MMAP-BPS, AVQ, Psy-flex, PHQ-9, STAIS-5, PCL-5, MHC-SF, AAQ-II. This part of the study took about 15 to 30 minutes and participants got rewarded 0.5 PPU. At the end of the survey participants could fill out their email addresses, when there was interest in participating in the second part of the study, an intervention for academic procrastination.

The intervention consisted of two steps. First, the participants were asked to monitor their academic behavior for one week and then five evaluation questions were sent to them by email (see Appendix A). When participants indicated the will to change their academic behavior, materials for the Choice Point were provided (Harris, 2017). During this second part of the intervention, the participants were asked to fill out the Choice Point for two challenging situations regarding academic procrastination and keep track of their academic behavior for another week.

After this intervention, evaluation questions for this part were provided by email (Appendix A) and an online survey on Qualtrics was shared with the participants. After opening the link an informed consent was presented to the participants. When consent was given the following questionnaires were administered: a demographic questionnaire, the MMAP-BPS, AVQ, Psy-flex, STAIS-5, and AAQ-II. This survey took about 5 to 10 minutes. When the survey of the second measurement was completed, participants got an additional reward of 1 PPU.

Data-analysis

After data collection was completed, the data file was exported to IBM SPSS Statistics 28 for the data preprocessing phase. This step involved selecting the cases for the target population, labeling all variables with an informative label (e.g. "MMAP_BPS1") and calculating the sum scores of the variables. Some variables were recoded when necessary and specified with an R after the label (e.g. Psy1_R) and the sum scores of the measures were calculated.

Subsequently, data were exported to JAMOVI and the data-analysis was conducted. For the data-analysis the psychometrics protocol for scale validation was used (Dima, 2018). First, the data was screened on outliers. This step entailed making frequency distributions in histograms and analyzing descriptive statistics of all relevant measures (M, SD, min., max.). The measures that were not normally distributed were noted and were assessed for assumption checks for the conducted analyses.

Then, a Confirmatory Factor Analysis (CFA) was conducted to test the internal construct validity of the Psy-flex for hypothesis 2. For the threshold of the adequacy of the factor loadings on the Psy-flex guidelines from Stevens (2002) were used (see Appendix B). Acceptable model of fit was assessed with the root means square error of approximation (RMSEA), standardized root-mean square residual (SRMR) and comparative fit index-Tucker Lewis index (CFI-TLI). The guidelines for these fit indices by Hu & Bentler (1999) were used for the assessment (see Appendix C). The improvement in the model of fit was assessed by the Chi-Square test difference for model comparison.

The third step was to conduct a reliability analysis to assess the internal consistency for hypothesis 1. The internal consistency was calculated for all questionnaires that were part of the analyses. The internal consistency was assessed by Cronbach's Alpha (α) and McDonald's Omega (ω). This is in accordance with the study from Peters (2014) which indicate that the McDonald's Omega is an essential instrument to solve potential limitations of Cronbach's Alpha. Besides this, inter-item correlations were assessed; correlations between .30 and .95 were adequate. The lower limit of all the item-total correlations was .20. All items with higher correlations were used for the reliability analysis. The internal consistency coefficients are assessed according to prescribed guidelines (see Appendix B).

Finally, correlation analyses were conducted to test the external construct validity for hypothesis 2. First, the assumption of normality was assessed to test the criteria of Pearson correlation analysis (see Appendix B). Then, the convergent validity was measured by calculating the correlations between the Psy-flex and the MMAP-BPS, PHQ-9, STAIS-5 and MHC-SF. Besides this, the discriminant validity was assessed by calculating the correlation between the Psy-flex and the AAQ-II. The correlation coefficients were assessed according to the prescribed guidelines (see Appendix B).

For hypothesis 3 a qualitative text-analysis was conducted due to the small sample size of

the second measurement. An exploratory data analysis was conducted to examine the answers to the evaluation questions of the intervention (see Appendix A). The common themes from participants are reported in the results section (Levy & Henry, 2003).

Results

Descriptive statistics

The descriptive statistics were conducted for the measures Psy-flex, MMAP-BPS, PHQ-9, STAI-S-5, MHC-SF and AAQ-II. See Table 1 for an overview of the mean scores, standard deviations and minimum- and maximum scores of the sample.

Table 1

Descriptive Statistics of the Included Measures in the Analyses

	<i>N</i>	Minimum	Maximum	<i>M</i>	<i>SD</i>
Psy-flex	128	6	30	20.7	4.35
MMAP-BPS	128	10	60	30.3	9.66
PHQ-9	128	0	26	8.55	6.43
STAI-S-5	128	5	18	8.02	3.12
MHC-SF	128	2	30	17.9	6.50
AAQ-II	128	7	49	24.1	10.7

Note. *N* = number of participants, *M* = mean score, *SD* = standard deviation.

Confirmatory Factor Analysis

All factor loadings met the criteria of the guidelines (>0.40) and can be found in Table 2.

Table 2*Factor Loadings per Item on the Psy-flex*

Psy-flex Item	Factor loading
PSY 4	.86
PSY 5	.67
PSY 3	.64
PSY 1	.64
PSY 2	.63
PSY 6	.46

Note. $N = 128$

The one-factor model did not fit the data well after conducting the CFA (SRMR = 0.071; RMSEA = 0.19; CFI = 0.85; TLI = 0.76). Post-hoc model analysis suggested correlated residuals between Items 5 and 6 (Modification Index 27.5). The model of fit with correlated residuals significantly improved ($\Delta\chi^2(1) = 25.5, p < .001$), resulting in an acceptable model of fit for the fit index CFI compared to the former model (SRMR = 0.053; RMSEA = 0.13; CFI = 0.94; TLI = 0.89). Post-hoc model analysis on this model of fit suggested correlated residuals between Items 1 and 4 (Modification index 8.5). The model of fit with correlated residuals significantly improved ($\Delta\chi^2(1) = 11.1, p < .001$), resulting in an acceptable model of fit for all fit indices except from the RMSEA compared to the former model (SRMR = 0.041; RMSEA = 0.087; CFI = 0.98; TLI = 0.95). For an overview of the model of fit indices, see Table 3.

Table 3*Model of Fit Indices of the Psy-flex Before and After the Assumption of Correlated Residuals Using a Confirmatory Factor Analysis*

N	$\chi^2(df)$	CFI	TLI	RMSEA	SRMR
128	50.3(9)*	.85	.76	.19	.071
128	24.8(8)*	.94	.89	.13	.053
128	13.7(7)*	.98	.95	.087	.041

Note. * $p < .01$

Reliability analysis

The results from the reliability analysis indicated that the Psy-flex has an adequate internal consistency ($\alpha = .83, \omega = .84$). The Psy-flex had a weak inter-item correlation ($r < .30$) for items 3 and 6 and items 2 and 6. These items were not excluded as the item-rest correlations were

sufficient ($r > .20$) and the internal consistency did not increase after excluding any item on the Psy-flex.

Correlation analysis

To assess the external construct validity, a correlation analysis was conducted. The assumption of normality was not met, therefore the *Spearman* correlation analysis ($\alpha = .05$) was conducted. The correlations between the Psy-flex and the constructs were all significant and met the criteria of the guidelines (see Appendix B). For an overview of the correlations between all the constructs, see Table 4.

Table 4

Spearman Correlations Between the Study Variables for External Construct Validity

Variable	1	2	3	4	5	6
1. Psy-flex	-					
2. MMAP-BPS	-.30**	-				
3. STAI-S-5	-.40**	.25**	-			
4. PHQ-9	-.55**	.45**	.66**	-		
5. MHC-SF	.55**	-.28**	-.44**	-.64**	-	
6. AAQ-II	-.58**	.23*	.53**	.70**	-.65**	-

Note. $N = 128$

* $p < .05$. ** $p < .01$.

Qualitative text-analysis of the intervention

Due to the lack of participants completing the Choice Point intervention, an exploratory data analysis of the evaluation questions of the intervention was conducted (Appendix A). Several themes emerged after analyzing the answers to the evaluation questions (see Table 5).

Open up

According to the Triflex (Harris, 2009; see Appendix C), this theme consists of two subthemes: Acceptance and Defusion. The answers of participants 1 and 3 (see Table 5) indicated that there was intolerance towards negative feelings like “embarrassment” and “frustration” (Acceptance) and negative thoughts about their undesired academic behavior (Defusion) when academic procrastination occurred. In contrast, participant 2 was more understanding about engaging in academic procrastination when feelings of “annoyance” occurred (Acceptance).

Be present

This theme consists of two aspects of psychological flexibility: Present moment and Self as context (Harris, 2009; see Appendix C). Participant 2 indicated that having the Choice Point on her desk improved the focus on completing the academic-related task instead of getting distracted by external stimuli and thoughts (Present moment, see Table 5). Participant 3 indicated she identifies herself as a person who needs urgency to show diligent behavior, making it more difficult to engage in the desired behavior and to procrastinate less at the beginning of the module (Self as context, see Table 5)

Do what matters

This theme consists of two core skills of psychological flexibility: Values and Committed action (Harris, 2009; see Appendix C). In the answers of all participants content of Values towards the academic-related task was included. Participants 2, 3 and 4 (see Table 5) indicated that being aware of the importance of the desired behavior, motivated them to engage in this behavior, whereas participant 1 pointed out that focusing on values was counterproductive and that the focus on emotions would have been more motivating. Participant 2 indicated that the first part of the intervention was not effective, since the purpose and values for the desired behavior were not explored when writing the journal (Values; see Table 5). However, the Choice Point intervention supported Participant 2 to explore the Values regarding academic-related tasks and stimulated her to engage in the desired behavior (Committed Action)

Table 5*Themes Extracted from the Answers to the Evaluation Questions*

Themes	Subthemes	Participants	Quote
Open up	Acceptance	Participant 1, 2, 3	<i>I would be mad at myself that I didn't do anything even though I planned to do something. This made me very frustrated towards myself. [Participant 3]</i>
	Defusion	Participant 1, 3	<i>So what I would do is whenever I felt like doing "away" things, I imagined that someone I look up to was in the same room as me and I felt embarrassed about doing the "away" things. [Participant 1]</i>
Be present	Self as context	Participant 3	<i>I'm a person who needs a close deadline to show diligent behaviour and this is not really the case in the beginning of a new module. [Participant 3]</i>
	Present moment	Participant 2	<i>Keeping the Choice Point in mind was definitely helpful, I put it on my desk so I could always see it whenever I was distracted. The Choice Point often was like a reminder for me. [Participant 2]</i>
Do what matters	Values	All participants	<i>I became more aware of certain patterns or specific moments when I procrastinate and it has given me more drive to work on reducing the amount of procrastinating. [Participant 4]</i>
	Committed Action	Participant 2	<i>For some people it may work to keep a journal, but I think for me it would be more valuable to first reflect (shortly) on why I don't want to do it. To set kind of a goal, or to have the purpose more consciously in mind, would be a good addition I believe. [Participant 2]</i>

Discussion

The purpose of the present study was to test whether the Psy-flex is an adequate measure to assess psychological flexibility and measure change in the population of college students. In line with this purpose, the reliability and validity of the Psy-flex were examined to assess the adequacy of the questionnaire. The expectation was that the Psy-flex was a valid and reliable measure for psychological flexibility in the target population of college students. Due to the lack of participants completing the Choice Point intervention, an exploratory data analysis of the evaluation questions of the intervention was conducted. Results from the analyses indicated that the Psy-flex was a valid and reliable measure for psychological flexibility and all six core processes of psychological flexibility were found in the qualitative analysis. Since this part of the study was based on an explorative design, no expectations were set beforehand.

The results of the present study indicated that the Psy-flex had an adequate internal consistency (Jensen, 2003; Dunn et al., 2014). This confirms the first hypothesis and is in accordance with the findings of Gloster et al. (2021). It indicates that the Psy-flex is a reliable measure and that the items on the Psy-flex are sufficiently interrelated concepts (Henson, 2001), consistent with the theoretical conceptualizations defining psychological flexibility as a construct that consists of six interrelated skills (Hayes et al., 2011).

Moreover, the results indicated that the Psy-flex had an adequate internal and external construct validity. The internal structure of the Psy-flex was sufficient and indicated a one-factor solution with an overall acceptable model of fit as in the study of Gloster et al. (2021). This was consistent with the theoretical conceptualization which suggests that all the six core skills belong to one construct (Hayes et al., 2011). Consistent with the expectations, the Psy-flex correlated with measures for psychopathology and well-being (Kashdan et al., 2020) and was sufficiently distinctive from the AAQ-II which is a more suitable measure for distress than psychological inflexibility (Wolgast, 2014). These findings were also consistent with the study of Gloster et al. (2021) and supported the second hypothesis.

Furthermore, all six core processes of psychological flexibility were found during the qualitative text analysis. All participants indicated that deficits in one or more particular core skills were related to the perception of their academic procrastination (“Open up” and “Be present”, Harris, 2009) and the reason why they did not engage in the desired behavior concerning academic-related tasks (“Do what matters”; Harris, 2009). From the two participants who completed the Choice Point intervention (Harris, 2017), Participant 1 indicated that a focus on emotions was more desired for the motivation to engage in the adaptive behaviour than the focus on values as was indicated in the intervention materials. Consequently, the academic behaviour did not improve, which is supported by the theoretical assumption that implies acceptance is required before values-consistent actions can be taken (Hayes et al., 2011). In contrast, participant 2 indicated that

exploring her values regarding academic behavior guided her towards the desired behavior and diminished academic procrastination. This suggests that, when correctly applied, ACT-interventions are effective for treating individuals who suffer from academic procrastination, which is in accordance with previous findings (e.g. Wang et al., 2017).

Despite these promising results, this study needs to be interpreted in light of several limitations. First of all, the residuals between items 5 (values) and 6 (committed action) and between items 1 (present moment awareness) and 4 (self as context) were correlated. The finding that the residuals of items 5 and 6 are correlated is consistent with the study of Gloster et al. (2021), whereas correlated residuals between items 1 and 4 were only found in the current study. However, these findings can be explained by the theoretical connection between the items as illustrated with the Triflex (Harris, 2009; see Appendix C). Therefore, the correlated residuals are retained in the one-factor solution, since this is consistent with theoretical and analytical assumptions. Besides this, the high dropout rate (91.3%) throughout the intervention can be considered an important limitation of the current study. The non-response rate was moderate (52.2%) and the main explanation for the withdrawal of the remaining part was absence from study (21.7%), making it impossible to keep track of academic behavior and take part in the intervention. Other explanations for the high dropout rate could be the implementation of the intervention as a self-help web-based intervention (Karyotaki et al., 2016), the absence of personalized reminders (Weston et al., 2017), and the lack of monetary incentives for participation (Gates et al., 2009). Additionally, due to the current implementation of the Choice Point the techniques to improve the unhooking skills could not be explored and applied to the situation of the students (Harris, 2017). Since unhooking skills are important for four core processes of psychological flexibility (defusion, acceptance, present moment and self-as-context), this might be the cause of the drop-out rate during the Choice Point intervention (8,7%) and is an explanation for the ineffectiveness of the Choice Point for Participant 1 (Hayes et al., 2011).

Although the present study indicates that the Psy-flex is an adequate measure to assess psychological flexibility, no robust conclusions about the relation between the six core processes can be drawn yet. The results of the current study and the study of Gloster et al. (2021) indicate that a combination of the theoretical framework of the Triflex (see Appendix C; Harris, 2009) and the Hexaflex (see Appendix D; Hayes et al., 2011) is involved in the processes of psychological flexibility. However, a network approach to psychological flexibility is required for a better understanding of the underlying mechanisms (Christodoulou et al., 2019). Therefore, future research should focus on using the network approach to examine underlying processes to cover up limitations of traditional psychometric approaches, such as validation studies with questionnaires (Christodoulou et al., 2019). When opting for a traditional psychometric approach, future research should use the Psy-flex during ACT-interventions to examine whether Psy-flex can measure change regarding academic procrastination in the population of college students.

In conclusion, the Psy-flex is an adequate measure to assess psychological flexibility in the population of college students. Given its association with various psychopathological problems and mental well-being, this confirms the theoretical assumptions that psychological flexibility is a fundamental component of mental health (Kashdan & Rottenberg, 2010). Therefore, the Psy-flex can be administered as a short screening tool to assess psychological flexibility for ACT for the population of college students and is applicable to mental health conditions in the clinical setting, like mental well-being and psychopathology. Whether the Psy-flex is an adequate measure to assess change in psychological flexibility remains unclear. The present study suggests that the Triflex (Harris, 2009; see Appendix C) and Hexaflex (Hayes et al., 2011; see Appendix D) are involved in psychological flexibility and that the target for treatment differs per individual. External factors, like specific life histories, can affect the interrelationships between the processes of psychological flexibility (Hayes et al., 2013) and implication of the theoretical framework might differ between populations and individuals. Therefore, further exploration of the underlying processes with the network approach is required (Christodoulou et al., 2019).

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Appendix A

Evaluation Questions and Answers

Table A1

Evaluation Questions and Answers from Participants after the First Part of the Intervention

Evaluation question	Participant 1	Participant 2	Participant 3	Participant 4
1. By looking at your journal about the academic behavior of last week, do you think you engaged in academic procrastination?	Yes	Yes I procrastinated on most days. Sometimes more sometimes less, but with the exception of 1 day it always happened	Yes, I did, very clearly. It was the first week and I had trouble with starting up my good and motivated academic behaviour. Some days I didn't even do anything, or only did something for half a day/few hours.	I did engage in academic procrastination, not every day, but more than I wished.
2. Do you want to change this behavior from last week?	Definitely, yes.	Yes I would like to change it, even though I am not sure how I can achieve that. But I definitely felt better when I did not procrastinate,	Yes, that would be very nice. I'm a person who needs a close deadline to show diligent behaviour and this is not really the case in the beginning of a new	I would like to change this behavior.

- | | | | | |
|--|--|--|--|--|
| | | and I have more time to do things I enjoy | module. It would be good for me to have diligent behaviour in general and not only close to a deadline. | |
| 3. Were you bothered by this behavior during the week? | It did bother me | Yes, but not more than usually. This week was stressful not only because of uni, but other things were going on as well. So often I was annoyed with myself, but this week I was also more understanding with myself than in some other weeks | Yes, I was. Sometimes when I looked back at that day or the previous day, I would be mad at myself that I didn't do anything even though I planned to do something. This made me very frustrated towards myself. | Yes I was bothered, because I also had tests this week, so for me it was important to not procrastinate. |
| 4. How would you evaluate the method of writing a journal of your behavior of the last week? | I wrote an entry for every day, and tried to write about my tasks + procrastination, so I think it was okay. | Before starting with the journalling, I thought it might help me to procrastinate less over the week. But that was not the case, so it was not really helping me with not procrastinating. But it was good to be confronted with it and to think about my study behaviour each day, because it highlighted what needs improvement. | I actually liked it more than I expected. It gave me a chance to evaluate my previous behaviour in a sense of motivating myself to do better, or to be proud of myself that I achieved something that day. | I would evaluate it as useful. I became more aware of certain patterns or specific moments when I procrastinate and it has given me more drive to work on reducing the amount of procrastinating |

- | | | | | |
|--|--|--|--|---|
| 5. Do you have any remarks and/or suggestions about keeping track of academic behavior by using this method? | Hmm. I think it would have been easier to have a template / schema that I could fill in. Now it felt a little bit open to interpretation, but I tried to be as thorough as possible. | I think, most people do not want to procrastinate but do it anyways. Especially people who are flexible in their schedule and can work any time they want to. For some people it may work to keep a journal, but I think for me it would be more valuable to first reflect (shortly) on why I don't want to do it. To set kind of a goal, or to have the purpose more consciously in mind, would be a good addition I believe. But generally I like the idea of keeping a journal because it can bring insight to situations where one procrastinates the most, if there are certain things that increase procrastination etc. | Not really, I was positively surprised. The only thing was that when I didn't have a good day regarding studying behaviour, I was also less motivated to write in the journal since I knew that I wouldn't be proud of myself. But besides that, it was good | Sometimes it was difficult for me to keep up with the journal, because of procrastinating it. |
|--|--|--|--|---|
-

Table A2*Evaluation Questions and Answers from Participants after the Choice Point Intervention*

Evaluation Question	Participant 1	Participant 2
1. Were you familiar with the Choice Point or similar techniques before taking part in this intervention?	I think I vaguely remember hearing about it somewhere, but I've never practiced it.	No, I never heard of the Choice Point. I only know "study tricks" that go in a similar direction, for example that one should set up a specific routine, eliminate distractions etc., which I think is similar to the part of Choice Point where one defines hindering and helping behaviours/circumstances.
2. How satisfied are you with the current academic behavior of this week on a scale from 1-10? Please elaborate a bit on this assessment.	My academic behavior in the week of 14 to 20 february was alright, I would say a 7 out of 10. I was studying most of the days. The new semester hadn't started yet, so I felt like I was doing enough to work on preparing for my resits. (My academic behavior in the week of 21 to 27 february was O.K., I would say a 5 out of 10. The new semester started, and I attended lectures, but	I'd rate it a 7. I see improvement to the week before, and I definitely procrastinated less. I got done what I wanted to, but I could still improve and let myself get distracted less. It was especially hard for me to sit on my desk and start. I noticed that it works better when I do not force myself and talk myself down for not working hard enough, but when I listen to my

nothing else. I was visiting friends from the 24th of February till the 1st of March and during that time I did not study at all. Which I planned that way, but it does mean I have to catch up on some classes.)

needs and also let myself do fun things before, and then I am more motivated to work afterwards.

3. How satisfied are you with the achieved result of this intervention regarding your academic behavior compared to the behavior during the first step of intervention on a scale from 1-10? Please elaborate a bit on this assessment.

I think it's hard to compare the two moments, because during the first part of the intervention I was still studying for my exams and during the second part of the intervention (with the choice point) I was already done with them and waiting for the second semester to start. So the most work I did was preparing for my resits. I would give the result of the interention a neutral grade like a 5, because I don't think it's a fair comparison. That being said although my stress was a lot less, and therefore I had less distractions, I did find it easier to deal with the distractions that came up.

I am satisfied (I rate it with 8), and proud that I worked on my tasks better this week. Keeping the Choice Point in mind was definitely helpful, I put it on my desk so I could always see it whenever I was distracted. The Choice Point often was like a reminder for me.

4. How would you evaluate the Choice Point method as an addition to writing a journal about your behavior of the last week?
- I think that I liked the idea, but in practice it didn't really work for me that well. Doing the journal was very intuitive, but the choice point method felt too intellectual and abstract and I noticed that I procrastinated on doing it. Whenever I wanted to do "away" things, such as playing video games, focussing on the "toward" was a lot easier if I focussed on my emotions instead of the values. So what I would do is whenever I felt like doing "away" things, I imagined that someone I look up to was in the same room as me and I felt embarrassed about doing the "away" things. A couple times I mentally promised to someone else that I would not do the "away" things and that was useful.
- This was better than just writing down my study behaviour, but the combination was also good. When I worked well on one day (because of the motivation I got from the Choice Point) and wrote it down, it gave me motivation to do the same the next day as well. So it reinforces each other.
5. Do you have any remarks on and/or suggestions about keeping track of academic behavior by using this method?
- Maybe see if people are more motivated by positive or negative outcomes. And see if people can find things that give them emotions with a lot of valence to motivate them? Also, I don't know if you did it, but maybe screen for ADHD and other diagnoses that might make it difficult to study.
- As I understood it, the questions of the Choice Point were targeted at one specific task. I think it would also be helpful to fill out one general Choice Point. At least for me, the things I struggle with are always the same, so it feels repetitive to fill it out multiple times.
-

Appendix B

Assumption Checks and Guidelines for Analyses

Confirmatory Factor Analysis:

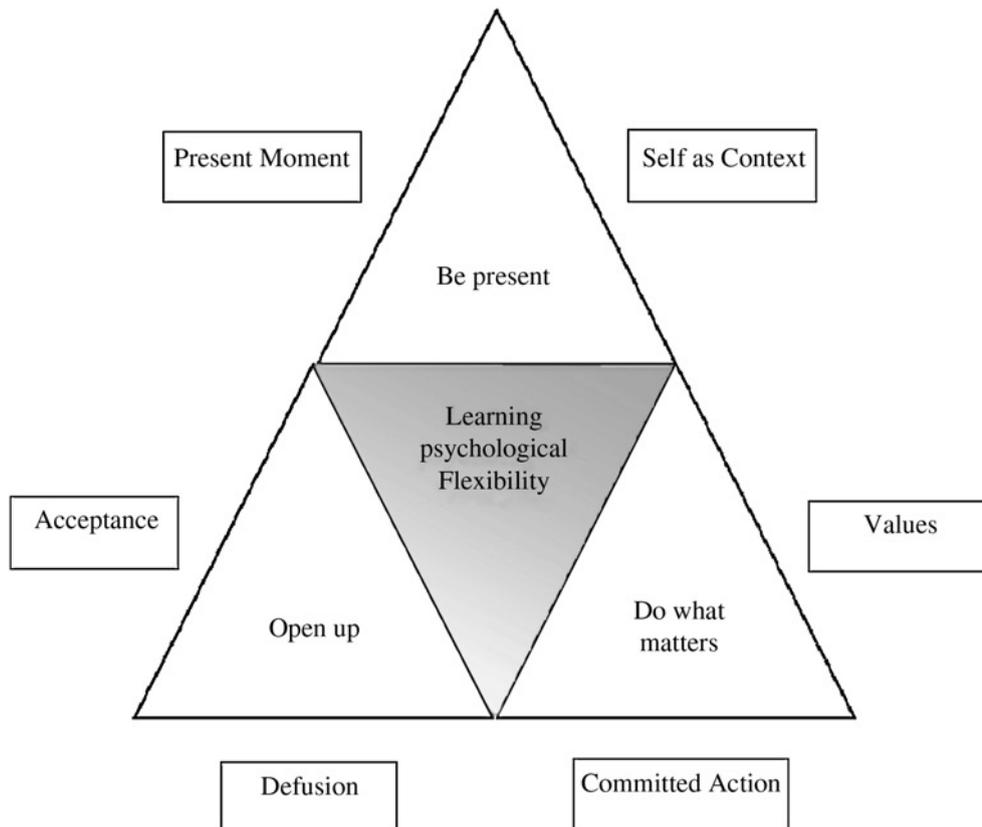
The guidelines from Stevens (2002) were used to assess the factor loadings. According to these guidelines the factor loadings are adequate when above .40. The guidelines from Hu & Bentler (1999) were used to assess the model of fit indices. These guidelines state the following: RMSEA < .08, SRMR < .08, CFI and TLI > .90.

Reliability Analysis:

The criteria for the internal consistency of Cronbach's Alpha are assessed with the guidelines of Jensen (2003). According to these guidelines an internal consistency coefficient above .70 is sufficient for an adequate reliability. The criteria for the internal consistency of McDonald's Omega are assessed with the guidelines of Dunn et al. (2014). According to these guidelines an internal consistency above .70 is sufficient for an adequate reliability.

(Pearson) Correlation Analysis:

The assumption of normality was checked with the Shapiro-Wilk test and the data is inspected on outliers. When the Shapiro-Wilk test is significant ($p < .01$) the assumption of normality is not met. Besides the assumption checks, the guidelines of Cohen (1988) were used to assess the convergent validity. The correlation coefficient need to be at least of medium effect size ($r > .20$). The guidelines of Hodson (2021) are used to assess the discriminant validity. According to these guidelines the correlation coefficient of $r < .70$ is sufficient for a good discriminant validity.

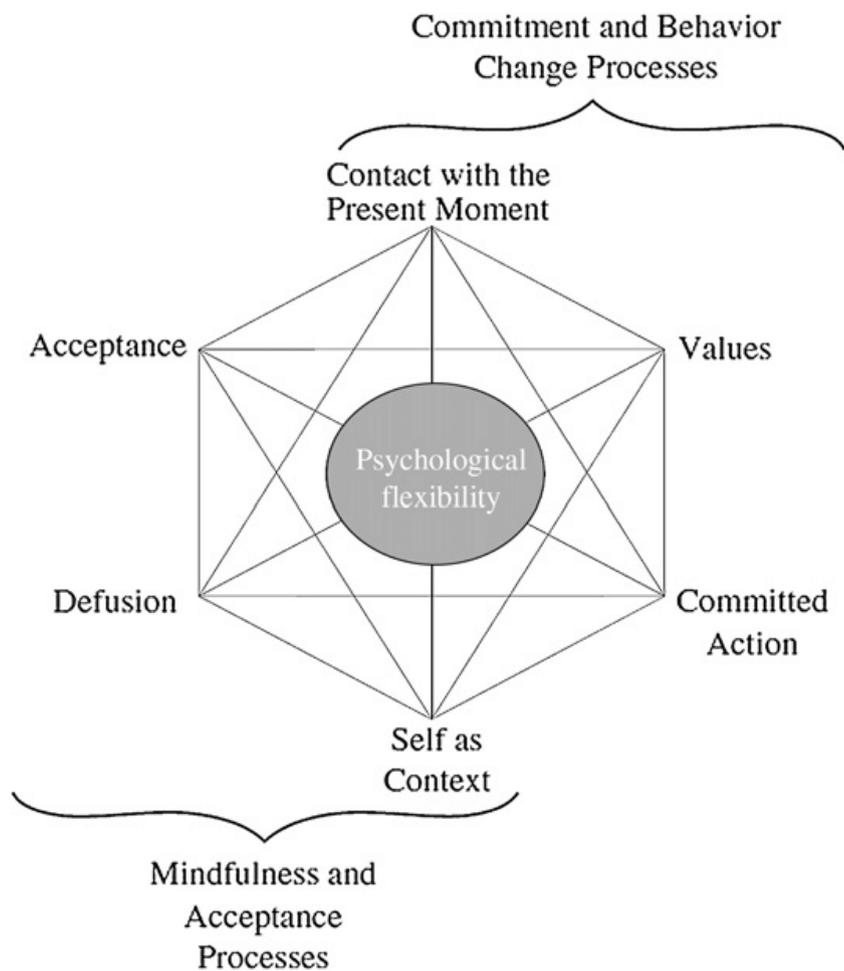
Appendix C**The Triflex Model of Psychological Flexibility****Figure C1***The Triflex Model of Psychological Flexibility*

Appendix D

The Hexaflex Model of Psychological Flexibility

Figure D1

The Hexaflex Model of Psychological Flexibility



Appendix E**Syntax Preprocessing Phase SPSS**

Selecting participants for informed consent

USE ALL.

COMPUTE filter_\$=(Informed_consent = 4).

VARIABLE LABELS filter_\$ 'Informed_consent = 4 (FILTER)'.
VALUE LABELS filter_\$ 0 'Not Selected' 1 'Selected'.

FORMATS filter_\$ (f1.0).

FORMATS filter_\$ (f1.0).

FILTER BY filter_\$.

EXECUTE.

System missing values question for student status and last question AAQ-II

RECODE Student_Status AAQ_II_7 (SYSMIS=-1).

EXECUTE.

Recoding last question AAQ-II into filter variable

RECODE AAQ_II_7 (1=1) (2=1) (3=1) (4=1) (5=1) (6=1) (7=1) (-1=0) INTO AAQ_II_in.

EXECUTE.

Selecting participants who are student and filled out the last question AAQ-II (all the questionnaires for the analyses)

USE ALL.

COMPUTE filter_\$=(Student_Status = 1 AND AAQ_II_in = 1).

VARIABLE LABELS filter_\$ 'Student_Status = 1 AND AAQ_II_in = 1 (FILTER)'.
VALUE LABELS filter_\$ 0 'Not Selected' 1 'Selected'.

FORMATS filter_\$ (f1.0).

FORMATS filter_\$ (f1.0).

FILTER BY filter_\$.

EXECUTE.

Recoding Psy-flex

RECODE Psy1 Psy2 Psy3 Psy4 Psy5 Psy6 (1=5) (2=4) (3=3) (4=2) (5=1) INTO Psy1_R Psy2_R
Psy3_R Psy4_R

Psy5_R Psy6_R.

EXECUTE.

Recoding PHQ-9

RECODE PHQ_9_1 PHQ_9_2 PHQ_9_3 PHQ_9_4 PHQ_9_5 PHQ_9_6 PHQ_9_7 PHQ_9_8
PHQ_9_9 (1=0) (2=1) (3=2)

(4=3) INTO PHQ9_1R PHQ9_2R PHQ9_3R PHQ9_4R PHQ9_5R PHQ9_6R PHQ9_7R
PHQ9_8R PHQ9_9R.

EXECUTE.

Recoding MHC_SF

RECODE MHC_SF_1 MHC_SF_2 MHC_SF_3 MHC_SF_4 MHC_SF_5 MHC_SF_6 (1=0) (2=1)
(3=2) (4=3) (5=4) (6=5)

INTO MHC_SF_1R MHC_SF_2R MHC_SF_3R MHC_SF_4R MHC_SF_5R MHC_SF_6R.

EXECUTE.

Total score Psy-flex

COMPUTE Psy_Tot=Psy1_R + Psy2_R + Psy3_R + Psy4_R + Psy5_R + Psy6_R.

EXECUTE.

Total score MMAP-BPS

COMPUTE MMAP_BPS_Tot=MMAP_BPS_1 + MMAP_BPS_2 + MMAP_BPS_3 +
MMAP_BPS_4 + MMAP_BPS_5 + MMAP_BPS_6 +

MMAP_BPS_7 + MMAP_BPS_8 + MMAP_BPS_9 + MMAP_BPS_10.

EXECUTE.

Total score PHQ-9

COMPUTE PHQ9_Tot=PHQ9_1R + PHQ9_2R + PHQ9_3R + PHQ9_4R + PHQ9_5R +
PHQ9_6R + PHQ9_7R + PHQ9_8R + PHQ9_9R.

EXECUTE.

Total score STAIS-5

COMPUTE STAI_S_5_Tot=STAIS_5_1 + STAIS_5_2 + STAIS_5_3 + STAIS_5_4 +
STAIS_5_5.

EXECUTE.

Total score MHC_SF

COMPUTE MHC_SF_Tot=MHC_SF_1R + MHC_SF_2R + MHC_SF_3R + MHC_SF_4R +
MHC_SF_5R + MHC_SF_6R.

EXECUTE.

Total score AAQ-II

COMPUTE AAQ_II_Tot=AAQ_II_1 + AAQ_II_2 + AAQ_II_3 + AAQ_II_4 + AAQ_II_5 +
AAQ_II_6 + AAQ_II_7.

EXECUTE.

Appendix F**Syntax JAMOV****Data inspection:***Descriptives age*

```
jmv::descriptives(  
  data = data,  
  vars = Age_1,  
  freq = TRUE)
```

Descriptives sex

```
jmv::descriptives(  
  data = data,  
  vars = Sex,  
  freq = TRUE)
```

Descriptives Psy-flex

```
jmv::descriptives(  
  data = data,  
  vars = vars(Psy1_R, Psy2_R, Psy3_R, Psy4_R, Psy5_R, Psy6_R, Psy_Tot),  
  freq = TRUE,  
  hist = TRUE,  
  box = TRUE,  
  sw = TRUE)
```

Descriptives MMAP-BPS

```
jmv::descriptives(  
  data = data,
```

```
vars = vars(MMAP_BPS_1, MMAP_BPS_2, MMAP_BPS_3, MMAP_BPS_4, MMAP_BPS_5,  
MMAP_BPS_6, MMAP_BPS_7, MMAP_BPS_8, MMAP_BPS_9, MMAP_BPS_10,  
MMAP_BPS_Tot),
```

```
freq = TRUE,
```

```
hist = TRUE)
```

Descriptives PHQ-9

```
jmv::descriptives(  
  data = data,
```

```
  vars = vars(PHQ9_1R, PHQ9_2R, PHQ9_3R, PHQ9_4R, PHQ9_5R, PHQ9_6R, PHQ9_7R,  
  PHQ9_8R, PHQ9_9R, PHQ9_Tot),
```

```
  freq = TRUE,
```

```
  hist = TRUE)
```

Descriptives STAIS-5

```
jmv::descriptives(  
  data = data,
```

```
  vars = vars(STAIS_5_1, STAIS_5_2, STAIS_5_3, STAIS_5_4, STAIS_5_5, STAI_S_5_Tot),
```

```
  freq = TRUE,
```

```
  hist = TRUE)
```

Descriptives MHC-SF

```
jmv::descriptives(  
  data = data,
```

```
  vars = vars(MHC_SF_1R, MHC_SF_2R, MHC_SF_3R, MHC_SF_4R, MHC_SF_5R,  
  MHC_SF_6R, MHC_SF_Tot),
```

```
  freq = TRUE,
```

```
  hist = TRUE)
```

Descriptives AAQ-II

```
jmv::descriptives(  
  data = data,  
  vars = vars(AAQ_II_1, AAQ_II_2, AAQ_II_3, AAQ_II_4, AAQ_II_5, AAQ_II_6, AAQ_II_7,  
  AAQ_II_Tot),  
  freq = TRUE,  
  hist = TRUE)
```

Reliability Analyses*Betrouwbaarheidsanalyse Psy-flex*

```
jmv::reliability(  
  data = data,  
  vars = vars(Psy1_R, Psy2_R, Psy3_R, Psy4_R, Psy5_R, Psy6_R),  
  omegaScale = TRUE,  
  corPlot = TRUE,  
  alphaItems = TRUE,  
  omegaItems = TRUE,  
  itemRestCor = TRUE)
```

Betrouwbaarheidsanalyse MMAP-BPS

```
jmv::reliability(  
  data = data,  
  vars = vars(MMAP_BPS_1, MMAP_BPS_2, MMAP_BPS_3, MMAP_BPS_4, MMAP_BPS_5,  
  MMAP_BPS_6, MMAP_BPS_7, MMAP_BPS_8, MMAP_BPS_9, MMAP_BPS_10),  
  omegaScale = TRUE,  
  corPlot = TRUE,  
  alphaItems = TRUE,
```

```
omegaItems = TRUE,  
itemRestCor = TRUE)
```

Betrouwbaarheidsanalyse PHQ-9

```
jmv::reliability(  
  data = data,  
  vars = vars(PHQ9_1R, PHQ9_2R, PHQ9_3R, PHQ9_4R, PHQ9_5R, PHQ9_6R, PHQ9_7R,  
  PHQ9_8R, PHQ9_9R),  
  omegaScale = TRUE,  
  corPlot = TRUE,  
  alphaItems = TRUE,  
  omegaItems = TRUE,  
  itemRestCor = TRUE)
```

Betrouwbaarheidsanalyse STAIS-5

```
jmv::reliability(  
  data = data,  
  vars = vars(STAIS_5_1, STAIS_5_2, STAIS_5_3, STAIS_5_4, STAIS_5_5),  
  omegaScale = TRUE,  
  corPlot = TRUE,  
  alphaItems = TRUE,  
  omegaItems = TRUE,  
  itemRestCor = TRUE)
```

Betrouwbaarheidsanalyse MHC-SF

```
jmv::reliability(  
  data = data,
```

```
vars = vars(MHC_SF_1R, MHC_SF_2R, MHC_SF_3R, MHC_SF_4R, MHC_SF_5R,
MHC_SF_6R),
omegaScale = TRUE,
corPlot = TRUE,
alphaItems = TRUE,
omegaItems = TRUE,
itemRestCor = TRUE)
```

Betrouwbaarheidsanalyse AAQ-II

```
jmv::reliability(
  data = data,
  vars = vars(AAQ_II_1, AAQ_II_2, AAQ_II_3, AAQ_II_4, AAQ_II_5, AAQ_II_6, AAQ_II_7),
  omegaScale = TRUE,
  corPlot = TRUE,
  alphaItems = TRUE,
  omegaItems = TRUE,
  itemRestCor = TRUE)
```

Confirmatory Factor Analysis

Confirmatory factor analysis Psy-flex before assumption correlated residuals

```
jmv::cfa(
  data = data,
  factors = list(
    list(
      label="Factor 1",
      vars=c(
        "Psy1_R",
```

```
"Psy2_R",  
"Psy3_R",  
"Psy4_R",  
"Psy5_R",  
"Psy6_R"))),  
resCov = list(),  
fitMeasures = c("cfi", "tli", "rmsea", "srmr"),  
corRes = TRUE,  
mi = TRUE)
```

Confirmatory factor analysis Psy-flex after assumption correlated residuals

```
jmv::cfa(  
  data = data,  
  factors = list(  
    list(  
      label="Factor 1",  
      vars=c(  
        "Psy1_R",  
        "Psy2_R",  
        "Psy3_R",  
        "Psy4_R",  
        "Psy5_R",  
        "Psy6_R"))),  
  resCov = list(  
    list(  
      i1="Psy5_R",  
      i2="Psy6_R"),
```

```
list(  
  i1="Psy1_R",  
  i2="Psy4_R")),  
fitMeasures = c("cfi", "tli", "rmsea", "srmr"),  
corRes = TRUE,  
mi = TRUE)
```

Correlationanalysis

```
jmv::corrMatrix(  
  data = data,  
  vars = vars(Psy_Tot, MMAP_BPS_Tot, PHQ9_Tot, STAI_S_5_Tot, MHC_SF_Tot,  
  AAQ_II_Tot),  
  pearson = FALSE,  
  spearman = TRUE,  
  n = TRUE,  
  plots = TRUE)
```