Psychological Flexibility as a Malleable Public Health Target: Evidence from a Representative Sample

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Background

Identifying salient and widespread health-promoting targets is a prerequisite for efficient public health initiatives. We tested the moderating influence of psychological flexibility — a fundamental, *trainable* set of intrapersonal and interpersonal processes that help people manage stressors and strengthen alternative adaptive behaviors — on the relationship between known risk factors and physical health, mental health, and well-being.

Method

A representative sample of 1,035 participants in Switzerland aged 18 – 74 years answered questions about their physical health, health care utilization, mental health, well-being, and three risk factors: stressful life events, daily stress, and low social support. Statistical models tested whether psychological flexibility moderated the relationship between risk factors and outcomes.

Results

Psychological flexibility consistently moderated the relationship between stress and all tested outcomes, following a dose response: Higher levels were more protective.

Conclusions

Targeting psychological flexibility — a salient and widespread set of trainable skills — could promote various health outcomes.

Keywords: psychological flexibility, stress, mental health, well-being, epidemiology

Psychological Flexibility as a Malleable Public Health Target: Evidence from a Representative Sample

Ample evidence exists to suggest that a significant portion of today's society suffers from diminished mental health. Epidemiological studies estimate that 38.2% of the population suffered from a clinically relevant mental disorder in the past 12 months, with staggering costs for society (Wittchen et al., 2011). These statistics do not include subclinical symptoms, syndromes, or suffering (Fava et al., 2001). Nor do they fully capture the negative effects experienced by those who "merely" experience high levels of perceived stress, such as early exit from the workforce.

Exacerbating this situation is the fact that mental and physical disorders are highly comorbid. Although the causal direction remains unclear, epidemiological evidence has documented links between numerous physical and mental disorders (Kessler, Chiu, Demler, & Walters, 2005; Witthauer, Gloster, Meyer, Goodwin, & Lieb, 2014). These individuals lose more productivity and incur greater health care costs than either group alone. This is reflected in primary care, where a disproportionate percentage of total patients suffer from mental disorders and complaints (Berghofer, Roll, Bauer, Willich, & Pfennig, 2014).

Attempts to reduce the suffering associated with physical and mental disorders tend to aim to reduce disorders themselves, with the logical assumption that this will increase well-being. However, the factors that directly promote well-being are only partially related to factors that diminish mental health (Huppert, 2009). Whereas resilience is not simply the absence of risk, less is understood about the positive side of this relationship. Studies are needed that examine mental illness, physical illness, and well-being simultaneously in order to examine the specificity vs. generalizability of findings.

Risk Factors: Stressful Events, Daily Stress, & Low Social Support

Experienced stress is one of the most consistently associated risk factors for poor mental health, physical health, and health-care utilization (Cohen, Janicki-Deverts, & Miller, 2007). Numerous variations of stressors have been tested ranging from single events to chronic ongoing stressors. One of the most researched stressors is a large stressful life event such as death of a loved one, unemployment, birth of a child, etc. All these events place strain on a person, especially when interpreted by the person as stressful.

Equally detrimental to individuals is daily stress or hassles. Daily stress and hassles are events or stimuli that put temporary strain on people. They can have negative consequences for physical health and mood (Delongis, Folkman, & Lazarus, 1988) and can even alter health behaviors such as degree of nutritional eating (O'connor, Jones, Conner, McMillan, & Ferguson, 2008). Negative effects subsequent to daily stress and hassles has been documented for chronic physical health conditions (Piazza, Charles, Sliwinski, Mogle, & Almeida, 2013), psychotic symptoms (Tessner, Mittal, & Walker, 2011), etc.

Low social support is also a well-known risk factor for negative health outcomes. Low social support is associated with physical complications such as cardiovascular disease, psychological distress such as suicidality (Kleiman & Liu, 2013), decreased well-being(Gençöz, Özlale, & Lennon, 2004), and an increase in mortality with an effect comparable to other risk-factors such as smoking and obesity(Holt-Lunstad, Smith, & Layton, 2010).

Despite clear evidence about the importance of these risk factors, this knowledge is not easily translated to health and well-being promotion. The reason for this lies in the nature of the risks themselves: it is extraordinarily difficult, if not

impossible, to design interventions that reduce the incidence or impact of stressful life events or daily stress or to increase the availability and quality of social support. Instead, research is needed that examines processes that are more readily translatable into interventions.

Salient, Widespread, & Malleable Resilience Factor: Psychological Flexibility?

Research into the intersection between mental health, resilience, and well-being must search for factors that are both widespread and malleable. Understanding which factors consistently help people adapt better to risk factors would offer health care and public health professions the opportunity to harness their effects and promote health. Likewise, identification of malleable, salient, and widespread targets is a prerequisite for any efficient public health initiative. *Psychological flexibility*, a transdiagnostic concept that entails a range of inter- and intra-personal skills, is increasingly considered a fundamental aspect of health (Kashdan & Rottenberg, 2010). Psychological flexibility can be defined as the ability to "recognize and adapt to various situational demands; shift mindsets or behavioral repertoires when these strategies compromise personal or social functioning; maintain balance among important life domains; and be aware, open, and committed to behaviors that are congruent with deeply held values" (Kashdan & Rottenberg, 2010). As such, psychological flexibility both helps an individual interact differently with stressors and simultaneously builds new behavioral repertoires, namely towards the things an individual holds dearly. A growing literature shows that PF can be successfully promoted (Gloster et al., 2014; Hayes, Luoma, Bond, Masuda, & Lillis, 2006; Wilson, Hayes, Biglan, & Embry, 2014), even in difficult and stuck populations (Clarke, 2014; Gloster, Sonntag, et al., 2015; Lundgren, Dahl, & Hayes, 2008), and is successful in reducing the negative effects of stress (Hofer et al., 2015). Indeed,

reticulated research has identified experimental conditions (Levin, Hildebrandt, Lillis, & Hayes, 2012) and genetic associations (Gloster, Gerlach, et al., 2015) that promote its change. Psychological flexibility has been observed to moderate associations with posttraumatic stress symptoms (Pickett, Bardeen, & Orcutt, 2011), internet addiction (Levin, Lillis, & Hayes, 2012), social anxiety (Randall, 2011), and psychological stress (Fledderus, Bohlmeijer, Fox, Schreurs, & Spinhoven, 2013) and various indices of functioning.

To our knowledge, however, psychological flexibility has not been tested in the general population, with most studies to date concentrating on clinical samples. These results are subject to potential selection biases such as severity and treatment seeking. As such, it remains unknown whether the promising target of psychological flexibility has a salient impact on health outcomes in the general population.

Aim

Building upon the literatures of risk factors and psychological flexibility, this study aimed to examine whether the clinically important variable of psychological flexibility also moderates the relations between known risk factors and outcomes of physical health, mental health, and well-being. (see Figure 1). Using a representative sample of the general population we hypothesized that higher levels of psychological flexibility would demonstrate more advantageous outcomes (i.e., function as a protective factor). Specifically, we hypothesized that psychological flexibility would moderate the relationships between risk factors and health/well-being outcomes. We believed moderating role of psychological flexibility would greatest for outcomes of psychological health and for the risk factor of daily stress.

------ Figure 1 here ------

Method

Sample

The sample was drawn from the Swiss population of literate adults, aged 18-74 years, who access the internet at least once per week for private purposes. In Switzerland, 99.0% of the population is literate and over 91% have internet access. The sample was further representative with the Swiss population with respect to education, socio-economic-status, immigration status, and urbanicity (Kucera & Krummenacher, 2016). Residents of cantons that speak German and French were included. Importantly, this study included older adults (65-74 years), thus sampling a larger age range of adults than is normally examined and including an often-excluded group.

The sample consisted of equal numbers of men and women (49.7% & 50.3%); had an average age of 45.4 years (18 – 34 [30.1%]; 35 – 54 [41.1%]; 55 – 74 [28.8%]); with mixed relationship status [single = 33.8%; living with partner/ married = 54.0%; widowed 1.9; divorced 9.2]. Nearly two-thirds of the sample reported that they currently work or were in training (65.9%). Urbanicity was reported as follows: inner city (25.5%); surrounding areas (48.3%), rural (25.2%), and isolated city (01.0%). Finally, participants reported obtaining the following amount of formal education: 6 years (1.2%), 9 years (3.6%), 12 years (39.0%), 14 years, (15.5%), and at least 18 years (26.4%).

Procedure

These data were collected by a professional survey company. All procedures were approved by the local ethics committee and consistent with the international code on market and social research. Participants were part of a standing panel of volunteers representative of the population of Switzerland and were nominally compensated for their time. In order to guarantee representativeness, participants were

recruited until cells were filled (quota sampling). Numerous quality control measures including testing for response latencies and patterns were implemented to detect and eliminate participants who simply clicked through the questionnaire without reading the questions.

Assessment

Psychological Flexibility

Acceptance and Action Questionnaire – II (AAQ-II) (Bond et al., 2011). Psychological flexibility was measured with the AAQ-II, a unidimensional seven-item Likert-style questionnaire. Test scores on the AAQ-II are reliable and valid. Scores on the AAQ-II have been shown to predict variance above and beyond other constructs (Gloster, Klotsche, Chaker, Hummel, & Hoyer, 2011). For this study, scores were polled such that higher values represent greater flexibility. The internal consistency for this sample was $\alpha = 0.94$.

Predictor Variables

In order to facilitate comparison across measures, we scaled all predictor variables such that higher scores represented greater levels of problems. As indicated below, this required revers scaling for some of the variables.

List of Threatening Experiences (LTE)(Brugha, Bebbington, Tennant, & Hurry, 1985). Major life events/ stressors were measured using the commonly utilized LTE. The LTE queries about 12 possible major life events. Minor and more daily stressors are excluded. Participants indicate the presence or absence of these events over the past 12 months and higher scores represent greater endorsement of major life stressors.

Experienced Daily Stress. Daily stress was measured by having participants judge the stress level of seven commonly experienced stressors in daily life on a

seven-point Likert scale from “not at all stressing” to “extremely stressing”. This procedure is commonly used to measure the impact of daily stressors (Conner, Fitter, & Fletcher, 1999; O'connor et al., 2008). Higher scores represent greater daily stress and the internal consistency for this sample was $\alpha = 0.76$.

Oslo Social Support Scale (OSS) (Dalgard, 1996) The OSS is a three item measure of the availability of social support. Scores were reversed so that greater scores represent less social support. It is a commonly used measure whose test scores have been found to be reliable and valid. The internal consistency for this three item measure in this sample was $\alpha = 0.57$.

Outcome Variables

Physical Health Outcomes. Participants’ health outcomes were measured using items that asked about their overall physical health (ranging from very good to very bad); healthcare utilization of physician visits (frequency); sick days (frequency); and disability specifically related to physical problems (ranging from not at all impaired to strongly impaired).

Psychological Health Outcomes

Consistent with the predictor variables, all outcome variables were scaled such that higher scores represented greater levels of problems.

Overall Psychological Health. Participants’ overall psychological health was measured with an item (ranging from very good to very bad).

Depression, Anxiety, Stress Scales (DASS-21)(Antony, Bieling, Cox, Enns, & Swinson, 1998). Depression, Anxiety, and Stress were each measured via seven-item subscales of the DASS-21. Higher scores represent greater levels of depression, anxiety, and stress. The DASS-21 is a well-established measurement of these concepts, with demonstrated utility across numerous populations(Gloster et al., 2008)

and whose test scores have been found to be reliable and valid. The internal consistency for each subscale in this sample was DASS-D $\alpha = 0.90$; DASS-A $\alpha = 0.80$; DASS-S $\alpha = 0.87$.

Well-Being Outcomes

Satisfaction With Life Scale (SWLS)(Diener, Emmons, Larsen, & Griffin, 1985). Global life satisfaction was measured using the widely utilized five-item SWLS. Scores on the SWLS have been found to be reliable and valid. Scores were reversed so that higher scores represent less satisfaction. The internal consistency for this sample was $\alpha = 0.90$.

Mental Health Continuum – Short Form (MHC-SF)(Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). Three commonly referenced dimensions of well-being were measured using the MHC-SF: Emotional Well-Being (EW); Social Well-Being (SW); and Psychological Well-Being (PW). The test scores of the MHC-SF have been found to be reliable and valid. Scores were reversed so that higher scores on each subscale represent less levels of well-being. The internal consistency for each subscale in this sample was EW $\alpha = 0.89$; SW $\alpha = 0.87$; PW $\alpha = 0.90$.

Statistical Analyses

We set up a multiple regression model including psychological flexibility as moderator, age, sex, and work status as covariates, and the respective predictor and outcome. Covariates were included in order to avoid spurious findings. For each predictor x outcome combination a separate model was run. We were interested in the interaction effect between psychological flexibility and the respective predictor, suggesting a relationship between predictor and outcome that is malleable through psychological flexibility. The model was linear for continuous or ordinal outcomes, logistic for dichotomous outcomes, and quasi-poisson for counts. The model also

accounted for varying sampling weights and estimated standard errors accordingly, using the R package survey.

Results

Moderation

There were 35 analyses, of which 33 led to a negative and the remaining 2 to a positive sign in the interaction coefficient. That is, in 33 instances persons who were higher in psychological flexibility reported weaker relationships between risk factors and problems with physical health, psychological health, and well-being. In only two instances were the relations such that those who were higher in psychological flexibility reported stronger relationships between risk factors and problems with physical health, psychological health, and well-being. Coefficients with a positive sign were never significant (at alpha=5%), however, whereas those with negative sign were significant in 17 of 33 (51.5%) cases. Corresponding percentages by predictor (i.e., risk factor) were: 16.7% (Threating Life Events), 90.9% (Daily Stress), and 41.7% (Low Social Support). Percentages by outcome were highest for Anxiety, Depression (100% each), Overall Physical Health, Overall Psychological Health, and Health Disability (66.7% each), and lowest for Sick Days (0%). See Table 1 for details and Figure 2 for a depiction of the moderating effect of psychological flexibility on the example of the relationship between daily stress and depression.

----- Table 1 here -----

----- Figure 2 here -----

Discussion

Psychological flexibility regularly moderated outcomes of physical health, mental health, and well-being in the general population. The relationships were in the expected direction and suggested that psychological flexibility served as a protective

factor. This effect was strongest for the predictor stress and outcomes of depression and anxiety. Importantly, the moderating role of psychological flexibly was salient for well-researched associations of risk factors in a representative sample.

The moderating role of psychological flexibly was most consistent for the predictor daily stress. The present results suggest that people who can flexibly interact with stressful environmental demands have greater physical, mental, and well-being outcomes than those who are inflexible, *even if they report having more stress*. This is important because daily stressors inundate people to a degree barely imaginable a generation ago. Technology, email, migration, globalism, and a general push for ever-increasing productivity characterize modern Western society. Each aspect has some positive effects for society as a whole. Effects on the individual, however, depend on a person's ability to successfully adapt to changing demands while maintaining progress towards chosen goals. The present study suggests that psychological flexibility may be helpful towards mitigating the negative influence of such daily stressors.

The relationship between threating life events and outcomes of physical, mental, and well-being do not seem to be largely moderated by psychological flexibility. This is consistent with how threating life events are believed to influence negative outcomes. Whereas threatening events such as death of a loved one, loss, etc. lead to strong reactions, some evidence suggests that this becomes problematic when the effects are chronic. For example, divorce was found to be more problematic than other threating life events because of the chronic disturbance to ones daily life (Keller, Neale, & Kendler, 2007). Thus, negative sequelae that could potentially be moderated by psychological flexibility are more likely to materialize when they manifest into daily stress.

The moderating role of psychological flexibility on the association between social support and health outcomes again reflected logical patterns. Primarily physiological outcomes such as sickness per se and sick days were not moderated by psychological flexibility. Psychological flexibility does not likely influence whether someone becomes infected with a virus. However, psychological flexibility did moderate the relationship between social support and health disability, perception of overall health, and again depression and anxiety. These data are consistent with data showing that psychological flexibility prevented sick-leave utilization in a sample at risk for long-term disability(Dahl, Wilson, & Nilsson, 2004) and reduced rehospitalization rates in patients with psychosis (Bach & Hayes, 2002).

The moderating role of psychological flexibility on the association between predictors and outcomes of well-being is worthy of special mention. Previous authors have suggested that well-being can be supported by positive psychology(Slade, 2010). The present results showed that psychological flexibility regularly moderated the relationship between stress and four commonly cited dimensions of well-being(Keyes, 2005). Indeed, stress is seen as an influence that can tip someone at the low end of well-being into mental disorder(Keyes, 2005). Our findings suggest that psychological flexibility is such a protective factor thereby specifying a mechanism through which this may be achieved.

These results can also be understood within a larger evolutionary perspective. That is, a function of behavior is to adapt organisms quickly to changing environmental conditions, which is consistent with the principles of variation, selection, and retention. Organisms that adapt to the challenges at hand have an advantage over those that can't or don't. Likewise, people with a rich and diverse repertoire of behaviors that flexibly respond to stressors and hassles will have an

advantage over those with impoverished and rigid response repertoires(Hayes & Sanford, 2014). This is precisely the process through which psychological flexibility is hypothesized to offer a protective effect. Individuals who flexibly respond to stressors (e.g., hold the stressor and evaluations lightly, remain open to alternative possibilities) while simultaneously building behaviors that lead to what one deeply cares about (e.g., interacting with chosen valued areas with integrity, care, support, etc.) are more likely to quickly disengage from problematic responses and turn towards adaptive responses.

These findings are encouraging for public health. Daily stress is omnipresent and it is here that psychological flexibility was most consistently a protective factor. Life threatening events and low social support may still be important predictors of health and well-being, but these factors are less likely to be targets of public health: threatening events occur by definition infrequently and social support is not easily targeted by public health initiatives. Encouragingly, the effect of psychological flexibility was always either protective or sometimes inert, but never damaging. As such, iatrogenic effects do not appear likely.

Psychological flexibility is not the only important factor that contributes to physical health, mental health, and well-being. Other targets to promote health and also well-being have been discussed such as mindfulness and positive psychology(Slade, 2010). Other approaches have been proposed to intervene with specific problems once they arise (e.g., following a trauma) as in cognitive behavioral therapy (Lyubomirsky & Della Porta, 2010) or specifically for increasing well-being(Fava, 1999). Psychological flexibility is not mutually exclusive with these approaches. Indeed, psychology flexibility contains some of these processes like mindfulness. An advantage of psychological flexibility, however, lies in the fact that

interventions that promote psychological flexibility additionally program the building up of new repertoires of behaviors (i.e., valued behaviors) and critically helping an individual decide when and how to use the skills(Gloster, Klotsche, et al., 2015). Furthermore, knowledge already exits how to increase psychological flexibility from over 135 randomized clinical trials.

This study is limited in several ways. First, these data are cross-sectional and the analyses are correlational in nature. Causality cannot be directly inferred. Longitudinal and experimental designs are required to substantiate these findings. Second, whereas the models included salient predictors and outcomes, other variables might have led to different results. Third, additional population-based replication studies are needed, and these studies should include additional competing variables. Fourth, the data were self-report and thus susceptible to biases inherent in this assessment approach. Other assessment modalities such as interviews or event sampling may help overcome some of these biases.

These limitations notwithstanding, this study contributes to the growing literature on psychological flexibility and is consistent with studies that point to the advantages of flexibility in general(Cheng, Lau, & Chan, 2014). The study clearly documented how psychological flexibility moderates the impact of daily stress – an omnipresent and well-documented risk factor. This pattern was consistent across various health and well-being outcomes in a representative sample free from biases associated with clinical samples. A key importance of this is the fact that psychological flexibility is a basic factor present to a greater or lesser degree in all humans, is malleable, and techniques already exist to promote it. These results inform public health initiatives aimed at promoting well-being – a goal called for by the WHO that has largely gone unanswered in part because of the difficulty of knowing

what to target. Targeting subgroups with low levels of psychological flexibility might offer the most impact.

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References

Antony, M. M., Bieling, P. J., Cox, B. J., Enns, M. W., & Swinson, R. P. (1998). Psychometric properties of the 42-item and 21-item versions of the Depression Anxiety Stress Scales in clinical groups and a community sample. *Psychological Assessment, 10*, 176-181. doi: 10.1037/1040-3590.10.2.176

Bach, P., & Hayes, S. C. (2002). The use of acceptance and commitment therapy to prevent the rehospitalization of psychotic patients: A randomized controlled trial. *Journal of Consulting and Clinical Psychology, 70*, 1129-1139. doi: 10.1037/0022-006X.70.5.1129

Berghofer, A., Roll, S., Bauer, M., Willich, S. N., & Pfennig, A. (2014). Screening for depression and high utilization of health care resources among patients in primary care. *Community Mental Health Journal, 50*, 753-758. doi: 10.1007/s10597-014-9700-4

Bond, F. W., Hayes, S. C., Baer, R. A., Carpenter, K. M., Guenole, N., Orcutt, H. K., . . . Zettle, R. D. (2011). Preliminary psychometric properties of the Acceptance and Action Questionnaire-II: A revised measure of psychological inflexibility and experiential avoidance. *Behavior Therapy, 42*, 676-688.

Brugha, T., Bebbington, P., Tennant, C., & Hurry, J. (1985). The List of Threatening Experiences - a subset of 12 life event categories with considerable long-term contextual threat. *Psychological Medicine, 15*, 189-194.

Cheng, C., Lau, H. P. B., & Chan, M. P. S. (2014). Coping flexibility and psychological adjustment to stressful life changes: A meta-analytic review. *Psychological Bulletin, 140*, 1582-1607. doi: 10.1037/a0037913

Clarke, S., Kingston, J., James, K., Bolderston, H., & Remington, B. (2014). Acceptance and commitment therapy group for treatment-resistant participants: A randomized controlled trial. *Journal of Contextual Behavioral Science, 3*, 179-188. doi: 10.1016/j.jcbs.2014.04.005

Cohen, S., Janicki-Deverts, D., & Miller, G. E. (2007). Psychological stress and disease. *Journal of the American Medical Association, 298*, 1685-1687. doi: 10.1001/Jama.298.14.1685

Conner, M., Fitter, M., & Fletcher, W. (1999). Stress and snacking: A diary study of daily hassles and between-meal snacking. *Psychology & Health, 14*, 51-63. doi: 10.1080/08870449908407313

Dahl, J., Wilson, K. G., & Nilsson, A. (2004). Acceptance and commitment therapy and the treatment of persons at risk for long-term disability resulting from stress and pain symptoms: A preliminary randomized trial. *Behavior Therapy, 35*, 785-801. doi: 10.1016/S0005-7894(04)80020-0

Dalgard, O. (1996). Community health profile: A tool for psychiatric prevention. In D. R. Trent & C. A. Reed (Eds.), *Promotion of mental health* (Vol. 5). Aldershot: Avebury Press.

Delongis, A., Folkman, S., & Lazarus, R. S. (1988). The impact of daily stress on health and mood - Psychological and social resources as mediators. *Journal of Personality and Social Psychology, 54*, 486-495. doi: 10.1037/0022-3514.54.3.486

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment, 49*, 71-75. doi: 10.1207/S15327752jpa4901_13

Fava, G. A. (1999). Well-being therapy: Conceptual and technical issues. *Psychotherapy and Psychosomatics, 68*, 171-179. doi: 10.1159/000012329

Fava, G. A., Rafanelli, C., Ottolini, F., Ruini, C., Cazzaro, M., & Grandi, S. (2001). Psychological well-being and residual symptoms in remitted patients with panic disorder and agoraphobia. *Journal of Affective Disorders, 65*, 185-190. doi: 10.1016/S0165-0327(00)00267-6

Fledderus, M., Bohlmeijer, E. T., Fox, J. P., Schreurs, K. M. G., & Spinhoven, P. (2013). The role of psychological flexibility in a self-help acceptance and commitment therapy intervention for psychological distress in a randomized controlled trial. *Behaviour Research and Therapy, 51*, 142-151. doi: 10.1016/j.brat.2012.11.007

Gençöz, T., Özlale, Y., & Lennon, R. (2004). Direct and indirect effects of social support on psychological well-being. *Social Behavior and Personality: An international journal, 32*, 449-458.

Gloster, A. T., Gerlach, A. L., Hamm, A., Hofler, M., Alpers, G. W., Kircher, T., . . . Reif, A. (2015). 5HTT is associated with the phenotype psychological flexibility: Results from a randomized clinical trial. *European Archives of Psychiatry and Clinical Neuroscience, 265*, 399-406. doi: 10.1007/s00406-015-0575-3

Gloster, A. T., Klotsche, J., Chaker, S., Hummel, K. V., & Hoyer, J. (2011). Assessing psychological flexibility: What does it add above and beyond existing constructs? *Psychological Assessment, 23*, 970-982. doi: 10.1037/A0024135

Gloster, A. T., Klotsche, J., Ciarrochi, J., Eifert, G., Sonntag, R., Wittchen, H., & Hoyer, J. (2015). *Increasing valued behaviors precedes reduction in suffering: Findings from a randomized controlled trial using ACT*. Manuscript submitted for publication.

Gloster, A. T., Klotsche, J., Gerlach, A. L., Hamm, A., Strohle, A., Gauggel, S., . . . Wittchen, H. U. (2014). Timing matters: Change depends on the stage of treatment in cognitive behavioral therapy for panic disorder with agoraphobia. *Journal of Consulting and Clinical Psychology, 82*, 141-153. doi: 10.1037/A0034555

Gloster, A. T., Rhoades, H. M., Novy, D., Klotsche, J., Senior, A., Kunik, M., . . . Stanley, M. A. (2008). Psychometric properties of the Depression Anxiety and Stress Scale-21 in older primary care patients. *Journal of Affective Disorders, 110*, 248-259. doi: 10.1016/j.jad.2008.01.023

Gloster, A. T., Sonntag, R., Hoyer, J., Meyer, A. H., Heinze, S., Strohle, A., . . . Wittchen, H. U. (2015). Treating treatment-resistant patients with panic disorder and agoraphobia using psychotherapy: A randomized controlled switching trial. *Psychotherapy and Psychosomatics, 84*, 100-109. doi: 10.1159/000370162

Hayes, S. C., Luoma, J. B., Bond, F. W., Masuda, A., & Lillis, J. (2006). Acceptance and commitment therapy: Model, processes and outcomes. *Behaviour Research and Therapy, 44*, 1-25. doi: 10.1016/j.brat.2005.06.006

Hayes, S. C., & Sanford, B. T. (2014). Cooperation came first: Evolution and human cognition. *Journal of the Experimental Analysis of Behavior, 101*, 112-129. doi: 10.1002/jeab.64

Hofer, P., Waadt, M., Aschwanden, R., Milidou, M., Acker, J., Meyer, A. H., . . . Gloster, A. T. (2015). *The effectiveness of an ACT self-help intervention for stress and burnout without therapist contact: An exclusively online randomized controlled trial.* Manuscript submitted for publication.

Holt-Lunstad, J., Smith, T. B., & Layton, J. B. (2010). Social relationships and mortality risk: A meta-analytic review. *PLoS Med, 7*, e1000316. doi: 10.1371/journal.pmed.1000316

Huppert, F. A. (2009). Psychological well-being: Evidence regarding its causes and consequences. *Applied Psychology-Health and Well Being, 1*, 137-164. doi: 10.1111/j.1758-0854.2009.01008.x

Kashdan, T. B., & Rottenberg, J. (2010). Psychological flexibility as a fundamental aspect of health. *Clinical Psychology Review, 30*, 865-878. doi: 10.1016/J.Cpr.2010.03.001

Keller, M. C., Neale, M. C., & Kendler, K. S. (2007). Association of different adverse life events with distinct patterns of depressive symptoms. *American Journal of Psychiatry, 164*, 1521-1529. doi: 10.1176/appi.ajp.2007.06091564

Kessler, R. C., Chiu, W. T., Demler, O., & Walters, E. E. (2005). Prevalence, severity, and comorbidity of 12-month DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry, 62*, 617-627. doi: 10.1001/Archpsyc.62.6.617

Keyes, C. L. M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology, 73*, 539-548. doi: 10.1037/0022-006X.73.3.539

Kleiman, E., & Liu, R. (2013). Social support as a protective factor in suicide: Findings from two nationally representative samples. *Journal of Affective Disorders, 150*, 540-545.

Kucera, J., & Krummenacher, A. (2016). *Die Bevölkerung der Schweiz 2015*. Neuchâtel: Bundesamt für Statistik

Lamers, S. M. A., Westerhof, G. J., Bohlmeijer, E. T., ten Klooster, P. M., & Keyes, C. L. M. (2011). Evaluating the psychometric properties of the Mental Health Continuum-Short Form (MHC-SF). *Journal of Clinical Psychology, 67*, 99-110. doi: 10.1002/jclp.20741

Levin, M. E., Hildebrandt, M. J., Lillis, J., & Hayes, S. C. (2012). The impact of treatment components suggested by the psychological flexibility model: A meta-analysis of laboratory-based component studies. *Behavior Therapy, 43*, 741-756.

Levin, M. E., Lillis, J., & Hayes, S. C. (2012). When is online pornography viewing problematic among college males? Examining the moderating role of experiential avoidance. *Sexual Addiction & Compulsivity, 19*, 168-180. doi: 10.1080/10720162.2012.657150

Lundgren, T., Dahl, J., & Hayes, S. C. (2008). Evaluation of mediators of change in the treatment of epilepsy with acceptance and commitment therapy. *Journal of Behavioral Medicine, 31*, 225-235. doi: 10.1007/s10865-008-9151-x

Lyubomirsky, S., & Della Porta, M. D. (2010). Boosting happiness, buttressing resilience. In J. W. Reich, A. J. Zautra & J. S. Hall (Eds.), *Handbook of adult resilience* (pp. 450-464). New York, NY: Guilford Press.

O'connor, D. B., Jones, F., Conner, M., McMillan, B., & Ferguson, E. (2008). Effects of daily hassles and eating style on eating behavior. *Health Psychology, 27*, 20-31. doi: 10.1037/0278-6133.27.1(Suppl.).S20

Piazza, J. R., Charles, S. T., Sliwinski, M. J., Mogle, J., & Almeida, D. M. (2013). Affective reactivity to daily stressors and long-term risk of reporting a chronic physical health condition. *Annals of Behavioral Medicine, 45*, 110-120. doi: 10.1007/s12160-012-9423-0

Pickett, S. M., Bardeen, J. R., & Orcutt, H. K. (2011). Experiential avoidance as a moderator of the relationship between behavioral inhibition system sensitivity and posttraumatic stress symptoms. *Journal of Anxiety Disorders, 25*, 1038-1045. doi: 10.1016/j.janxdis.2011.06.013

Randall, J. A. (2011). *Acceptance and suppression as moderators of the relationship between fear of negative evaluation and social anxiety symptomatology.* Pacific University. Retrieved from http://commons.pacificu.edu/spp/177

Slade, M. (2010). Mental illness and well-being: the central importance of positive psychology and recovery approaches. *Bmc Health Services Research, 10*. doi: 10.1186/1472-6963-10-26

Tessner, K. D., Mittal, V., & Walker, E. F. (2011). Longitudinal study of stressful life events and daily stressors among adolescents at high risk for psychotic disorders. *Schizophrenia Bulletin, 37*, 432-441. doi: 10.1093/schbul/sbp087

Wilson, D. S., Hayes, S. C., Biglan, A., & Embry, D. D. (2014). Evolving the future: Toward a science of intentional change. *Behavioral and Brain Science, 37*, 395-416. doi: 10.1017/S0140525x13001593

Wittchen, H. U., Jacobi, F., Rehm, J., Gustavsson, A., Svensson, M., Jonsson, B., . . . Steinhausen, H. C. (2011). The size and burden of mental disorders and other disorders of the brain in Europe 2010. *European neuropsychopharmacology: the journal of the European College of Neuropsychopharmacology, 21*, 655-679. doi: 10.1016/j.euroneuro.2011.07.018

Witthauer, C., Gloster, A. T., Meyer, A. H., Goodwin, R. D., & Lieb, R. (2014). Comorbidity of infectious diseases and anxiety disorders in adults and its association with quality of life: A community study. *Frontiers in public health, 2*, 80. doi: 10.3389/fpubh.2014.00080

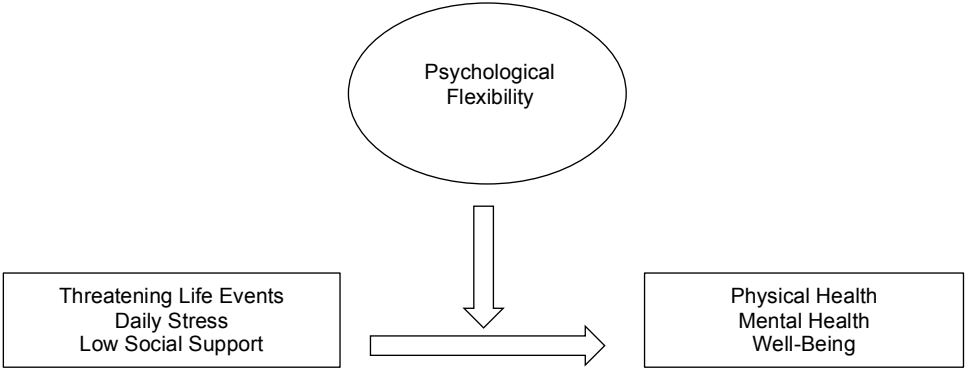
Table 1

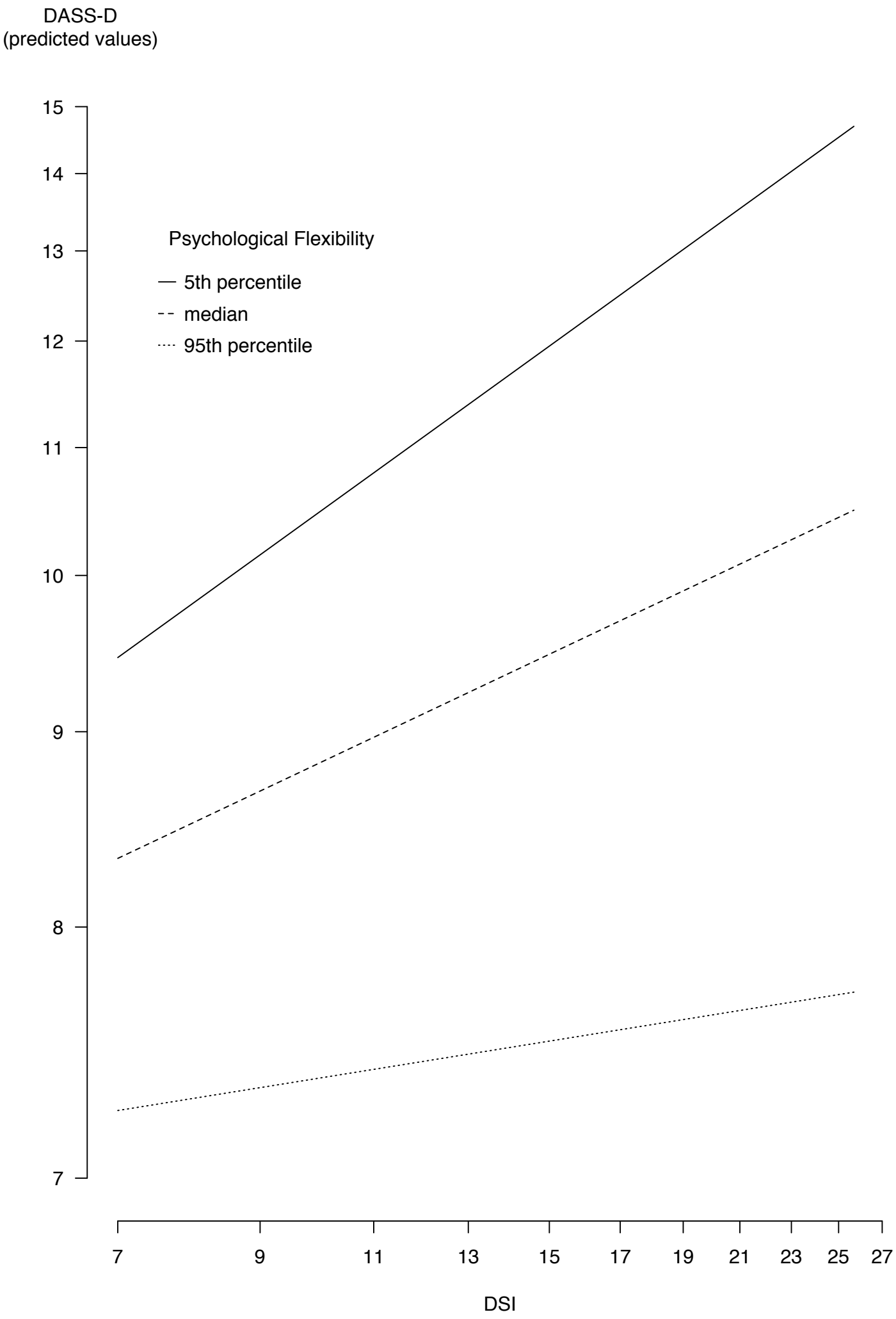
Moderating Effect of Psychological Flexibility on Relationship between Predictors and Health/Well-Being Outcomes

Outcome Domain	Specific Outcome	Risk Factor	*B* (SE)	*t*–value	*p*—
Physical Health	Overall	Threatening Life Events	–1.25 (2.14;–4.64)	–0.72	>.250
		Daily Stress	–0.08 (–0.02;–0.14)	–2.88	**.004***
		Low Social Support	–0.06 (–0.001;–0.12)	–2.00	**.046***
	Physician Visits	Threatening Life Events	–3.00 (8.52;–14.5)	–0.51	>.250
		Daily Stress	–0.25 (–0.07;–0.43)	–2.71	**.007***
		Low Social Support	–0.09 (0.11;–0.29)	–0.92	>.250
	Sick Days	Threatening Life Events	19.8 (44.5;–4.85)	1.57	.116
		Daily Stress	–0.18 (0.43;–0.79)	–0.57	>.250
		Low Social Support	–0.58 (0.22;–1.39)	–1.41	.156
	Health Disability	Threatening Life Events	–2.63 (3.41;–8.67)	–0.85	>.250
		Daily Stress	–0.18 (–0.10;–0.26)	–4.56	**<.001***
		Low Social Support	–0.14 (–0.06;–0.22)	–3.24	**.001***
Psychological Health	Overall Psychological Health	Threatening Life Events	–3.04 (0.66;–6.74)	–1.61	.107
		Daily Stress	–0.11 (–0.05;–0.17)	–4.22	**<.001***
		Low Social Support	–0.12 (–0.06;–0.18)	–4.33	**<.001***
	Stress (x 10^{-2})	Threatening Life Events	–4.06 (13.6;–21.7)	–0.45	>.250
		Daily Stress	N/A	N/A	N/A
		Low Social Support	–0.3 (0.01;–0.61)	1.89	.059
	Depression (x 10^{-2})	Threatening Life Events	–23.49 (–4.91;–42.1)	–2.47	**.014***
		Daily Stress	–0.70 (–0.39;–1.01)	–4.46	**<.001***
		Low Social Support	–0.54 (–0.23;–0.85)	–3.49	**<.001***
	Anxiety (x 10^{-2})	Threatening Life Events	–33.25 (–15.1;–51.4)	–3.58	**<.001***
		Daily Stress	–0.94 (–0.63;–1.25)	–6.03	**<.001***
		Low Social Support	–0.58 (–0.29;–0.87)	–3.79	**<.001***
Well–Being	Life Satisfaction	Threatening Life Events	–42.3 (6.09;–90.7)	–1.71	.087
		Daily Stress	–1.19 (–0.62;–1.76)	–4.13	**<.001***
		Low Social Support	–0.58 (0.05;–1.21)	–1.83	.067
	Emotional Well–Being	Threatening Life Events	–3.45 (1.63;–8.53)	–1.33	.183
		Daily Stress	–0.10 (–0.04;–0.16)	–3.37	**.001***
		Low Social Support	–0.05 (0.01;–0.11)	–1.81	.070
	Social Well–Being	Threatening Life Events	12.17 (84.8;–60.5)	0.33	>.250
		Daily Stress	–0.90 (–0.06;–1.74)	–2.09	**.036***
		Low Social Support	0.00 (0.78;–0.78)	–0.01	>.250
	Psychological Well–Being	Threatening Life Events	–4.00 (5.27;–13.3)	–0.84	>.250
		Daily Stress	–0.16 (–0.04;–0.28)	–2.77	**.006***
		Low Social Support	–0.03 (0.07;–0.13)	–0.71	>.250

Note: B denotes the coefficient of the interaction term between the respective predictors–outcome pair. A negative/positive value of *B* denotes a decreasing/increasing association between predictor and outcome with increasing psychological flexibility; x 10^{-2} = the *B* needs to be divided by 100. This was done to ensure that very small numbers could be presented with sufficient precision; N/A = planned missing to avoid redundancy in predictor and outcome; Statistical significant at the .05 level is denoted by bolded numbers with *; all predictor and outcome variables were scaled such that higher numbers represent greater problems.

Figure 1


Psychological
Flexibility
Threatening Life Events
Daily Stress
Low Social Support
Physical Health
Mental Health
Well-Being


DASS-D
(predicted values)
15
14
13
12
11
10
9
8
7
Psychological Flexibility
5th percentile
median
95th percentile
7
9
11
13
15
17
19
21
23
25
27
DSI