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The causal relationship between perfectionism and negative affect: Two experimental studies

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Author note

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Abstract

Perfectionistic concerns and negative affect have been found to be associated in clinical and non-clinical populations. However, evidence regarding the causality and direction of these associations is scarce. In two studies, we thus tested whether an experimental induction of perfectionistic concerns would increase levels of negative affect, and whether the induction of negative affect would increase perfectionistic concerns. In Study 1, an unselected student sample was tested; Study 2 included students scoring high on trait perfectionistic concerns, and both these samples either randomly received a perfectionistic-concerns induction or a negative affect induction. Across both studies, participants' levels of perfectionistic cognitions, perfectionistic interpretation bias, and negative affect were assessed before and after the corresponding induction. The perfectionistic-concerns induction only showed effects in participants high in perfectionistic concerns. Additionally, in Study 2, we found the expected effect of the perfectionistic-concerns induction on negative affect. The negative affect induction increased negative affect across both studies, but showed no effect on perfectionistic concerns. Our results give some indication that a unidirectional causal relationship from perfectionistic concerns to negative affect may exist in individuals with high levels of trait perfectionism. Limitations and further implications are discussed.

Keywords: Perfectionism, perfectionistic concerns, negative affect, causal, experimental, psychopathology

Introduction

Perfectionism is commonly defined as a multidimensional construct with two dimensions: perfectionistic strivings and perfectionistic concerns (PC). Perfectionistic strivings are related to setting high standards for oneself in order to strive for perfectionism, whereas PC are related to one's self-esteem based on how well one's own standards are met (Frost et al., 1993). PC represent the more maladaptive type of perfectionism, typically showing strong associations with emotional distress both in clinical and non-clinical populations (e.g., Limburg et al., 2017; Stoeber & Otto, 2006), and there is evidence from longitudinal studies indicating that such concerns may serve as a risk and maintaining factor for mental disorders (e.g., Smith et al., 2018, 2021). Regarding the potential causal role of PC, it is assumed that such maladaptive cognitions increase the risk for mental disorder by eliciting negative affect (NA). Here, cognitive theories (e.g., Beck & Alford, 2009) have suggested that the associations between cognitive schemas such as PC and NA are the key mechanisms of depression and anxiety, as well as other disorders that have negative emotions as a core symptomatology (e.g., OCD, eating and personality disorders Egan et al., 2011; Smith et al., 2021). Indeed, studies suggest that PC are associated with elevated levels of NA (e.g., Cooks & Ciesla, 2019). Some longitudinal evidence suggests that PC can increase NA (Prud'homme et al., 2017). First evidence for the potential causal role of PC come from experimental studies that assessed the effect of perfectionism (including PC) on NA. Those studies have assessed the impact of negative feedback on performance tasks on NA, with the idea that negative feedback would work as a PC induction. Those studies have found mixed results. For example, Besser and colleagues (2004) showed that dispositional perfectionistic strivings, but not dispositional PC, were related to higher levels of NA after negative feedback on a performance task. In contrast, Cooks and Ciesla (2019) showed that dispositional PC predicted increased NA after failure in a performance task. Although those studies are important, they only test the effect of dispositional PC on NA in a very specific situation (failure in performance situations) rather than assessing the effect of induced PC more generally.

To the best of our knowledge no study has assessed the effect of experimentally induced perfectionism on NA. However, the effect of experimentally induced perfectionism has been tested on subsequent symptomatology. In one study, perfectionism was experimentally induced by manipulating perfectionistic interpretations using a cognitive bias modification (CBM) training (Yiend et al., 2011). The study consisted of a perfectionistic training condition and a non-perfectionistic training condition. Participants were presented with ambiguous scenarios after which they were asked to complete disambiguating word fragments either in a perfectionistic (perfectionistic condition) or non-perfectionistic (non-perfectionistic condition) way. After each word fragment they had to answer questions that reinforced the desired interpretation. The study included a healthy student sample and testes the CBM-training effects on the students' anxious and depressed mood. However, no difference between the perfectionism condition and the non-perfectionism condition on post-training ratings of anxious or depressed moods emerged. In several other studies the effect of experimentally induced perfectionism on symptoms of eating disorders were assessed (Boone et al., 2012; Shafran et al., 2006). To illustrate, in a study by Boone et al. (2012), female university students were randomized into one of two perfectionism conditions or into a control condition. In the two perfectionism conditions, either perfectionistic strivings alone or perfectionistic strivings in combination with PC were induced for a period of 24 hours. In both perfectionistic conditions, participants were asked to complete tasks in a self-selected domain to the highest possible standard. Additionally, in the combined perfectionistic strivings and PC condition, participants were further asked to try to avoid failure and thus avoid disappointing oneself or others. In the control condition, participants were asked that they will do the tasks within a certain life domain to the lowest possible standards and to deal with expectations or demands as relaxed as possible. In all conditions, participants then chose a domain, for example, studying or social domains. One example within the studying domain involved participants saying they wanted to concentrate perfectly during class and make perfect notes of the class' contents. After the induction, participants in the two perfectionism conditions reported higher levels of symptoms of eating disorders (binge eating and restraint) compared to participants in the control condition.

Taken together, experimental studies have either been conducted to test the effect of dispositional perfectionism on NA after induced failure, or they were conducted to test the effect of experimentally induced perfectionism on the symptomatology of specific mental disorders (anxiety and depression, Yiend et al., 2011; eating disorders, Boone et al., 2012; Shafran et al., 2006). Therefore, studies are missing that have experimentally induced PC outside of just performance situations and tested the effect on NA. Thus, the first aim of our study was to systematically investigate the causal effect of PC on NA (as a feature inherent to various mental disorders) using an experimental induction of PC instead of only assessing dispositional perfectionism.

Another aim of our studies was to assess the potentially bidirectional link between PC and NA. This is based on the assumptions of cognitive models of mental disorders, which assume not only that cognitive schemas (such as PC) trigger NA, but also that NA trigger cognitive schemas (such as PC; e.g., Beck & Alford, 2009). This assumption is supported by a recent meta-analysis of perfectionism and depression, indicating that the relationship between PC and depressive symptoms is reciprocal, which highlights the importance of studying bidirectional relationships between PC and NA (Smith et al., 2021).There is some evidence that indicates that stressors trigger PC (e.g., Zuroff et al., 1999) – which may be due to increased NA –but there is no direct evidence that NA trigger PC.

Accordingly, we conducted several laboratory experiments in which we used experimental inductions of PC (based on (Boone et al., 2012) and NA (based on Lerner et al., 2004, 2013), to further advance our understanding of the potential bidirectional, causal link between PC and NA. First, to ensure that the two inductions manipulate the respective targeted concept, we tested whether a perfectionistic-concern induction would increase PC and perfectionistic interpretation biases, and in turn, whether a NA induction increased NA (manipulation check). Second, we assessed the inductions' effect on the respective other factor, namely, the effect of the PC induction on NA and vice versa. We also assessed trait perfectionism since we expected it to play a moderating role. Since NA is a symptom of depression and PC are closely related to depression (Smith et al., 2021), we also assessed the moderating role of depressive symptoms. Based on cognitive models of psychopathology (e.g., Beck & Alford, 2009) we formulated the following hypotheses. Hypothesis 1: We hypothesized that PC and NA would show bidirectional associations. Specifically, we expected that experimentally induced PC would increase NA, and that induced NA would in turn increase PC. Hypothesis 2: We expected participants scoring higher on trait perfectionism to be more influenced by the respective induction than participants with lower scores on trait perfectionism.

The present manuscript presents two separate studies, both testing the effects of PC versus NA inductions. However, two different samples were tested: Study 1 included an unselected student sample and Study 2 included a student sample with high levels of PC. Study 2 allowed us to explore whether the induction effect(s) would be more prominent in individuals with high perfectionism as compared to an unselected sample.

Study 1

Methods

Study Design

We used a 2x2x2 factorial design with induction (i.e., PC and NA) and condition (induction vs. control) as a between-person factors and assessment time point (pre- vs. post-induction) as a within-person factor. Participants were randomly allocated to one of the four conditions: (a) the PC induction or (b) its control (non-perfectionism induction); or (c) negative-affect or (d) its control (neutral-affect induction). In each condition, PC and NA were assessed pre- and post-induction.

Participants

The sample included students who were recruited via social network services, newsletters, and leaflets around the campus of LMU Munich. Participants were only included if they were (a) older than 18 years, (b) currently enrolled as students at a university, and (c) fluent in German. Ninety-six students participated in Study 1 (58 women, 38 men; mean age = 22.9, *SD* = 3.5 years). The sample size was determined by an a priori power analysis (with G*power; Faul et al., 2009). We based this analysis on the findings of Boone et al. (2012), who used a perfectionism-induction method similar to that used in the current study, and found an effect of $f^2 = .19$. The required sample size to run multiple regression analyses predicting post-induction PC or NA by two different inductions (i.e., NA induction vs. control; PC induction vs. control) after controlling for the respective baseline scores, with an alpha = 0.05 and power = 0.80, was *N* = 88.

Measures

Multidimensional Perfectionism Cognitions Inventory (MPCI). The MPCI (German version: Prestele & Altstötter-Gleich, 2019) is a self-report questionnaire that assesses the frequency of automatic thoughts involving perfectionistic themes for the following three dimensions: Concerns over mistakes, personal standards, and pursuit of perfection. It is designed to capture more transient aspects of perfectionism, and is thus suitable to assess perfectionism in short laboratory sessions. The 15 items can be answered on a 6-point Likert scale ranging from 1 = “never” to 6 = “very often”. Example items of the concern over mistakes-subscale include: “I’ll blame myself if I make a mistake.” and “I would feel worthless if I fail.”. Since the MPCI was used in this study to evaluate state perfectionism in particular, participants rated how frequently they experienced perfectionistic cognitions in the last 20 minutes (as opposed to “last week” in the original version). In this study, we only analyzed scores of the “concerns over mistakes” subscale as it measures PC. The MPCI showed good to excellent internal consistency, with a Cronbach’s alpha of .87 in Study 1 for the concerns over mistakes cognitions dimension, and a Cronbach’s alpha of .86 in Study 2.

Ambiguous Scenario Task for Perfectionistic Concerns (AST-PC). The AST-PC (Cludius et al., 2023) was designed to assess perfectionistic interpretation biases. In this computer task, participants are presented with ambiguous scenarios describing daily life situations or situations taking place at university settings. Scenarios are presented randomly, and each scenario is followed by three different statements. These statements represent (a) a PC interpretation, (b) an adaptive interpretation, and (c) a maladaptive but not perfectionistic interpretation. An example of a perfectionistic scenario in a university setting is: “In a seminar I present a calculation method on the blackboard. I made a mistake in the process.” The corresponding interpretations are: (a) “I think people will probably think worse of me now than they did before” (PC); (b) “It's good that I was able to discuss my solution in the seminar today because then I won't make this mistake during the exam” (adaptive); and (c) “I think: ‘How annoying, now I have to start all over again’” (maladaptive, non-perfectionistic). The AST-PC was administered with filler items (AST-N) that did not include any perfectionistic cognitions (e.g., “In the evening my neighbor is listening to music very loudly.”). For each interpretation, participants rate how likely they would be to react that way, using a Likert-scale ranging from 1 (*very unlikely*) to 9 (*very likely*). Across both types of scenarios (i.e., daily life vs. university), only the likelihood ratings for PC statements were used in the analysis, i.e., the mean likelihood ratings for these statements.

Due to the repeated measurement design (i.e., pre- and post-experimental induction), we created two parallel versions of the AST-PC (Versions A and B), both including unique scenarios and statements. Originally, each version included a total of 20 scenarios, namely, 10 perfectionistic and 10 neutral scenarios. However, for statistical analyses, we selected the scenarios that had good factor loadings in order to achieve sufficiently high internal consistency for the aggregated scores used in the present study. Specifically, we performed factor analyses on the data that we collected through the online screening assessments for Study 2 (for details see Cludius et al., 2023), which also included a validation study of the AST-PC. The item selection for the present study resulted in two academic and four daily-life scenarios for Version A (i.e., 6 in total), and three academic and four daily-life scenarios for Version B (i.e., 7 in total). The order of the two versions was counterbalanced across participants. That is, half of the participants completed version A pre-induction and version B post-induction, and vice versa for the other half of the participants. Psychometric properties of the AST-PC are reported elsewhere (Cludius et al., 2023).

Positive and Negative Affect Schedule (PANAS). The PANAS (German version: (Breyer & Bluemke, 2016) is a self-report questionnaire that measures positive affect and NA using two scales, each containing 10 mood-related adjectives. Participants are asked to indicate how they feel with regard to the adjective at that particular moment. We only used the NA scale in this study, which showed a good reliability score with a Cronbach's alpha of .89 in Study 1 (.83 in Study 2).

Frost Multidimensional Perfectionism Scale (FMPS-D). The FMPS-D (German version: Stöber, 1998) is a 35-item self-report questionnaire assessing six dimensions of trait perfectionism: Concerns over mistakes, doubts about actions, parental expectations, parental criticism, personal standards, and organization. We focused on the concerns over mistakes subscale. This subscale showed an acceptable-to-good internal consistency (Cronbach's alpha = 0.88 in Study 1; 0.79 in Study 2).

Beck's Depression Inventory (BDI-II). The BDI-II (German version: Hautzinger et al., 2006) was used to assess the severity of participants' depressive symptoms during the previous two weeks. In Study 1, the BDI-II showed a good Cronbach's alpha of .89 (.92 in Study 2).

State-Trait Anxiety Inventory-Trait (STAI-Trait). The STAI-Trait (German version: Laux et al., 1981) is a self-report questionnaire that measures trait anxiety. In Study 1, the STAI-Trait showed a Cronbach's alpha of .91 (.92 in Study 2), indicating excellent reliability.

Experimental Inductions

We created a PC induction and a NA induction, which were similar regarding several aspects. In both inductions, participants watched videos and were asked to write something down. The time allocated to watching and writing was similar in both inductions. See below for more details.

Perfectionistic-concerns induction. The PC induction procedure was adapted from Boone et al. (2012), in which participants could select a task they wanted to complete perfectly over the course of 24 hours. From the different tasks the students had indicated in the study by Boone et al. (2012), we selected a common university activity for the purpose of the present study: taking notes during lectures. To standardize this task in the experimental setting, we showed participants an educational video about conflicts in the Middle East (10 minutes in total), during which they took notes about the video's content. Before they started the task, the students either received a PC induction or a non-perfectionism induction. In the PC induction, the students were told that they should complete this task to the highest standards and avoid any failures. To enhance the effect of this induction, participants signed a contract stating that they would complete the task in this manner. To increase the task's personal relevance, participants were also asked to write down reasons why it is important in their day-to-day work at university to complete assignments to the highest possible standards.

In the non-PC induction, participants signed a contract asking them to deal with the demands as relaxed as possible, and to not set high personal standards. Similar to the PC induction, participants were asked to indicate reasons why it is helpful to work on university assignments in this manner. Both procedures had been piloted with a small student sample ($N = 11$), and this data showed that the perfectionism compared to the non-perfectionism induction successfully increased PC from pre- to post-induction: In the perfectionism concerns induction, the concerns over mistakes score on the MPCI significantly increased from $M = 2.13$, $SD = 0.78$ to $M = 2.79$, $SD = 0.73$; $t(5) = 6.73$, $p < .001$, and significantly decreased in the non-perfectionism induction, $M = 2.12$, $SD = 0.78$ to $M = 1.89$, $SD = 0.44$; $t(4) = 6.06$, $p = .002$.

Negative affect induction. The NA induction was adapted from previous studies by Lerner and colleagues (2004, 2013). Specifically, participants watched sadness-eliciting videos (10 minutes in total) from the stimulus pool of Schaefer et al. (2010), namely, scenes from the films *Dead Poets Society* and *City of Angels*. Afterwards, participants were asked to write a short essay about a sad, autobiographical situation that they had experienced in the past. Participants were given a five-minute interval for this task and were instructed to describe the situation in a way that would cause potential readers to also become sad. In the neutral affect induction (control condition), participants watched two emotionally neutral scenes from nature documentaries Lerner et al. (2004). Subsequently, participants wrote a short essay about their daily routines. They were instructed to write this essay in a manner that would allow a reader to understand what the participant does on a daily basis.

Procedure

The study protocols were pre-registered on the Open Science Framework (https://osf.io/zj78d[1] and https://osf.io/evkx6). The studies were approved by the Ethics Committee of the Faculty

[1] The preregistered protocol included the Single-Category Implicit Association Test and the State-Trait Anxiety Inventory, but we do not report the results here in order to keep the paper as concise and short as possible.

of Psychology and Pedagogy at LMU Munich (approval number: 62_Cludius_b). Figure 1 shows a schematic flow of the study procedure. Participants were tested in groups of up to eight people in the laboratory. First, they provided demographic information (e.g., gender, age, years of education) and then they completed the questionnaires assessing dispositional perfectionism, depressive symptoms, and level of trait anxiety (i.e., FMPS-D, BDI-II, and STAI-T). After that, baseline levels of PC, perfectionistic interpretation biases, and NA were assessed (MPCI, AST-PC, and PANAS). Next, the experimental induction took place (i.e., perfectionism vs. non-PC induction or negative vs. neutral affect induction), and after that the MPCI, AST-PC, and PANAS were applied again. At the end of the experiment, all participants received a positive mood induction in order to neutralize the negative effects of the inductions (for a similar procedure see e.g., Takano et al., 2019). The experiments were conducted in one session and lasted approximately 90 minutes in total. Participants received either monetary compensation (12€) or course credits. All measures were delivered via the computer using Inquisit (Version 5; Millisecond Software, 2018), except for the AST-PC, which was run in E-Prime (Version 2.0 (Schneider et al., 2002).

[Figure 1]

Statistical analyses

Separate regression models were run for the perfectionistic concern induction and the NA induction.

Perfectionistic concerns induction. We conducted separate multiple regression analyses to test the effects of the experimental conditions on PC and NA, following the approach of Boone et al. (2012). For the PC induction, we first ran two regression models (as a manipulation check) where the post-induction levels of PC were predicted by the condition (dummy-coded as 1 = PC induction and 0 = control) after controlling for the baseline levels of PC. These analyses were performed on the self-reported measure (MPCI) and on the interpretation bias (AST-PC) as the outcomes. Second, we tested the effect of the PC condition on post-induction levels of NA after controlling for the baseline levels of NA. Third, we added the interaction term between the condition and trait perfectionism (as assessed by the FMPS-D) to the regression models; also, we examined the interaction effect between the condition and depressive symptoms (BDI-II). These interactions allowed us to test whether individuals with existing maladaptive (perfectionistic or depressive) tendencies would react differently to the induction procedure.

Negative affect induction. For the NA induction, the manipulation check consisted of a regression model where the post-induction levels of NA (as measured by the PANAS) were predicted by the condition (dummy-coded as 1 = NA induction and 0 = neutral affect induction). In the main analysis, we examined the effect of the condition on post-induction levels of PC (MPCI and AST-PC) after controlling for the baseline levels of PC. Again, we examined the interaction effect between the condition and the moderators (trait perfectionism and depressive symptoms, respectively).

All analyses were conducted using R (R Core Team, 2019). An alpha level of .05 was applied for all analyses.

In contrast to our preregistration we included all participants (instead of excluding those who did not show any increase after the respective induction). Additionally, we decided not to run repeated-measures ANOVAs, and we did not control for the scores of the adaptive and maladaptive interpretations in the AST-PC when predicting the PC interpretations. Lastly, we did not compute any exploratory analyses in an effort to keep the manuscript as short and concise as possible. We included more information on the deviations from the preregistration and results of an additional analysis in the supplementary file.

Results

Table 1 shows the descriptive data. The conditions did not differ regarding sociodemographic or psychopathological variables, except for age. Individuals in the NA condition were older than those in the neutral affect condition. Furthermore, the conditions did not differ regarding PC or perfectionistic biases. There were differences in NA before the induction. Participants in the non-perfectionism induction showed higher levels of NA before the induction than participants in the PC induction (Table 1)[2].

[Table 1]

Perfectionistic-concerns induction

Results of the manipulation check showed that there was no statistically significant effect of condition on neither PC as assessed by the MPCI nor on perfectionistic interpretation biases as assessed by the AST-PC (Table 2). These results indicate that the PC induction did not have the expected effect on perfectionistic cognitions or interpretation biases. Similarly, we identified no significant interaction effects between the condition and trait perfectionism (as measured by the FMPS-D) in predicting MPCI or AST-PC scores, which implies that the induction's effect on PC did not differ across levels of trait perfectionism. However, we decided to proceed to the planned simple slope tests to explore whether subsamples (i.e., individuals with high vs. low levels of trait perfectionism, defined as the mean ± 1 *SD* of the FMPS-D) would be influenced differently by the induction. Results showed that participants with high levels of trait perfectionism reported higher MPCI scores after the induction compared to the non-perfectionism control condition (B = 0.84, SE = 0.40, t = 2.12, p = .040). Participants low in trait perfectionism did not differ between the induction and non-perfectionism control conditions (B = -0.02, SE = 0.40, t = 0.06, p = .952).

Contrary to our hypothesis, the regression analysis did not yield a significant main effect of the condition (perfectionism vs. non-perfectionism) on NA. However, we identified

[2] Because of the significant group differences in pre-induction NA, we repeated all analyses with pre-induction scores for the PANAS as a control variable. This had no influence on the results.

a significant interaction effect between condition and trait perfectionism (FMPS-D) in predicting the NA score, which suggests that the induction's effect on NA differed across levels of trait perfectionism, *B* = 2.59, *SE* = 1.20, *t* = 2.17, *p* = .036 (also see Table S1 in the supplement). Subsequent simple slope tests (for high vs. low levels of trait perfectionism, defined as the mean ± 1 *SD* of the FMPS-D) revealed that participants with high trait perfectionism reported higher NA after the PC induction compared to the non-perfectionism control condition, *B* = 4.25, *SE* = 1.76, *t* = 2.41, *p* = .020. Participants with low trait perfectionism did not differ regarding their NA after the PC induction when compared to the non-perfectionism control condition, *B* = -0.93, *SE* = 1.68, *t* = -0.55, *p* = .584. No such effect was found for interpretation bias (AST-PC). Lastly, we did not find a significant moderation effect of depressive symptoms (BDI-II) on perfectionistic cognitions (MPCI), perfectionistic interpretation bias (AST-PC), or NA (PANAS), all with *p*s > .05 (see Table S2 in the supplement).

[Table 2]

Negative affect induction

As expected, the manipulation check revealed a statistically significant effect of the condition on the post-induction levels of NA, with a stronger increase of NA in the NA induction condition compared to the control condition (PANAS, Table 2)[3].

Contrary to our hypotheses, the multiple regression analyses testing the effect of the condition (NA vs. neutral affect induction) on post-induction levels of PC showed no statistically significant effect on either perfectionistic cognitions (MPCI) or on perfectionistic interpretation biases (AST-PC; Table 2).

[3] Because of the significant group differences in age, we repeated all analyses with age as a control variable. This had no influence on the results.

The interaction between the condition and trait perfectionism (FMPS-D) was predictive of the perfectionistic interpretation biases (AST-PC), which suggests that the NA induction's effect on perfectionistic interpretation biases differed across levels of trait perfectionism, $B = -0.69$, $SE = 0.26$, $t = -2.61$, $p = .012$ (also see Table S1 in the supplement). Subsequent simple slope analyses (for high vs. low levels of trait perfectionism, defined as the mean ± 1 *SD* of the FMPS-D) showed that participants with high trait perfectionism reported fewer perfectionistic interpretation biases after the NA induction compared to the neutral affect induction, $B = -0.749$, $SE = 0.37$, $t = -2.04$, $p = .047$. Participants with low trait perfectionism did not differ regarding their perfectionistic interpretation biases after the NA induction when compared to the neutral affect control condition, $B = 0.62$, $SE = 0.37$, $t = 1.69$, $p = .099$. No such effects were found for perfectionistic cognitions (MPCI). Lastly, as above, we did not find a significant moderation effect of depressive symptoms (BDI-II) on perfectionistic cognitions (MPCI), perfectionistic interpretation bias (AST-PC), or NA (PANAS; *p*s > .05; see Table S2 in the supplement).

Discussion

In Study 1, we investigated the effect of a PC induction on NA, and the effect of a NA induction on PC. The PC induction did not influence the levels of PC and perfectionistic interpretation biases, suggesting that the induction procedure was not effective to manipulate perfectionistic cognitions in general. Given the absence of a successful manipulation, it is thus not surprising that there was no significant effect of the PC induction on NA. However, individuals with high trait perfectionism were more strongly influenced by the induction (higher PC) and showed stronger effects on NA compared to those with low levels of PC. The NA induction was overall successful in increasing the levels of NA. However, contrary to our expectations, the NA induction did not lead to higher PC. However, individuals with high trait perfectionism were more strongly influenced by the induction (higher NA) and showed a reduction of the perfectionistic interpretation biases compared to those with low levels of PC.

A critical limitation of Study 1 is that the regressions including the interaction effects might be statistically underpowered (*n* = 24 in each condition). Therefore, in order to replicate and better understand our preliminary observations from Study 1, we conducted Study 2 and only included participants with high levels of trait perfectionism.

Study 2

In Study 2, the research questions were the same as in Study 1; however, for the second study we selected a sample of students who all scored high on PC, screened via the FMPS-D (Stöber, 1998). Based on the results of study 1, which only showed significant results in participants high in perfectionism following the PC induction (not the NA induction), we formulated the following hypothesis. Hypothesis 1: We hypothesized that in highly perfectionistic students the induction of PC would enhance NA. Furthermore, we wanted to test whether the induction of NA would increase PC (as measured by the MPCI and the AST-PC).

Methods

Participants

A total of 223 participants completed the FMPS-D in an online screening for high perfectionism (defined as ≥ 25 on the concerns over mistakes subscale of the FMPS-D, based on the average score of anxiety disorder samples; Egan et al., 2011). Of those, 121 participants (100 women, 19 men, 2 unknown; mean age = 22.8, *SD* = 4.6 years) reported elevated levels of perfectionism and thus met the study’s general inclusion criteria. Data from three participants were not used for statistical analyses: the data from one participant was lost due to a technical error, and two participants did not follow the induction procedures and thus their data were regarded as unreliable (leaving a final sample of $N = 118$ for the analysis). The sample size was determined by an a priori power analysis, which was based on the effects observed in Study 1, $f^2 = .15$. Specifically, we performed a power analysis to run a multiple regression analysis among individuals with high levels of trait perfectionism, predicting post-induction NA scores on the PANAS by the condition (perfectionism vs. non-perfectionism induction) after controlling for the baseline NA scores. Our power analysis indicated that $n = 53$ (for the comparison of the perfectionism vs. non-perfectionism induction) is required under the assumptions of alpha = 0.05 and power = 0.80. The same sample size was used for the NA induction. Thus, we aimed for $N = 106$ in total.

Measures

Participants completed the same trait (FMPS-D, BDI-II, and STAI-T) and outcome measures (MPCI, AST-PC, and PANAS) as in Study 1. Additionally, we assessed levels of sadness, an emotional state that is not covered by the PANAS. Participants had to rate how sad they were feeling at that moment, using a visual analogue scale (VAS) by moving a slider on a line with the anchors 0 (*not at all*) to 100 (*totally*). The distance (in mm) between 0 and the participant’s mark on the line served as an index for the participant’s level of sadness. Throughout Study 2, the sadness VAS always preceded the PANAS.

Procedure

As in Study 1, participants first completed the following measures: demographic questionnaire (gender, age, years of education), trait measures (FMPS-D, BDI-II, STAI-T) and outcome measures for perfectionistic cognitions (MPCI), interpretation biases (AST-PC), sadness (VAS), and NA (PANAS). Next followed the experimental induction, namely, either the PC vs. non-perfectionism induction or the negative vs. neutral affect induction. Then the outcome measures (MPCI, AST-PC, PANAS, sadness VAS) were administered again (Figure 1).

To enhance the effect of the PC induction we changed the following aspects. In contrast to Study 1, all participants in Study 2 were tested individually. Furthermore, the experimenter gave all instructions orally, the contract was handed over in paper form, and participants were asked to sign this paper contract. The writing tasks during both inductions were also done on paper. These changes were implemented in order to maximize the inductions' effects, because we expected participants to be more engaged in the task.

Statistical Analyses

The same statistical analyses were conducted as in Study 1, except for the moderation analyses by trait perfectionism.

Results

Table 1 shows the descriptive data. Although all participants had met the screening's inclusion criteria, some participants (n = 14) scored below the cutoff on the FMPS-D concerns over mistakes subscale when they were invited to the lab. However, as those participants scored higher than the average of non-clinical controls in the study by Egan et al. (2011, average = 17.92), we decided to include their data in the statistical analyses. The four conditions did not differ regarding sociodemographic or psychopathological data.

Perfectionistic-concerns induction

First, the results of the manipulation check revealed that the condition had a significant effect on post-induction levels of PC as assessed by the MPCI (Table 3). This indicates that individuals who received the PC induction exhibited higher levels of PC post-induction than those in the non-perfectionism condition, after controlling for the baseline levels of PC. However, this group difference appears to be better explained by the reduction in PC in the non-perfectionism condition, $t(28) = - 2.43$, $p = .022$, $d = 0.32$, than by the increase in the perfectionism condition, $t(29) = 0.75$, $p = .461$, $d = 0.12$ (Table 4). Second, the multiple regression analysis testing the perfectionistic interpretation biases as assessed by the AST-PC revealed a significant effect of the condition on perfectionistic interpretation biases (Table 3), showing that individuals who received the PC induction exhibited higher levels of perfectionistic interpretation biases post-induction than those in the non-perfectionism condition. However, again this group difference appears to be better explained by the reduction in perfectionistic interpretation biases in the non-perfectionism condition, $t(28) = -2.36$, $p = .026$, $d = 0.45$, than by the increase in the perfectionism condition, $t(29) = 0.65$, $p = .521$, $d = 0.11$ (Table 1).

In line with our hypothesis, the multiple regression analysis revealed a significant effect of the PC condition on NA (Table 3), showing that the PC induction exhibited higher levels of NA post-induction than those in the non-perfectionism induction, after controlling for the baseline levels of NA. However, the magnitude of the change was smaller than we expected because paired *t*-tests failed to detect a significant increase in NA within the PC induction condition, $t(29) = 1.36$, $p = .183$, $d = 0.27$; also, the decrease that we observed for the control condition did not reach statistical significance, $t(28) = - 1.43$, $p = .165$, $d = 0.30$. The multiple regression analysis using levels of sadness as assessed by the VAS as outcome (Table 3) showed that there was no significant effect of the condition, suggesting that the two conditions did not differ on their levels of sadness after the experimental induction.

[Table 3]

Negative affect induction

First, the multiple regression analysis revealed a significant effect of the NA condition on NA (Table 3), showing that individuals who received the NA induction exhibited higher levels of NA than those in the neutral affect (control) condition, after controlling for the baseline levels of NA. This group difference was qualified by the significant increase of NA in the NA induction condition, $t(28) = - 3.26$, $p = .003$, $d = 0.50$, and a significant decrease in the neutral affect condition, *t*(29) = 3.20, *p* = .003, *d* = 0.41. Second, we tested the NA induction's effect on levels of sadness (VAS). Results showed a statistically significant effect of the condition on sadness (Table 6). The NA induction condition experienced a significant increase, *t*(28) = -5.93, *p* = < .001, *d* = 0.56, whereas the control condition experienced no significant decrease in sadness, *t*(29) = 2.04, *p* = .051, *d* = 0.17.

The multiple regression analyses showed neither a significant effect on perfectionistic cognitions, as assessed by the MPCI, nor on perfectionistic interpretation biases, as assessed by the AST-PC (Table 6).

Discussion

In Study 2, we examined the effects of the PC versus NA induction in a sample of students with high trait perfectionism scores. As expected, the groups differed regarding their perfectionistic cognitions and perfectionistic interpretation bias scores after the PC vs. non-perfectionism induction. However, this difference was due to a decrease after the non-perfectionism induction and not an increase following the PC induction. Nevertheless, the effect of the PC induction on post-induction levels of NA (but not sadness ratings) was statistically significant. Yet, within the conditions, no significant increase (PC induction) or significant decrease (non-perfectionism induction) in NA was found. Thus, there is only some evidence that an increase in PC goes along with an increase in NA.

Results of the NA induction showed that the induction was successful in increasing the levels of NA and sadness, whereas the neutral affect induction condition experienced a reduction in NA (but not in sadness). Contrary to our expectations, the NA induction did not have a significant effect on PC or perfectionistic biases. This indicates that the changes in NA do not influence state perfectionistic cognitions or interpretation biases.

General discussion

The current studies examined the causality and the direction of the relationships between PC and NA. Specifically, we tested whether an experimental induction of PC, compared to a control condition, would increase levels of NA, and whether the induction of NA, compared to a control condition, would increase PC (i.e., perfectionistic cognitions and interpretation biases). Study 1 was conducted in an unselected student sample, whereas Study 2 included a pre-selected, highly perfectionistic student sample. In general, the results of both studies do not support the putative causal, bidirectional relationships between PC and NA. However, our data (particularly from Study 2) give some indication for a *unidirectional* pathway, from PC to NA.

Success of manipulation perfectionistic-concerns induction

The PC induction was not fully successful at increasing perfectionistic cognitions and perfectionistic interpretation biases across the two studies. We did not find any effects when looking at the whole sample in Study 1, which was somewhat surprising, since the manipulation had worked well in our pilot study. One possible explanation for the difference between the pilot study and the two current studies could be that the baseline PC score in the pilot study was lower compared to the current studies. This is especially true for Study 2, for which the scores for the concerns over mistakes scale on the MPCI were twice as high at baseline compared to the pilot data. A ceiling effect in the current studies may explain the results (see below for more information). Nevertheless, in both Studies 1 and 2, participants with high trait perfectionism reported an increase in perfectionistic cognitions. Furthermore, an increase in perfectionistic interpretation biases was found in Study 2. This result is in line with cognitive models of psychopathology (Beck & Alford, 2009). The models suggest that negative cognitive schemas (such as PC) are developed throughout one’s life and are dormant until they are activated by a life event. Once activated, they lead to information being processed according to that schema, which is accompanied by behavior and affect corresponding to that schema. Our results suggest that the PC induction may have activated the schema of PC in participants high in trait perfectionism rather than inducing PC in all participants.

However, in Study 2 the difference between the PC induction and the control condition could be better explained by a decrease in perfectionistic cognitions and perfectionistic interpretation biases in the control condition. The question arises as to why the induction did not significantly increase PC. Several reasons could account for this null effect, such as the fact that the induction may not have been appropriate to increase PC. To fully standardize the procedure in the lab, our induction differed in two ways from previous studies that induced perfectionism to test the effect on symptoms of eating disorders (Boone et al., 2012; Shafran et al., 2006). First, our induction was shorter than Boone et al.'s procedure (2012). In the previous studies, participants were asked to follow the perfectionistic induction's instructions for 24h. Second, in previous studies, the induction was individualized for each participant. Thus, our PC induction may not have been as relevant for participants. According to cognitive theories, the meaning individuals assign to an activating stimulus (i.e., induction procedure) determines whether associated variables are activated (i.e., NA or PC in this case; Beck, 2008). Even though the induction might have been a stressor in a relevant real-life situation, the participants have likely had enough experience to learn how to cope effectively with this kind of situation. Our sample of university students was probably familiar with stressful situations in relation to the university setting (c.f., PC induction), which may have prevented the activation of a negative schema. Additionally, the lack of increase in PC may be attributable to a ceiling effect since participants in Study 2 had been already high on perfectionistic cognitions prior to receiving the induction. When considering cognitive theories of psychopathology (e.g., Beck & Alford, 2009) this would mean that the negative cognitive schema had already been active prior to the study or had been activated within the testing situation in the lab. This may also explain the reduction of perfectionistic cognitions in the control condition: In this condition, participants were asked to work on the task in as relaxed a manner as possible and to not worry about any possible mistakes. Therefore, this induction may have served as a very brief intervention for high perfectionists rather than deactivating the schema of perfectionism and leading to less perfectionistic cognitions.

Effects of perfectionism on negative affect

Even though we did not find significant effects of the PC induction on NA in the unselected sample, we did find an effect for individuals with high levels of trait perfectionism. In Study 1, we found a significant interaction between trait perfectionism and the condition, highlighting that individuals with higher levels of trait perfectionism showed higher levels of NA as a reaction to the PC induction. In Study 2, we selected individuals with high trait perfectionism and found a significant effect of the PC induction on NA. However, these findings must be interpreted with caution. First, the interaction effect in Study 1 may have been underpowered (with n = 24 in each condition) as we did not focus on recruiting highly perfectionistic students. Second, in both studies, the induction effect on PC was rather weak. Third, the reduction in PC in the non-perfectionism (control) condition in Study 2 may have triggered a reduction in NA, which may then partly account for the significant regression effect on NA. Nevertheless, we can conclude that changes in PC are highly likely to influence levels of NA in individuals with perfectionistic tendencies.

Success of manipulation negative affect induction

In both studies, the NA induction was successful at increasing NA as measured by the PANAS. Furthermore, it increased sadness, which was only measured in Study 2.

Effect of negative affect induction on perfectionism

Contrary to our hypotheses, the NA induction showed no effect on perfectionistic cognitions, neither in the general student sample (Study 1) nor in the sample of students with high trait PC (Study 2). The only exception was that in Study 1 participants high in trait perfectionism elicited a lower perfectionistic interpretation bias after the NA induction. However, this result should be interpreted with caution as this sub-analysis was underpowered and was not replicated in Study 2. Thus, in general, our results give some indication of a unidirectional effect of PC on NA but not vice versa. Even though we did not assess the effect on depressive symptoms, NA can be viewed as one crucial symptom in depressive disorders, and a comparison with depression may be helpful to interpret the results. Theories about the maintenance of depressive symptoms suggest that negative thoughts stem from negative schemas (e.g., PC), which can trigger NA. Furthermore, these theories also suggest that emotional symptoms of depression, including negative affective states, enhance negative thoughts and schemas (Beck, 2008). In line with this theory, a recent meta-analysis has shown that a bidirectional effect between PC and depressive symptoms exists, when comparing longitudinal studies (Smith et al., 2021). Thus, our results stand in contrast to cognitive theories on depression and recent results. One reason for this discrepancy could be that depressive symptoms encompass a wide range of affective, cognitive, and behavioral changes that are quite stable over time, whereas NA occurs over a short-time period. Thus, NA itself may not be sufficient to trigger PC. Furthermore, PC have been found to be quite stable over time, which may explain why their activation can increase NA (e.g., Rice & Aldea, 2006; Smith et al., 2021). Another reason could be related to the high average of depressive symptoms in our sample of participants with high PC (especially in Study 2 where the mean BDI-II scores refer to mild depressive symptoms), which may have influenced the induction procedure. That is, (mildly) depressed individuals already exhibit high levels of NA, which, according to cognitive models of depression, is accompanied by a constant activation of maladaptive schemas. This activation, in turn, may have produced a ceiling effect regarding participants' perfectionistic cognitions, such that the induction was unable to further increase these cognitions.

Our study has a number of limitations. First, we used a very brief (but standardized) induction for PC. Even though this is helpful in the lab to be able to compare different conditions, it may not have been enough to fully activate PC in individuals with high dispositional perfectionism. Our induction differed from previous perfectionism inductions regarding idiosyncrasy of the domain and length, and our study was not able to produce effects similar to previous studies. Future studies could therefore consider using longer and more individualized scenarios (also see Boone et al., 2012; Shafran et al., 2006). Second, we did not counterbalance the order of the PC questionnaires (MPCI) and the task to assess perfectionistic interpretation biases (AST-PC). Therefore, we could not control for possible order effects and the answers on the AST-PC may be influenced by filling out the MPCI first.

Taken together, our studies should be interpreted with caution. The modified PC induction did not fully produce the expected effects. Even though experimental studies are important to assess causality of processes, the induction of specific processes is complicated due to ethical reasons and considerations regarding standardization (Van Den Hout et al., 2017). Future studies should optimize the induction to produce stable results. Even though the results of the two studies are rather mixed, some cautious conclusions can be drawn. First, PC can be manipulated in the lab in individuals high in trait perfectionism, even using a brief procedure. This is of practical value for future studies that aim to causally test specific research questions related to PC. As student samples are often used as analogue samples for individuals with mental disorders, including those with PC as a risk or maintaining factor, one could, for example, use our design (ideally with an improved induction, see above) to test whether PC may serve as a risk factor for symptoms of mental disorders. Second, we experimentally tested a bidirectional relationship between perfectionism and NA. Our results give some indication that the relationship is rather unidirectional, with PC influencing NA. Third, a clinical implication of our results may be related to the reductions of PC and NA that we found in the control conditions of the second study. We saw that in individuals high in trait perfectionism, it is possible to reduce PC and NA by instructing them to work in as relaxed a manner as possible and not to worry about the consequences. Considering that perfectionism seems to be an important transdiagnostic risk factor (e.g., Limburg et al., 2017) our results give an indication that a very short intervention may even be helpful for individuals high in perfectionism. Consequently, future studies could test whether interventions targeting perfectionism (e.g., Egan et al., 2011) could be adjusted to very brief interventions, and whether those interventions might reduce perfectionism and NA as well as symptomatology.

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Table 1

Frequencies or Means and Standard Deviations, T-scores and Effect Size (d) of Sociodemographic, Psychopathological, Perfectionism and Negative Affect Data of Study 1 and Study 2

Study 1

Variables	Perfectionism induction						Negative affect induction					
	Experimental *n* = 24		Control *n* = 24				Experimental *n* = 24		Control *n* = 24			
Gender (male/female/non-binary)	9/15/–		9/15/–		$\chi^2 = 0$		13/11/–		7/17/–		$\chi^2 = 2.14$	
	M	*SD*	*M*	*SD*	*t*(46)	*d*	*M*	*SD*	*M*	*SD*	*t*(46)	*d*
Age (in years)	23.04	3.98	22.42	2.21	0.67	0.19	24.12	4.52	22.04	2.51	**2.05***	0.59
Years of education	14.92	1.59	14.67	2.67	0.39	0.11	14.40	1.96	14.52	1.98	- 0.22	0.06
Trait perfectionistic concerns (FMPS-D CM-subscale)	26.38	7.89	25.88	8.13	0.22	0.06	23.17	6.47	21.58	6.36	0.86	0.25
Depressive symptoms (BDI-II)	7.50	6.72	8.29	7.14	-0.40	0.11	5.04	3.25	6.67	8.71	- 0.86	0.25
Trait anxiety (STAI-T)	38.04	10.12	39.04	9.57	-0.35	0.10	35.62	7.05	37.25	11.99	- 0.57	0.17

Pre-induction perfectionistic cognitions (MPCI-CM)	2.98	1.27	3.13	1.32	-0.42	0.12	2.63	1.00	2.47	0.97	0.59	0.17
Post-induction perfectionistic cognitions (MPCI-CM)	3.08	1.42	2.77	1.26	0.80	0.23	2.62	1.11	2.29	1.11	1.04	0.30
Pre-induction perfectionistic bias (AST-PC)	3.77	1.74	3.67	1.80	0.20	0.06	3.48	1.63	3.33	1.66	0.20	0.06
Post-induction perfectionistic bias (AST-PC)	3.82	2.11	3.80	1.49	0.04	0.01	2.97	1.28	2.86	1.83	0.04	0.01
Pre-induction negative affect (PANAS)	11.75	1.80	15.33	7.78	**-2.20***	0.63	13.00	4.36	12.83	3.34	0.15	0.04
Post-induction negative affect (PANAS)	14.08	5.41	15.79	7.51	-0.90	0.26	14.75	4.01	11.58	3.49	2.92	0.84

Study 2

	Perfectionism induction						Negative affect induction					
	Experimental $n = 30$		Control $n = 29$				Experimental $n = 29$		Control $n = 30$			
Gender (male/female/non-binary)	2/28/–		3/26/–		$\chi^2 = 0$		8/20/1		5/25/–		$\chi^2 = 2.32$	
	M	*SD*	*M*	*SD*	*t*(57)	*d*	*M*	*SD*	*M*	*SD*	*t*(57)	*d*
Age (in years)	21.47	3.79	23.86	5.79	-1.89	0.49	23.14	4.18	22.83	4.59	0.27	0.07

Years of education	13.82	1.70	14.02	1.67	-0.46	0.12	14.66	3.47	13.82	1.48	1.21	0.32
Trait perfectionism (FMPS-D total score)	95.30	12.87	95.52	16.48	-0.06	0.01	98.90	13.61	92.27	12.04	1.98	0.52
Trait perfectionistic concerns (FMPS-D CM-subscale)	30.37	3.73	30.93	6.04	-0.43	0.11	32.52	4.99	30.53	5.90	1.39	0.36
Trait personal standards (FMPS-D PS-subscale)	26.60	3.23	26.59	4.51	0.01	0.00	27.76	4.63	26.03	3.56	1.61	0.42
Depressive symptoms (BDI-II)	17.07	9.88	13.10	9.80	1.55	0.40	18.79	10.93	13.93	11.86	1.64	0.43
Trait anxiety (STAI-Trait)	48.10	10.94	47.59	9.99	0.19	0.05	53.34	8.93	48.30	12.64	1.77	0.46
Pre-induction perfectionistic cognitions (MPCI-CM)	18.07	5.61	16.48	6.53	1.00	0.26	17.83	5.72	15.93	6.76	1.16	0.30
Post-induction perfectionistic cognitions (MPCI-CM)	18.73	5.31	14.55	5.38	**3.01***	0.78	18.48	6.47	15.4	7.4	1.70	0.44
Pre-induction perfectionistic bias (AST-PC)	4.62	1.42	4.89	1.92	-0.63	0.16	4.91	1.57	4.88	1.92	0.06	0.02
Post-induction perfectionistic bias (AST-PC)	4.77	1.49	4.12	1.44	1.69	0.44	5.08	1.61	4.84	1.73	0.54	0.14
Pre-induction negative affect (VAS)	35.2	26.23	31.72	24.64	0.52	0.14	43.34	26.07	26.87	27.09	**2.38***	0.62
Post-induction negative affect (VAS)	37.4	28.57	28.03	20.79	1.44	0.37	57.38	24.17	22.4	24.64	**5.50***	1.43
Pre-induction negative affect (PANAS)	16.2	5.2	16.45	5.1	-0.19	0.05	17.28	5.33	16.23	5.79	0.72	0.19

Post-induction negative affect (PANAS)	17.9	7.34	15.07	3.87	1.84	0.48	20.45	7.17	14.17	4.21	**4.12***	1.07

Note. Years of education = Sum of school years and study duration; FMPS-D = Frost Multidimensional Perfectionism Scale; CM = concerns over mistakes; PS = personal standards; BDI-II = Beck's Depression Inventory; STAI-T = State-Trait Anxiety Inventory-Trait; MPCI-CM = Multidimensional Perfectionism Cognitions Inventory-concerns over mistakes subscale; AST-PC = Ambiguous Scenario Task for Perfectionistic Concerns; VAS = Visual analogue scale for sadness; PANAS = Positive and Negative Affect Schedule; * statistically significant difference between experimental and control conditions.

Table 2

Multiple Regressions Predicting Perfectionistic Concerns and Negative Affect after both inductions (Study 1)

Perfectionism vs. Non-Perfectionism Induction					
	B	*SE*	*t*	*p*	95 % CI
Manipulation check					
DV: Post-induction perfectionistic cognitions (MPCI), R^2 = 0.52					
Pre-induction perfectionistic cognitions (MPCI-CM)	0.74	0.11	6.87	< .001	[0.52, 0.96]
Condition	0.43	0.27	1.55	.128	[-0.13, 0.98]
DV: Post-induction perfectionistic interpretation bias (AST-PC), R^2 = 0.51					
Pre-induction perfectionistic interpretation bias (AST-PC)	0.74	0.11	6.84	< .001	[0.52, 0.95]
Condition	-0.05	0.37	-0.14	.888	[-0.81, 0.7]
Main Analysis					
DV: Post-induction negative affect (PANAS), R^2 = 0.61					
Pre-induction negative affect (PANAS)	0.90	0.11	8.25	< .001	[0.68, 1.12]
Condition	1.51	1.27	1.20	.238	[-1.04, 4.07]
Negative Affect vs. Neutral Affect Induction					
	B	*SE*	*t*	*p*	95% CI
Manipulation check					
DV: Post-induction negative affect (PANAS), R^2 = 0.45					
Pre-induction negative affect (PANAS)	0.57	0.12	4.95	< .001	[0.34, 0.81]
Condition	3.07	0.88	3.48	.001	[1.29, 4.85]
Main analyses					
DV: Post-induction perfectionistic cognitions (MPCI), R^2 = 0.57					
Pre-induction perfectionistic cognitions (MPCI-CM)	0.84	0.11	7.57	< .001	[0.62, 1.07]
Condition	0.19	0.22	0.89	.378	[-0.24, 0.63]
DV: Post-induction perfectionistic interpretation bias (AST-PC), R^2 = 0.64					

Pre-induction perfectionistic interpretation bias (AST-PC)	0.76	0.09	8.87	< .001	[0.59, 0.94]
Condition	0	0.28	-0.01	.991	[-0.56, 0.56]

Note. DV = Dependent variable; MPCI-CM = Multidimensional Perfectionism Cognitions Inventory-concerns over mistakes subscale; FMPS-D = Frost Multidimensional Perfectionism Scale; AST-PC = Ambiguous Scenario Task for Perfectionistic Concerns; PANAS = Positive and Negative Affect Schedule; condition was dummy-coded with the induction as 1 and with the control as 0; $n = 48$ for each model.

Table 3

Multiple Regressions Predicting Perfectionistic Concerns, Perfectionistic Interpretation Biases, Negative Affect and Sadness after both inductions (Study 2)

Perfectionism vs. Non-Perfectionism Induction						
		B	*SE*	*t*	*p*	95 % CI
Manipulation check						
DV: Post-induction perfectionistic cognitions (MPCI), $R^2 = 0.54$						
	Pre-induction perfectionistic cognitions (MPCI-CM)	0.60	0.09	7.00	< .001	[0.43, 0.77]
	Condition	0.65	0.21	3.13	< .001	[0.23, 1.06]
DV: Post-induction perfectionistic interpretation bias (AST-PC), $R^2 = 0.32$						
	Pre-induction perfectionistic interpretation bias (AST-PC)	0.47	0.10	4.66	< .001	[0.27, 0.67]
	Condition	0.78	0.33	2.36	.022	[0.12, 1.44]
Main analyses						
DV: Post-induction negative affect (PANAS), $R^2 = 0.21$						
	Pre-induction negative affect (PANAS)	0.46	0.14	3.26	< .001	[0.18, 0.74]
	Condition	2.94	1.42	2.07	.043	[0.10, 5.79]
DV: Post-induction sadness (VAS), $R^2 = 0.6$						
	Pre-induction sadness (VAS)	0.75	0.09	8.83	< .001	[0.58, 0.92]
	Condition	6.76	4.27	1.58	.119	[-1.79, 15.30]

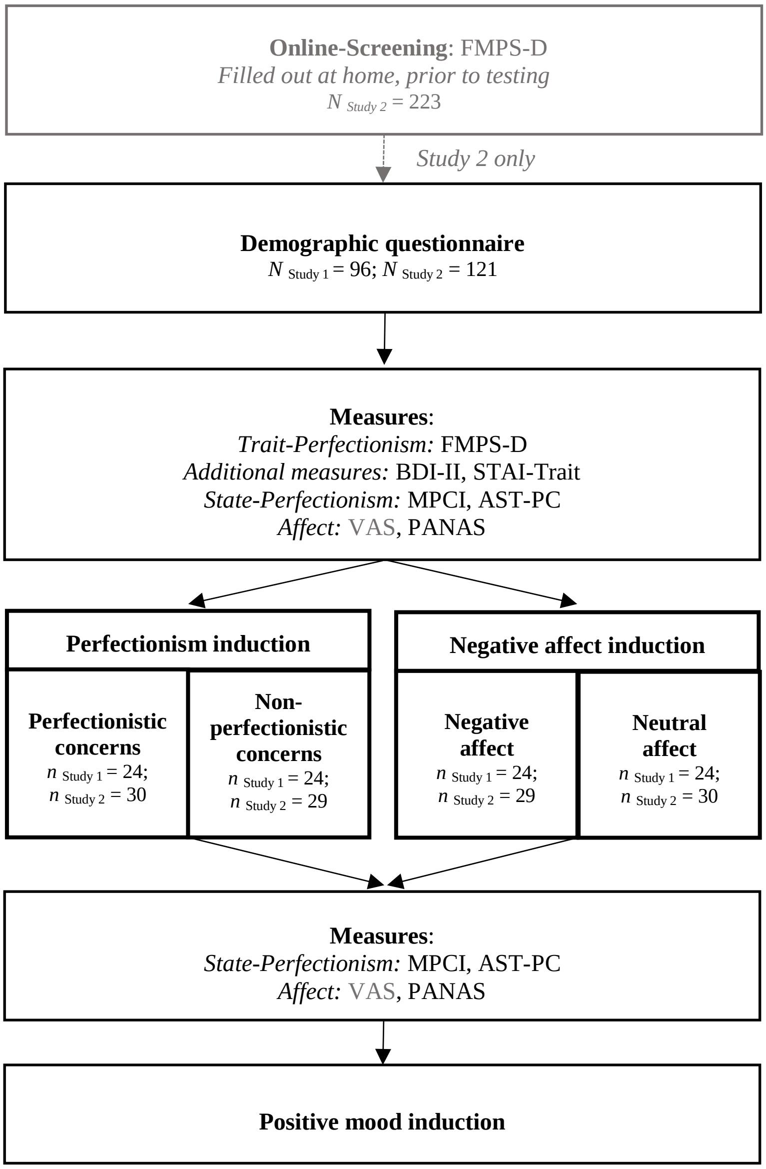
Negative Affect vs. Neutral Affect Induction						
		B	*SE*	*t*	*p*	95 % CI
Manipulation check						
DV: Post-induction negative affect (PANAS), $R^2 = 0.6$						
	Pre-induction negative affect (PANAS)	0.73	0.10	7.28	< .001	[0.53, 0.93]
	Condition	5.52	1.11	4.98	< .001	[3.30, 7.74]
DV: Post-induction sadness (VAS), $R^2 = 0.86$						

	Pre-induction sadness (VAS)	0.81	0.06	14.27	< .001	[0.70, 0.93]
	Condition	21.58	3.12	6.91	< .001	[15.33, 27.84]
Main analyses						
DV: Post-induction perfectionistic cognitions (MPCI), R^2 = 0.55						
	Pre-induction perfectionistic cognitions (MPCI-CM)	0.81	0.10	7.91	< .001	[0.60, 1.01]
	Condition	0.31	0.25	1.22	.226	[-0.20, 0.82]
DV: Post-induction perfectionistic interpretation bias (AST-PC), R^2 = 0.32						
	Pre-induction perfectionistic interpretation bias (AST-PC)	0.60	0.10	6.10	< .001	[0.41, 0.80]
	Condition	0.22	0.34	0.65	.518	[-0.46, 0.91]

Note. DV = Dependent variable; MPCI-CM = Multidimensional Perfectionism Cognitions Inventory-concerns over mistakes subscale; AST-PC = Ambiguous Scenario Task for Perfectionistic Concerns; PANAS = Positive and Negative Affect Schedule; VAS = Visual analogue scale for sadness; condition was dummy-coded with the induction as 1 and with the control as 0, *n* = 59 for each model.

Figure 1

Schematic Flow of Studies 1 and 2



Note. FMPS-D = German version of Frost Multidimensional Perfectionism Scale; BDI-II = Beck's Depression Inventory; STAI-Trait = Trait version of State-Trait Anxiety Inventory; MPCI = Multidimensional Perfectionism Cognitions Inventory; VAS = Visual analogue scale; PANAS = Positive and Negative Affect Schedule; AST-PC = Ambiguous Scenario Task for Perfectionistic Concerns. The online-screening of participants and the inclusion of a visual analogue scale (VAS) for sadness was only implemented in Study 2. There were small methodological adjustments to the induction procedures between Studies 1 to 2.