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Action Crisis Experiment: Measuring Effort-Related
Cardiovascular Responses and Carry-Over Effects.

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Abstract

Action crisis describes an intrapsychic conflict between disengaging and further pursuing a personal goal. Previous research has predominantly used longitudinal designs and self-report measures to study this phenomenon. However, these approaches offer limited experimental control, making it difficult to isolate the underlying mechanisms. To address this, the present study adopts an experimental design that enables the targeted manipulation of action crises. Our aim was to manipulate action crisis through a writing task, measure the physiological signature through effort-related cardiovascular response, and additionally provide insight into the carry-over effect of effort in an unrelated follow-up task. We hypothesized that the effort-related cardiovascular response during the writing task would be higher for individuals experiencing an action crisis than for their control counterparts. Further, we expected to see the same difference in effort-related cardiovascular response during an unrelated follow-up task, due to the influence that the action crisis has on current mood. To test these hypotheses, we conducted a randomized controlled trial with $N = 198$ participants. Pre-ejection period served as a measure for effort-related cardiovascular response. The results showed that, although the action crisis was not successfully manipulated through the writing task, there was a significant difference in the cardiovascular response during the follow-up task. Mood did not prove to be a mediating variable. Based on these results, one can conclude that writing about a current struggle with a goal increases effort, even in unrelated tasks. The underlying mechanisms driving this effect are still open for further investigation.

Keywords: integrated analysis, experiment, action crisis, pre-ejection period, effort-related cardiovascular response

Zusammenfassung

Eine Handlungskrise beschreibt einen intrapsychischen Konflikt zwischen dem Aufgeben und dem Weiterverfolgen eines persönlichen Ziels. In früheren Studien wurde dieses Phänomen vorwiegend anhand von Längsschnittdesigns und Selbstbeurteilungsfragebögen untersucht. Diese Ansätze bieten jedoch nur begrenzte experimentelle Kontrolle, was es schwierig macht, die zugrunde liegenden Mechanismen zu isolieren. Um dieser Tendenz entgegenzuwirken, verfolgt diese Studie ein experimentelles Design. Dazu versuchen wir die Handlungskrise durch eine Schreibaufgabe zu manipulieren und messen dann die Herzkontraktionskraft, als anstrengungsbezogener, kardiovaskulärer Indikator von Handlungskrisen. Weiters untersuchen wir einen Übertragungseffekt der Anstrengung auf den d2-task, als unabhängige Folgeaufgabe. Wir stellten die Hypothese auf, dass die anstrengungsbezogene Reaktion bei Personen, die eine Handlungskrise erleben, höher ist als bei einer Kontrollgruppe. Denselben Unterschied erwarteten wir im d2-task, mediiert durch Stimmung. Um diese Hypothesen zu untersuchen, haben wir ein randomisiertes kontrolliertes Studiendesign mit $N = 198$ Studierenden verwendet. Präejektionsperiode (PEP) dient als Maß für die anstrengungsbezogene Reaktion. Die Ergebnisse zeigten keine erfolgreiche Manipulation der Handlungskrise durch die Schreibaufgabe, jedoch einen signifikanten Unterschied in PEP während der Folgeaufgabe. Stimmung erwies sich nicht als Mediator. Aus den Ergebnissen lässt sich schlussfolgern, dass das Schreiben über ein Ziel, mit dem man derzeit zu kämpfen hat, die Anstrengung auch bei unabhängigen Folgeaufgaben erhöht. Die zugrunde liegenden Mechanismen erfordern noch weitere Untersuchungen.

Schlüsselwörter: Experiment, Handlungskrise, Präejektionsperiode, Anstrengung, kardiovaskuläre Reaktion

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Introduction

Goals and feelings of accomplishment are essential to our well-being (Brandstätter & Herrmann, 2016). Personal goals—goals with high personal value and meaning, such as an academic degree, an aspiring profession, mastering a complex skill, or getting in shape—require repeated action over a longer time, and it is most often not a linear path to attainment. To secure desired outcomes, perseverance and passion for long-term goals are valuable skills, especially because setbacks and difficulties in the pursuit of personal goals are likely (Duckworth et al., 2007). These qualities are rightfully admired in our culture and understandably so, motivational psychology has predominantly focused on these areas. However, persistence is not always advantageous. Sometimes, holding onto a goal can be costly—not only in terms of time and resources but also in terms of psychological and physiological well-being (Brandstätter & Schüler, 2013; Wrosch et al., 2003). Theories like escalation of commitment (Staw, 1976), the sunk cost fallacy (Arkes & Blumer, 1985), and loss aversion (Kahneman & Tversky, 1979) explain why individuals struggle to disengage from failing goals, even when doing so would be the more rational choice. Psychological mechanisms such as self-justification (Aronson & Mettee, 1968) reinforce this tendency by making individuals reluctant to admit that their past investments were futile.

So, what if a goal is no longer desirable or feasible? Instead of overcommitment and wasting important resources (e.g., mental, physical, time and money), goal-shelving or goal disengagement can be the most sensible thing to do (Kurzban et al., 2013; Mayer & Freund, 2022). Rightfully so, research investigating goal disengagement is getting more and more attention. *“There is now scientific consensus that persistence is only one side of the coin, and*

effective self-regulation and maintenance of well-being likewise require an individual to disengage from goals that are unattainable or too costly.” (Ghassemi et al., 2017, p. 10).

However, how do people decide whether to continue pursuing a goal or disengage from it? Contrary to the notion that goal disengagement is a discrete decision (i.e., a sudden realization), Klinger (1977) describes it as a sometimes longer and wavering process, whereby the person can face many crucial changes on different levels. According to Klinger’s *incentive-disengagement model*, goal disengagement follows a structured sequence of phases: initial frustration, intensified effort, emotional distress (depression), and eventually, cognitive restructuring that enables disengagement. This is especially true for central goals of high personal value (Wrosch et al., 2003). Recognizing that this transition is not instantaneous, Brandstätter and colleagues (2013) introduced the concept of *action crisis*. This closes the conceptual gap between engagement and disengagement theories.

Action Crisis

At the heart of an action crisis lies the conflict between pursuing a goal and disengaging from it. Action crisis “... *describes a motivational conflict in which the individual is torn between holding on to and letting go of a personal goal, a situation that typically arises when individuals have already invested a great deal into their goal but suffer repeated setbacks and/or a substantial drop in the desirability of the goal.*” (Brandstätter & Bernecker, 2022, p.286). Not only does one feel torn between two choices in this situation, but experiencing an action crisis is also associated with lower psychological and physiological well-being, including symptoms of depression, ill-being, higher cortisol levels, slower recovery, less improvement in pain and lower health-related quality of life during physical therapy (Brandstätter et al., 2013; Brandstätter & Herrmann, 2016; Herrmann & Brandstätter, 2015; Wolf et al., 2019). Additionally, goal-related

performance and subjective goal progress are negatively influenced by an action crisis (Brandstätter et al., 2013; Holding et al., 2017).

To show how a person can get trapped in an action crisis and experience the negative effects mentioned above, one must contextualize this within field theory (Lewin, 1963). An action crisis can be described as an urge conflict in an aversive–aversive motivational field, which means that pursuing and disengaging from a goal is both associated with negative consequences. An example could be a student struggling with their major. On the one hand, pursuing the major does not feel good, since setbacks and difficulties such as failing multiple exams lead the student to question its feasibility. On the other hand, quitting the major does not feel good either, because the already invested resources would seem wasted, supportive friends and family would be let down, and the inability to finish the studies becomes apparent. Considering all these aspects, it is important to investigate the underlying mechanisms that govern such an experience.

Methodological Approach

Although research has shed light on different aspects of action crisis, in regard to the methodological approach and measurement, the field is more unidimensional. With exceptions (Ghassemi et al., 2017), most often longitudinal designs (e.g., Wolf et al., 2019) and self-report measures of action crisis (ACRISS; Brandstätter & Schüler, 2013) are used. Despite their advantages, these methods are not without their difficulties. The issue with longitudinal studies is the lack of control of important variables and low manipulative ability. Self-report measures come with a variety of challenges, which interfere with the accuracy and validity of the data. For example, social desirability bias and self-enhancement bias/ego protection and therefore dishonest answers are hard to control in this context. Therefore, experimental designs and

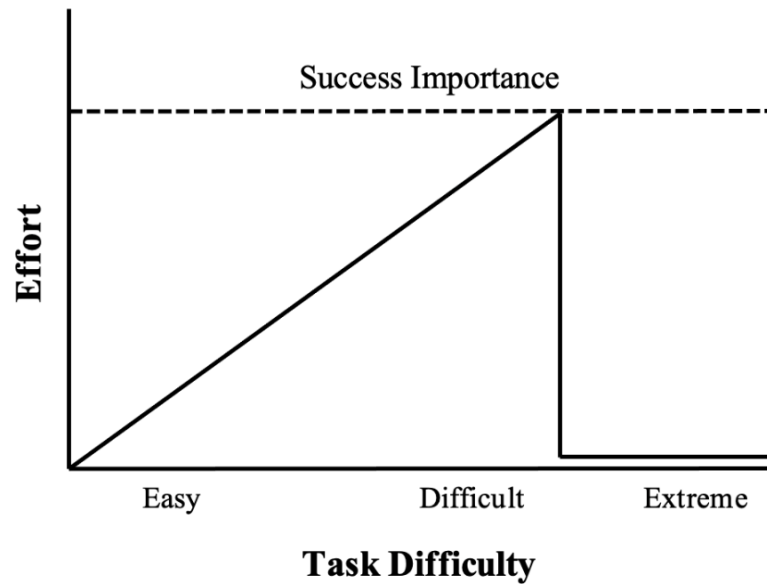
objective measures are needed to provide a more balanced and solid field of research and enable new ways to answer pressing questions regarding action crisis.

Building on the pilot study of Ghassemi et al. (2017), which examines action crisis in such a manner, the main aim of this study is to extend this approach and address possible weaknesses. The following section serves as an in-depth background on the theoretical reasoning of a) the objective measurement of action crisis and b) the experimental manipulation.

Effort – An Objective Measurement of Action Crisis

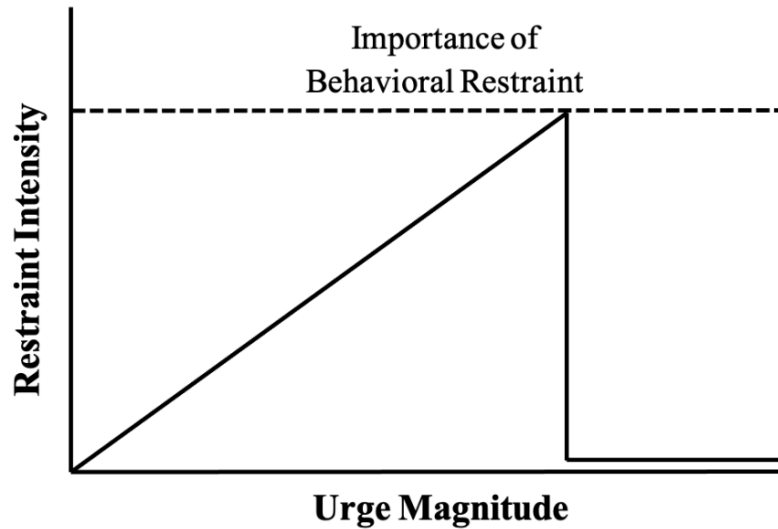
In essence, action crisis describes an urge conflict in an aversive-aversive field. On the one hand, we do not want to quit the master studies because the already invested resources would go to waste. But on the other hand, we also do not want to fail exams and waste more resources, since the goal seems no longer feasible. While we do not have a direct objective measure for this urge conflict, the integrated analysis by Wright (1996) together with its recent extension by Agtarap and colleagues (2016) provides a compelling approach.

Integrated analysis combines the Motivational Intensity Theory (MIT; Brehm & Self, 1989) and the active coping hypothesis by Obrist (1976). MIT posits that effort—defined as the mobilization of resources to sustain behavior over time—is directly determined by task difficulty, as long as success importance is high enough to justify the effort. In this context, task difficulty should be viewed as a subjective evaluation of the demands rather than objective difficulty, since multiple factors influence the perceived task difficulty (see Carry-Over Effect & Mood pp. 14; Gendolla, 2025). When success importance is not high enough, one disengages, thus putting forth no effort. This relation is illustrated with a sawtooth pattern (see Figure 1).

Figure 1*Motivational Intensity Theory*

Obrist's active coping hypothesis states that beta-adrenergic sympathetic nervous system activation varies with effort in response to a performance challenge (Obrist, 1976). This effort-related cardiovascular response is assessed via myocardial contractility i.e., the forcefulness of the heartbeat. The gold standard of measurement is pre-ejection period (PEP; Kelsey, 2012). In sum, MIT and Obrist's active coping hypothesis form the integrated analysis (Wright, 1996).

Expanding on the integrated analysis, Agtarap and colleagues (2016) applied this framework to behavioral restraint. In this extension, urge magnitude represents task difficulty. As the urge magnitude increases, restraint intensity and therefore effort to fight those urges increases. As long as the importance of behavioral restraint justifies the effort, this relation is linear between restraint intensity and urge magnitude. But when the importance of behavioral restraint is not high enough, one disengages and gives into the urge, thus putting forth no effort. Again, this is best illustrated with a sawtooth pattern (see Figure 2.).

Figure 2*Integrated Analysis*

Following this theory, action crisis should be very effortful, since there are two strong contradicting urges to fight at the same time—we do not want to quit the goal because the already invested resources would go to waste, but we also do not want to waste more resources, since setbacks and difficulties make the goal no longer feasible.

As one main aim of the study is to use an objective measurement of action crisis, we use the physiological signature as described by the integrated analysis and its extension (Agtarap et al., 2016; Wright, 1996).

Action Crisis in an Experimental Design

When designing a lab experiment to induce an action crisis, one key question emerges: How can we reliably create an action crisis in a controlled setting? To address this, we used an adapted version of Ghassemi's (2017) writing task: participants reflect on a goal experiencing an action crisis. Specifically, the manipulation group describes their goal and explains why they might want to disengage from it. In comparison, the control group describes their goal and the

reasons why they remain motivated to pursue it. Both groups then respond to seven identical prompts—covering importance, emotions, doubts, and next steps—in 3–5 sentences each (e.g., “Die nächsten Schritte, die Sie geplant haben, um dieses Ziel zu erreichen.“ or „Die Zweifel und Schwierigkeiten, welche Sie beim Zielstreben erfahren haben.“). This differs from Ghassemi’s original design, which used distinct question sets for each condition.

This aims to induce the urge conflict characteristic through contemplating about the urges related to the specific goal. We hypothesize that this task will be more difficult for participants writing about a goal that they are having an action crisis with currently, compared to participants who are writing about a goal they are progressing well on (control group). In line with the integrated analysis (Wright, 1996), we therefore expect action crisis participants to show more effort.

Our first hypotheses are as follows:

H1a. Self-reported action crisis after the writing task will be higher for the action crisis group than the control group. (Manipulation Check)

H1b. Effort-related cardiovascular response during the writing task will be higher for the action crisis group than the control group.

Carry-Over Effects & Mood

Action crises can reliably trigger lower well-being, including negative affect and symptoms of depression (Brandstätter et al., 2013; Herrmann & Brandstätter, 2015). In this context, it is important to understand emotions not only as a reflection of our state, but as a functional part influencing subsequent behavior. According to Forgas’s Affect Infusion Model (Forgas, 1995), negative mood influences our demand appraisals and makes otherwise neutral tasks feel harder. Similarly, Lazarus and Folkman (1984) showed that mood shapes both primary

appraisal (“How demanding is this?”) and secondary appraisal (“Can I handle it?”). Combining these findings with the integrated analysis by Wright (1996), the main principle is:

“(...) for an easy task more resources are mobilized in a negative mood than in a positive mood, because subjective demand and, as a result, mobilized resources are higher in a negative mood than in a positive mood. But when a task is objectively difficult, more resources are mobilized in a positive mood than in a negative mood, because subjective demand is high but not yet too high in a positive mood, whereas it is already too high for active coping in a negative mood.” (Silvestrini & Gendolla, 2009, pp. 226–227)

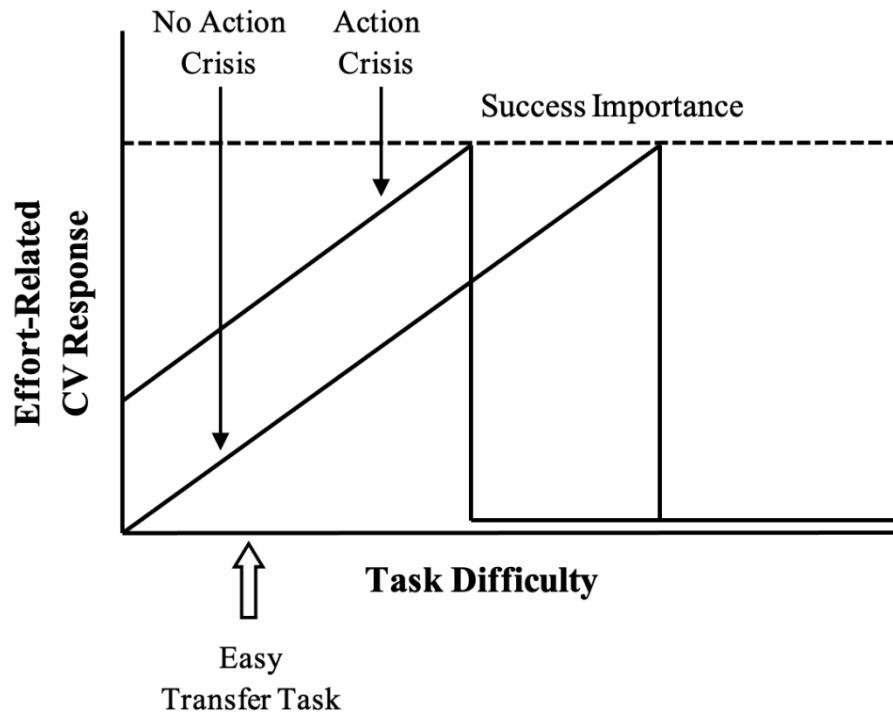
Due to evidence of mood influences on effort, we hypothesized that mood functions as a potential mediator of action crisis on effort during a subsequent task (Gendolla, 2025).

Gendolla (2025) also points out that general task context seems to play an important role in this relationship between mood and effort. For example, personal choice (vs. external action assignment) can shield affective influences on effort-related cardiovascular response (Falk et al., 2022). We therefore chose the d2 Letter Cancellation Task (Brickenkamp et al., 2010). This is an unrelated, externally assigned task, with low difficulty to avoid shielding effects and disengagement in participants.

Conclusively, we expect that an action crisis will leave participants in a more negative mood, bias their difficulty appraisals for the unrelated task, and thereby drive higher effort-related cardiovascular responses. In Figure 3, we illustrate the difference in effort between the two groups.

Figure 3

Study Design: Difference in Effort-Related CV Response Through Action Crisis



Note. Theoretical illustration of effort (PEP) during the transfer task as a function of group (action crisis vs. control). Higher perceived difficulty in the action crisis group leads to higher effort-related physiological response.

Our second and third hypotheses states as follows:

- H2. Effort-related cardiovascular response during the transfer task will be higher for the action crisis group than the control group.
- H3. The effect of our grouping variable on effort response will be mediated through mood.

Methods

Participants

For our sample we recruited students—mainly studying psychology—from the University of Vienna. As part of their curriculum, participants received lab-credits upon participation in this study. Based on a power analysis (using G*Power 3.1) for an independent samples t-test with a small to moderate effect size of Cohen's $d = 0.35$, a significance level of $\alpha = 0.05$ (one-tailed), and a desired power of $1 - \beta = 0.80$, we would need a total of 204 participants. We aimed to recruit a total of 216 participants to account for potential exclusions.

In the end, we excluded 18 participants leaving us with a sample of $N = 198$ participants (145 females, 53 males), with a mean age of 21.57 years ($SD = 3.49$, age range: 18–36 years). Six participants were excluded for having incomplete or missing data, eight people were excluded for having uninterpretable PEP data and four were excluded for having PEP data $3SD$ away from the group mean. 100 participants were assigned to the control group, 98 to the manipulation group.

Materials and Measures

Manipulation Check and Independent Variable - Action Crisis

To measure action crisis, we used the Action Crisis Scale (ACRISS; Brandstätter & Schüler, 2013). The scale comprises six items with an internal consistency (Cronbach's $\alpha = .75-.88$). Participants read the prompt “Bitte geben Sie an, inwiefern die folgenden Aussagen in Bezug auf Ihr Ziel zutreffen.“ They rated each statement (e.g. “Ich grübele immer wieder über mein Ziel.“ or „Wie häufig hatten Sie in letzter Zeit den Impuls, Ihr Ziel aufzugeben?“) on a 5-point Likert scale. Four items ranging from 1 = “gar nicht zutreffend” to 5 = “völlig zutreffend” and two items ranging from 1 = “nie” to 5 = “sehr häufig”.

To manipulate action crisis, we used an adapted version of Ghassemi's (2017) writing task (see introduction pp. 12–13).

Dependent Variable – Effort

For effort-related cardiovascular response our study used PEP, which measures myocardial contractility i.e., the forcefulness of the heartbeat. Continuous electrocardiogram (ECG) and impedance cardiogram (ICG) signals were recorded with a Cardioscreen 1000 system, using four electrodes. PEP was defined as the time interval in milliseconds between the onset of left ventricular depolarization (R-wave onset in the ECG) and the opening of the aortic valve (B-point of the ICG dZ/dt waveform). To identify B-point we used the method of Lozano and colleagues (2007). Blood pressure and heart rate were also recorded at one-minute intervals to test for a rare error; these measures were logged but not part of the primary analyses given the consensus that PEP more reliably reflects sympathetic activation (Richter et al., 2016).

For each participant, we computed mean PEP values for the baseline, the writing task, and the transfer task. To assess the magnitude of change, two PEP reactivity scores were calculated by subtracting baseline PEP from writing task PEP (H1b.), as well as from transfer task PEP (H2. & H3.). This approach follows the reactivity scoring conventions recommended by Llabre and colleagues (1991).

Transfer Task – d2 Letter Cancellation Task

To test carry-over effects, we used an online version of d2 letter cancellation task (Brickenkamp et al., 2010). This selective attention test served as an unrelated task. Participants had to correctly identify all d's with two strokes, in 55 lines of letters over a 5-minute timeframe. We informed them through the instructions that the average student could perform 55 lines in 4 minutes. This extra minute in our study ensured the task was of low difficulty.

Mediating Variable - Mood

Negative mood was assessed twice using two short form versions of the Multidimensionaler Befindlichkeitsfragebogen (MDBF; Steyer et al., 1997). We analyzed only the first four items, which reliably distinguish between good and bad mood (Cronbach's $\alpha = .73-.89$), including for example “wohl”, “unglücklich”, “unzufrieden” and “glücklich”. Participants rated each item in response to the prompt “Bitte geben Sie an, wie Sie sich jetzt in diesem Moment fühlen.” on a 5-point Likert scale ranging from 1 = “*gar nicht*” to 5 = “*sehr*”.

Procedure

We employed a randomized control trial with a double-blind procedure. This study was split into two phases. First, we conducted an online screening to ensure participants met inclusion criteria and informed them about the study's experimental setting, as well as measurement techniques. The second phase was the experimental testing at the lab.

Screening

At the beginning, we informed participants about the laboratory setting, cardiovascular measures (PEP-electrodes, SBP-arm cuff), risks, insurance, voluntariness and withdrawal, as well as expense allowance and data-processing. Only participants who provided informed consent were allowed to proceed with the study. As the first step, participants answered a questionnaire about personal goals. This served to identify whether they are currently experiencing an action crisis in relation to one goal, while also making satisfactory progress on another. For each goal, they indicated their level of commitment, perceived difficulty and overall importance. Other parts in the questionnaire included health-related questions, implicit willpower, self-doubt and self-control, with the last three mostly to distract from the current aims of the study.

Laboratory Testing

If participants met the necessary requirements for the study—agreeing to the in lab testing and terms, having both a goal where they are progressing well on, as well as a goal with which they experienced an action crisis with—they proceeded to the testing phase in the lab. We began by attaching the electrodes and arm cuff to the participants and assessed baseline myocardial contractility. To ensure a resting state, participants listened to relaxing music from a provided YouTube playlist for 10 minutes. After 8 minutes, we recorded the baseline measurement during the final 2 minutes of this period. Following this, the participants answered the MDBF (Steyer et al., 1997). After the baseline phase, participants got randomly assigned to a group (action crisis vs. control) through the experimental administration program Qualtrics. Participants then had to write about either a goal they are experiencing struggles and setbacks on or a goal they are progressing well on. Neither the participants nor the researchers involved knew which group each participant belonged to. During this part we measured the cardiovascular response, PEP, SBP, HR. After the writing task, the questionnaire followed up with the ACRISS (Brandstätter & Schüler, 2013), MDBF (Steyer et al., 1997) and Self-Assessment Manikin Scale (Bradley & Lang, 1994), as well as questions of self-worth and alternatives & consequences when disengaging from their goal.

For the last phase, participants moved on to the transfer task. They first got on-screen instructions to the d2 letter cancellation task (Brickenkamp et al., 2010), and practiced one string of the d2 letter cancelation task with performance feedback. After the practice, participants were provided with information about the length, performance requirements, and average performance of participants on the d2 letter cancelation task. Following this information, participants answered questions regarding their ability compared to other students, their expected

performance, as well as the importance and perceived difficulty of the task. Then, participants completed the main testing of the task, while we measured their cardiovascular response. Finally, the participants answered questions about rumination during the task. At the end of the laboratory study participants received a debriefing with the possibility to ask questions.

Statistical Analysis

All analyses and plots except the mediation were generated in JASP (Version 0.19.1). To account for the violation of equal variance in our data, we used Welch's t-test. Normality was sufficient in our data. To deal with outliers, we removed participants who had PEP reactivity scores that are three standard deviations away from the group mean.

To test our hypothesis 1a, the manipulation check, we have used a one-tailed Welch's t-test for independent samples with group as our independent variable and the ACRISS score as our dependent variable. Action crisis group was hypothesized to have higher self-report action crisis than the control group. For hypothesis 1b, we have planned on using a one-tailed Welch's t-test for independent samples with group as our independent variable and PEP reactivity as our dependent variable. The action crisis group was hypothesized to have lower PEP reactivity (indicating higher effort-related cardiovascular response) than the control group.

To test our second hypothesis, we have used a one-tailed Welch's t-test for independent samples with group as our independent variable and PEP reactivity from the baseline to the transfer task as our dependent variable. Again, the action crisis group was hypothesized to have lower PEP reactivity (indicating higher effort-related cardiovascular response) than the control group. To test our third hypothesis, we used structural equation modeling (SEM) in Mplus, with group as the independent variable, PEP reactivity from the baseline to the transfer task as our dependent variable and the mood score as our mediator.

For our exploratory analysis we conducted a Mann-Whitney-U test for self-reported difficulty of the transfer task. For performance during the transfer task, we conducted a Welch's t-test for independent samples. For interrater reliability, we computed intraclass correlation coefficient (ICC). Three independent coders rated each participant's response on a 5-point action crisis scale (1 = "*no action*" to 5 = "*clear action crisis*").

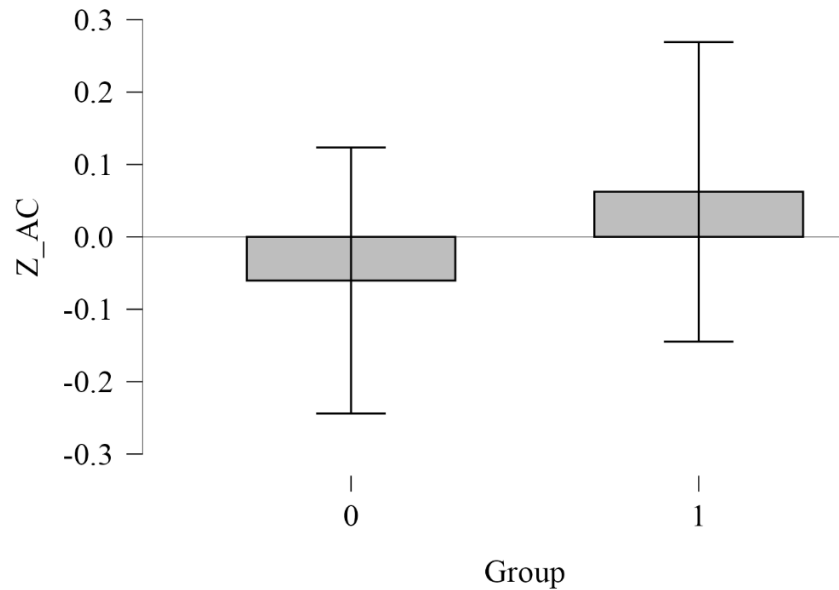
Results

Hypothesis 1a – Manipulation Check

Hypothesis 1a proposed that self-reported action crisis would be higher in the action crisis group compared to the control group. Due to a violation of the assumption of equal variances, we conducted a Welch's t-test for independent samples. The analysis indicated no significant difference in self-report action crisis between the action crisis group ($M = 0.06$, $SD = 1.03$) and the control group ($M = -0.06$, $SD = 0.93$), $t(192.85) = -0.88$, $p = .190$. In Figure 4, the box plots display the means and 95% confidence intervals.

Hypothesis 1b – Writing Task Effort Response

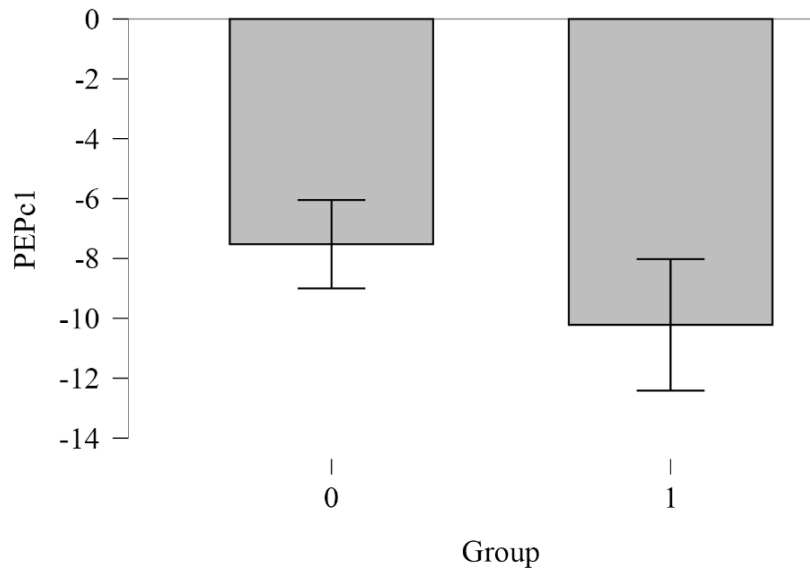
Hypothesis 1b proposed that effort-related cardiovascular response during the writing task would be higher in the action crisis group than in the control group. However, as the manipulation check (Hypothesis 1a) did not reveal a significant group difference in self-reported action crisis, this planned analysis was not conducted.

Figure 4*Box Plots of Self-Reported Action Crisis by Group*

Note. Mean action crisis score (ACRISS; Brandstätter & Schüller, 2013) = Z_AC ; control group = 0; action crisis group = 1.

Hypothesis 2 – Transfer Task Effort Response

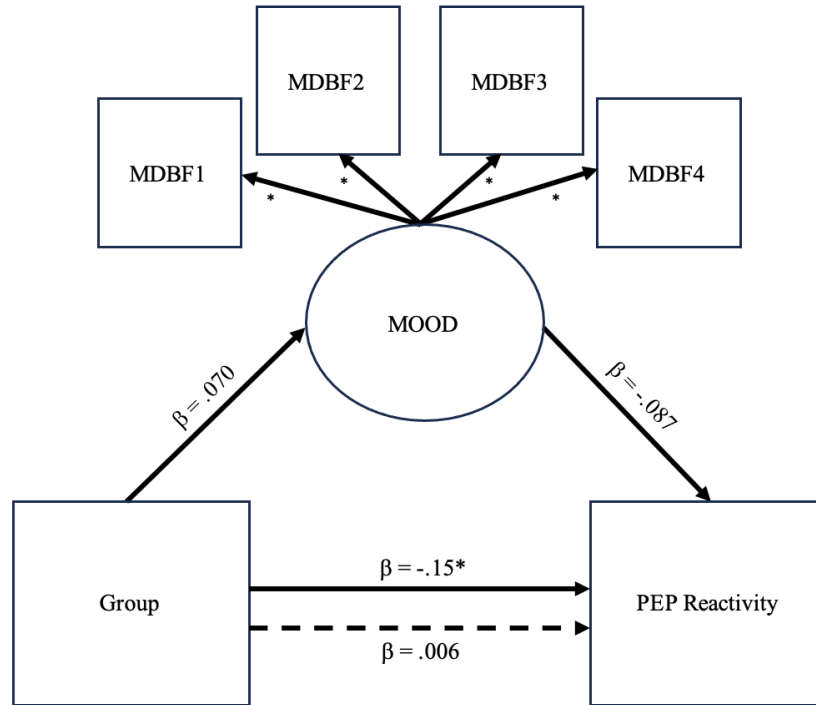
Hypothesis 2 proposed that effort-related cardiovascular response during the transfer task would be higher in the action crisis group compared to the control group. Again, a Welch's t-test for independent samples was used. The results showed a significant difference in PEP reactivity between groups, with the action crisis group ($M = -10.22$, $SD = 10.94$) displaying lower PEP reactivity than the control group ($M = -7.52$, $SD = 7.37$), $t(169.98) = 2.02$, $p = .022$. This difference corresponds to a small effect size ($d = 0.29$), indicating that the action crisis group exhibited modestly greater effort-related cardiovascular response during the transfer task. In Figure 5, the box plots display this difference of effort related cardiovascular response for both groups with means and 95% confidence intervals.

Figure 5*Box Plots of PEP Reactivity During Transfer Task by Group*

Note. PEP reactivity = PEPc1; control group = 0; action crisis group = 1.

Hypothesis 3 – Mediation Analysis

Hypothesis 3 proposed that the effect of the grouping variable on effort-related cardiovascular response would be mediated through mood. A structural equation model was estimated using Mplus to test this mediation pathway. Results showed a significant direct effect of group on PEP reactivity, $\beta = -0.144$, $p = .030$, 95% *CI* $[-0.274, -0.014]$. However, the indirect effect via mood was not significant, $\beta = -0.006$, $p = .408$, 95% *CI* $[-0.020, 0.008]$. Furthermore, there was no significant effect of group on mood, $\beta = 0.070$, $p = .352$, 95% *CI* $[-0.077, 0.216]$, nor of mood on effort response, $\beta = -0.087$, $p = .186$, 95% *CI* $[-0.215, 0.042]$. Figure 6 displays the mediation path model.

Figure 6*Mediation Path Model With Mood as Mediator*

Note. Items 1–4 of the MDBF scale (Steyer et al., 1997) = MDBF 1–4;

control group = 0; action crisis group = 1.

Exploratory Analyses

Inter-rater Reliability Test

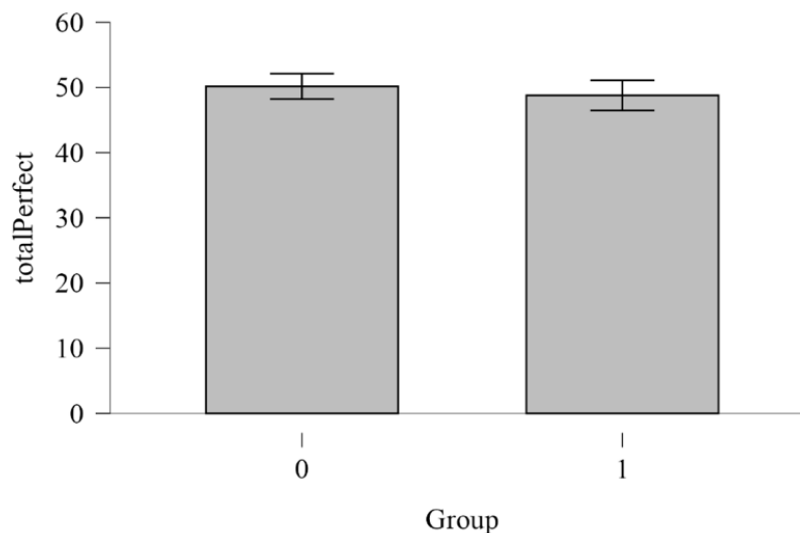
To strengthen the reliability of action crisis measurement, three independent researchers conducted an inter-rater reliability test by coding each participant's answers (Likert-Scale reaching from 1 = "no action", to 5 = "clearly action crisis"). The results show an ICC score of 0.696, which indicates moderate agreement between the raters (Koo & Li, 2016). Similar to the ACRISS scale, the results indicated no difference in action crisis between the two groups.

Performance During the Transfer Task

We investigated the difference in performance of the transfer task between groups, through the total number of correct lines in the d2 letter cancellation task (Brickenkamp et al., 2010). A Welch's t-test for independent samples indicated no significant difference in performance between the action crisis group ($M = 50.18$, $SD = 8.06$) and the control group ($M = 48.80$, $SD = 9.24$), $t(125.17) = 0.912$, $p = .364$. In Figure 7, the box plots display the means with 95% confidence intervals.

Figure 7

Box Plots of Performance During the Transfer Task by Group



Note. Performance = totalPerfect; control group = 0; action crisis group = 1.

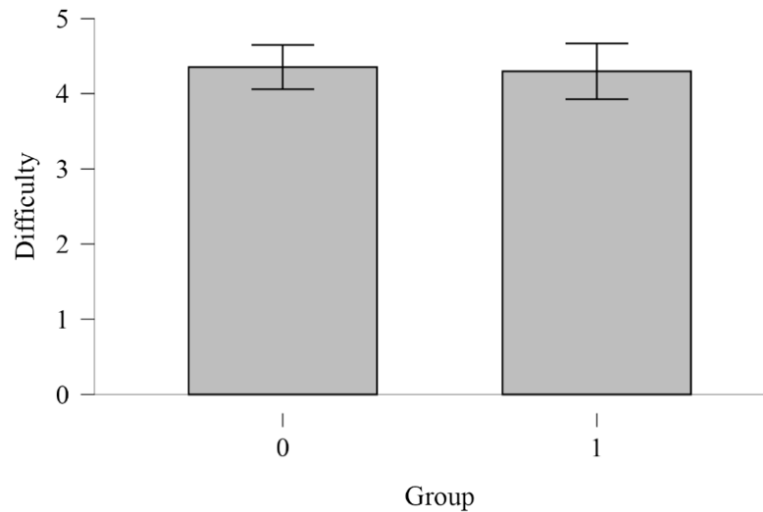
Self-report difficulty of the transfer task

We also investigated the difference in self-reported difficulty of the transfer task between groups. A Mann-Whitney-U test indicated no significant difference in self-reported difficulty

between the action crisis group ($Mdn = 4.00$) and the control group ($Mdn = 4.00$), $U = 2215.50$, $p = .856$, $r = .018$. In Figure 8, the box plots display the means and 95% confidence intervals.

Figure 8

Box Plots of Self-Reported Difficulty of the Transfer Task by Group



Note. Control group = 0; action crisis group = 1.

Discussion

The study's aim was to experimentally induce an action crisis state, while simultaneously using effort-related cardiovascular responses (PEP) as an objective measure of the state. Furthermore, we aimed to examine the effect of this manipulation on unrelated tasks. Although our writing task failed to successfully manipulate the action crisis, participants in the action crisis condition nevertheless exhibited significantly lower PEP reactivity during the subsequent transfer task, indicating greater effort. Mood did not prove to be a mediating variable, leaving the mechanism driving this heightened effort open for further investigation. The post-hoc analysis

showed no difference in performance and self-reported difficulty between the groups. Our inter-rater reliability testing supports the unsuccessful manipulation. In the following section, we explore possible explanations for these results, discuss strengths and limitations of this study and provide ways for future research to delve into.

Hypothesis 1 – Writing Task Manipulation

Contrary to our expectations and previous findings (Ghassemi, 2017), the writing exercise failed to induce a measurable difference in self-reported action crisis state between the groups. One likely reason lies in our methodological choice to use the same set of mixed-valence prompts for both conditions. We deliberately adapted Ghassemi's approach, which relied on valence-separated instructions—purely negative prompts for the action crisis group and purely positive ones for the control group—in order to minimize alternative explanations and strengthen internal validity. However, this modification may have had unintended consequences. First, the mixed-valence prompts may have shifted participants in the control group out of an implemental mindset and into a deliberative one (Gollwitzer, 1990), a cognitive state closely associated with action crises (Brandstätter & Schüler, 2013; Herrmann et al., 2014). This could have blurred the intended divergence between groups, resulting in the observed null effect. Second, it is possible that previous findings were partially driven by the differing question sets themselves, rather than genuine differences in participants' states. If so, our study may have overestimated the expected effect size of an induced action crisis, suggesting that future studies may require larger samples to detect more subtle effects. Lastly, the use of identical prompts complicated post hoc coding, as responses often contained overlapping elements of conflict and progress, making it difficult to reliably distinguish between conditions.

A second explanation concerns the nature of the goals that participants in the action crisis group chose to write about. While we asked whether they were currently struggling with a goal, we did not assess whether continuing and abandoning that goal was associated with negative consequences—a defining feature of action crises (Lewin, 1963). Without this aversive–aversive structure, the chosen “struggle goal” may not have been sufficient to elicit a genuine crisis state in the lab. On the same point, we only ensured they had a goal they were struggling with (as well as a goal they were progressing well on) in the screening, but we did not insist participants write about these exact goals in the lab later on. Although participants could not continue the lab testing without a goal, there was no control for the adequacy of goals in the lab. Taken together, both points raise the question of whether participants truly experienced an action crisis, and if so, to what extent. Measuring key goal characteristics—such as commitment, centrality, prioritization, duration of pursuit, urgency, number of setbacks, and resource loss—would allow for more refined sampling, thus strengthening the manipulation. Importantly, the domain is not as central, as research shows that action crises can occur with similar severity across life areas (see e.g., comparison academic vs. leisure goals; (Brandstätter et al., 2013))

A third area of concern is the concept of goal shelving. If participants had already shelved their nominated goal—postponing rather than actively confronting it—this could have diluted any action crisis response. Shelving may reduce emotional engagement and perceived urgency, thereby weakening the motivational conflict required for an action crisis to emerge (Mayer & Freund, 2022).

Fourth, our sample of psychology students may have further weakened the manipulation. This population tends to show high dispositional self-awareness, which fosters a problem-solving orientation and buffers against sustained action crises (Kreibich et al., 2022). Moreover,

participation in the study also granted lab credits, directly contributing to academic advancement. If participants selected study-related goals—such as fear of dropout or exam failure—this may have conflicted with the experience of progress through participation, thereby undermining the emotional tension required for an action crisis. Additionally, bachelor psychology students at the University of Vienna show relatively low dropout rates ($\approx 21\%$; unidata.gv.at), suggesting that academic disengagement may not be a salient or threatening prospect for most. Taken together, these factors may have diminished the severity of action crisis experiences, resulting in no observable difference between groups.

Hypotheses 2 & 3 – Carry-Over Effect on Transfer Task

The results of Hypotheses 2 and 3 show that participants in the action crisis condition exhibited a significantly stronger effort-related cardiovascular response during the transfer task. This suggests that even without a clear action crisis manipulation of the two groups (H1a), forcing someone to write about a goal they struggle with does change effort in unrelated tasks. However, contrary to our third hypothesis, mood did not mediate this effect. Although effort was higher in the action crisis group, there was no difference in performance between the two conditions.

One primary explanation for the observed effort increase is the experience of self-threat. Ghassemi (2017) demonstrated that reflecting on a personal goal in action crisis (vs. unobstructed goal striving) leads to reduced self-worth and lower expectations to perform well in subsequent tasks. This threat to one's sense of self may elicit compensatory effort in unrelated tasks, as individuals attempt to resolve this dissonance. This mechanism aligns with self-completion theory, which posits that people strive to reaffirm threatened aspects of their identity through symbolic actions (Wicklund & Gollwitzer, 1981). In our case, the d2 task may have

served as an opportunity for participants to demonstrate these symbolic actions, thereby mobilizing more effort to restore their sense of self.

The increased effort can also be interpreted through Motivational Intensity Theory (Brehm & Self, 1989), which states that effort is mobilized in proportion to subjective demand signal—given that success is possible and justified. If participants in the action crisis group perceived the transfer task as more demanding, this could explain the stronger physiological response. In our study, self-reported difficulty of the transfer task did not differ significantly between conditions, as shown in post-hoc analysis. Nor did mood differ between groups, or explain a mediating relationship between group and effort. Nevertheless, the observed increase in effort-related cardiovascular response (PEP) in the action crisis group aligns with meta-analytic evidence that implicit affect can mobilize effort independently of conscious appraisal (Gendolla, 2025). Writing about a personal goal conflict likely activated affective schemas associated with sadness or fear—emotions shown to increase sympathetic effort in manageable tasks. This mechanism operates below the level of introspection, but may explain why participants in the action crisis condition invested more effort in the transfer task, despite reporting no difference in mood or difficulty. Our null finding suggests that the mood–effort link may depend on task context or measurement sensitivity. Future research should revisit this relationship using targeted mood inductions and more granular physiological metrics.

Lastly, our findings of H2 and H3 may be attributed to heightened experience of cognitive conflict and affective conflict (Herrmann & Brandstätter, 2015). This study indicates that these conflicts deplete executive control resources and undermine self-efficacy. Herrmann and colleagues (2014) pinpoint the neural correlates of an action crisis, where brain regions that are active are associated with conflict monitoring and emotional regulation. Both studies provide

possible explanations for the higher subjective demand and increased effort even in unrelated tasks in the action crisis group.

Strengths and Limitations

The study's double-blind, randomized controlled design offers a great foundation for our research. The use of pre-ejection period as a gold standard measure for effort further strengthens the reliability of our study. Furthermore, the measurement of the manipulation was also backed by post hoc interrater reliability testing. This helps mitigate possible weaknesses in self-report measure of ACRISS (Brandstätter & Schüler, 2013). Thanks to this considerable effort, we can make more accurate statements regarding the results and their interpretation, as well as provide useful methodological recommendations for future studies.

Nevertheless, our reliance on a sample of predominantly young psychology undergraduates introduces clear constraints on generalizability, especially concerning older adults, non-students, and individuals with diverse occupational and cultural backgrounds. In addition, due to exclusions, we had a slightly smaller sample size than our power analysis suggested. Plus, we possibly overestimated the effect size. Both factors together limit our statistical significance, increasing the risk of overlooking more subtle patterns that may be present in a larger, more diverse cohort.

Obviously, inducing an action crisis through a writing task in the lab setting clearly does not represent the day-to-day experiences of an action crisis. Firstly, although Ghassemi (2017) did successfully employ the writing task, this is still a new approach to action crisis research and therefore further validation of this method is needed. Secondly, this approach also invites social-desirability influences. Future research could incorporate tools such as the Marlowe–Crowne Social Desirability Scale (MC-SDS; Crowne & Marlowe, 1960) to reduce bias around this.

Moreover, we did not include a refined measurement for the adequacy of participants' goals and thus our results might not equally hold for all kinds of goals (see discussion pp. 26-27). Although ample research backs our hypothesis (e.g., Agtarap et al., 2016; Wright, 1996), we cannot be certain that cardiovascular effort markers like PEP accurately reflect an action crisis. Replication with larger, more diverse samples coupled with additional metrics will be needed to improve generalizability.

Practical Implications

The study's findings suggest that forcing someone to write about a goal they struggle with—even without a clear difference in action crisis between the two groups—does change effort in unrelated tasks. Although the drivers of this effect remain unknown, people should not underestimate the effect of a goal they are struggling with on other unrelated areas of their life. While our study did not support performance differences—most likely due to the relatively easy task—, participants had to try harder for the same results. In line with MIT, if people face harder tasks, this could potentially lead to early disengagement (Brehm & Self, 1989; Gendolla, 2025). Therefore, supporting individuals who struggle with a goal, potentially improves not only their effort efficiency but also makes a difference in whether they try or not. In the context of a student, dwelling over their field of study can possibly prevent them from trying in another area of their life, such as applying for a summer job.

Future Research

To push this line of research forward, we propose three aspects to consider. Firstly, studies should discover the mediators driving the carry-over effect. Therefore, it is necessary to include measures that shed light on self-worth, self-efficacy, cognitive load, cognitive conflict, affective conflict, stress and discrete affective states—sadness, fear, anger, happiness—using

targeted mood inductions (Gendolla, 2025; Ghassemi, 2017; Herrmann & Brandstätter, 2015). Pinning down which of these aspects actually contributes to heightened effort, will clarify why writing about a struggle goal affects unrelated tasks.

Secondly, to map the temporal dynamics of this carry-over effect, future studies could introduce delays—immediate, 10 minutes, and 30 minutes—between the writing prompt and the transfer tasks. This would show whether the effect fades, accumulates, or even rebounds after recovery. Testing the carry-over effect across a range of other cognitive-effort tasks will reinforce generalization.

Thirdly, future studies must strengthen the manipulation by refining pre-screening and in-lab procedures. Screening more precisely for adequate action crisis goals helps to distinguish between groups. This could entail measures such as goal commitment, goal centrality, prioritization, duration of pursuit, number of setbacks, resource loss and the aversive-aversive motivational field. Controlling for these characteristics could also strengthen internal validity and reliability. If research goes to such lengths in screening, we suggest ensuring participants are forced to write about this goal during in-lab testing. If there is a lot of time between screening and in-lab testing, this approach may be more susceptible to fluctuation in action crisis (Ghassemi et al., 2021). This results in potentially less pronounced action crisis states during the in-lab testing later on, compared to the approach of allowing the participants to choose the most salient action crisis goal at the moment. Another line of thought uses a mixed approach for the manipulation, derived from two previous studies (Brandstätter & Schüler, 2013; Ghassemi, 2017). The idea is to let participants write a one-page essay about their thoughts, feelings and emotions regarding their goals in the screening, which will later be presented to them during in-lab testing. This way participants could read and empathize with their own struggle (or progress)

goal. Additionally, this could help check for goal adequacy and needed requirements, as well as reduce costly in-lab time.

The procedure could also be altered in another way. Instead of placing the ACRISS scale right after the questionnaire about the specific goal, we could directly check their self-reported action crisis after random assignment to the group, where participants select accordingly (action crisis vs. well-progressing goal) and state their goal, including reasoning. This way further questioning about the selected goal—positive and/or negative—cannot influence the manipulation check through mindset shifts.

Of course, broadening the samples beyond young psychology students will test whether carry-over effects hold across diverse populations. Building on Holding and colleagues' (2017) work, the influence of autonomous versus controlled motivation on action crisis may reveal interesting results in a cross-cultural comparison of collectivistic and individualistic samples.

Conclusion

The study's aim was to experimentally induce an action crisis state, while simultaneously using pre-ejection period as an objective measure. We also aimed to look at the carry-over effect on unrelated tasks. Although our writing task failed to successfully manipulate action crisis, participants in the action crisis condition nevertheless indicated greater effort in the unrelated follow-up task. Self-report mood did not prove to be a mediating variable, leaving the mechanisms driving this heightened effort open for further investigation.

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