

Utrecht University
Faculty of Social and Behavioural Science
Clinical Psychology



Master Thesis

**Relations between Psychological Flexibility, Humor Styles and Pain
and the Mediating Role of Well-Being**

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Abstract

The goal of this survey study is to research the relationships between psychological flexibility, adaptive (affiliative and self-enhancing) and maladaptive (aggressive and self-defeating) humor styles, well-being and pain. It will be investigated whether a high psychological flexibility and adaptive humor styles lead to less pain, whereas maladaptive humor styles lead to more pain and which role well-being plays in these relationships. Furthermore, the relationship between psychological flexibility and humor styles will be explored.

An online survey was used, measuring psychological flexibility (FIT-60), humor styles (HSQ), well-being (SF-36) and pain (SF-36, PHQ-15). Structural equation modeling (SEM) and correlation analysis were conducted to examine these relationships. 245 participants finished the study, 85 % was female and the mean age was 44 (SD = 13,6).

SEM shows that well-being goes together with less pain. Psychological flexibility goes together with less pain on an indirect path via well-being but when the mediator well-being is controlled, psychological flexibility goes together with more pain. Adaptive humor styles show a negative relationship with pain and a positive relationship with psychological flexibility. Maladaptive humor styles, especially the self-defeating humor style show a negative relationship with psychological flexibility.

People might score higher on psychological flexibility because they engage so much and avoid negative perceptions. This can lead to less well-being and in turn to more pain. Further research should test how far the different humor styles are correlating and how adaptive or maladaptive they are in fact. It might also be that self-directed humor styles are closer related to well-being, pain and psychological flexibility than other-directed.

Keywords: humor styles, psychological flexibility, well-being, pain

Preface

Quality academic work is not accomplished single-handedly. Several people have supported me academically, practically and personally. I would like to thank my parents, who encouraged me to follow my curiosity enormously. Without them, it would have been a longer and harder way to where I am now. A thousand thanks to Str for listening to me and consulting me with my professional but also personal concerns. Special thanks to T-Pain, who made my results even more interesting. Also, I would like to thank everyone, that filled in my survey, which made this research possible. That is why I also want to thank my thesis buddies that, like me, put a lot of effort in collecting as much data as possible. I am proud about the big amount of people we have managed to participate in our questionnaire. At this point, I also like to thank Rinie Geenen for his helpful information and suggestions. Finally, I would like to thank my supervisor Sibe Doosje for his critical requests and for giving valuable advice. The meetings always gave me new ideas and more understanding of the matter I was working on. But also thanks for the one or the other joke in between and all in all for setting PILZINMOTION.

Regina Pilz, April 2019

Introduction

Most people have experience with some form of pain for no obvious medical reason, and worldwide a large number is suffering from chronic pain (Katz, Rosenbloom, & Fashler, 2014). About 20 – 25% of all people will experience chronic pain at least once in their life (Elliott, Smith, Penny, Smith, & Chambers 1999; Gureje, Korff, Simon, & Gater, 1998). Therefore, it is important to find out about factors that are associated with pain and factors that help to deal with, heal from, or even prevent pain. Lately, research has focused on psychological flexibility, humor styles and emotional well-being as predictors of pain. As it can be seen in Figure 1, the current study will research psychological flexibility and humor styles as predictors of pain and a potential mediating role of well-being. Additionally, the relation between psychological flexibility and humor styles will be explored. In the following, all these potential relations will be described closer. Emotional well-being is defined in this study as the balance between frequent positive affect and infrequent negative affect (Ryff & Keyes, 1995).

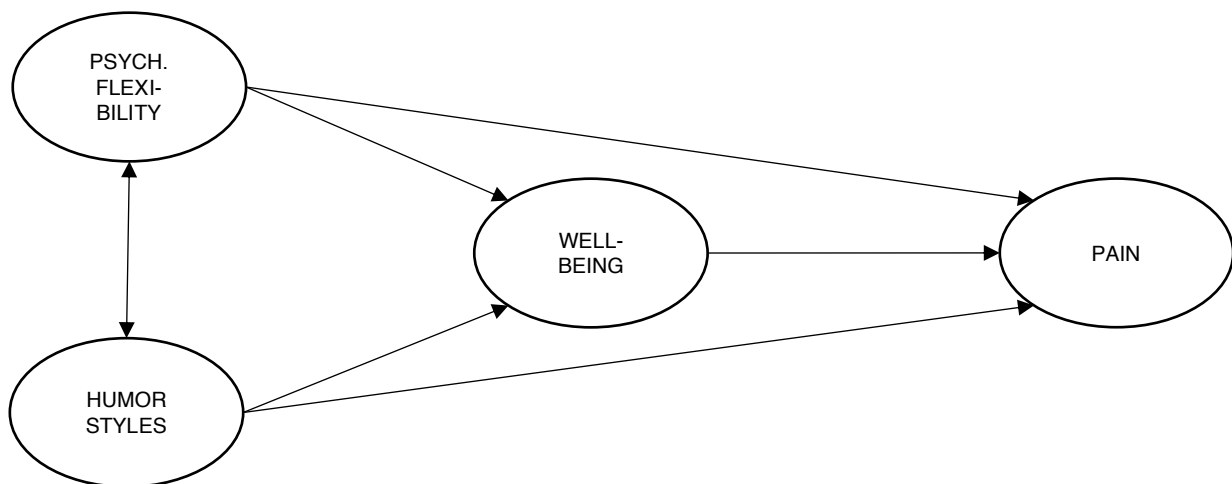


Figure 1. Model of possible relations

Psychological Flexibility a set of processes, which helps people deal with stress and strengthens adaptive behavior. According to a model by Hayes, Luoma, Bond, Masuda and Lilis (2006), psychological flexibility consists of six core components. *Acceptance* is the ability to actively experience events, feelings, and thoughts with awareness, even if it might seem hard to handle. *Cognitive defusion* is the ability to change the interaction with, or the relation to thoughts and to not try to avoid or change the thoughts themselves. *Being present* provides non-judgemental contact with inner and outside events. *Self as context* describes the ability of observing the self in a dynamic manner and as a part of the environment. The component *values* aims at discovering one's true important values. *Committed action* is having the courage to act according to these values. Acceptance and commitment therapy (ACT; Hayes, et al., 2006) aims to increase psychological flexibility and shows evidence of the improvement of emotional,

social, and physical functioning as well as lower health care utilization (McCracken, Vowles, & Eccleston, 2004).

But how is psychological flexibility related to pain? Psychological flexibility implies the ability to acknowledge perceived pain without judging (Sturgeon, 2014). ACT and other treatments (e.g. internet-based ACT-interventions) based on the components of psychological flexibility seem to have a positive impact on people, specifically on those who suffer chronic pain (Buhrman et al., 2013) and seem to be superior to traditional pain management strategies (Vowles & McCracken, 2010). Some articles even report pain reduction itself (Johnston, Foster, Shennan, Starkey, & Johnson, 2010). However, most evidence regarding the relation of ACT and pain shows that people receiving ACT are able to accept and control their pain, but this does not mean that the pain itself decreases. ACT's main goal is therefore not pain reduction, but pain management (Batink, Jansen, & de Mey, 2012; Buhrman et al., 2013; Dahl, Wilson, & Nilsson, 2004; Hayes et al., 1999). All these findings suggest that higher psychological flexibility is associated with lower impairments through pain.

Psychological flexibility is also highly related to well-being (Lamb, 2018), which in turn is related to pain (Gureje et al., 1998). Psychological flexibility and well-being can even overlap; e.g. acceptance is a core factor of psychological flexibility and appears as self-acceptance also in the well-being model of Ryff and Keyes (1995). Furthermore, randomized controlled trials show that with an ACT intervention that targets the increase of psychological flexibility, an increase of well-being can be observed (Wersebe, Lieb, Meyer, Hofer, & Gloster, 2018; Räsänen, Lappalainen, Muotka, Tolvanen, & Lappalaine, 2016). In several studies, well-being and pain are examined both as outcome variables (e.g. Zisman, Leibovici, Kleinmann, Siegel, & Lindner, 2001). Sometimes, pain also functions as a predictor of well-being (Huber, Suman, Biasi, & Carli, 2008; Ferreira & Sherman, 2007; Viane et al. 2003). There is less evidence for the predicting role of well-being on pain. However, a review by Finan & Garland (2015) concludes that positive affect, which one part of well-being has an impact on pain. This approach and the relationship between psychological flexibility and well-being lead to the assumption that well-being mediates the relationship between psychological flexibility and pain.

Humor is usually seen as one single, exclusively positive construct. This is reflected by several sense-of-humor measurements, which are measuring humor as such (e.g. Situational Humor Response Questionnaire of Martin & Lefcourt, 1984; Coping Humor Scale of Martin & Lefcourt, 1983; Sense of Humor Questionnaire of Svebak, 1996). In recent years, criticism of this approach has been heard. In 2003, Martin, Puhlik-Doris, Larsen, Gary, and Weir evaluated

the construct of sense of humor more critically and proposed four distinct humor styles with trait character. These styles can be described in three dimensions as can be seen in Figure 2. Firstly, a humor style can be either benevolent or detrimental. Secondly, it can be used to either enhance the self or the relationship with others. And thirdly, it can be self-directed or other-directed. *Self-enhancing* humor is benevolent and used to enhance the self and reflects a humorous perspective on life, also in difficult times. The *affiliative* humor style is benevolent but is used to enhance the relationship with others, e.g. by joking around. *Self-defeating* humor is detrimental to the self and is showed by ridiculing oneself to find approval from others. *Aggressive* humor is detrimental but at the expense on others. The self-enhancing and the self-defeating humor styles are self-directed and the affiliative and aggressive humor style other-directed. Whereas the two benevolent humor styles are considered to be adaptive, the two detrimental ones are considered to be maladaptive (Martin et al., 2003; Kuiper & Harris, 2009).

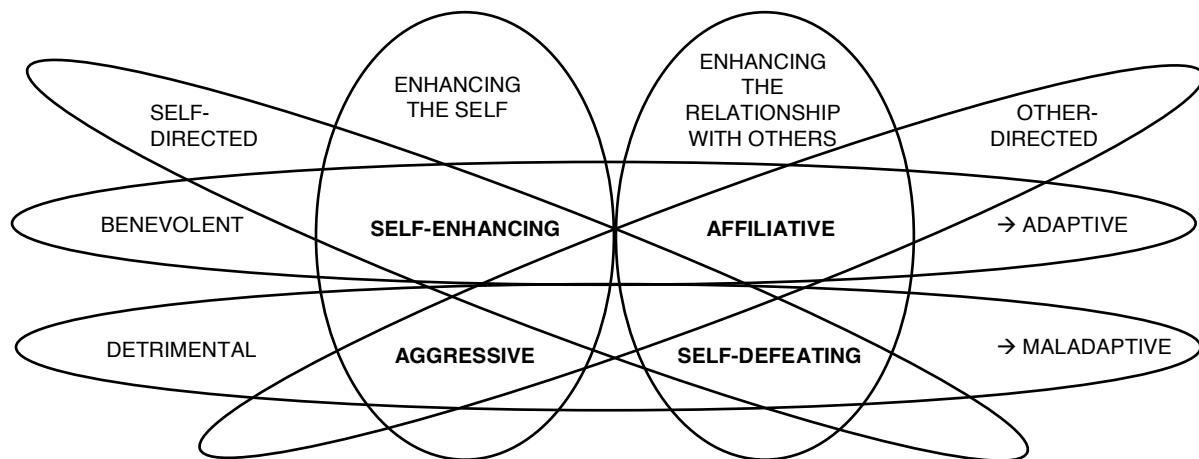


Figure 2. Model of the four different Humor Styles
Origin: own representation.

General opinion considers humor the best medicine against several illnesses, whereas scientific evidence for the positive impact of humor on physical health, or more specifically toward pain is not clear (Martin et al., 2003; Kuiper & Harris, 2009). A reason for this ambivalence is that only certain humor styles might be related to better health, and not sense of humor in general (Kuiper & Martin, 1998; Richards & Kruger, 2017). It might be possible that only the adaptive humor styles are related to psychological as well as physical health (Martin et al., 2003; Cann, Stilwell, & Taku, 2009). There is evidence for a positive relation between affiliative humor style and physical health and a negative relation between self-enhancing humor style and perceived stress (Richards, 2017), which in turn is highly correlated to health (Martin, 2002; Schatt, Kelloway & Desmarais, 2005). Regarding the specific relation between humor and pain, humor as a state induced by an external trigger shows a significant impact on

pain tolerance, but the cause of the effect is unclear and the positive emotion of mirth might be responsible for the increased tolerance (Chen & Martin, 2007; Weisenberg, Tepper, & Schwarzwald, 1995; Weisenberg, Raz, & Hener, 1998). Yet little is known about the relationship between specifically humor styles and pain as an own factor.

Well-being might mediate the relation between humor styles and pain. As shown in several studies, adaptive humor styles are related to higher psychological well-being, whereas maladaptive humor styles are related to a lower psychological well-being (Martin et al., 2003; Thomas E. Ford, Katelyn A. McCreight, Kyle Richardson (2014), Chen & Martin, 2007; Kuiper, Grimshaw, Leite, & Kirsh, 2004; Kuiper & McHale, 2009). Other findings show that only the self-defeating humor style is negatively related to well-being and that the relationship between the aggressive humor style and well-being needs further exploration (Martin et al., 2003). Cann et al. (2009) state that there is a relation only between the self-directed humor styles and happiness, which is closely related to well-being. They found that the self-enhancing humor style is positively and the self-defeating humor style is negatively related to happiness, which is closely related to well-being. Furthermore, the overlapping factor of acceptance is also relevant here. Adaptive humor styles are characterized by tolerance and acceptance. People with the self-enhancing humor style provide a realistic perspective on aversive situations and can cope with them in a humorous way (Martin et al., 2003). People with an affiliative humor style are able to laugh about themselves in the self-accepting manner (Martin et al., 2003) and self-acceptance is in certain definitions a part of well-being (Ryff & Keyes, 1995).

A relation between humor styles and psychological flexibility is poorly researched. Nevertheless, there are indicators for links between certain humor styles and certain components of psychological flexibility. Acceptance occurs, as previously discussed, in both. Cognitive defusion as another core component of psychological flexibility suggests a change in the normal use of language, cognition, memories and emotions, which leads to the ability to see the world in a more flexible way (Luoma & Hayes, 2009). Cognitive defusion can be connected to the self-enhancing humor style, which relates to perspective taking-humor (Martin et al., 2003). Both suggest a change in perspective as a way to cope with negatively experienced situations. Overlapping parts of psychological flexibility and certain humor styles lead to the idea that these constructs might be connected.

Hypotheses and Questions

For a better understanding of the factors of psychological flexibility, humor styles, well-being and pain and possible relations between those factors and on the basis of aforementioned

previous study results and theoretical considerations, a model with following research questions and hypotheses will be tested:

1. Is there a relationship between psychological flexibility and pain?
Hypothesis 1a) Psychological flexibility is negatively associated with pain
2. Is there a relationship between humor styles and pain?
Hypothesis 2a) Adaptive humor styles are negatively associated with pain
Hypothesis 2b) Maladaptive humor styles are positively associated with pain
3. Is there a mediating role of well-being?
Hypothesis 3a) Psychological flexibility is positively associated with well-being
Hypothesis 3b) Adaptive humor styles are positively associated with well-being
Hypothesis 3c) Maladaptive humor styles are negatively associated with well-being
Hypothesis 3d) Well-being is negatively associated with pain

A relation between psychological flexibility and humor styles seems to be conceivable. However, research about this topic is scant, which is why no directed hypotheses are made at this point. Instead, an explorative approach following open questions is pursued:

- 4a) Is there a relation between psychological flexibility and humor styles? If so,
- b) How can the relation between psychological flexibility and humor styles be characterized?

Methods

Design

In this survey a multi factorial within-subject design was applied. It is a correlation and multiple regression study, in which following relations were investigated: psychological flexibility and pain; humor styles and pain, a mediating role of well-being in the relation between psychological flexibility and pain, a mediating role of well-being in the relation between humor styles and pain; and finally, psychological flexibility and humor styles. The gathered data was evaluated with structural equation modeling (SEM) and correlation analysis.

Participants and procedure

The participants of this online-study were found in the general population. Via Facebook (also put on a fibromyalgia patient association Facebook-page), WhatsApp and Linked-In the survey was spread with the invitation to participate and to spread it further. Everybody could participate between the 22nd of November in 2018 and the 6th of January in 2019, which was the starting date of the data analysis. There were no exclusion criteria. As a thank-you for participating a donation to a social organization was given. The survey took about 20 minutes.

First, the participants had to give informed consent. The information included the aim, the content and the possibility to stop the survey at any time. 806 people entered the survey. 561 of them interrupted the survey and did not finish all of the questionnaires, which are indispensable for this analysis. Their data is not integrated into results because of lack of completeness. Thus, the data of 245 participants are integrated into analyses. Their demographics and health-related characteristics can be seen in Table 1. The majority of the participants was female. The mean age was 44 years with a range from 18 till 72. About two thirds were married or living together, one fifth single. The rest were divorced, widowed or claimed ‘different’ as their status. 149 participants claimed to have a chronic disease and 214 indicated to suffer under specific diseases.

Table 1

Descriptive demographics and health-related characteristics of the participants (N = 245)

| | |
|----------------------------------------|-------------|
| Age, <i>M (SD)</i> | 44,0 (13,6) |
| Gender, <i>n (%)</i> | |
| Female | 207 (84,5) |
| Male | 38 (15,5) |
| Civil status, <i>n (%)</i> | |
| Single | 50 (20,4) |
| Married / living together | 168 (68,6) |
| Divorced | 10 (4,1) |
| Widowed | 2 (0,8) |
| Other | 15 (6,1) |
| Education Level, <i>n (%)</i> | |
| Academic | 136 (55,6) |
| Other | 109 (44,4) |
| Chronic Somatic Diseases, <i>n (%)</i> | 149 (60,8) |
| Diseases, <i>n (%)</i> | 214 (87,3) |
| Fibromyalgia | 81 (37,9) |
| Irritable bowel syndrome | 40 (18,7) |
| Arthrosis | 36 (16,8) |
| Chronic pain elsewhere than head | 31 (14,5) |
| Cardiovascular disease | 27 (12,6) |
| Migraine | 27 (12,6) |
| Rheumatic disease | 23 (10,7) |
| Burn-out | 21 (4,4) |
| Psychiatric disease | 20 (9,3) |
| Severe obesity | 19 (8,9) |
| Chronic fatigue symptom | 18 (8,4) |
| Lung disease | 17 (7,9) |
| Addiction | 16 (7,5) |
| Chronic skin conditions | 15 (7,0) |
| Diabetes | 8 (3,7) |
| Chronic headache | 7 (3,3) |
| Cancer | 3 (1,4) |
| Epilepsy | 2 (0,9) |
| Somatic symptom disorder | 1 (0,5) |

Note: M = mean; SD = standard deviation; Academic: university of applied sciences and university education; Other: primary school, preparatory vocational secondary education, intermediate vocational education, senior vocational education and general secondary education.

Questionnaires

All measuring instruments were applied in their original Dutch or in their into Dutch translated version.

Psychological Flexibility. The 60-item Flexibilities Index Test (FIT-60; Batink, Jansen, & de Mey, 2012) is a self-report questionnaire, and was used to measure psychological flexibility in this study. All components of the psychological flexibility model of Hayes et al. (2006) are measured with 10 items in each case. Item examples are: 'It is okay to remember something unpleasant' (acceptance), 'My thoughts cause me discomfort or emotional pain' (cognitive defusion), 'I observe my feelings without losing myself in them' (being present), 'I often feel limited by everything I need from myself' (self as context), 'My life is well balanced' (values) and 'If I want to do something, I go for it' (committed action). Answers had to be given in a 7-points Likert-scale from *Totally disagree* (0) to *Totally agree* (6). The internal consistency is good and the convergent validity acceptable (Batink et al., 2012). The internal consistency in the current study was excellent ($\alpha = .89$). Cronbach's Alpha for the subscales were .85 for acceptance, .88 for cognitive defusion, .80 for being present, .60 for self as a context, .77 for values and .82 for committed action.

Humor Styles

The four different humor styles were measured with the self-report Humor Styles Questionnaire (HSQ; Martin et al., 2003). It consists of 32 items and each humor style subscale is measured with eight items. The four humor styles are affiliative ('I enjoy making people laugh') self-enhancing ('Even when I'm by myself, I'm often amused by the absurdities of life'), aggressive ('If somebody makes a mistake, I will often tease them about it') and self-defeating ('I let people laugh at me or make fun at my expense more than I should'). Hence, adaptive humor style is measured by the total of 16 single items of the affiliative and the self-enhancing humor style and maladaptive humor style by the total of 16 items of the aggressive and self-defeating humor style. Answers had to be given in a 7-points scale from *totally disagree* (1) to *totally agree* (7). According to Martin et al., (2003). the internal consistency of the subscales ranges from .77 to .81 and the intercorrelations are relatively low (maximum $r = .36$). In the current study Cronbach's Alpha for the affiliative humor style was .88, for the self-enhancing humor style .82, for the aggressive humor style .70 and for the self-defeating humor styles .83. The data of this study showed small (.20) to medium (.48) intercorrelations between five out of six possible relations between the subscales. Only the self-enhancing and the self-defeating humor styles showed no correlation.

Well-being

Well-being was measured with seven items of the 36-item Short Form Health Survey-36 (SF-36; VanderZee et al., 1996). The SF-36 is a measurement for health-related quality of life. The well-being subscale with five items was used ('Have you been a very nervous person?'; 'Have you felt so down in the dumps that nothing could cheer you up?'; 'Have you felt calm and peaceful?'; 'Have you felt downhearted and blue?'; 'Have you been a happy person?') and additionally two further items, due to the lack of missing positive affect items in the original subscale ('Did you feel full of pep?'; 'Did you have a lot of energy?'). Answer options range from *all of the time* (1) to *none of the time* (6). Cronbach's Alpha for the original well-being subscale is excellent ($\alpha = .90$; Steward, 1992). For the current well-being scale with its seven items Cronbach's alpha was as well excellent ($\alpha = .91$). For the purpose of a better intuitive understanding the scale was scored in a reverse way, so that a high well-being score refers to high well-being.

Pain

To measure pain, two questionnaires were used. Firstly, the bodily pain scale of the SF-36 with two questions was used. The first question was about the experienced severity of pain: 'How much bodily pain have you had during the past 4 weeks?' and the answer options ranged from *None* (1) to *Very severe* (6). The second one is depending on the first and was about the experienced limitations, which were caused by pain: 'During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?' The answer options ranged from *not at all* (1) to *extremely* (5). The reliability for the pain scale is acceptable ($\alpha = 0.78$) (Steward, 1992). In the current study the reliability is good, at .84. For the purpose of a better intuitive understanding the scale was reverse-scored, so that a high pain score refers to high experience of pain.

Secondly, the 15-item Patient Health Questionnaire (PHQ-15; Kroenke, Spitzer, & Williams, 2002) was used (Van der Zee, Sanderman, Heyink & de Haes, 1996). It indicates how many different forms of pain participants experienced. The PHQ-15 asks to which extent people have been bothered by 15 different pain- and health related problems. For this present analysis only five (for men)/ six (for women), pain-related items are included (stomach pain; back pain; pain in the arms, legs, or joints (knees, hips, etc.); menstrual cramps or other period-related problems (women only); headaches and chest pain). The answer options were *not at all* (0), *a little* (1) and *a lot* (2).

The questionnaires correlate with each other in an acceptable degree ($\alpha = .70$).

Statistical analyses

The descriptive statistics and reliability tests were conducted with SPSS 25.0 software. Significance was given when $p < .05$ (two-tailed). For structural equation modeling (SEM) and correlation analysis the software R 3.5.2 and RStudio 1.1.463 were used. SEM can be seen as a combination of confirmatory factor analysis (CFA), multiple regression and complex path models (Hox & Bechger, 1998) and was used to test hypotheses 1a), 2a), b), 3a) b) c) and d). SEM consists of two submodels. First, the measurement model: to check the respective postulated factor structure of the adaptive and maladaptive humor styles as well as of psychological flexibility, CFA as an initiative part of SEM took place. Secondly, to test the hypothesized paths, the second model of SEM, the structural model, was applied. Two similar models were tested. In both models adaptive humor styles, maladaptive humor styles and psychological flexibility were the three exogenous (similar to independent or predicting) and latent variables. The endogenous (similar to dependent or outcome) and manifest variable was pain and the possible mediating and also manifest variable was well-being. The first model (SF-model) uses the total pain scale of the SF-36 to measure pain, whereas the second model (PHQ-model) uses the pain items of the PHQ-15. The latent variables adaptive and maladaptive humor styles were indicated by all of their each 16 single manifest items. The latent variable psychological flexibility was indicated by its summarizing six manifest scales, in favor of a better overview. Every first indicating item – the regression coefficients – of the three latent variables is fixed to 1. To estimate the relations robust maximal likelihood estimation was applied. To explore question 4a), b) a correlation analysis was applied. To calculate this relationship in the SEM, the variance between adaptive humor styles and maladaptive humor styles was based on the literature fixed to zero.

Results

Hypothesis Testing

The in the SEM integrated CFA shows that all items which should measure adaptive humor style, all items which should measure maladaptive humor style and all scales, which should measure psychological flexibility load significantly on their factors in the SF- and the PHQ-model, as can be seen in Figure 3 and Figure 4. Hence, the measurement part of SEM fits. The structural model part which shows the direct and indirect relationships in both models, gives the answers on all hypotheses and can as well be seen in Figure 3 and Figure 4.

The regression analysis of the SEM shows surprising outcomes regarding the relationship between psychological flexibility and pain. Instead of the hypothesized negative association, a positive relationship can be observed in the SF-model ($\beta = 0.369$; $SE = 0.152$; p

= .015). In the PHQ-model this relationship is not significant ($\beta = 0.104$; $SE = 0.146$; $p = .474$). As hypothesized, adaptive humor styles and pain have in the SF-model a negative relationship ($\beta = -0.205$; $SE = 0.090$; $p = .022$). In the PHQ-model this relationship is not significant ($\beta = -0.103$; $SE = 0.083$; $p = 0.214$). Despite the hypotheses that maladaptive humor styles are positively associated with pain, both models cannot confirm this relationship (SF-model: $\beta = 0.061$; $SE = 0.081$; $p = .454$; PHQ-model: $\beta = 0.030$; $SE = 0.083$; $p = .715$).

Regarding direct effects on well-being, only psychological flexibility shows as hypothesized a positive and strong effect on well-being in both models (SF-model: $\beta = 0.865$; $SE = 0.067$; $p = .000$; PHQ-model: $\beta = 0.865$; $SE = 0.067$; $p = .000$). The for the adaptive humor and well-being hypothesized positive relationship shows no significance (SF-model: $\beta = 0.031$; $SE = 0.062$; $p = .617$; PHQ-model: $\beta = 0.031$; $SE = 0.062$; $p = .620$). Maladaptive humor styles do not show the hypothesized negative relationship (SF-model: $\beta = 0.117$; $SE = 0.069$; $p = 0.092$; PHQ-model: $\beta = 0.117$; $SE = 0.069$; $p = .092$). Well-being and pain are negatively related in both models (SF-model: $\beta = -0.546$; $SE = 0.122$; $p = .000$; PHQ-model: $\beta = -0.558$; $SE = 0.113$; $p = .000$).

In both models a mediating role of well-being in the negative relation between psychological flexibility and pain can be confirmed (SF-model: $\beta = -0.532$; $SE = 0.138$; $p = .000$; PHQ-model: $\beta = -0.126$; $SE = 0.029$; $p = .000$). A mediating role of well-being in the relation between adaptive humor styles and pain could not be found (SF-model: $\beta = -0.241$; $SE = 0.484$; $p = .618$; PHQ-model: $\beta = -0.056$; $SE = 0.115$; $p = .622$). Also, a mediating role of well-being in the relation between maladaptive humor styles and pain could not be confirmed. (SF-model: $\beta = -1.287$; $SE = 0.826$; $p = .119$; PHQ-model: $\beta = -0.305$; $SE = 0.191$; $p = .111$)

Regarding the whole model fit, both full hypothesized models have to be rejected due to the aforementioned results, which can be seen in Table 2. The comparative fit index of 0.73 in both models is not satisfactory, but the value comes close to 0.9, which suggests a satisfactory fit. The value of the root mean square error of approximation of < 0.08 suggests an acceptable fit. (Hu & Bentler, 2014). However, both models are significant, which means they are differing from the implied covariance structure and cannot be accepted.

Table 2
Godness-of-Fit Indices for two models

| Model | χ^2 | d.f. | ρ | CFI | RMSEA |
|-----------|----------|------|--------|-------|-------|
| SF-Model | 1782.330 | 733 | .000 | 0.728 | 0.079 |
| PHQ-Model | 1788.277 | 733 | .000 | 0.729 | 0.079 |

Note: χ^2 : chi-square; d.f.: degrees of freedom; CFI, comparative fit index; RMSEA, root mean square error of approximation

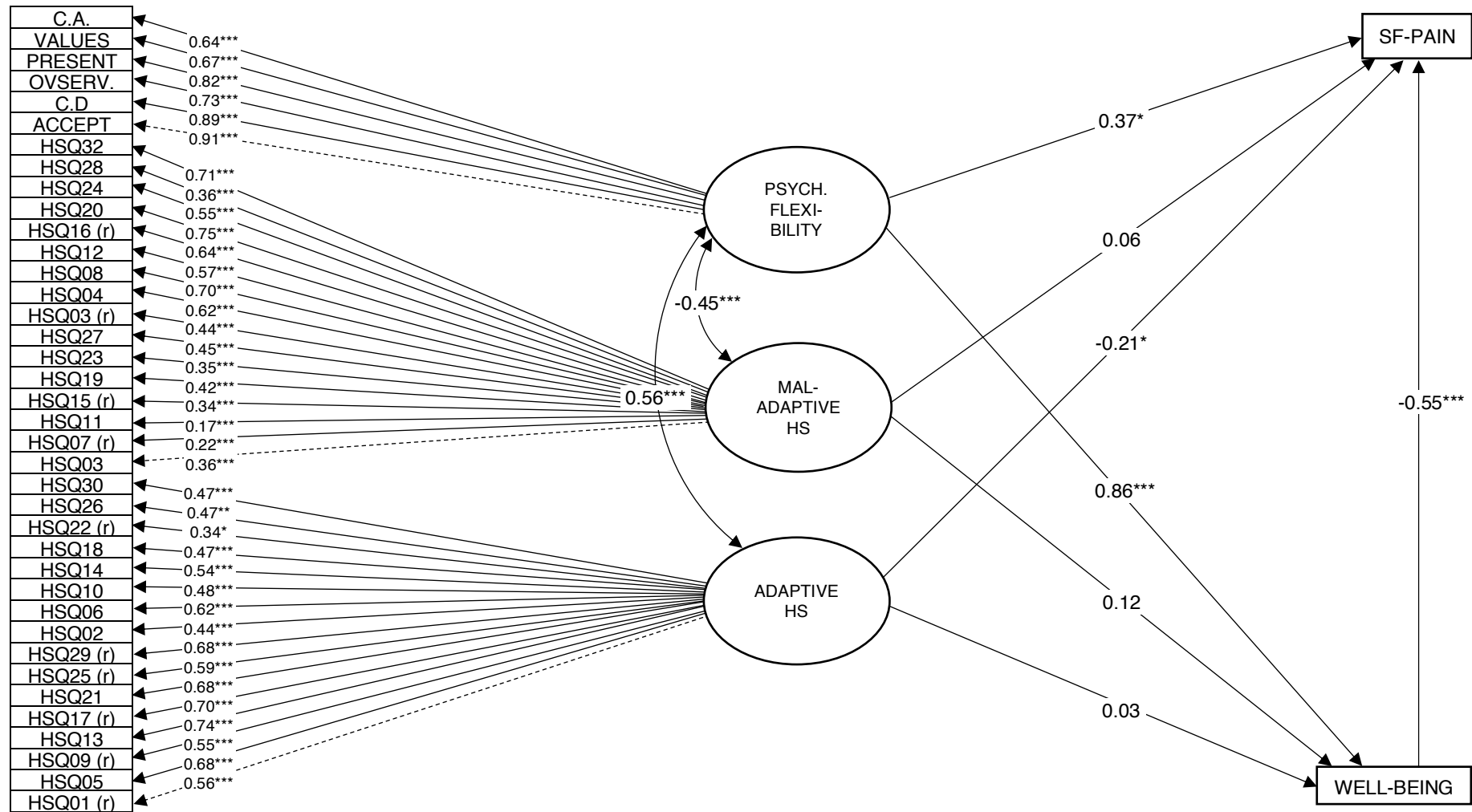


Figure 3. SF-Model

NOTES: * = $p < .05$; ** = $p < .01$; *** = $p < .001$; ovals: latent variables; rectangles: manifest variables; single headed arrows: causal relationships; double headed arrows: correlations; green arrows indicate positive relationship and red arrows indicate negative relationships; the thicker the arrows, the stronger the relationship; dashed lines: factor loadings are fixed to one; unmeasured residual error terms are not depicted due to a better overview;

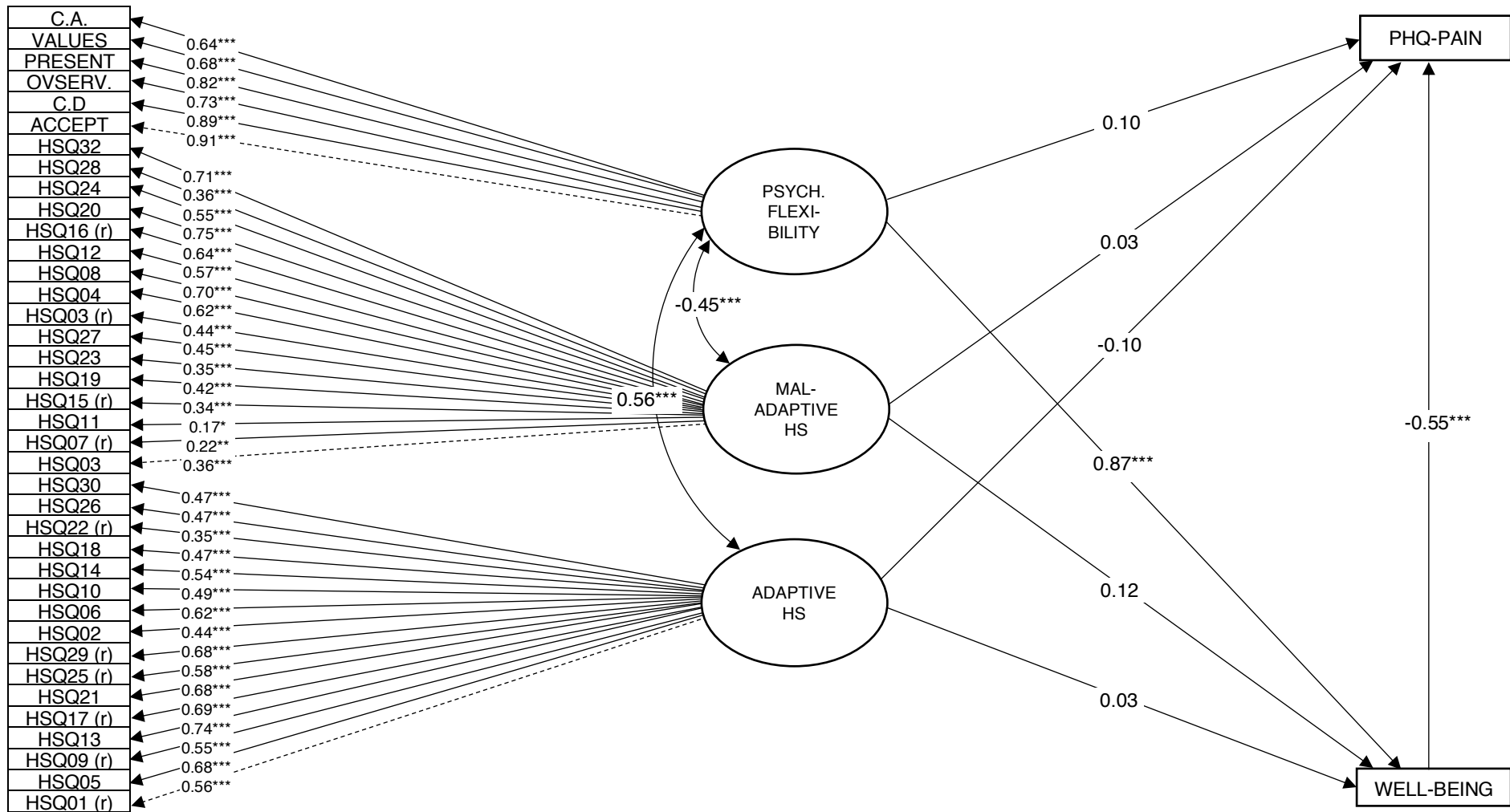


Figure 4. PHQ-Model

Notes: * = $p < .05$; ** = $p < .01$; *** = $p < .001$; Ovals: latent variables; rectangles: manifest variables; single headed arrows: causal relationships; double headed arrows: correlations; green arrows indicate positive relationship and red arrows indicate negative relationships; the thicker the arrows, the stronger the relationship; dashed lines: factor loadings are fixed to one; unmeasured residual error terms are not depicted due to a better overview;

Explorative analyses

Covariance analyses was integrated into SEM. These analyses were conducted to explore the relationship between psychological flexibility and humor styles. Adaptive humor styles are positively associated with the psychological flexibility total score in both models (SF- and PHQ-model: $\beta = 0.556$; $SE = 0.054$; $p = .000$). Maladaptive humor styles are negatively associated with the psychological flexibility total score (SF- and PHQ-model: $\beta = -0.454$; $SE = 0.053$; $p = .000$). Also, a separate correlation analysis was applied to explore the relationship in more detail. The correlation matrix in Table 3 shows all relations between all subscales of the FIT-60 and the HSQ. All subscales of psychological flexibility correlate positively with each other. But also all humor styles correlate more or less positively with each other. The self-enhancing and aggressive humor style show even a moderate correlation ($\alpha = .48$). All adaptive humor styles correlate positively with all psychological flexibility subscales. The strongest positive relations are between the self-enhancing humor style and the psychological flexibility scales acceptance ($\alpha = .41$) and cognitive defusion ($\alpha = .45$). The self-defeating humor style shows negative correlations with all of the subscales of psychological flexibility, whereas the correlations of the aggressive humor styles with the subscales are mixed and not strong at all. The strongest negative relations are between the self-defeating humor style and the psychological flexibility scales self as a context ($\alpha = -.39$) and contact with the present moment ($\alpha = -.38$).

Table 3

Correlation Matrix Of The Humor Styles Of The HSQ And The Six Scales Of The FIT-60.

| | SELF-ENHANCING HS | AFFILIATIVE HS | SELF-DEFEATING HS | AGGRESSIVE HS | PF-ACCEPTANCE | PF-COGNITIVE DEFUSION | PF-SELF AS CONTEXT | PF-BEING PRESENT | PF COMMITTED ACTION | PF-VALUES |
|-----------------------|-------------------|----------------|-------------------|---------------|---------------|-----------------------|--------------------|------------------|---------------------|-----------|
| SELF-ENHANCING HS | 1 | | | | | | | | | |
| AFFILIATIVE HS | 0.48*** | 1 | | | | | | | | |
| SELF-DEFEATING HS | 0.09 | 0.23*** | 1 | | | | | | | |
| AGGRESSIVE HS | 0.19** | 0.34*** | 0.45*** | 1 | | | | | | |
| PF-ACCEPTANCE | 0.41*** | 0.29*** | -0.32*** | 0.06 | 1 | | | | | |
| PF-COGNITIVE DEFUSION | 0.45*** | 0.26*** | -0.28*** | 0.05 | 0.82*** | 1 | | | | |
| PF-SELF AS CONTEXT | 0.34*** | 0.22*** | -0.39*** | -0.04 | 0.64*** | 0.63*** | 1 | | | |
| PF-BEING PRESENT | 0.36*** | 0.24*** | -0.38*** | -0.09 | 0.73*** | 0.72*** | 0.58*** | 1 | | |
| PF-VALUES | 0.38*** | 0.39*** | -0.18** | 0.05 | 0.56*** | 0.45*** | 0.48*** | 0.46*** | 1 | |
| PF COMMITTED ACTION | 0.34*** | 0.29*** | -0.13* | 0 | 0.52*** | 0.47*** | 0.39*** | 0.53*** | 0.7*** | 1 |

NOTE: * = $p < .05$; ** = $p < .01$; *** = $p < .001$; HS = Humor Styles; PF = Psychological Flexibility

Discussion

The present research investigates the relationships between the variables psychological flexibility, humor styles, well-being and pain. It was hypothesized that psychological flexibility and pain are negatively associated (1a). Instead, psychological flexibility and pain show a positive direct relationship in one model. Adaptive humor styles show as hypothesized a negative relationship with pain in one model (2a), but maladaptive humor styles do not show the hypothesized positive association (2b). As hypothesized, psychological flexibility shows a strong positive relationship with well-being (3a). Adaptive and maladaptive humor styles do not show a relationship with well-being (3b, c). Well-being in turn shows a strong negative relationship with pain in both models (3d). Well-being shows only in the relationship between psychological flexibility and pain a mediating role, but not in the relationships of the adaptive humor styles and pain and maladaptive humor styles and pain. The models, which integrate all hypotheses of this study have to be rejected. Nevertheless, particular hypothesized paths of the model can be accepted. A correlation analysis of the so far unexplored relationship between psychological flexibility and humor styles shows a remarkable outcome. Adaptive humor styles are positively related to a psychological flexibility, whereas the self-enhancing humor style shows a stronger relationship than the affiliative humor style. The self-defeating humor style shows a negative relationship with psychological flexibility, whereas the aggressive humor style does not correlate with psychological flexibility at all. Furthermore, the different humor styles correlate as well positively with each other more or less.

Psychological flexibility helps dealing with pain, but this study indicates, that this only happens by well-being. The higher the psychological flexibility, the higher the well-being and the lower the pain. But if the well-being part is taken away from psychological flexibility, psychological flexibility apparently goes together with more pain. So, it is likely that people who report high psychological flexibility but poor wellbeing report more pain than people with poor well-being and also poor psychological flexibility. A possible explanation therefore is that when people engage in becoming happier and in thinking more positively, it might happen that they therefore avoid negative feelings or thoughts. But this behavior can be counterproductive and could lead to a worse well-being (Wegner, 1994), which in turn leads to more pain. E.g. somebody scores high for the item 'My life is well balanced' but only because he or she would like to score high. However, psychological flexibility is in general very close related to well-being, as can be seen in this as well as in many other studies (e.g. Viane et al., 2003) or is even implying well-being in its theoretical considerations. The part, which is not related to well-being and causes apparently more pain experience might be hard to interpret properly. At this

point, I could not find any literature about a potential detrimental effect of psychological flexibility.

Regarding humor styles, results of at least one model indicate that adaptive humor styles help managing pain and are therefore indeed adaptive. But there is no clear relationship between adaptive humor styles and well-being and the results show also no evidence that the so called maladaptive humor go together with less well-being and more pain. Hence, they might not be entirely maladaptive. The relationship between psychological flexibility and humor styles gives a hint for a possible reason for that outcome. Indeed, there is an overall positive relationship between adaptive humor styles and psychological flexibility and an overall negative relationship between maladaptive humor styles and psychological flexibility, which in turn is highly related to well-being and indirectly to pain. First, these findings supports the original idea of distinguishing between adaptive and maladaptive humor styles in the way, that self-enhancing and affiliative humor styles are adaptive and self-defeating and aggressive humor styles are maladaptive (e.g. Martin et al., 2003).

But a closer look on the correlations in Table 3 shows that the self-enhancing humor style is stronger related to psychological flexibility than the affiliative humor style and the self-defeating stronger than the aggressive, which shows no relations at all. This leads to the idea that only the self-defeating humor style is maladaptive, but not the aggressive. Reflecting these findings, Cann et al. (2012) found that only the self-directed humor styles, namely the self-defeating and self-enhancing humor style have an impact on well-being, whereas the other-directed humor styles, namely the affiliative and self-defeating humor styles do not have that impact. Not existing relationships between the aggressive or affiliative humor style and well-being and pain could suppress the general relationship between an adaptive or maladaptive humor style and well-being and pain. The results indicate, that this effect is stronger for the maladaptive humor styles. Supporting this, Kuiper and McHale (2009) state that people with a self-defeating humor style might be especially unhappy, because others tend to avoid interacting with them, which in turn leads to feelings of social isolation. On the one hand, this idea speaks partly against the assumption of e.g. Martin et al. (2003) regarding the belongingness of the aggressive humor style to maladaptive humor styles. On the other hand, it also supports Martin et al.'s own findings which state that self-defeating humor styles are related to lesser well-being, whereas the relationship between aggressive humor style and well-being is not clear yet (Cann & Etzel, 2008; Cann, Stilwell, & Taku, 2010).

Limitations and methodological criticism

One limitation of the study is that 85 percent of the sample is female. There are differences in perceiving pain in men and women (Keefe et al., 2000) and there are also differences in the scorings of the humor styles; men score in general higher than women and especially in the detrimental humor styles. (Martin et al., 2003). The results in a sample with more men might therefore differ to a certain degree.

Further, to calculate the relationship between humor styles and psychological flexibility, the variance between adaptive and maladaptive humor styles was fixed to zero. This procedure was necessary to conduct the SEM and also reflect the assumption, that they are barely correlating (Martin et al., 2003). But the results show all in all, that there might be a higher correlation – at least between certain humor styles as can be seen in Table 3 – than presumed. Therefore, these results have to be treated with caution.

Even though statistical analyses assume directed hypotheses and SEM is developed to prove causal relations, the study is in fact designed as a correlation study and not as an experiment. Thus, in the end the results can actually not be taken as causal relations and other relations are reasonable; in this study well-being predicts pain, but it sometimes can be the other way round and perceived pain might be the reason, why people do not feel well (e.g. Viane et al. 2003).

The creation of adaptive and maladaptive humor styles as such on the one hand were built on scientific approaches (Martin et al., 2003) and includes all humor style in the model and made it as simple as possible. On the other hand, the results indicate a not entire adaption or maladaptation of the humor styles, but the reason can only be interpreted and not directly observed, because the humor styles were put together.

The strength of SEM in general is the ability of testing complex models and specific relations within a model while respecting other variables. This leads to fuller information and in the current study, this approach especially gave more information about the relationship between psychological flexibility and well-being and pain.

Implications for science and practice

On basis of the remarkable finding that psychological flexibility only leads to more pain by well-being but leads to more pain, when well-being is controlled, these relationships should be explored in terms of moderation. Furthermore, it should be researched if and how psychological flexibility has detrimental facets. This knowledge can be helpful in clinical practice in ACT treatments for pain patients, especially for those who show no increase in dealing with pain, regardless an apparent increase of psychological flexibility. The apparent increase might also be caused by the patient's motivation to feel better, which in turn can lead

to avoidance and to less well-being (Wegner, 1994). As a clinical practitioner it is important to be aware of such behavior to react and adjust or even change treatment if there is no improvement. Furthermore, because of the high correlations between the scales of psychological flexibility and due to economic advantages, the development of a short version of the FIT-60 should be taken into account.

Regarding the findings about humor styles, the results also show evidence for the actual existence of adaptive and maladaptive humor styles but perhaps not in the way in which they were originally constructed. Further research has to be conducted to concretize this approach. Furthermore, confirmation studies should take place to test the original assumption that humor styles are barely correlating (Martin et al., 2003) and if adaptive and maladaptive humor styles are inherently adaptive or maladaptive, because the current study shows evidence against this approach. To test this, long-term studies could be conducted on a big group in which different humor styles get tested and distinguished. It can be researched then if different humor styles have different effects on psychological and physiological health indicators over time. Increased knowledge about humor is especially important to break down broadly accepted prejudices about humor and its effect on health. And also for practice the findings include an importance of the awareness of pitfalls; someone who exhibits an aggressive humor style does in turn not necessarily behave maladaptive for him-/herself by bearing low well-being or more pain, whereas it might be the case in people with a self-defeating humor style.

Regarding an improvement of the whole SEM model, taking into account the only self-directed humor styles, might already lead to a better model-fit. Especially since the trend is towards positive psychology approaches, which include psychological flexibility, humor and well-being, it is important to do further research about the relations within this field.

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