This is an unedited manuscript accepted for publication at *Journal of Behavior Therapy and Experimental Psychiatry*. The published version of the paper is available under the following link:

https://doi.org/10.1016/j.jbtep.2022.101811

Development and validation of the Ambiguous Scenario Task for Perfectionistic Concerns for University Students

Barbara Cludius[1], Julia Hummel[1], Karina Limburg[1], Marcella L. Woud[2], and Keisuke Takano[1]

[1] Department of Psychology, LMU Munich

[2] Mental Health Research and Treatment Center, Faculty of Psychology, Ruhr-Universität Bochum

Author note

We have no conflict of interest to declare. Correspondence concerning this article should be addressed to: Barbara Cludius. Department of Psychology, Division of Clinical Psychology and Psychotherapy, LMU Munich, Leopoldstrasse 13, 80802 Munich, Germany. Telephone: +49 89 2180 5590. Fax: +49 89 2180 5224. E-mail: barbara.cludius@psy.lmu.de.

Abstract

Background and Objectives: Interpretation biases (IBs) are found in a range of psychological disorders, and the transdiagnostic role of IBs has gained increasing attention. Among the variants, IBs of perfectionism (e.g., interpreting a trivial error as equivalent to complete failure) are understood to be a central transdiagnostic phenotype. Perfectionism is a multidimensional construct and the dimension of perfectionistic concerns has been found to be most closely related to psychopathology. Therefore, capturing IBs that are specifically related to perfectionistic concerns (not perfectionism in general) is of particular importance in studying pathological IBs. Thus, we developed and validated Ambiguous Scenario Task for Perfectionistic Concerns (AST-PC) to be used in university students.

Methods: We created two versions of the AST-PC and administered each version to one of the two independent student samples (i.e., Version A to N = 108 and Version B to N = 110). We then examined the factor structure and associations with established questionnaires of perfectionism, depression, and anxiety.

Results: The AST-PC showed good factorial validity, confirming the hypothesized three-factor structure: perfectionistic concerns, adaptive, and maladaptive (but not perfectionistic) interpretations. The interpretations related to perfectionistic concerns showed good correlations with questionnaires of perfectionistic concerns, depressive symptoms, and trait anxiety.

Limitations: Additional validation studies are required to establish the temporal stability of the task scores and their sensitivity to experimental induction and clinical intervention. Additionally, IBs of perfectionism should be investigated within a broader transdiagnostic context.

Conclusions: The AST-PC demonstrated good psychometric properties. Future applications of the task are discussed.

Keywords: Perfectionism, perfectionistic concerns, interpretation bias, anxiety, depression

Highlights

- Ambiguous Scenario Task for Perfectionistic Concerns (AST-PC) was developed.
- The AST-PC assesses interpretation biases (IBs) related to perfectionistic concern.
- Confirmatory factor analyses showed good factorial validity for the AST-PC.
- The IBs correlated with dispositional perfectionism, depression, and anxiety.
- The AST-PC may be useful to study perfectionistic IBs as a transdiagnostic factor.

Development and Validation of the Ambiguous Scenario Task for Perfectionistic Concerns

1. Introduction

Cognitive research in psychopathology has shown that individuals with psychological disorders or at risk for a disorder tend to interpret ambiguous information in a systematically biased (emotionally negative or disorder-specific) manner. Such interpretation biases (IBs) have gained much attention as a cognitive marker or even vulnerability factor for numerous disorders, including depression and various anxiety disorders (e.g., Hirsch, Meeten, Krahé, & Reeder, 2016; Mathews & MacLeod, 2005). To illustrate, a study by Woud, Zhang, Becker, McNally, and Margraf (2014) showed that panic-related IBs predicted an onset of panic disorder even after controlling for other known risk factors. There are several paradigms available to assess IBs (for an overview of paradigms to assess IBs, see supplements of Hirsch et al., 2016). Some of them use reaction time to infer IBs; typically, ambiguous information is presented with prime target words that participants have to categorize. Other paradigms include presenting (open-ended) ambiguous scenarios for which participants are either required to generate an ending (i.e., an interpretation) or select or rank order explanations that involve different interpretations of the ambiguous scenario.

Independent of the type of paradigm, there is robust and consistent evidence that a dysfunctional, interpretational processing style is associated with a wide range of psychopathological symptoms and a variety of psychological disorders. For example, a recent meta-analysis revealed a lack of a positive IB and a bias towards threat for ambiguous, social situations in social anxiety (Chen et al., 2020). IBs in social anxiety are usually tested using written ambiguous situations (e.g., sentences or vignettes of social situations) or visual stimuli (e.g., pictures of threatening faces). Similarly, a meta-analysis showed that depression is associated with a negative IB and a lack of positive IB (Everaert et al., 2017). A study by Ree, Pollitt, and Harvey (2006) showed that poor sleepers tend to interpret ambiguous situations within the context of insomnia (e.g., “fogginess” is interpreted as “drowsiness”) as compared to normal sleepers (cf. Ellis, Gardani, & Hogh, 2010; Ree et al., 2006). Woud and colleagues found IBs related to alcohol in both alcohol-dependent inpatients and students who drink heavily (Woud, Pawelczak, et al., 2014; Woud, Zhang, et al., 2014). Furthermore, IBs of trauma have shown a positive correlation with trauma symptoms (Woud et al., 2019). Similar patterns have been found across various psychopathology, such as generalized anxiety disorder, anxiety sensitivity, and panic disorder (Teachman, Smith-Janik, & Saporito, 2007; Zahler et al., 2020). Thus, it is evident that IBs specific to a disorder play a role in numerous psychological disorders. These findings also suggest that IBs (apart from the disorder-specific contents or targets of the biases) are general cognitive processing styles contributing to multiple disorders and therefore should be investigated from a transdiagnostic perspective (Harvey, Watkins, & Mansell, 2004; National Institute of Mental Health, 2020).

The current study focuses on a known transdiagnostic construct, perfectionism. There is a growing body of research operationalizing perfectionism and investigating it within the context of IBs (e.g., Yiend, Savulich, Coughtrey, & Shafran, 2011). Qualitative and quantitative evidence suggests the importance of perfectionism in the etiology of various types of psychopathology, such as depression, anxiety, and eating disorders (Egan, Wade, & Shafran, 2011; Limburg, Watson, Hagger, & Egan, 2017). Perfectionism is typically defined as the tendency to set high standards and engage in overly critical self-

evaluation (Frost & Marten, 1990); it is commonly understood as a multidimensional construct. Therefore, most existing perfectionism scales consist of multiple dimensions that cover perfectionistic strivings and perfectionistic concerns. Perfectionistic strivings refers to the tendency to set extremely high standards, and perfectionistic concerns describes the tendency to react negatively to one's own mistakes, to interpret those mistakes as equivalent to failure, and to assume that one will lose the respect of others following failure (Frost et al., 1990). Both dimensions are shown to be associated with psychopathology although the associations are stronger for perfectionistic concerns than perfectionistic strivings (Limburg et al., 2017). Previous research has almost exclusively relied on questionnaires to assess perfectionism (e.g., Limburg et al., 2017). One of the most widely used questionnaires is the Frost Multidimensional Perfectionism Scale (FMPS-D; Frost, Marten, Lahart, & Rosenblate, 1990; German version: Stöber, 1998), which targets enduring trait dispositions of perfectionism on several dimensions, including personal standards (i.e., perfectionistic strivings) and concerns over mistakes (i.e., perfectionistic concerns). Another questionnaire, the Multidimensional Perfectionism Cognitions Inventory (MPCI; Kobori & Tanno, 2004; German version: Prestele & Altstötter-Gleich, 2019), assesses automatic thoughts involving themes of perfectionism in several dimensions, including (a) personal standards (e.g., perfectionistic strivings), (b) pursuit of perfection, and (c) concerns over mistakes (i.e., perfectionistic concerns).

Both theoretical and empirical evidence highlight that IBs play a vital role within the context of perfectionism. Shafran, Cooper, and Fairburn (2002) proposes that individuals with high levels of perfectionism tend to interpret trivial errors (e.g., giving a wrong answer in an exam) as equivalent to complete failure (e.g., "I have totally failed the exam"). That is, individuals with high levels of perfectionism exhibit an exaggerated and dysfunctional interpretational style. This tendency may cause maladaptive psychological states and responses, such as low self-esteem and self-criticism. Also, perfectionistic interpretations might trigger a fear of negative evaluations from others. Although empirical evidence on IBs in perfectionism is still scarce, across a series of experimental studies researchers have developed an IB task to assess perfectionistic interpretations while establishing the content specificity of the task (i.e., being not reflective of general negativity; Yiend et al., 2011). Yiend et al. (2011) also manipulated perfection-specific IBs via systematic, computerized interpretation training and found that this manipulation influences performance checking behavior (cf. Boone, Soenens, Vansteenkiste, & Braet, 2012).

Building on these findings and theoretical considerations, the current study aimed to advance IB research on perfectionism, providing more specific and detailed information for psychopathology. The motivation for this goal was twofold – first, a reliable and valid assessment tool was needed to study perfectionistic interpretations as a transdiagnostic risk factor for psychopathology. Specifically, we wanted to develop an IB task that captures the dimension of perfectionistic concerns, because demonstrably, this dimension is the most closely associated with psychopathology, unlike other dimensions such as perfectionistic strivings (Limburg et al., 2017). Second, it is generally recommended to cross-validate evidence using different methodological approaches (Munafò & Smith, 2018). Cross-validation can help to reduce potential biases in results arising from exclusive reliance on a particular measure. Optimally, a construct or a process (in this case, perfection-specific IBs) should be assessed via multiple and varying methods of operationalization. Although the present study overlaps conceptually

with the seminal work of Yiend et al. (2011), our unique contribution would be to strengthen the psychological and psychometric evidence on perfection-specific IBs with a particular focus on perfectionistic concerns.

Accordingly, the present study developed and validated a novel ambiguous scenario task to assess IBs specifically related to perfectionistic concerns (Ambiguous Scenario Task for Perfectionistic Concerns; AST-PC). In contrast to the task created by Yiend et al. (2011), our AST-PC was created to include response options specific to perfectionistic concerns. Furthermore, within the same scenario, the AST-PC also included a response option for maladaptive, non-perfectionistic responses. Lastly, based on the used outcome measures of the tasks, namely, similarity rating for response options with ambiguous passage (Yiend et al., 2011) vs. rating of likeliness to react this way in the AST-PC, the AST-PC is assumed to be less implicit compared to the IB task by Yiend et al. (2011).

In our analyses, we aimed to establish the factorial validity (i.e., the task's IB score is psychometrically separable from other forms of interpretation) and construct validity (i.e., the IB score is correlated with existing measures of perfectionistic concerns as well as relevant psychopathology symptoms). The AST-PC consists of ambiguous scenarios that allow for different interpretations. Half of the scenarios describe episodes in typical academic settings, and the other half are situations from non-academic and daily life contexts (Table 1). Each scenario was presented together with three types of interpretations (or resolutions) that disambiguated the situation: (a) perfectionistic concern, (b) adaptive, and (c) maladaptive but not perfectionistic interpretation. The last interpretational category was added to differentiate between a general negativity bias and a bias specific to perfectionistic concern (cf. Yiend et al., 2011). Thus, the maladaptive interpretations (or resolutions) were created in a way that is not helpful or constructive in the given situation but also does not include interpretations related to perfectionistic concerns. The interpretations across both the academic and daily life scenarios were designed to represent perfectionistic concerns, characterized by doubts about one's performance (Blatt, 1995; Frost et al., 1990) and concerns about negative evaluation (Kobori & Tanno, 2004; Prestele & Altstötter-Gleich, 2019; Stöber, Kobori, & Tanno, 2010). In the AST-PC, participants were instructed to imagine themselves in the described situation. Next, the three interpretations were presented separately in random order, and participants were asked to rate the likelihood of each interpretation. For each type of interpretation, likelihood ratings were aggregated across scenarios, and the aggregated scores served as indices of participants' interpretational tendencies. We included academic scenarios in the AST-PC because we aimed to create a measure with university students as the main target population. This was done because university students show high levels of maladaptive perfectionism (including perfectionistic concerns, e.g., Collin et al., 2020; Grzegorek et al., 2004; Hummel et al., 2023) and report various problems due to their high perfectionistic concerns (e.g., reduced academic achievement, Madigan, 2019). Lastly, student populations are often used as analogue samples for clinical populations and therefore provide an adequate sample for this first, proof-of-principle study.

Another key feature of the AST-PC is that the task is designed for repeated measurements, which enable researchers to assess within-person changes in IBs relevant to perfectionistic concerns. Pre-to-post changes are often a main target of analysis in experimental studies inducing perfectionistic cognition (e.g., Boone, Soenens, Vansteenkiste, & Braet, 2012; Yiend et al., 2011) or related studies manipulating interpretational processing styles, such as cognitive bias modification training (e.g., Joormann, Waugh, & Gotlib, 2015; Mathews & Mackintosh, 2000; Salemink, van den Hout, & Kindt,

2009; Woud et al., 2018). In an experimental context, it is important to administer parallel versions of the task for different time points as a manipulation check (to assess whether the training induced the intended changes in interpretations), because presenting identical stimuli multiple times may cause habituation and unexpected learning effects. For this purpose, we created two versions of the AST-PC (hereafter, Version A and B), with a parallel structure (regarding the task and response scheme) that include different scenarios and interpretations.

To establish the AST-PC's psychometric properties, we first tested the factor structure of the task using confirmatory factor analysis (CFA). The CFA approach uses item selections to achieve a clear single factor structure for each form of interpretation (i.e., perfectionistic concern, adaptive, and maladaptive). Note that the item selection was performed at the scenario level, because the three forms of interpretation are nested in each scenario. For this hierarchical structure, we used confirmatory but not exploratory factor analysis, that is, to model within-scenario correlations. We explored measurement models for each form of the interpretations (Figure 1A), while comparing the one- vs. two-factor models by scenario types in terms of model fit (Figure 1B). We then established the "full" model covering three forms of interpretations as independent (but correlated) latent factors (Figure 1C). To test construct validity, we explored whether the AST-PC is correlated with the existing perfectionism questionnaires (FMPS-D, MPCI) and general psychopathology measures (depression and anxiety). We anticipated that interpretations related to perfectionistic concerns would be positively correlated with the questionnaires assessing perfectionism (FMPS-D and MPCI), especially with the subscales related to perfectionistic concerns (concerns over mistakes of the FMPS-D and MPCI and doubts about actions of the FMPS-D). We also performed multiple regression analyses to examine whether questionnaire-measured perfectionism is uniquely associated with the interpretations related to perfectionistic concerns after controlling for the adaptive and maladaptive interpretations. As stated above, psychopathology is related to general negative IBs; however, we wanted to test interpretations specifically related to perfectionistic concerns. Because the AST-PC consists exclusively of emotionally negative scenarios and negatively toned perfection-relevant interpretations, we compared the results of the AST-PC with an additional set of neutral ambiguous scenarios (Table 3; Ambiguous Scenario Task Neutral Scenarios, AST-N). These scenarios offered negative and positive (but not perfectionistic) interpretations and thus could be used as controls for emotional valence in the regression analyses. Finally, we tested whether the two parallel versions of the AST-PC (Version A and B) have comparable psychometric properties; that is, the factor analyses and tests on the validity of the two versions were performed by administering each version on an independent sample.

2. Method

2.1 Participants and procedure

We recruited 223 students (39 men, 177 women, one other, and six unknown; age: M = 23.2, SD = 5.2 years) via flyers distributed around the university as well as online advertisements on social networking services. The inclusion criteria were the following: (a) fluent in German, (b) aged ≥ 18 years, and (c) enrolled as a student at a university. Data from five participants were not used for the statistical analyses because (a) two had technical errors in saving data, (b) one was not a student, and (c) two received an incorrect version of the AST-PC and their data were not saved. Upon arrival at our

laboratory, the participants provided written informed consent. Participants first completed the self-report questionnaires including the FMPS-D and MPCI, following which they received either Version A or B of the AST-PC and AST-N at random; 108 participants completed Version A, whereas 110 completed Version B. We used random.org for the allocation of participants to the two versions of the AST-PC. The study protocol was approved by the Ethics Committee of the Department of Psychology, LMU Munich (62_Cludius_b).

The sample size was determined outside of the current study (Hummel et al., 2023; see also our preregistered study protocol: https://osf.io/evkx6 and https://osf.io/zj78d). Wolf, Harrington, Clark, and Miller (2013) suggested that, in general, approximately 100 observations are needed to estimate a three-factor CFA model with six indicators per factor with moderate and high factor loadings. This finding supports the sample sizes that we had for each version of the AST-PC.

2.2 Measures

2.2.1 Ambiguous Scenario Task for Perfectionistic Concerns*.*

We first generated a pool of hypothetical scenarios (academic and non-academic, daily life settings) as well as the three types of interpretations (perfectionistic concern, adaptive, and maladaptive but not perfectionistic) for each scenario. The interpretations related to perfectionistic concerns were based on the concern-over-mistakes subscale of the FMPS-D. Three of the authors (BC, KL, and MLW) verified the content of the scenarios, then selected five academic and five daily life scenarios for each parallel version of the AST-PC. Five clinical psychologists were asked to rate the response options to each scenario on how strongly it relates to perfectionism and how dysfunctional the interpretation is. This rating confirmed that the perfectionistic concerns items were rated as highly perfectionistic.

The task was implemented with E-prime (Schneider, Eschman, & Zuccolotto, 2002), which controlled the stimulus presentations and recorded participants' responses. Each scenario was presented in random order, immediately followed by one of the three interpretations (presented in random order within a scenario). For each type of interpretation, participants rated the likelihood on a 9-point scale (1 = *very unlikely*, 9 = *very likely*).

2.2.2 Ambiguous Scenario Task – Neutral Scenarios.

This task was designed as a filler or control task that had a parallel structure to the AST-PC but consisted of emotionally neutral scenarios. Each scenario was followed by positive, negative, and neutral interpretations (none of them was related to perfection). The AST-N also had two parallel versions (five academic and five daily life scenarios each), and this task was embedded in the AST-PC, Versions A and B. That is, in the actual assessment, participants received a general instruction covering the two tasks, and the scenarios from the AST-PC and AST-N were intermixed and presented in random order. Therefore, participants were not explicitly instructed to perform two different tasks; instead, they were informed that they would be presented with a series of scenarios that they were supposed to interpret. Before participants started with the actual task, they were presented with three practice scenarios that were not used for statistical analyses.

To infer IBs, we calculated the mean ratings of each form of interpretation (aggregated across the two types of scenarios, namely academic and non-academic, daily life scenarios). The internal

consistency was acceptable for the negative and positive interpretations of the AST-N (Cronbach's α = 0.66 and 0.61), but not for neutral interpretations (α = 0.42). This low internal consistency suggests that participants' ratings of neutral interpretations were inconsistent and unstable across the scenarios. Therefore, we only used negative and positive interpretation scores for the statistical analyses. As noted above, the AST-N served as a filler or control task representing negative or positive (but not perfectionistic) interpretations for emotionally neutral scenarios. The AST-PC also covers a negative (maladaptive) form of interpretation, which is associated with scenarios that are not emotionally neutral and allow for perfection-related interpretations, such as an evaluative situation. Because our primary focus was on the psychometric properties of the AST-PC, we decided not to examine the validity of the AST-N in depth.

2.2.3 Frost Multidimensional Perfectionism Scale

The Frost Multidimensional Perfectionism Scale (FMPS-D; Frost et al., 1990; German version: Stöber, 1998) consists of 35 items assessing six dimensions of trait perfectionism as the following: concern over mistakes, doubts about actions, parental expectations, parental criticism, personal standards, and organization. For this study, we specifically used two dimensions related to perfectionistic concerns, that is, concern over mistakes (nine items; e.g., "I should be upset if I make a mistake"), doubts about actions (four items; e.g., "I usually have doubts about the simple everyday things I do"); and one dimension related to perfectionistic strivings, that is, personal standards (seven items; e.g., "I set higher goals than most people"). Each item was rated on a five-point scale (1 = *strongly disagree*, 5 = *strongly agree*). In this study, each dimension showed good internal consistency (α = .80–.92).

2.2.4 Multidimensional Perfectionism Cognitions Inventory

The Multidimensional Perfectionism Cognitions Inventory (MPCI; Kobori & Tanno, 2004; German version: Prestele & Altstötter-Gleich, 2019) assesses automatic thoughts involving perfectionistic themes for the following three dimensions: concern over mistakes (i.e., perfectionistic concerns), personal standards, and pursuit of perfection (five items each). To capture the transient state of perfectionistic cognition, we modified the time window of the instructions; here, participants rated how frequently they experienced perfectionistic thoughts during the last 20 minutes (last week in the original instruction). A four-point scale was used (1 = *never*, 4 = *always*). Each dimension showed good internal consistency (α = .86–.91) in our study.

2.2.5 Beck Depression Inventory II

Depressive symptoms were assessed using the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996; German version: Hautzinger, Keller, & Kühner, 2006). It consists of 21 items rated from zero to three points related to depressive symptoms. The sum score indicates the severity of the symptoms and showed good internal consistency (α = .92) in our study.

2.2.6 State-Trait Anxiety Inventory – Trait

Trait anxiety was measured by the State-Trait Anxiety Inventory – Trait (STAI-T; Spielberger, Gorsuch, & Lushene, 1970; German version: Laux, Glanzmann, Schaffner & Spielberger, 1981). The

inventory consists of 20 items representing general feelings of stress, worry, and discomfort. Participants rate each item on a four-point scale. The sum score indicates anxiety level as a dispositional characteristic. The scale showed good internal consistency (α = .93) in our study.

2.3 Statistical analyses

We performed a series of CFAs on the AST-PC to determine the factor structure. As the task had a 2 × 3 design with the scenario types (academic and daily life) and forms of interpretations (perfectionistic concerns, adaptive, and maladaptive), we explored whether the task should be configured to have six factors or some of the conditions should be combined to yield a more parsimonious factor structure. First, we fit a simple measurement model (Figure 1A) for each form of interpretation that participants rated. Using the model-fit indices, we selected the items (here, each interpretation to rate) that fit the data well. Initially, all items were entered into the model and items that had the lowest factor loading were excluded. This item reduction was repeated until the model achieved an acceptable model fit, comparative fit index (CFI) > 0.90, and root mean square error of approximation (RMSEA) < 0.08. To do so, we tested whether we should assume two factors representing the two types of scenarios (i.e., academic and daily life), or a single factor structure would suffice (Figure 1B). The Akaike information criterion (AIC; a smaller value indicates a better model fit) was used for model selection.

Next, the specified measurement models for the three interpretations of the AST-PC, namely, perfectionistic concern, adaptive, and maladaptive interpretations of the AST-PC were integrated into a larger model with three latent factors (Figure 1C). This larger CFA model clarified whether the interpretations were psychometrically separable and could be recognized as different latent factors. We also estimated a one-factor model as a benchmark to explicitly show that the three-factor model fits the data better. The error covariance was assumed between the interpretation items within each scenario. Each interpretation item was constrained to have a loading based only on the relevant factor; for example, perfectionistic concern interpretation items) were assumed to have loadings based on the latent factor of perfectionistic concern but not on other factors of adaptive or maladaptive interpretations.

To establish construct validity, we examined the correlations between the AST-PC and questionnaire-measured perfectionism. That is, we computed the mean score for each form of interpretation (but not the factor scores for ease of calculation and application for future research) – after the item selection through CFA, interpretations related to perfectionistic concerns showed good internal consistency (Cronbach's alphas = 0.87 and 0.83 for Versions A and B). We also performed multiple regression analyses, from which scores on the concern-over-mistakes subscales of the questionnaires (FMPS-D and MPCI) were predicted by the perfectionistic concern score after controlling for the maladaptive non-perfectionistic interpretation assessed by the AST-PC and the positive and negative interpretations by the AST-N. These controls (i.e., maladaptive non-perfectionistic interpretation of the AST-PC and the interpretations of the AST-N) were used to exclude the possibility that general negativity of the perfectionistic interpretations completely explains the association with questionnaire-measured perfectionism. All analyses were performed using R Version 4 with a specific package for CFAs (lavaan; Rosseel, 2012).

3. Results

3.1 Factor Structure of the AST-PC, Version A

The factor structure was inspected separately for the two parallel versions of the AST-PC (Version A and Version B of the AST-PC). For Version A, the measurement models showed adequate model fits for perfectionistic concern and adaptive interpretations (Table 1), while maintaining all 10 scenarios in the models. However, the measurement model for maladaptive interpretations had convergence issues when all items were used. We excluded therefore the least informative scenario (e.g., one item had the mean rating of 1.76 with *SD* = 1.48, indicating that most participants rated "very unlikely"). This resulted in three academic and four daily-life scenarios achieving an acceptable model fit. Because the AIC gave greater weight to the one-factor over the two-factor structure (academic and non-academic, daily life scenarios) consistently across the three forms of interpretations, we did not consider distinctions between the scenario types (i.e., academic vs. daily life settings) in the following analyses.

The selected items were then used to estimate the full model, which covered three academic and four daily life scenarios (7 scenarios x 3 interpretations = 21 interpretation items in total). The estimated results revealed that the adaptive interpretation item of an academic life scenario had negligible loading on the intended factor (β = 0.039), which was thus excluded along with the paired perfectionistic concern and maladaptive interpretation items that belonged to the same scenario. The final model with 18 selected interpretation items showed a good model fit. Also, this three-factor model fit the data better than the one-factor model. The standardized factor loadings are listed in Table 3. Overall, each item (interpretation) had a good loading solely on the intended factor (i.e., perfectionistic concerns, maladaptive non-perfectionistic, or adaptive). One interpretation item had a relatively low factor loading (i.e., DL 4 Ad; see the supplementary material for the item description) and thus could have been excluded in order to increase the homogeneity of the adaptive interpretation score when aggregated across scenarios. Ultimately, we decided to keep this item given that the model fit was good overall. These results suggest that the perfectionistic concern interpretation is separable from the other two types, although the inter-factor correlations show substantial overlaps between the factors.

3.2 Factor Structure of the AST-PC, Version B

The same analyses were repeated for Version B of the AST-PC. The results were quite similar to those of Version A: (a) the measurement models showed good fit with the data, although several maladaptive interpretation items had to be excluded to improve the model fit (Table 4). (b) The one-factor model was preferred to the two-factor model (i.e., academic and non-academic, daily life scenarios) across interpretations; (c) the full model with three latent factors for the perfectionistic concern, adaptive, and maladaptive interpretations showed a good model fit after excluding interpretation items that had low factor loadings.

3.3 Construct validity of the AST-PC: Correlations and Multiple Regressions

The interpretations related to perfectionistic concerns were highly correlated with the concern-over-mistakes subscales of the FMPS-D and MPCI (*r*s = .55–.82; Table 5), whereas the correlations with the personal-standard subscales were small or moderate (*r*s = .13–.47). The perfectionistic concern

interpretations also showed moderate correlations with depressive symptoms (BDI-II) and trait anxiety (STAI-T). Furthermore, the results of the multiple regression analyses (Table 6) indicated that for the parallel versions of the AST-PC, the perfectionistic concern interpretations are uniquely associated with concern over mistakes (FMPS-D and MPCI) even after controlling for non-perfectionistic maladaptive and negative interpretations. Similarly, additional regressions showed that perfectionistic concern interpretations were uniquely predicted by concern over mistakes even after controlling for other forms of perfectionism, such as doubts about actions and personal standards. These findings suggest that the AST-PC indeed reflects perfectionistic concerns, and that this association cannot be explained merely by the negative valence of the interpretations.

4. Discussion

Various IBs have been shown to be associated with numerous psychological disorders (Hirsch et al., 2016). Furthermore, perfectionism has been suggested as a transdiagnostic factor (Egan et al., 2011; Limburg et al., 2017). Importantly, these two concepts do not operate in isolation, and theory and research align in that perfectionism can be characterized by IB. Specifically, high levels of dispositional perfectionism are associated with a dysfunctional, perfection-relevant interpretational style (e.g., Yiend et al., 2011). The aim of the current study therefore was to develop and validate a version of the ambiguous scenario task to assess IBs related to perfectionistic concerns (AST-PC) in order to further advance and deepen knowledge regarding the role of IBs in pathological perfectionism.

The AST-PC demonstrated good factorial validity, confirming the hypothesized three-factor structure (i.e., perfectionistic concerns, adaptive, and maladaptive interpretations) as well as excellent construct validity for the associations with questionnaire-measured perfectionism traits and cognition. The ATS-PC targets specific interpretations relevant to perfectionistic concerns, the dimension that is closely associated with psychopathology (Limburg et al., 2017; cf. Yiend et al., 2011). Furthermore, the two parallel versions of the AST-P demonstrated comparable psychometric properties in terms of their factor structure and correlations with other questionnaires. This may indicate a reliable assessment of IBs related to perfectionistic concerns if used in experimental investigations or treatment studies that require repeated measurements. Note that, however, the two versions were designed to have a parallel structure (regarding the task and response scheme) but our data does not guarantee that the two versions are consistent within a person. A within-person investigation is still warranted.

The AST-PC was designed to assess three forms of interpretations for ambiguous scenarios from academic and non-academic daily life settings. The CFAs supported our hypotheses that the perfectionistic interpretations are separable from general (mal)adaptive interpretations. This indicates that the AST-PC can be used to specifically assess perfectionistic concerns, which, in turn, may serve as a risk factor for various mental disorders. As such, it is useful to differentiate perfectionistic from disorder-specific IBs, especially in those disorders that are characterized by perfectionistic concerns but also show disorder-specific negativity biases (e.g., social anxiety and depression). The distinction between academic and daily life scenarios did not emerge as an independent factor. Therefore, researchers may consider using both types of scenarios for student populations, whiles exclusively focusing on the daily life scenarios for non-student populations. This does not immediately mean, however, that the academic scenarios can be omitted safely – our data showed that there is little or no additive value in scoring IB for

academic and daily life scenarios separately among students. Put otherwise, it is still recommended to (re)test the task's (and scenarios') properties if one wants to omit the academic scenarios e.g., for a study in the general population.

The AST-PC has several limitations. First, it should be noted that perfectionistic interpretations are moderately correlated with the other types of interpretations of AST-PC. These correlations suggest that perfectionistic interpretations overlap with (mal)adaptive interpretations, for example, in terms of emotional valence such as lack of positivity and excess of negativity. This notion is further supported by the correlations between positive and negative interpretations as assessed by the AST-N. As a general recommendation, an appropriate control should be used if one wants to highlight a pure perfectionistic component in perfectionistic interpretations, avoiding contamination by other emotional factors. Similarly, it would be helpful to extend the AST-PC with scenarios in relation to fear of negative evaluation, to differentiate IBs related to social anxiety versus perfectionism. Second, we only assessed the AST-PC and questionnaires at one time point. Thus, we cannot make inferences about the stability of the AST-PC, its sensitivity to change, or its predictive validity. Additional validation studies are warranted at multiple assessment time points, which will establish the degree of measurement invariance across time, clinical utility for identifying or screening at-risk samples, predictive power informing future increases in psychopathology symptoms, or the onset of a psychological disorder. Third, we only included one measure for depressive symptoms (BDI-II) and one for anxiety (STAI). As perfectionistic IBs are thought to be a transdiagnostic vulnerability factor, future studies should include a wide range of psychopathological measures (including e.g., measures of social anxiety).

The AST-PC was constructed with two different parallel versions (Version A and Version B) to be used to assess the effect of experimental inductions of perfectionistic cognitions (e.g., Boone et al., 2012) or interventions targeting (maladaptive) perfectionism (Riley, Lee, Cooper, Fairburn, & Shafran, 2007; Shafran et al., 2002). Our data indicate the psychometric equivalence of the two parallel versions of the AST-PC on factor structure and correlations with conceptually related measures. However, a replication study is necessary to confirm the factor structure and the reliability and validity of the task. This study should be conducted with two measurement time points to be able to assess re-test reliability. Furthermore, it is still unclear how effective the AST-PC is at capturing changes caused by experimental manipulation or clinical intervention for perfectionism. We have elaborated on this issue elsewhere (Hummel et al., 2023), which provides preliminary evidence that the AST-PC is sensitive to an experimental manipulation of perfectionistic cognition among highly perfectionistic individuals. It may be interesting to assess the responsiveness of AST-PC to clinical intervention and treatment. The AST-PC could be used in experimental psychopathology research, especially when including student samples as analogue samples to a population with a mental disorder. The AST-PC could complement questionnaire measures on perfectionism, and could be used to assess changes in IBs within the lab, when testing the effect of an (novel) intervention, for example, an intervention targeting perfectionistic concerns. Ultimately, the AST-PC may also be used in clinical trial research, including various disorders, to assess changes in perfectionism as a transdiagnostic factor and potential mechanism of change.

In conclusion, the current study offers a psychometrically valid tool to assess IBs in perfectionism, specifically, perfectionistic concerns. Although the non-clinical nature of our samples may limit the clinical implications of the findings, we hope that the AST-PC enhances experimental research

from a transdiagnostic perspective. Future research should focus on the predictive validity of the AST-PC as a measure of vulnerability to psychopathological symptoms (Vervliet & Raes, 2013); therefore, it should be administered to samples such as those comprising individuals at risk for or suffering from a psychological disorder. Although the link between perfectionistic IBs and psychopathology (especially depressive symptoms and anxiety) is clear in our cross-sectional data, longitudinal and additional experimental investigations are important next steps in elucidating aspects concerning mechanisms and causality, that is, how perfection-relevant IBs contribute to the onset and persistence of symptoms of psychopathology.

Acknowledgements

We thank Veronika Huber for her support in data collection. This work was supported by the Department of Psychology, LMU Munich.

References

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). Beck depression inventory-II. *San Antonio, 78*(2), 490-498.

Blatt, S. J. (1995). The destructiveness of perfectionism: Implications for the treatment of depression. *American Psychologist, 50*(12), 1003.

Boone, L., Soenens, B., Vansteenkiste, M., & Braet, C. (2012). Is there a perfectionist in each of us? An experimental study on perfectionism and eating disorder symptoms. *Appetite, 59*(2), 531-540. doi:10.1016/j.appet.2012.06.015

Egan, S. J., Wade, T. D., & Shafran, R. (2011). Perfectionism as a transdiagnostic process: A clinical review. *Clinical Psychology Review, 31*(2), 203-212. doi:10.1016/j.cpr.2010.04.009

Ellis, J., Gardani, M., & Hogh, H. (2010). Priming affects poor sleepers but not normal sleepers on an insomnia ambiguity task. *Journal of Sleep Research, 19*(1-Part-I), 27-30.

Frost, R. O., Heimberg, R. G., Holt, C. S., Mattia, J. I., & Neubauer, A. L. (1993). A comparison of two measures of perfectionism. *Personality and Individual Differences, 14*(1), 119-126. doi:10.1016/0191-8869(93)90181-2

Frost, R. O., Marten, P., Lahart, C., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research, 14*(5), 449-468. doi:10.1007/BF01172967

Frost, R. O., & Marten, P. A. (1990). Perfectionism and evaluative threat. *Cognitive Therapy and Research, 14*(6), 559-572.

Harvey, A. G., Watkins, E., & Mansell, W. (2004). *Cognitive behavioural processes across psychological disorders: A transdiagnostic approach to research and treatment*: Oxford University Press, USA.

Hautzinger, M., Keller, F., & Kühner, C. (2006). *Beck Depressions-Inventar (BDI-II)*. Frankfurt/Main: Harcourt Test Services.

Hirsch, C. R., & Mathews, A. (2000). Impaired positive inferential bias in social phobia. *Journal of Abnormal Psychology, 109*(4), 705.

Hirsch, C. R., Meeten, F., Krahé, C., & Reeder, C. (2016). Resolving Ambiguity in Emotional Disorders: The Nature and Role of Interpretation Biases. *Annual Review of Clinical Psychology, 12*, 281-305. doi:10.1146/annurev-clinpsy-021815-093436

Hummel, J., Cludius, B., Woud, M. L., Holdenrieder, J., Mende, N., Huber, V., Limburg, K., & Takano, K. (2023). The causal relationship between perfectionism and negative affect: Two experimental studies. *Personality and Individual Differences*, *200*, 111895. https://doi.org/10.1016/j.paid.2022.111895

Joormann, J., Waugh, C. E., & Gotlib, I. H. (2015). Cognitive bias modification for interpretation in major depression: Effects on memory and stress reactivity. *Clinical Psychological Science, 3*(1), 126-139.

Kobori, O., & Tanno, Y. (2004). Development of Multidimensional Perfectionism Cognition Inventory. *The Japanese Journal of Personality, 13*, 34-43. doi:10.2132/personality.13.34

Krahé, C., Whyte, J., Bridge, L., Loizou, S., & Hirsch, C. R. (2019). Are different forms of repetitive negative thinking associated with interpretation bias in generalized anxiety disorder and depression? *Clinical Psychological Science, 7*(5), 969-981.

Laux, L., Glanzmann, P., Schaffner, P., & Spielberger, C. D. (1981). *Das State-Trait-Angstinventar. Theoretische Grundlagen und Handanweisung. [The State-Trait Anxiety Inventory. Theoretical basics and manual.]*.

Limburg, K., Watson, H. J., Hagger, M. S., & Egan, S. J. (2017). The Relationship Between Perfectionism and Psychopathology: A Meta-Analysis. *Journal of Clinical Psychology, 73*(10), 1301-1326. doi:10.1002/jclp.22435

Mathews, A., & Mackintosh, B. (2000). Induced emotional interpretation bias and anxiety. *Journal of Abnormal Psychology, 109*(4), 602-615. doi:10.1037/0021-843X.109.4.602

Mathews, A., & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology, 1*(1), 167-195. doi:10.1146/annurev.clinpsy.1.102803.143916

Munafò, M. R., & Smith, G. D. (2018). Robust research needs many lines of evidence: Nature Publishing Group.

National Institute of Mental Health. (2020). Research Domain Criteria (RDoC). Retrieved from https://www.nimh.nih.gov/research-priorities/rdoc/index.shtml

Prestele, E., & Altstötter-Gleich, C. (2019). Testgüte einer deutschen Version des Mehrdimensionalen Perfektionismus Kognitions-Inventars (MPCI-G). *Diagnostica, 65*(1), 14-25. doi:10.1026/0012-1924/a000211

Ree, M. J., Pollitt, A., & Harvey, A. G. (2006). An investigation of interpretive bias in insomnia: an analog study comparing normal and poor sleepers. *Sleep, 29*(10), 1359-1362.

Riley, C., Lee, M., Cooper, Z., Fairburn, C. G., & Shafran, R. (2007). A randomised controlled trial of cognitive-behaviour therapy for clinical perfectionism: a preliminary study. *Behaviour Research and Therapy, 45*(9), 2221-2231. doi:10.1016/j.brat.2006.12.003

Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling and more. Version 0.5–12 (BETA). *Journal of Statistical Software, 48*(2), 1-36.

Salemink, E., van den Hout, M., & Kindt, M. (2009). Effects of positive interpretive bias modification in highly anxious individuals. *Journal of Anxiety Disorders, 23*(5), 676-683.

Schneider, W., Eschman, A., & Zuccolotto, A. (2002). *E-Prime Reference Guide*. Pittsburgh: Psychology Software Tools Inc.

Shafran, R., Cooper, Z., & Fairburn, C. G. (2002). Clinical perfectionism: a cognitive-behavioural analysis. *Behaviour Research and Therapy, 40*(7), 773-791. doi:10.1016/s0005-7967(01)00059-6

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *STAI manual for the state-trait anxiety inventory. Self-Evaluation Questionnaire*. Palo Alto, CA: Consulting Psychologists Press.

Stöber, J. (1998). The Frost Multidimensional Perfectionism Scale revisited: More perfect with four (instead of six) dimensions. *Personality and Individual Differences, 24*, 481-491. doi:10.1016/S0191-8869(97)00232-8

Stöber, J., Kobori, O., & Tanno, Y. (2010). The Multidimensional Perfectionism Cognitions Inventory-English (MPCI-E): Reliability, validity, and relationships with positive and negative affect. *Journal of Personality Assessment, 92*(1), 16-25.

Teachman, B. A., Smith-Janik, S. B., & Saporito, J. (2007). Information processing biases and panic disorder: Relationships among cognitive and symptom measures. *Behaviour Research and Therapy, 45*(8), 1791-1811.

Vervliet, B., & Raes, F. (2013). Criteria of validity in experimental psychopathology: application to models of anxiety and depression. *Psychological Medicine, 43*(11), 2241-2244.

Voncken, M. J., & Bögels, S. M. (2008). Social performance deficits in social anxiety disorder: Reality during conversation and biased perception during speech. *Journal of Anxiety Disorders, 22*(8), 1384-1392.

Wolf, E. J., Harrington, K. M., Clark, S. L., & Miller, M. W. (2013). Sample size requirements for structural equation models: An evaluation of power, bias, and solution propriety. *Educational and psychological measurement, 73*(6), 913-934.

Woud, M. L., Cwik, J. C., de Kleine, R. A., Blackwell, S. E., Würtz, F., & Margraf, J. (2019). Assessing trauma-related appraisals by means of a scenario-based approach. *Cognitive Therapy and Research, 43*(1), 185-198.

Woud, M. L., Pawelczak, S., Rinck, M., Lindenmeyer, J., Souren, P., Wiers, R. W., & Becker, E. S. (2014). Alcohol-related interpretation bias in alcohol-dependent patients. *Alcoholism: Clinical and Experimental Research, 38*(4), 1151-1159.

Woud, M. L., Zhang, X. C., Becker, E. S., McNally, R. J., & Margraf, J. (2014). Don't panic: Interpretation bias is predictive of new onsets of panic disorder. *Journal of Anxiety Disorders, 28*(1), 83-87.

Woud, M. L., Zlomuzica, A., Cwik, J. C., Margraf, J., Shkreli, L., Blackwell, S. E., . . . Ehring, T. (2018). Effects of appraisal training on responses to a distressing autobiographical event. *Journal of Anxiety Disorders, 56*, 26-34. doi:10.1016/j.janxdis.2018.03.010

Yiend, J., Savulich, G., Coughtrey, A., & Shafran, R. (2011). Biased interpretation in perfectionism and its modification. *Behaviour Research and Therapy, 49*(12), 892-900. doi:10.1016/j.brat.2011.10.004

Zahler, L., Sommer, K., Reinecke, A., Wilhelm, F. H., Margraf, J., & Woud, M. L. (2020). Cognitive Vulnerability in the Context of Panic: Assessment of Panic-Related Associations and Interpretations in Individuals with Varying Levels of Anxiety Sensitivity. *Cognitive Therapy and Research, 44*(4), 858-873.

Table 1

Structure and Examples of the Ambiguous Scenario Tasks

Task	Scenario	Type of interpretation	Example
AST-PC	Academic (e.g., When creating the online survey for my bachelor's thesis, I made a mistake that the participants can see.)	Perfectionistic concern	They must think that I am completely unsuitable for my intended occupation.
		Adaptive	The participants probably didn't even notice the mistake.
		Maladaptive	I am annoyed that I can no longer fix the error.
	Daily life (e.g., I bought the wrong ticket on the bus which was more expensive than necessary.)	Perfectionistic concern	I am annoyed about my inattention.
		Adaptive	I sit down and don't think about it any further.
		Maladaptive	I am annoyed that now I don't have enough change for the coffee machine anymore.
AST-N (filter task)	Academic (e.g., The library is very full today.)	Positive	Then it's easier for me to study because everyone else has to study, too.
		Negative	I probably can't concentrate well because it's going to be too loud.
		Neutral	I sit down on an empty seat and unpack my books.
	Daily life (e.g., It could be an extremely hot day tomorrow.)	Positive	I like the hot weather and look forward to going to the pool.
		Negative	The hot weather always strains me and I will stay indoors
		Neutral	I pack the sunscreen and enough water.

Note. AST-PC/-N = Ambiguous Scenario Task for Perfectionistic Concerns/ Neutral Scenarios

Table 2

Fit Indices of the Confirmatory Factor Models for the Two Parallel Versions of the AST-PC

Version / Model	N of scenarios	χ^2	*p*	CFI	RMSEA	AIC
Version A (*n* = 108) /						
Measurement models:						
Perfectionistic concern, one factor	5, 5	46.044	0.100	0.979	0.054	4449.706
Perfectionistic concern, two factors	5, 5	46.044	0.081	0.977	0.057	4451.706
Adaptive, one factor	5, 5	43.838	0.145	0.960	0.048	4507.668
Adaptive, two factors [a]	5, 5	43.725	0.123	0.956	0.051	4509.555
Maladaptive, one factor	3, 4	13.970	0.452	1.000	0.000	3396.232
Maladaptive, two factors	3, 4	13.930	0.379	0.966	0.026	3398.192
One-factor model	2, 4	201.133	<0.001	0.865	0.082	8138.172
Full (three-factor) model	2, 4	162.069	0.002	0.923	0.062	8105.107
Version B (*n* = 110) /						
Measurement models:						
Perfectionistic concern, one factor	5, 5	59.083	0.007	0.931	0.079	4722.791
Perfectionistic concern, two factors	5, 5	58.458	0.006	0.930	0.081	4724.166
Adaptive, one factor	5, 5	28.660	0.767	1.000	0.000	4816.621
Adaptive, two factors [a]	5, 5	28.221	0.746	1.000	0.000	4818.183
Maladaptive, one factor	4, 4	15.450	0.750	1.000	0.000	3856.230
Maladaptive, two factors	4, 4	15.062	0.719	1.000	0.000	3857.843
One-factor model	3, 4	246.119	<0.001	0.867	0.065	10016.201
Full (three-factor) model	3, 4	201.981	0.026	0.937	0.045	9978.062

Note. N of scenarios = number of academic vs. daily-life scenarios included in the model. One factor, two factors = the factor structure distinguishing (or not distinguishing) between the academic and daily-life scenarios; Full model = final model that covers perfectionistic concern, adaptive, and maladaptive items as latent factors. [a] the covariance matrix of the latent variables had a non-positive definite most likely because of the model misspecification; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; AIC = Akaike Information Criterion.

Table 3

Factor Loadings of the AST-PC (Version A) and Inter-factor Correlations

Scenario, type of interpretation	Factors		
	Perfectionistic concern	Adaptive	Maladaptive
Ac 1, PC	0.731		
Ac 4, PC	0.738		
DL 1, PC	0.407		
DL 2, PC	0.782		
DL 3, PC	0.830		
DL 4, PC	0.834		
Ac 1, Ad		0.744	
Ac 4, Ad		0.368	
DL 1, Ad		0.413	
DL 2, Ad		0.641	
DL 3, Ad		0.733	
DL 4, Ad		0.183	
Ac 1, Ma			0.300
Ac 4, Ma			0.301
DL 1, Ma			0.307
DL 2, Ma			0.402
DL 3, Ma			0.335
DL 4, Ma			0.263
Inter-factor Correlations			
Perfectionistic concerns	-		
Adaptive	-0.769	-	
Maladaptive	0.753	-0.382	-

Note. Ac = Academic scenarios; DL= Daily life scenarios; PC= Perfectionistic concern; Ad = Adaptive; Mal = Maladaptive interpretations. Loadings in the blank cells were fixed to be zero. See the supplementary materials for the detailed item descriptions.

Table 4

Factor Loadings of the AST-PC (Version B) and Inter-factor Correlations

Scenarios, type of interpretation	Factors		
	Perfectionistic concern	Adaptive	Maladaptive
Ac 1, PC	0.674		
Ac 4, PC	0.661		
AC 5, PC	0.533		
DL 1, PC	0.659		
DL 2, PC	0.783		
DL 3, PC	0.436		
DL 5, PC	0.667		
Ac 1, Ad		0.602	
Ac 4, Ad		0.568	
Ac 5, Ad		0.533	
DL 1, Ad		0.526	
DL 2, Ad		0.410	
DL 3, Ad		0.343	
DL 5, Ad		0.528	
Ac 1, Ma			0.500
Ac 4, Ma			0.418
Ac 5, Ma			0.326
DL 1, Ma			0.381
DL 2, Ma			0.284
DL 3, Ma			0.620
DL 5, Ma			0.305
Inter-factor Correlations			
Perfectionistic concerns	-		
Adaptive	-0.764	-	
Maladaptive	0.616	-0.282	-

Note. Ac = Academic scenarios; DL= Daily life scenarios; PC= Perfectionistic concern; Ad = Adaptive; Ma = Maladaptive interpretations. Loadings in the blank cells were fixed to be zero. See the supplementary materials for the detailed item descriptions.

Table 5

Descriptives and Correlations

Version / Variable	*N*	*M*	*SD*	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Version A															
1. AST-PC PC	108	4.2	1.8												
2. AST-PC Ad	108	6.0	1.3	-0.66											
3. AST-PC Mal	108	4.7	1.2	0.48	-0.27										
4. AST-N Pos	108	5.9	1.1	-0.49	0.56	-0.03									
5. AST-N Neg	108	4.3	1.1	0.43	-0.32	0.43	-0.42								
6. BDI-II	106	12.0	9.3	0.47	-0.47	0.24	-0.38	0.24							
7. STAI-T	107	44.5	12.0	0.56	-0.54	0.38	-0.41	0.38	0.77						
8. MPCI PS	107	15.5	6.6	0.21	-0.13	0.19	0.03	0.01	0.24	0.15					
9. MPCI CM	107	14.1	6.1	0.62	-0.48	0.39	-0.28	0.24	0.46	0.52	0.61				
10. MPCI PP	107	13.1	6.2	0.46	-0.30	0.31	-0.15	0.20	0.39	0.40	0.72	0.77			
11. FMPS-D CM	107	25.3	8.0	0.82	-0.61	0.40	-0.42	0.35	0.49	0.64	0.32	0.69	0.54		
12. FMPS-D DA	107	11.8	3.6	0.54	-0.41	0.38	-0.30	0.39	0.44	0.55	0.09	0.46	0.36	0.56	
13. FMPS-D PS	107	24.2	4.8	0.47	-0.35	0.31	-0.18	0.32	0.29	0.36	0.43	0.48	0.49	0.62	0.30
Version B															
1. AST-PC PC	110	3.8	1.7												
2. AST-PC Ad	110	5.5	1.4	-0.65											
3. AST-PC Mal	110	4.4	1.3	0.43	-0.15										
4. AST-N Pos	110	5.6	1.1	-0.43	0.59	-0.12									
5. AST-N Neg	110	4.2	1.2	0.48	-0.18	0.54	-0.37								
6. BDI-II	107	12.6	10.5	0.49	-0.30	0.18	-0.35	0.25							
7. STAI-T	107	44.7	11.3	0.48	-0.42	0.19	-0.38	0.24	0.84						
8. MPCI PS	107	15.2	6.8	0.13	-0.12	-0.03	-0.04	0.03	0.14	0.10					
9. MPCI CM	107	14.1	6.6	0.55	-0.39	0.18	-0.26	0.20	0.55	0.55	0.60				
10. MPCI PP	107	13.1	6.3	0.36	-0.28	0.08	-0.07	0.09	0.39	0.29	0.75	0.73			
11. FMPS-D CM	107	25.5	8.0	0.58	-0.41	0.31	-0.35	0.34	0.55	0.60	0.26	0.65	0.43		

12. FMPS-D DA	107	12.6	3.7	0.50	-0.49	0.26	-0.24	0.28	0.44	0.57	0.22	0.54	0.41	0.58	
13. FMPS-D PS	107	24.5	5.2	0.38	-0.32	0.16	-0.25	0.29	0.28	0.28	0.51	0.49	0.49	0.72	0.37

Note. AST-PC PC, Ad, Mal = Ambiguous Scenario Task for Perfectionistic Concerns, Perfectionistic concern, Adaptive, Maladaptive interpretations; AST-N Pos, Neg= Ambiguous Scenario Task – Neutral Scenarios, Positive, Negative interpretations; BDI-II = Beck Depression Inventory II; STAI-T State-Trait Anxiety Inventory – Trait; MPCI PS, CM, PP = Multidimensional Perfectionism Cognitions Inventory, Personal Standards, Perfectionistic concerns, Pursuit of Perfection; FMPS-D CM, DA, PS = Frost Multidimensional Perfectionism Scale, Perfectionistic concerns, Doubts about Actions, Personal Standards. Parallel versions of the AST-PC and AST-N (Versions A and B) were administered on two independent samples.

Table 6

Multiple Regressions to Test Concurrent and Discriminant Validity

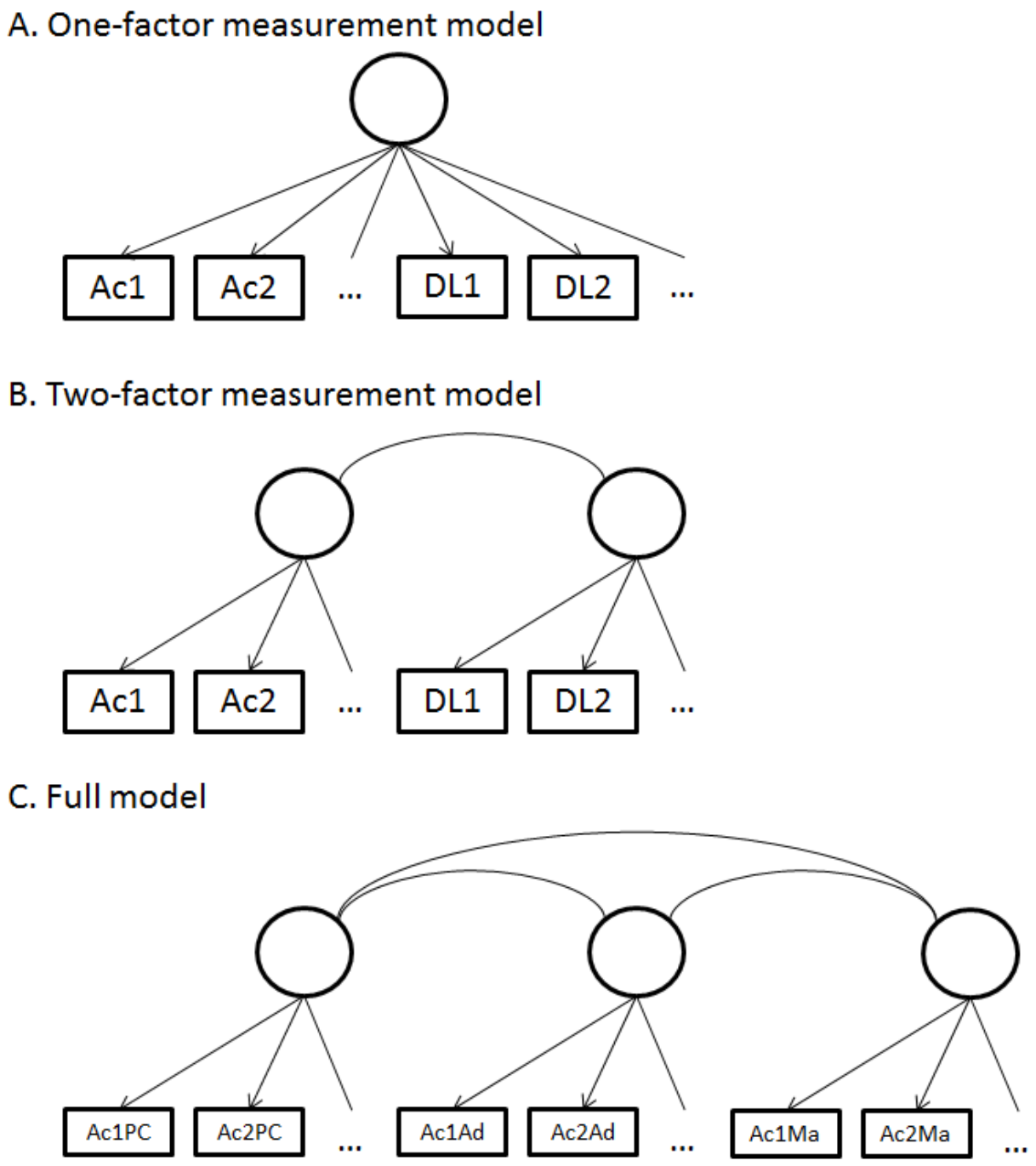
IV	Estimate	*SE*	*t*	*p*
Version A				
DV: FMPS-D CM	R^2 = 0.69			
AST-PC PC	3.25	0.37	8.72	0.00
AST-PC Ad	-0.74	0.48	-1.53	0.13
AST-PC Mal	0.06	0.47	0.13	0.89
AST-N Pos	0.13	0.54	0.24	0.81
AST-N Neg	0.02	0.50	0.04	0.97
DV: MPCI CM	R^2 = 0.41			
AST-PC PC	1.63	0.39	4.18	0.00
AST-PC Ad	-0.67	0.50	-1.32	0.19
AST-PC Mal	0.71	0.49	1.43	0.15
AST-N Pos	0.09	0.57	0.15	0.88
AST-N Neg	-0.37	0.52	-0.71	0.48
DV: AST-PC	R^2 = 0.68			
CM	0.18	0.18	9.91	<0.01
DA	0.05	0.03	1.54	0.13
PS	-0.02	0.03	0.83	0.41
DV: AST-PC	R^2 = 0.37			
CM	0.20	0.04	5.40	<0.01
PP	-0.01	0.04	-0.37	0.71
Version B				
DV: FMPS-D CM	R^2 = 0.36			
AST-PC PC	2.22	0.58	3.80	0.00
AST-PC Ad	-0.12	0.71	-0.17	0.86
AST-PC Mal	0.45	0.63	0.71	0.48
AST-N Pos	-0.84	0.75	-1.11	0.27
AST-N Neg	0.22	0.73	0.30	0.77
DV: MPCI CM	R^2 = 0.31			
AST-PC PC	2.29	0.50	4.59	0.00
AST-PC Ad	0.01	0.60	0.01	0.99
AST-PC Mal	-0.24	0.54	-0.45	0.66
AST-N Pos	-0.26	0.64	-0.40	0.69
AST-N Neg	-0.37	0.63	-0.59	0.56
DV: AST-PC	R^2 = 0.36			
CM	0.10	0.03	3.81	<0.01
DA	0.11	0.04	2.55	0.01
PS	-0.02	0.04	-0.56	0.58
DV: AST-PC	R^2 = 0.30			
CM	0.16	0.03	5.31	<0.01

PP	-0.03	0.03	-0.93	0.36

Note. AST-PC PC, Ad, Mal = Ambiguous Scenario Task for Perfectionistic Concerns, Perfectionistic concern, Adaptive, Maladaptive interpretations; AST-N Pos, Neg= Ambiguous Scenario Task – Neutral Scenarios, Positive, Negative interpretations; MPCI PS, CM, PP = Multidimensional Perfectionism Cognitions Inventory, Personal Standards, Concerns over Mistakes, Pursuit of Perfection; FMPS-D CM, DA, PS = Frost Multidimensional Perfectionism Scale, Perfectionistic concerns, Doubts about Actions, Personal Standards.

Figure 1

Confirmatory Factor Analyses on the Ambiguous Scenario Task for Perfectionistic Concerns



Note. Ac = Academic scenario; DL = Daily-life scenario; PC= Perfectionistic concern item; Ad = Adaptive interpretation item; Ma = Maladaptive interpretation item. The measurement models (Panels A and B) were specified each for PC, Ad, and Ma, separately.

Development and Validation of the Ambiguous Scenario Task for Perfectionistic Concerns for University Students

Supplementary material

1. Task Instruction (presented to participants)

Welcome to the next part of the study. Brief descriptions of situations are presented below. Please read each description carefully. It will stay on the screen for a few seconds. After this, you will be offered three response options one after the other. For each of the three possible reactions, we ask you to indicate how likely you are to react this way on a scale. Please try to not think for too long before you make up your mind. We are interested in your first impression. There is no right or wrong.

2. Scenarios and Interpretations (translated from German)

2.1 Academic Scenarios (Perfectionistic Concerns)

Version A

Ac 1: I have written an exam and already know that I answered a question incorrectly.

PC: This means that I failed.

Ad: This means that the grade can still be good.

Ma: This means that, once more, I will have more work to do as I will need to learn more about the topic the question addresses.

Ac 2: In a graded group assignment, fellow students get a better grade than me.

PC: I feel like a failure.

Ad: I am sure that there are good reasons for this, I will ask the lecturer for feedback.

Ma: I don't like this approach and am considering complaining.

Ac 3: In an exam I only get a B, although I was aiming for an A.

PC: This means that I failed completely.

Ad: B is still a good grade.

Ma: I am annoyed because I think the grading is unfair.

Ac 4: In a seminar we had to submit an assignment. Not mine, but a fellow student's solution was presented as a very good model solution.

PC: I hate not being the best at this.

Ad: I am interested in how the fellow student solved the task.

Ma: I think this selection of individual people is not beneficial to the group climate.

Ac 5: In a seminar I present a calculation method on the black board. I make a mistake in the process.

PC: I think people will probably think less of me now than they did before.

Ad: It's good that I was able to discuss my solution in the seminar today, then I won't make the same mistake in the exam.

Ma: I think: "How annoying, now I have to start all over again."

Version B

Ac 1: Last week I gave an incorrect answer that a fellow student corrected in a well-attended lecture. Today I have to attend this lecture again.

PC: I shouldn't be seen there, the others will be thinking that I'm stupid.

Ad: I am looking forward to it anyway since a new topic will be discussed today.

Ma: I cannot stand this know-it-all.

Ac 2: When the exam results are published, I see that someone I know has a better grade than me.

PC: I have to try a lot harder next time so that I will do better.

Ad: No surprise, the fellow student wrote his bachelor's thesis in the area that was queried.

Ma: Great, now this fellow student will show off again for weeks.

Ac 3: In the exam I notice that I did not prepare for one subject area.

PC: How could I have been so stupid to have left out exactly this area when I was studying.

Ad: The subject has never been discussed and will certainly be excluded from the evaluation.

Ma: I am totally annoyed that this particular area is queried in such detail.

Ac 4: When creating the online survey for my bachelor's thesis, I made a mistake that the participants can see.

PC: They must think that I am completely unsuitable for my intended occupation.

Ad: The participants probably didn't even notice the mistake.

Ma: I am annoyed that I can no longer fix the error.

Ac 5: I realize I am not perfectly prepared for an appointment with a lecturer when I get there.

PC: The lecturer will think of me as completely incapable.

Ad: Daring the gap, I always paid close attention to the lectures!

Ma: How am I supposed to prepare myself for it when I have so much else to do?

Note. PC = Perfectionistic concern; Ad = Adaptive; Ma = Maladaptive interpretations.

2.2 Daily-life Scenarios (Perfectionistic Concerns)

Version A

DL 1: I bought the wrong ticket on the bus which was more expensive than necessary.

PC: I am annoyed about my inattention.

Ad: I sit down and don't think about it any further.

Ma: I am annoyed that now I don't have enough change for the coffee machine anymore.

DL 2: I am interviewed for a part-time position, but someone else is hired. The feedback is that someone more suitable had been found.

PC: That means that I am worth less as a person.

Ad: Then I am suitable for another position.

Ma: It will now take a lot of time and nerves to apply elsewhere.

DL 3: If I'm not good all the time...

PC: …I will not be respected by others.

Ad: …I'm good at least every now and then.

Ma: …my roommate teases me, who is always better at everything.

DL 4: I told my boss that I can complete a task the next day. But then I didn't manage to finish the task.

PC: I am hopeless as a person.

Ad: The task was much more complex than I had thought before.

Ma: I have to change my schedule to not get annoyed by stress.

DL 5: At a game night together, another player wins a strategy game and I end up in second place.

PC: I get angry because I wasn't better than him.

Ad: He deserved it because his strategy was better.

Ma: I blame him for cheating.

Version B

DL 1: I don't notice until noon that I had been wearing a t-shirt with a stain since that morning.

PC: I feel like a total idiot because I can't even put on a clean t-shirt.

Ad: Probably nobody noticed.

Ma: I am annoyed that my detergent does not seem to be good enough anymore.

DL 2: I have a doctor's appointment and I'm 10 minutes late.

PC: Now the whole day is a letdown because I can't even be on time for a doctor’s appointment.

Ad: This is actually quite handy because you always have to wait quite long there.

Ma: Public transport is once again totally unreliable.

DL 3: I would like to quickly wrap the present for a friend before I go to her birthday party, but I have no more wrapping paper at home.

PC: I find it just as bad as if I hadn't gotten a present at all.

Ad: I wrap the gift in newspaper instead and tie a bow around it.

Ma: I'm annoyed by my roommate who must have used it up again.

DL 4: I mispronounce a colleague's name when talking to my boss.

PC: If I can't even do that, I'm probably worth less as a person.

Ad: I assume that my boss wasn't listening too closely anyway.

Ma: For better or worse, I guess, I have to take the time to practice the names.

DL 5: I have decided to save photos that were sent to me. Instead of saving the last picture, I delete it.

PC: I am angry with myself all day.

Ad: I ask if I can get it again.

Ma: I am totally annoyed by the poor handling of my cell phone.

2.3 Academic Scenarios (Neutral)

Version A

AcN 1: The library is very full today.

Pos: Then it is easier for me to study because everyone else has to study too.

Neg: I probably can’t concentrate well because it’s going to be too loud.

Neu: I sit down on an empty seat and unpack my books.

AcN 2: A new café has opened next to the cafeteria.

Pos: I'm glad, they'll definitely have delicious coffee there.

Neg: Great, another place that uses plastic cups.

Neu: The coffee machines are sure to be removed soon.

AcN 3: There is a guest lecturer in the lecture today.

Pos: I'm happy because it will probably be especially interesting today.

Neg: On such visits I am always suspicious that visiting lecturers mostly have commercial interests.

Neu: He will be teaching in English because he is from the USA.

AcN 4: At university, there are more fellow students than usual at a lecture.

Pos: If so many are interested in today's topic it will be an exciting session.

Neg: Now it will definitely be noisier again and it will be harder to follow the lecture.

Neu: It can only be a coincidence, nothing special was planned for today.

AcN 5: The prices in the cafeteria seem to have increased.

Pos: Then the chefs will probably buy better quality food now.

Neg: Now I probably can't afford it that often anymore.

Neu: Probably not that many people will notice.

Version B

AcN 1: All whiteboard markers that the lecturer has with him are empty.

Pos: I'm amazed at how well he can adapt the exercise.

Neg: I am annoyed that he does not come better prepared.

Neu: I think they have been used many times.

AcN 2: When looking at the exam, I see that our exam papers are curled.

Pos: That brings back memories of a nice trip with friends when one of my books got wet.

Neg: I think it's outrageous that the professor didn't take better care of the documents.

Neu: Presumably the professor walked through the rain with it once.

AcN 3: A lecturer arrives at the seminar five minutes late.

Pos: That's great because I wanted to discuss something with my fellow students anyway.

Neg: It's annoying because I got up extra early for the seminar.

Neu: She walks in and starts talking while the laptop is uploading.

AcN 4: During a group assignment, my fellow students chat instead of doing the exercise.

Pos: I'm a little happy to hear new gossip.

Neg: I am annoyed that they do not engage in the exercise.

Neu: In this seminar we do group exercises from time to time.

AcN 5: The lecturer wants to show us a film in the lecture, but the sound doesn't work.

Pos: After all, it's great that he's trying to plan the lecture to be exciting. Hopefully it works next time.

Neg: It annoys me that the technical equipment at uni always works so badly.

Neu: The film serves as a short introduction to the topic and should last about five minutes.

Note. Pos = Positive; Neg = Negative; Neu = Neutral interpretations.

2.4 Daily-life Scenarios (Neutral)

Version A

DLN 1: It could be an extremely hot day tomorrow.

Pos: I like the hot weather and look forward to going to the pool.

Neg: The hot weather always strains me and I will stay indoors.

Neu: I pack the sunscreen and enough water.

DLN 2: This is my first time riding my new bike.

Pos: It's great to ride and I have a lot of fun.

Neg: It's super heavy and hard to handle.

Neu: It is blue and has a 7-speed gear shift.

DLN 3: There is currently a lot of construction going on in the city.

Pos: I am happy that something is moving forward.

Neg: That means it is annoyingly loud and dusty everywhere.

Neu: One of the new buildings will probably be equipped with offices.

DLN 4: Tomorrow I'm going to the mountains for a hike.

Pos: I'm looking forward to the magnificent view from the summit.

Neg: The tour will probably be super exhausting.

Neu: I looked at the tour on the map beforehand.

DLN 5: The subway is particularly full today.

Pos: I am lucky that I got a seat.

Neg: Hopefully I won't catch a cold from others.

Neu: Here it becomes clear once again how many commuters are using the subway every day.

Version B

LN 1: I saw a very long movie in the cinema yesterday.

Pos: I'm still in a good mood today because the movie was really funny.

Neg: I'm a little annoyed today because the movie wasn't nearly as good as expected.

Neu: I do not feel any different than usual today.

DLN 2: My neighbor listens to loud music in the evening.

Pos: I am happy to have such relaxed neighbors.

Neg: I'm angry because I have to get up early tomorrow.

Neu: I wonder if it's the radio or his own music.

DLN 3: In the street there is a box with things which says “to give away”.

Pos: What a good idea. Less stuff is thrown away this way.

Neg: I think that's outrageous, people should get rid of their rubbish elsewhere.

Neu: There are three books and two white cups in the box.

DLN 4: I stand at the traffic light and see a lot of cyclists riding past.

Pos: Nice, that's good for our environment. It's already too polluted anyway.

Neg: Unfortunately, they often ride like crazy people.

Neu: There is such a wide range of different bikes to choose from these days.

DLN 5: There is a very strong smell of lemon in the office.

Pos: The cleaning staff were probably already there and everything is nice and clean.

Neg: Unfortunately my colleague put on too much perfume again and it makes me sick.

Neu: Someone put a dash of lemon in the tea.

2.5 Scenarios for practice trials

1: I get in the car and the car won't start.

- That means I left the dipped headlights on and the battery drained.
- That means that the fuel has run out.
- That means that the car has an engine failure.

2: I bought new pants, but I don't like the color.

- The light in the shop was probably different from that at home.
- Then I'll just bring them back.
- Maybe a friend likes them.

3: I open the spectacles case, but the glasses are not inside.

- The glasses are probably on the coffee table.
- I guess I forgot the glasses at work.
- Maybe I lost my glasses.