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Motivating Personal Growth by Seeking Discomfort

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Abstract

Achieving personal growth often requires experiencing discomfort. What if instead of tolerating discomfort (e.g., feeling awkward or uncomfortable), people actively sought it out? Because discomfort is usually experienced immediately and is easy to detect, we suggest seeking discomfort as a signal of growth can increase motivation. Five experiments ($N = 2,163$) tested this prediction across various areas of personal growth: taking improvisation classes to increase self-confidence, engaging in expressive writing to process difficult emotions, becoming informed about the COVID-19 health crisis, opening oneself to opposing political viewpoints, and learning about gun violence. Across these areas of personal development, seeking discomfort as a signal of self-growth motivated engagement and increased perceived goal achievement relative to standard instructions. Consistent with our theorizing, these effects occurred only in areas of personal growth that cause immediate discomfort.

Keywords: motivation, self-control, self-growth goals, negative experience

Statement of Relevance

People constantly aspire to improve themselves, yet the process of personal growth can cause discomfort (e.g., feeling awkward during improvisation training). Extant research offers interventions for increasing motivation by avoiding and counteracting discomfort. Building on cognitive reappraisal (Gross, 1998; McRae, 2016), we offer an intervention that harnesses discomfort instead. Specifically, we encourage people to seek discomfort to motivate psychological growth. We explore this intervention in a field experiment in collaboration with one of the most renowned improvisation clubs in the USA (The Second City) and in online experiments. This research offers important theoretical contributions to motivation theory as well as practical implications for successful personal growth.

People commonly aspire to grow themselves, and thus become a better version of themselves (Jain, Apple, & Ellis, 2015). Yet the process of personal growth can be uncomfortable. From building self-confidence through improvisation classes, to working through difficult emotions through expressive writing (Pennebaker & Smyth, 2016), to becoming informed about uncomfortable issues (e.g., health crisis; gun violence), to opening oneself to opposing views, self-growth too often evokes discomfort (i.e., some form of negative experience; Crocker & Park, 2004; King & Hicks, 2007; Lyubomirsky et al., 2006).

How can people motivate themselves when experiencing discomfort? One approach involves reducing the negative experience. For example, people can mentally distance themselves from the negative experience through third-person self-talk (e.g., "Why did Kaitlin feel this way?" instead of "Why did I feel this way?"). Distancing reduces anxiety, and thus improves performance (Kross et al., 2014). Another approach involves adding immediate benefits (e.g., "a spoon full of sugar") to counteract discomfort. So, for example, adding colored pens and snacks increased high school students' engagement with a math task (Woolley & Fishbach, 2016) just as adding attention-grabbing videos increased people's toothbrushing persistence by counteracting boredom (Lieberman, Amir, & Morales, 2020).

Yet a third approach involves cognitive reappraisal of discomfort. This emotion regulation strategy alters the meaning applied to negative experiences before they occur to reduce their emotional impact (Gross, 1998; 1999). Reappraisal has a long history (for review, see McRae, 2016; Uusberg et al., 2019) and has proven beneficial in managing emotions in lab studies (Gross, 1998; Jamieson et al., 2012), field studies (Jamieson et al., 2021), and clinical trials of affective disorders (e.g., cognitive behavioral therapy; Butler et al., 2006; Cuijpers et al., 2013; with early models developed by Beck, 1963; Ellis, 1955). Through reappraisal, people

may reinterpret discomfort as a positive experience. For example, reframing anxiety as excitement improved amateurs' singing in front of a stranger (Brooks, 2014). Alternatively, research on stress mindsets suggests people can shift their beliefs about the meaning of negative experiences. For example, perceiving stress as helping rather than hurting achievement helped stress management (Jamieson et al., 2018). As such, speech-givers adopting a "stress-is-enhancing" (vs. "stress-is-debilitating") mindset were more open to feedback (Crum, Salovey, & Achor, 2013). When people reinterpret negative experiences as functional, they are more willing to engage in tasks that evoke these experiences.

Building on cognitive reappraisal research, we ask whether merely encouraging people to seek discomfort can motivate personal growth by transforming discomfort into a sign of progress. For example, in the context of improvisation training, would a person who seeks to feel awkward and uncomfortable be more motivated? We propose they would.

Discomfort as a Signal of Goal Progress

Progress on personal growth is notoriously hard to detect. How does a trainee know if they are becoming more confident during improvisation training? People take improvisation classes to develop confidence, communication, and public speaking skills (Evans, 2014; The Second City, 2020; Toohill, 2015), yet feedback on skill development is often lacking or delayed. Instead, trainees experience discomfort (e.g., awkwardness), which could be a cue to quit. Similarly, expressive writing about difficult emotional events can help people overcome trauma, improving their physical and mental health in the long run (Pennebaker & Smyth, 2016). Nonetheless, reliving these emotions in writing can be upsetting.

Relatedly, people may wish to learn about threats, but as they do, they experience discomfort and are tempted to avoid the information altogether (Trope & Neter, 1994; e.g., the

"ostrich problem;" Webb et al., 2013). And although people might want to understand others, when hearing opposing political views, they are often repelled (Finkel et al., 2020). These examples highlight the self-control conflict inherent to personal growth: The benefits are delayed and the costs are immediate. People will not know whether they are successful until later; in the present, they are uncomfortable.

Yet, progress feedback—knowing whether one is advancing—is critical for maintaining motivation (Carver & Scheier, 1998; Locke & Latham, 1990). And while discomfort is undesirable (it is a negative experience), it can signal progress. Indeed, negative mood often signals task readiness (e.g., preparing to fight; Tamir et al., 2008, feeling sad at a funeral; Tamir et al. 2019). Possibly, discomfort from personal growth can offer feedback that one is progressing on their goal. Although it is typically *positive* experiences that serve as a signal to persist (Turnwald et al., 2019; Woolley & Fishbach, 2016), absent positive experience, people may harness discomfort to increase motivation.

Specifically, seeking discomfort when pursuing a goal could cause people to reappraise discomfort as goal progress. While personal growth is difficult to detect, people know when they feel uncomfortable. They can use this as a cue that they are advancing their goal and be motivated to persist. Although reappraisal interventions traditionally focus on regulating emotion (e.g., decreasing negative emotion; Gross, 1998, 1999), we propose this technique can motivate pursuit of personal growth and merely be activated by encouraging people to seek discomfort.

Accordingly, our main prediction is that seeking discomfort will motivate personal growth. Instead of seeing discomfort as unrelated to the goal or as a signal to stop, people will start perceiving it as a sign of progress on their goal.

Five experiments tested this prediction, assessing motivation to pursue different growth goals. We first conducted a field experiment across 55 improvisation classes. We assessed students' motivation (persistence, risk-taking) in pursuing an improvisation exercise when instructed to seek discomfort (i.e., feel awkward and uncomfortable) in pursuit of growth. We predicted that students instructed to seek discomfort (vs. control) would persist longer in an improvisation exercise and take more risks. Moving to expressive writing, Experiment 2 assessed whether people writing about an emotional life event would be more motivated to reengage in the task, and perceive greater achievement of the growth goal, when seeking discomfort (vs. typical instructions; Pennebaker, 1997).

We predict that seeking discomfort motivates when it is inherent to, and thus signals, personal growth, which we tested via moderation. Experiment 3 examined whether seeking discomfort (vs. to learn) increases receptiveness to information about a dire health crisis (COVID-19 pandemic), but not unrelated information. Experiment 4 examined whether seeking discomfort (vs. to learn) opens people to opposing political views, but not views they agree with. Lastly, in the context of learning about gun violence, Experiment 5 tested whether seeking discomfort motivates openness to new information even in the absence of direct instructions to reappraise discomfort, presumably, by prompting spontaneous reappraisals (Tamir et al., 2019). We pre-registered Experiments 2-5; see OSF for all data, syntax, and materials: osf.io/2avtu.

Experiment 1: Seeking Discomfort Motivates Persistence in Improvisation

Across 55 improvisation classes, we tested whether seeking discomfort as a sign of growth is motivating. We compared instructions to seek discomfort ("feel awkward, uncomfortable") with standard improvisation instructions and instructions to "feel skills

developing." We expected seeking discomfort would be motivating, causing students to persist

longer in the exercise and take more risks.

Method

We conducted this experiment in four separate waves. Three waves were conducted at

The Second City Training Center in Chicago (Waves A-C) and one at a Behavioral Science and

Improvisation Workshop hosted by The Second City (Wave D). For Waves A-C, we recruited all

students during week seven of an eight-week beginner "Level A" class at Second City at

different times of the year. Level A classes are designed for people who want to learn how to

improvise and require no prior experience. In Wave D, we recruited participants in a single

Behavioral Science and Improvisation workshop that was hosted by The Second City and

targeted employees looking to improve leadership and team building in their companies. In total,

we recruited 557 students from 55 classes (see Table 1).

Table 1. Participant and class composition across four waves in Experiment 1.

Characteristic	Wave A	Wave B	Wave C	Wave D
Female (%)	47.6%	46.5%	35.7%	57.5%
Mean age (*SD*)		28.25 (8.69)	29.27 (8.43)	39.53 (12.10)
Class description	Level A Second City	Level A Second City	Level A Second City	Behavioral Science and Improvisation Workshop hosted by Second City
Number of classes	17	16	14	8
Median class size	10	9	10	10
Class size range	7 to 17	6 to 13	5 to 14	5 to 18
Total participants	185	142	143	87

Note: We did not collect information on participant age during Wave A. For Level A classes, we conducted the experiment during week seven of the eight-week class to ensure that participants had some experience with the exercise.

Intervention. Before launching the experiment, we held a training session for class instructors on the experimental procedures. Instructors were blind to the hypothesis.

During the experiment, instructors divided their classes into groups of 3-7 students and assigned each group to condition in a 2 (seek discomfort vs. control) between-subjects design. As such, students were nested within groups. Instructors delivered the manipulation privately by bringing each group out one at a time into the hallway. Participants in the seek-discomfort condition learned: "Your goal for the next exercise is to feel awkward and uncomfortable. Feeling uncomfortable is a sign that the exercise is working. In the next game, your goal is to push past your comfort zone and put yourself in situations that make you feel awkward and uncomfortable." We tested two different control instructions. Participants in the control condition in Waves A, C, and D received baseline instructions typical of these exercises ("We're going to play the exercise Give Focus. While you play, see if the exercise is working"); participants in the control condition in Wave B received instructions to seek benefits ("Your goal for the next exercise is to feel yourself developing new skills. Developing new skills is a sign that the exercise is working. In the next game, your goal is to push yourself to develop new skills and feel yourself improving"). We expected that instructing participants to feel skills develop would be less motivating because it is harder to assess progress on skill development, a less tangible experience, and because such instructions shift people to think about the outcome of their performance instead of the process (Grant & Dweck, 2003).

Participants further received instructions specific to the "Give Focus" improvisation exercise. In this exercise, one person "has focus." This person moves around the room while other members of the group are frozen in place. The person "with focus" holds onto their role for as long as she wants, and can do any movement during this time as she travels around the room.

Once the person with focus decides to pass her role to another student, she uses body language to signal who she is "passing the focus" to. For example, the person with focus might touch, point to, or nod at another student to signal she is passing her role to that person. The person with focus then freezes in place, and the person who received focus unfreezes and begins to move around. Each group performed the Give Focus exercise for three minutes. While one group was completing this exercise, the other group sat and watched, as is typical in these classes. We counterbalanced which group went first.

We video recorded all Give Focus exercises in all class sessions. Two independent coders who were blind to hypothesis and conditions evaluated participants' persistence ($r = .99$) and risk-taking ($r = .74$). We averaged the coders' ratings. For Wave B, time with focus was measured using responses from 97 MTurk workers who viewed the videos and recorded the number of seconds students held focus for each occasion they received it. Each video was rated by at least three workers, with high interrater reliability ($\alpha = .90$). We defined persistence as the number of seconds participants held focus for each occasion they received it. We calculated the average length of these occasions. We did not analyze the number of occasions students received focus as it was beyond their control (i.e., they received focus from another student). We coded risk-taking behavior on a 7-point scale: 1 = *no risks*; *the student with focus is walking around like normal*; 4 = *some risks; the student is pushing the boundaries somewhat, for example, walking very fast or very slow or moving arms around*; 7 = *many risks; for example, the student is pushing the boundaries and doing something extremely out of the ordinary or going out on a limb*.

We predicted that participants instructed to actively seek discomfort would persist longer in the improvisation exercise and exhibit greater risk-taking behavior than those receiving

baseline instructions or instructions to seek delayed benefits. In addition to these two primary variables, participants in Waves B-D completed a survey after the Give Focus exercise. Each wave completed a different survey, although some items were consistent across waves.

Survey Measures. In Wave B, we asked, "Did you feel awkward or uncomfortable at any point during the exercise?" (0 = *not at all*, 6 = *very much*). We expected everyone to feel a mild level of discomfort, which they did (*M* = 2.94, 95% CI = [2.61, 3.26]).

In Waves B-D, we confirmed that participated sought discomfort, "To what extent did you have the goal to feel awkward and uncomfortable during this exercise?" and that they sought benefits in Wave B, "To what extent did you have the goal to feel your skills developing during this exercise?" (0 = *not at all*, 6 = *very much*).

In Wave D, we measured beliefs about achieving growth as a secondary outcome variable. We reasoned that if seeking discomfort causes people to persist longer in the growth goal, those seeking discomfort should have a greater subjective assessment of achievement of the growth goal. To examine this, we asked participants to write down their personal goal in taking the improvisation class. For example, some participants wrote "improve communication skills," "improve team building" or "be more comfortable in front of others." We then asked participants, "Did you feel you accomplished this goal during this exercise?" (0 = *not at all*, 6 = *very much*). Additional exploratory items are reported in Supplemental Material.

Results

Supporting the manipulation, participants in the seek-discomfort condition sought discomfort more than those in the seek-benefits condition (Wave B: $t(140) = 10.98$, $p < .001$, $d = 1.84$, 95% CI = [1.45, 2.23]) and more than those in the baseline instructions condition (Wave C: $t(141) = 7.75$, $p < .001$, $d = 1.30$, 95% CI = [.93, 1.66]; Wave D: $t(85) = 6.70$, $p < .001$, $d = 1.45$,

95% CI = [.97, 1.93]; Table 2). Participants in Wave B were also more likely to report having a

goal to feel their skills developing in the seek-benefits (vs. seek-discomfort) condition, $t(140) = -$

2.18, $p = .031$, $d = -.37$, 95% CI = [-.70, -.03].

Table 2. Results of manipulation check items across Waves B-D in Experiment 1.

Wave	Manipulation Check Items	Condition		Statistical test
		Seek Discomfort	Seek Benefits	
B	Reported seeking to feel uncomfortable	4.21 [3.82, 4.60]	1.17 [.78, 1.56]	$t(140) = 10.98$, $p < .001$, $d = 1.86$
	Reported seeking to feel skills developing	3.27 [2.85, 3.69]	3.89 [3.50, 4.27]	$t(140) = -2.18$, $p = .031$, $d = -.37$
		Seek Discomfort	Baseline Instructions	
C	Reported seeking to feel uncomfortable	4.28 [3.87, 4.68]	1.93 [1.49, 2.37]	$t(141) = 7.75$, $p < .001$, $d = 1.30$
D	Reported seeking to feel uncomfortable	4.18 [3.71, 4.65]	1.70 [1.10, 2.30]	$t(85) = 6.70$, $p < .001$, $d = 1.45$

Note: Brackets indicate 95% CI.

Hypothesis testing. Our primary measures of motivation (i.e., engagement in the exercise)

were time spent holding focus and perceived risk taking. We conducted two mixed-model linear

regressions predicting time spent holding focus and perceived risk-taking (with responses from

the four waves weighted equally) as a function of condition, with random effects of condition

nested within each class (see Turnwald et al., 2019 for a similar method of analysis for a multi-

site field study).

As predicted, seeking discomfort increased time spent holding focus compared with

receiving baseline instructions (Waves A, C, and D) or seeking (less tangible) benefits (Wave B)

by 0.44 standard deviations, $B = 0.44$, 95% CI = [.32, .57], $p < .001$.

Seeking discomfort further increased observed risk-taking compared with baseline

instructions (Waves A, C, and D) or seeking benefits (Wave B) by 0.24 standard deviations, $B =$

0.24, 95% CI = [.12, .36], $p < .001$. We summarize individual results across the four Waves in

Table 3. These results reveal that seeking discomfort in pursuit of growth is motivating. Because

we observed this pattern across several waves, it is less likely that individual differences (e.g., in

skill, prior experience, interest in comedy, baseline negative emotions, or dysfunctional

regulatory strategies) drove the effect.

Table 3. Results for behavioral measures from Waves A-D in Experiment 1.

Wave A	Seek Discomfort	Baseline Instructions	Statistical test
Average seconds holding focus	14.09 [8.26, 19.92]	7.87 [2.05, 13.69]	$B = .45$, 95% CI = [.23, .67], $t(167) = 4.06$, $p < .001$
Observed risk-taking	2.49 [1.97, 3.02]	2.17 [1.64, 2.69]	$B = .28$, 95% CI = [.13, .43], $t(167) = 3.64$, $p < .001$
Wave B	**Seek Discomfort**	**Seek Benefits**	**Statistical test**
Average seconds holding focus	10.40 [7.85, 12.94]	7.67 [5.12, 10.22]	$B = .44$, 95% CI = [.22, .67], $t(125) = 3.85$, $p < .001$
Observed risk-taking	3.49 [2.95, 4.03]	3.64 [3.11, 4.18]	$B = -.13$, 95% CI = [-.36, .10], $t(125) = -1.11$, $p = .270$
Wave C	**Seek Discomfort**	**Baseline Instructions**	**Statistical test**
Average seconds holding focus	9.92 [7.70, 12.14]	8.51 [6.31, 10.72]	$B = .33$, 95% CI = [.12, .54], $t(128) = 3.09$, $p = .002$
Observed risk-taking	3.88 [3.13, 4.62]	3.06 [2.32, 3.80]	$B = .47$, 95% CI = [.23, .71], $t(130) = 3.94$, $p < .001$
Wave D	**Seek Discomfort**	**Baseline Instructions**	**Statistical test**
Average seconds holding focus	14.96 [11.47, 18.45]	10.48 [6.84, 14.12]	$B = .57$, 95% CI = [.20, .93], $t(82) = 3.06$, $p = .003$
Observed risk-taking	3.63 [3.10, 4.17]	3.20 [2.64, 3.75]	$B = .38$, 95% CI = [.001, .76], $t(80) = 1.96$, $p = .053$

Note: Brackets indicate 95% CI. For each wave, we conducted separate hierarchical linear models to account for the nesting of students within classes.

We next examined beliefs about achieving the growth goal, which we measured in Wave

D. Recall that we asked participants in Wave D about their goal for taking the class (e.g., to

improve communication) and their subjective assessment of achievement of this goal. If seeking

discomfort signals growth, it should increase perceived achievement, which is what we observed

($M_{discomfort} = 3.52$, 95% CI = [2.90, 4.13]; $M_{baseline} = 2.68$, 95% CI = [2.01, 3.35]), $B = .84$, 95%

CI = [.13, 1.54], $t(83) = 2.34$, $p = .022$, $d = .51$, 95% CI = [.07, .94]. Together, we find that

seeking discomfort can motivate engagement in an improvisation exercise for those who

perceive the discomfort of pursuing improvisation as positive feedback on goal pursuit. These

findings are further consistent with research showing that being tolerant or mindful of negative

experiences can be motivating (Alberts et al., 2012; Hayes et al., 1999). Indeed, mindfulness training can promote well-being by facilitating positive reappraisal (Hanley et al., 2021). Beyond being mindful of discomfort, we suggest that seeing it as a sign of progress is motivating.

<div align="center">**Experiment 2: Seeking Discomfort Motivates Expressive Writing**</div>

Writing about emotional experiences offers therapeutic benefits (Pennebaker, 1997; Pennebaker & Smyth, 2016), improving mental and physical health (Lyubomirsky et al., 2006). Yet writing about these experiences can be upsetting. Experiment 2 tested whether seeking discomfort (vs. to write) when pursuing therapeutic benefits through expressive writing would increase subjective assessment of growth and motivation to write in the future.

Method

We pre-registered this experiment (aspredicted.org/blind.php?x=wt7wy8) and recruited 301 MTurk participants (150 per cell) to have high statistical power and reliability. As pre-registered, we excluded participants with duplicate IP addresses and incomprehensible responses ($n = 43$), leaving a final sample of 258 participants ($M_{age} = 35.82$, $SD = 10.29$; 38.8% female).

Participants learned that they would engage in a writing exercise about an extremely important emotional issue that affected their life. They learned that the goal of writing is to achieve therapeutic benefits and that writing tasks like these "can help people work through difficult emotional situations and develop coping skills." Participants received the writing prompt, asking them to explore their deepest thoughts and feelings about an extremely important emotional issue, and were instructed to write for as long as they liked. These instructions were adopted from prior research on the benefits of expressive writing (Pennebaker, 1997).

We then assigned participants to condition in a 2 (seek discomfort vs. baseline instructions) between-subjects design. Participants assigned to seek discomfort read, "Your

primary goal during this writing task is to feel awkward and uncomfortable. Feeling

uncomfortable is a sign that the writing task is working. Your goal is to push past your comfort

zone and embrace feeling uncomfortable while writing." Participants in the control condition

read "Your primary goal during this writing task is to write. As you are writing, see if the

exercise is working."

Our key outcome measures were goal achievement and motivation to reengage in the

writing task in the future. We assessed achievement on a three-item scale ($\alpha = .87$): "Did you feel

that while writing, you were achieving your goal of growing emotionally?" "Did you feel that

you were developing coping skills while working on this writing task?" "Did you feel that this

writing task was useful for working through a difficult situation?" We assessed motivation to

reengage with a single item: "How interested are you in completing another similar writing

exercise in the future?" (1 = *not at all*, 7 = *very much* for all items).

Results

We first confirmed in a separate pre-test ($n = 48$ US Prolific participants; see

Supplemental Material for full details) that participants associate this expressive writing task

with discomfort ($M = 4.08$, $SD = 1.70$; from 0 = *not at all uncomfortable* to 6 = *very*

uncomfortable). Further, we confirmed that across conditions, participants were engaged in the

task (minutes spent writing: $M = 5.78$, $SD = 5.66$, *Median* = 4.16, 25th percentile = 2.47, 75th

percentile = 6.45; number of words written: $M = 132$, $SD = 143$, *Median* = 104; 25th percentile =

34, 75th percentile = 182).

Supporting our hypothesis, people reported greater goal achievement when seeking

discomfort ($M = 5.28$, 95% CI = [5.05, 5.51]) than when receiving typical instructions ($M = 4.82$,

95% CI = [4.56, 5.08]), $t(256) = 2.63$, $p = .009$, $d = .33$, 95% CI = [.08, .57]. Further, people

seeking discomfort were more motivated to reengage in the writing task in the future (M = 5.88, 95% CI = [5.64, 6.12]) than those responding to typical instructions (M = 5.52, 95% CI = [5.27, 5.76]), $t(256)$ = 2.06, p = .040, d = .26, 95% CI = [.01, .50].

As the length of the texts varied (from a maximum of 1361 words to just a few; e.g., "I am extremely triggered by this"), as did the time on the task, we repeated the analysis controlling for these variables. In these non-preregistered analyses, we found a significant effect of condition on perceived growth and motivation to reengage in the writing task when separately controlling for word count and minutes writing, Fs > 4.39, ps < .037, with no significant interaction between condition and word count or minutes writing, Fs < 1.49, ps > .223. In combination with the findings from Experiment 1, these results suggest that seeking discomfort as a sign of self-growth is motivating.

Experiment 3: Seeking Discomfort Increases Receptiveness to Information About a Health Crisis

For seeking discomfort to motivate personal growth, growth needs to be uncomfortable. Experiments 3-4 accordingly tested for moderation. First, we examined whether seeking discomfort (vs. to learn) motivates interest in information about the COVID-19 pandemic, but not unrelated information.

Method

We pre-registered this experiment (aspredicted.org/blind.php?x=n9bi55) and recruited 302 US Prolific participants (150 per cell). As pre-registered, we included an attention check before assignment to condition. A total of 37 participants failed the attention check, leaving a final sample of 265 participants (M_{age} = 33.05, SD = 12.70; 52.1% female).

We randomly assigned participants to condition in a 2 (instructions: seek discomfort vs. learn; between-subjects) × 2 (news articles: COVID related vs. unrelated; within-subject) mixed model design.

All participants were first reminded that the goal of reading the news is to "stay informed and up to date on what is happening with the current COVID-19 pandemic." Participants assigned to seek discomfort were asked to adopt "a goal to feel nervous and uncomfortable as you read about COVID" and further read, "feeling nervous is a sign that you are taking in new information - it's feedback that you are educating yourself on the global pandemic." Participants assigned to the control condition were asked to adopt "a goal to learn what's new" and further read, "learning what is new is a sign that you are taking in new information - it's feedback that you are educating yourself on the global pandemic."

Participants then viewed headlines and short synopses of six different news articles (see Supplemental Material for stimuli, including the procedure for selecting article headlines). Three news articles were related to COVID-19 (e.g., Current COVID-19 projections paint bleak future during winter) and three were unrelated to COVID-19 (e.g., 42 finalists in this year's comedy wildlife photography awards). We measured how motivated participants were to read each article (1 = *not at all motivated*, 7 = *very motivated*; for COVID-19 articles, α = .81; for unrelated articles, α = .79).

After reading the article synopses, we assessed subjective goal achievement using two items (averaged, *r* = .72): "While reading the news in this study, did you feel that you were achieving your goal of becoming informed?" and "How much progress do you feel you made on your goal to be informed about the COVID-19 pandemic?" (1 = *not at all*, 7 = *very much*). We report additional measures pre-registered as exploratory in Supplemental Material.

Results

We first confirmed in a separate pre-test ($n = 52$ US Prolific participants; see Supplemental Material for full details) that participants associate learning about COVID-19 with discomfort ($M = 3.81$, $SD = 1.70$; from 0 = *not at all uncomfortable* to 6 = *very uncomfortable*). Moving to hypothesis testing, a repeated measures ANOVA of instructions (seeking discomfort vs. to learn) × article (related vs. unrelated to COVID-19) predicting motivation to read news articles revealed a main effect of article type, $F(1, 263) = 49.64$, $p < .001$, $\eta_p^2 = .16$, 95% CI = [.06, .24], and no significant effect of instruction condition, $F(1, 263) = .64$, $p = .424$, $\eta_p^2 < .01$, qualified by a significant interaction, $F(1, 263) = 6.20$, $p = .013$, $\eta_p^2 = .02$, 95% CI = [.001, .07] (Figure 1). Participants were more motivated to read COVID-19 related articles when they sought discomfort (vs. to learn) ($M_{discomfort} = 4.57$, 95% CI = [4.30, 4.83]; $M_{learn} = 4.10$, 95% CI = [3.84, 4.36]), $F(1, 263) = 6.23$, $p = .013$, $\eta_p^2 = .02$, 95% CI = [.001, .07], but the instructions had no effect on their motivation to read articles unrelated to COVID-19 ($M_{discomfort} = 3.20$, 95% CI = [2.92, 3.48]; $M_{learn} = 3.45$, 95% CI = [3.14, 3.76]), $F(1, 263) = 1.33$, $p = .250$, $\eta_p^2 < .01$ (in non-preregistered analyses, we found a similar null effect for each of the three articles, suggesting that the interaction was not driven by any particular COVID-irrelevant content).
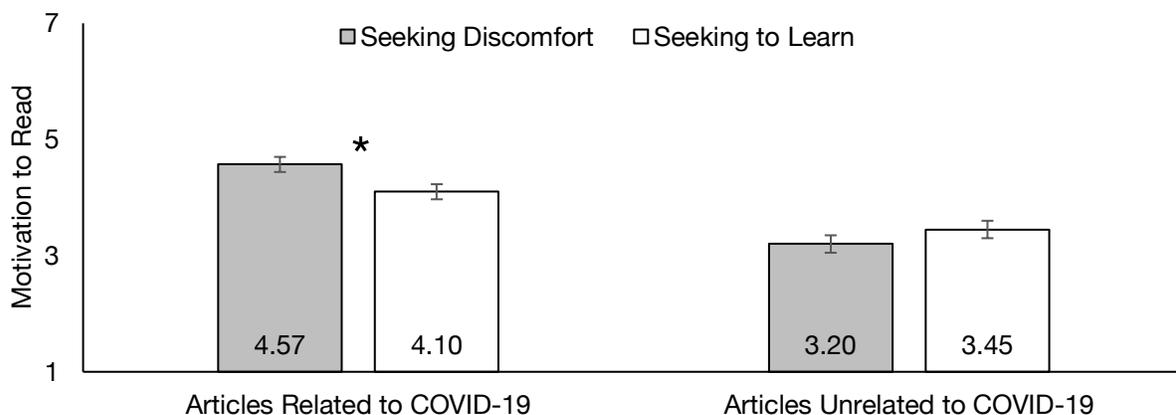
Figure 1. Seeking discomfort (vs. to learn) increased motivation to read articles about COVID-19 but not to read other articles. Asterisks indicate significant difference between conditions (*p < .05); bars indicate ± 1 SEM.

Those seeking discomfort reported greater achievement of their goal to learn about COVID-19 (M = 4.57, 95% CI = [4.35, 4.79]) than those seeking to learn (M = 4.17, 95% CI = [3.91, 4.44]), $t(263)$ = 2.28, p = .023, d = .28, 95% CI = [.04, .52]. Overall, we find that seeking discomfort (vs. to learn) motivated reading about a dire health crisis, but not reading news that was unassociated with immediate discomfort.

Experiment 4: Seeking Discomfort Increases Receptiveness to Opposing Political Views

We again examined moderation by whether discomfort is inherent to growth, this time in a between-subjects design. We recruited Republicans and Democrats from the US to engage with viewpoints either consistent with or opposing their own political beliefs, presumably to crystallize their own position (consistent-views condition) or to understand the opposing position (opposing-views condition). We further manipulated whether participants sought discomfort in pursuit of openness or to learn. We predicted that seeking discomfort (vs. to learn) would motivate people to open themselves more to opposing viewpoints, which can be uncomfortable, but not to viewpoints from their own party.

Method

We pre-registered this experiment (aspredicted.org/blind.php?x=6f967u) and recruited 600 US participants from Prolific (150 per cell) using filters on Prolific to recruit participants who identified as Republican or Democrat. As pre-registered, participants who reported not identifying with either political party at the time of the experiment were filtered to a different survey (n = 18), leaving a final sample of 582 (M_{age} = 31.52, SD = 11.52; 60.0% female).

After indicating their political affiliation, participants were randomly assigned to condition in a 2 (instructions: seek discomfort vs. learn) × 2 (political viewpoint: consistent with vs. opposing one's beliefs) between-subjects design.

Participants assigned to open themselves to viewpoints from their own political party read "Reading the news can help you crystallize your position and understand the opinions of fellow [Democrats/Republicans] who might have more informed positions or a different take on the issues at stake. Indeed, one goal of reading the news is to form a clearer position by understanding the views of fellow [Democrats/Republicans]." Participants assigned to open themselves to viewpoints from the opposing political party read "Reading the news can help you to understand people on the opposite side of the political spectrum as you (e.g., [Democrats/Republicans]). While the country may feel divided, one goal of reading the news is to try and understand the other party's position."

Similar to our prior experiments, we assigned participants to either seek discomfort or to learn something new. Participants assigned to seek discomfort read that one way they know they are understanding the position of leading [Democrats/Republicans] is by "adopting a goal to feel anxious and uncomfortable as you read about [Democrat/Republican] positions. Feeling uncomfortable is a sign that you are taking in new information - it's feedback that you are educating yourself and getting an understanding of your [*the other*] side's position." This manipulation thus instructed participants to perceive discomfort as advancing growth. Those assigned to learn something new read that one way to know they are understanding the position of leading [Democrats/Republicans] is by "adopting a goal to learn what's new. Learning what is new is a sign that you are taking in new information – it's feedback that you are educating yourself and getting an understanding of your [*the other*] side's position."

Participants then indicated their motivation to learn about different political opinions. Depending on condition and political affiliation, participants saw four political opinion articles from *The New York Times* or from *Fox News* (stimuli in Supplemental Material). For each

article, we asked participants "How motivated are you to read this news article" (1 = *not at all*

motivated, 7 = *very motivated*). As pre-registered, we averaged motivation to read each of the

four articles into a single index (α_{NYT} = .84; α_{Fox} = .84).

We describe in Supplemental Material the procedure for selecting these specific articles.

Because we ran the study in the days leading up to the 2020 U.S. presidential election, we used

articles about the two presidential candidates. We anticipated Republicans would generally

support Trump and oppose Biden, with the opposite being true of Democrats (Pew Research

Center et al., 2020). Beyond specific headlines, we emphasized the article's news source (Fox

News or the New York Times). Prior research found that Republicans and Democrats differ in

their news source preferences (Iyengar & Hahn, 2009) and that these news sources have different

political ideologies (Golbeck & Hansen, 2014), which we confirmed when selecting these

articles.

As a manipulation check, we asked participants "How uncomfortable do you find it to

read news articles from leading [Democrats/Republicans]?" (1 = *not at all*, 7 = *very much*). At

the end of the experiment, we provided PDFs of the articles for participants to download and

read later. We report additional measures pre-registered as exploratory in Supplemental Material.

Results

We confirmed that participants felt more uncomfortable opening themselves to

viewpoints from leading members of the opposite political party (*M* = 4.27, 95% CI = [4.11,

4.43]) than their own party (*M* = 2.90, 95% CI = [2.76, 3.05]), *t*(581) = 12.55, *p* < .001, *d* = .52,

95% CI = [.43, .61].

As pre-registered, we conducted an ANOVA of instruction condition (seek discomfort vs.

learn) and viewpoint (one's own political party vs. opposing political party) on receptiveness to

political opinions, which revealed a main effect of instruction, $F(1, 578) = 13.04$, $p < .001$, $\eta_p^2 = .02$, 95% CI = [.005, .05], and viewpoint, $F(1, 578) = 237.56$, $p < .001$, $\eta_p^2 = .29$, 95% CI = [.23, .35], qualified by a significant interaction, $F(1, 578) = 9.76$, $p = .002$, $\eta_p^2 = .02$, 95% CI = [.002, .04]. Participants were more receptive to viewpoints from the opposing political party when seeking discomfort than when seeking to learn ($M_{discomfort} = 2.83$, 95% CI = [2.61, 3.05]; $M_{learn} = 2.07$, 95% CI = [1.88, 2.26]), $F(1, 578) = 22.31$, $p < .001$, $\eta_p^2 = .04$, 95% CI = [.01, .07]. However, this effect significantly attenuated for viewpoints from one's own political party ($M_{discomfort} = 4.22$, 95% CI = [3.99, 4.46]; $M_{learn} = 4.17$, 95% CI = [3.93, 4.41]), $F(1, 578) = .12$, $p = .728$, $\eta_p^2 < .01$.

As a robustness check, we conducted an additional, non-pre-registered ANOVA of instruction (seek discomfort vs. learn), viewpoint (own side vs. opposite side), and political affiliation (Republican vs. Democrat). This analysis again revealed the predicted interaction between instruction condition and viewpoint, $F(1, 574) = 5.77$, $p = .017$, $\eta_p^2 = .01$, 95% CI = [.0003, .03] (Figure 2), with no significant interactions involving political affiliation. These results suggest that the observed effect of seeking discomfort motivated people to read articles from the opposing political party regardless of whether Republican participants considered opening themselves to Democrat opinions, or whether Democrat participants considered opening themselves to Republican opinions.
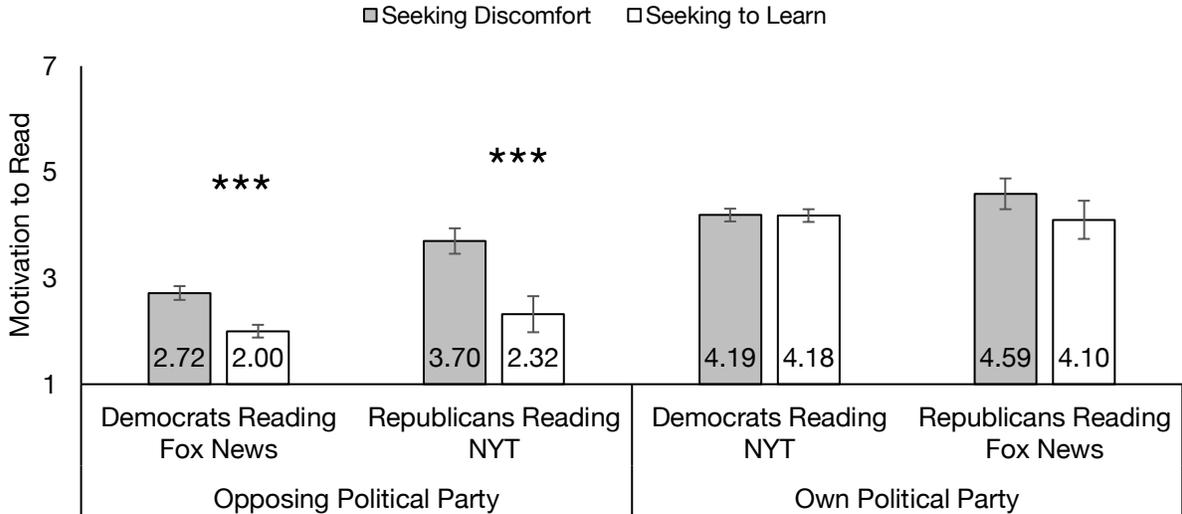
Figure 2. Seeking discomfort (vs. to learn) increased motivation to read political viewpoints from the opposing (vs. one's own) political party. Asterisks indicate significant differences between conditions (***$p \leq .001$); bars indicate ± 1 SEM.

Experiment 5: Seeking Discomfort Motivates Receptiveness to Information About Gun Violence

In the context of learning about gun violence, Experiment 5 tested the effect of seeking discomfort with and without direct instructions to reappraise discomfort as signaling progress. If seeking discomfort leads to spontaneous reappraisal of discomfort as signaling growth, its motivational effect should emerge regardless of direct reappraisal instructions.

Method

We pre-registered this study (aspredicted.org/79X_421) and recruited 401 MTurk participants (100 per cell; $M_{age} = 40.44$, $SD = 13.37$; 51.1% female). No participants were excluded from this study. Participants learned they would read statements from people affected by gun violence. They read "Gun violence is a complex issue with conflicting views on how to address it. But before we discuss how and whether it should be addressed, it is important to understand this issue."

Participants were then assigned to one of four conditions in a 2 (instructions to seek discomfort vs. not) × 2 (instructions to reappraise discomfort vs. not) between-subjects design. Participants in the seek-discomfort condition read "You should adopt the goal to feel upset and uncomfortable as you read" while the other half did not read these instructions. Participants in the reappraisal-condition read, "Know that feeling upset and uncomfortable as you read is a sign that you are taking in new information - it is feedback that you are educating yourself about the issue of gun violence" while the other half did not read these instructions. (Combining these instructions, those in the seek discomfort + reappraisal condition read "You should adopt the goal to feel upset and uncomfortable as you read. Feeling upset and uncomfortable as you read is a sign that you are taking in new information - it is feedback that you are educating yourself about the issue of gun violence." Participants in the fourth, control, condition did not receive these instructions.)

All participants then read one statement from a victim of gun violence and chose what they wanted to read next. Specifically, they had to choose three out of six articles, from a set of three articles about gun violence (taken from https://dearamericaproject.org/gallery; e.g., siblings telling their story of how they lost their mother) and three articles unrelated to gun violence (e.g., about the difference between cold brew and iced coffee; stimuli in Supplemental Material). Our key outcome measure was the number of gun violence articles participants chose to read. Participants read the articles they selected before ending the study.

Results

An ANOVA of seeking-discomfort × reappraisal on the number of articles on gun violence participants chose to read yielded a main effect of seeking-discomfort. As predicted, participants were more motivated to read about gun violence when they received instructions to

seek discomfort ($M = 2.46$, 95% CI = [2.33, 2.59]) than when they did not ($M = 1.51$, 95% CI = [1.35, 1.67]), $F(1, 397) = 79.85$, $p < .001$, $\eta_p^2 = .17$, 95% CI = [.11, .23]. This pattern emerged both when participants were further instructed to reappraise discomfort as a signal of progress, $F(1, 397) = 24.59$, $p < .001$, $\eta_p^2 = .06$, CI = [.02, .11], and without explicit reappraisal instructions, $F(1, 397) = 59.10$, $p < .001$, $\eta_p^2 = .13$, CI = [.07, .19]. There was no significant effect of reappraisal condition, $F(1, 397) = 1.87$, $p = .173$, $\eta_p^2 < .01$, CI = [.00, .03], and a marginally significant interaction, $F(1, 397) = 3.61$, $p = .058$, $\eta_p^2 < .01$, CI = [.00, .04].[1]

We conclude that when seeking discomfort, people spontaneously reappraise discomfort as a positive cue, even when not explicitly prompted to do so. This finding is in line with research showing that activating an emotion regulation goal, independent of reappraisal language, is sufficient to regulate emotion, presumably because people spontaneously adopt reappraisal strategies (Tamir et al., 2019).

Post-test. We reason that seeking discomfort changes the meaning of discomfort to a signal of growth, which is motivating. We accordingly tested for mediation in a post-test ($n = 100$ on MTurk; aspredicted.org/DLM_RXH). Participants were randomly assigned to one of two conditions from Experiment 5 (and which were the two key conditions in Experiments 1-4): seek discomfort + reappraisal versus control (no additional instructions). The study proceeded similarly to Experiment 5. After participants chose the three articles they wanted to read, we measured the mediator: "Feeling upset and uncomfortable when reading about gun violence is a sign that I am learning new information about the issue" (1 = *strongly disagree*, 7 = *strongly agree*).

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[1] Exploring this marginal interaction, participants instructed to seek discomfort were similarly motivated regardless of explicit reappraisal instructions, $F(1, 397) = .14$, $p = .711$, $\eta_p^2 < .01$, CI = [.00, .01], whereas participants not instructed to seek discomfort selected more articles when prompted to reappraise discomfort as progress, $F(1, 397) = 5.54$, $p = .019$, $\eta_p^2 = .01$, CI = [.0002, .04].

We found a main effect of condition on the mediator ($M_{discomfort}$ = 5.48, 95% CI = [4.93,

6.02]; $M_{control}$ = 3.35, 95% CI = [2.80, 3.90]), $t(98)$ = 5.47, p < .001, d = 1.10, 95% CI = [.67,

1.52], and on the number of gun-violence articles participants chose to read ($M_{discomfort}$ = 2.30,

95% CI = [1.97, 2.64]; $M_{control}$ = 1.00, 95% CI = [.68, 1.32]), $t(98)$ = 5.61, p < .001, d = 1.13,

95% CI = [.70, 1.55]. Participants' belief that discomfort signals learning mediated the effect of

condition on the number of articles selected, $B_{indirect}$ = .29, SE = .15, 95% CI = [.03, .63].

General Discussion

Can discomfort motivate self-growth? A field experiment with an improvisation club

(The Second City) suggests the answer to this question is yes. Seeking discomfort as a sign of

progress increases engagement. Students taking improvisation classes to improve their

confidence engaged more in the exercise when instructed to feel awkward and uncomfortable,

compared with typical instructions or instructions to feel their skills develop.

Four additional experiments confirmed this conclusion. People writing about an

emotional experience were more motivated to reengage in writing, and felt that they had better

achieved their coping goal, when instructed to seek discomfort (vs. to write). Seeking discomfort

motivates pursuit of personal growth when growth is inherently uncomfortable. Illustrating this,

people were more receptive to news about a health crisis and opposing political views when

seeking discomfort (vs. to learn), but no more open to other news or consistent views. Lastly,

people were more motivated to learn about gun violence when seeking discomfort (vs. not), even

in the absence of explicit reappraisal instructions, suggesting that seeking discomfort in pursuit

of growth prompts people to spontaneously view discomfort as a signal of progress.

Our intervention for motivating engagement in challenging tasks (e.g., improvisation

training) expands the literature on cognitive reappraisal and stress mindsets (Crum et al., 2013;

Jamieson et al., 2018; Uusberg et al., 2019). Prior research on stress-mindsets primarily utilized

two types of interventions, either providing information on how stress enhances (vs. debilitates)

health (Crum et al., 2013) or providing two-hour stress-mindset trainings (Jamieson et al., 2018).

What differentiates our approach is that it is more explicit and does not require extensive

training. Furthermore, seeking discomfort motivates goal pursuit even without reappraisal

instructions. We found evidence for this new intervention in motivating persistence in an under

researched domain, improvisation exercises, as well as in other growth goals that people value

pursuing.

   We further advance motivation theory beyond the pursuit of personal growth. Research

has demonstrated that more immediate (vs. delayed) positive experiences are motivating

(Milkman, et al., 2014; Rothman, 2000; Turnwald et al., 2019; Woolley & Fishbach, 2017). We

highlight the critical role of immediacy in motivation. Immediate positive experiences, like

immediate *negative* experiences (discomfort), increase motivation by providing progress

feedback. While positive experiences are likely more motivating than negative ones, we suggest

that perceiving negative experiences as a sign of progress is particularly motivating when

positive experiences are delayed and discomfort is immediate.

   Finally, there are times when discomfort should be a cue to stop, rather than a sign of

progress (e.g., sharp pain when exercising can signal injury and extreme emotional pain when

writing can signal a mental breakdown). In such cases, seeking discomfort could potentially be

harmful—it could encourage people to ignore a cue to quit.

Conclusion

   These findings offer implications for those wishing to encourage growth in others or

themselves. Whether through improvisation, writing about difficult emotions, seeking

uncomfortable information, or relating to others with opposite views: Instead of avoiding the

discomfort inherent to growth, people should seek it as a sign of progress. Growing is often

uncomfortable; we find that embracing discomfort can be motivating.

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