Supplementary Materials for

A Brief Behavioral Measure of Frustration Tolerance Predicts Academic Achievement
Immediately and Two Years Later

Peter Meindl,1* Alisa Yu,2* Brian M. Galla,3 Abigail Quirk,1 Carly Haeck,1 J. Parker Goyer,2
Carl W. Lejuez,4 Sidney K. D’Mello,5 & Angela L. Duckworth1

1University of Pennsylvania, 2Stanford University, 3University of Pittsburgh, 4University of
Kansas, 5University of Colorado at Boulder

This file includes:
Additional Results
Materials
Study 1

Results

**MTFT scores and task ability.** In Studies 1 and 2, we tested whether MTFT scores were related to baseline tracing ability. People who are better at a task will likely be inclined to spend more time on it. If tracing ability was strongly related to how much time participants spent tracing, it may not be appropriate to claim the task measures frustration tolerance. In Study 1, MTFT scores were not strongly related to the number of errors participants made on the practice trial (a proxy for task ability), $r(146) = -.17, p = .04, 95\% \text{ CI } [-.32, -.01]$.

**MTFT scores and task motivation.** In Study 1, we began to test the relationship between interest in or motivation to complete the frustrating task and MTFT scores. If MTFT scores were strongly related to task motivation or interest this would suggest poor validity, but in Study 1 MTFT scores were not related to interest levels while participants were completing the main trial, $r(146) = .06, p = .48, 95\% \text{ CI } [-.10, .22]$, even after partialling out baseline interest, $r(145) = .13, p = .11$. Additionally, though interest change scores predicted MTFT scores, $r(146) = .17, p = .04, 95\% \text{ CI } [.01, .32]$, this was not true after partialling out change scores for the other emotions measured, $r(120) = .15, p = .11$.

**Emotion change.** We tested whether absolute levels of change in frustration were greater than absolute change in all other emotions. To do this, for negative emotions (including frustration) we created change scores by subtracting baseline scores from follow-up scores; for positive emotions, we subtracted follow-up scores from baseline scores. We then compared each emotion’s change score to the frustration change score by conducting another set of paired samples $t$-tests. These analyses revealed that, as expected, frustration changed more than any other emotion (for all comparisons, $p \leq .002$).
We also repeated all emotion analyses by comparing frustration scores to a positive emotion composite (amusement, happiness, love, joy, interest, and pride) and a negative emotion composite (anger, anxiety, contempt, confusion, disgust, embarrassment, fear, guilt, sadness, shame, surprise, and unhappiness); this was done because a principal axis factor analysis with varimax rotation revealed evidence of a positive emotion factor and a negative emotion factor. Results using these composites did not differ from previously reported results.

**Study 2**

**Results**

**MTFT scores and task ability.** As in Study 1, the relationship between the number of errors participants committed in the practice round and their final MTFT scores was not significant, $r(281) = -0.07, p = 0.22, 95\% \text{ CI } [-0.19, 0.05]$, suggesting that frustration tolerance was not confounded with task ability.

**Study 3**

**Results**

**MTFT scores and task ability.** As in Studies 1 and 2, MTFT scores were not strongly related to the number of errors participants made during the practice trial, $r(389) = -0.15, p = 0.003, 95\% \text{ CI } [0.05, 0.25]$, suggesting that frustration tolerance was not confounded with baseline ability.

**MTFT scores and task motivation.** Participants in Study 3 who reported higher task motivation spent more time tracing the star, $r(389) = 0.17, p = 0.001, 95\% \text{ CI } [0.07, 0.24]$. This effect was not large, however, and therefore suggests MTFT scores are not confounded with

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1 Though five components reached an Eigenvalue greater than one, using the “elbow rule” (Cattell, 1966) there was evidence that a two-factor solution best fit the data, given that the first loading accounted for 30.4% of variance, the second accounted for 11.8%, and the third, fourth, and fifth explained only 7.2%, 6.6% and 5.3%, respectively.

2 Among excluded participants, this relationship was significant, $r(64) = -0.27, p = 0.03, 95\% \text{ CI } [-0.48, -0.03]$. 
motivation. Furthermore, as we reported in the main test, our main results did not change when controlling for task motivation.
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**Correlations Between All Time 2 Emotion Scores**

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*Note. *p < .05, **p < .01, ***p < .001*
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<td></td>
</tr>
<tr>
<td>19. Unhappiness</td>
<td></td>
<td></td>
<td>.51***</td>
<td>-.24**</td>
<td>.58***</td>
<td>.55***</td>
<td>.32***</td>
<td>.28***</td>
<td>.42***</td>
<td>.43***</td>
<td>.38***</td>
<td>.36***</td>
<td>-.34***</td>
<td>.13</td>
<td>-.23**</td>
<td>-.21*</td>
<td>-.17*</td>
<td>.51***</td>
<td>.48***</td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01, ***p < .001
Appendix SA: Frustration Tolerance Items in Study 2

Perceived Frustration Tolerance

1. How well did you do at tolerating the frustration you experienced while attempting to trace the star?
2. How well did you do at enduring the frustration you experienced while attempting to trace the star?
3. How well did you do at pushing through the frustration you experienced while attempting to trace the star?
4. How well did you do at “sucking it up” when you experienced frustration while attempting to trace the star?
5. How well did you do at withstanding the frustration you experienced while attempting to trace the star?
Appendix SB: Measures in Study 3

Nomological Network

**Distress Tolerance (Simons & Gaher, 2005)**
1. Feeling distressed or upset is unbearable to me.
2. I can’t handle feeling distressed or upset.
3. There’s nothing worse than feeling distressed or upset.

**Grit (adapted from Duckworth, Peterson, Matthews, & Kelly, 2007)**
1. I finish whatever I begin.
2. I work independently with focus.
3. I try very hard even after experiencing failure.
4. I stay committed to my goals.
5. I keep working hard even when I feel like quitting.

**Growth Mindset (Dweck, Chiu, & Hong, 1995)**
1. You have a certain amount of intelligence, and you really can’t do much to change it.
2. Your intelligence is something about you that you can’t change very much.
3. You can learn new things, but you can’t really change your basic intelligence.

**Self-Control (Items 1-8 are from Park et al., 2017; items 9-13 are part of the Brief Self-Control Scale by Tangney, Baumeister, & Boone, 2004)**
1. I allow others to speak without interruption.
2. I am polite to adults and classmates.
3. I can control my temper.
4. I can remain calm even when criticized or otherwise provoked.
5. I come to class prepared.
6. I pay attention and resist distractions in class.
7. I remember and follow directions.
8. I get to work right away, instead of waiting until the last minute.
9. I have a hard time breaking bad habits.
10. I do certain things that are bad for me, if they are fun.
11. Pleasure and fun sometimes keep me from getting work done.
12. I have trouble concentrating.
13. Sometimes I can’t stop myself from doing something, even if I know it’s wrong.
Academic Motivation

Academic Amotivation (translated from Vallerand, Blais, Brière, & Pelletier, 1989)
1. Honestly I don’t know; I really feel that I am wasting my time in school.
2. I once had good reasons for going to school; however, now I wonder whether I should continue.
3. I can’t see why I go to school and frankly, I couldn’t care less.
4. I don’t know; I can’t understand what I am doing in school.

Academic Locus of Control (adapted from Wellborn, Connell, & Skinner, 1989)
1. Getting good grades is a matter of luck.
2. If your teacher doesn’t like you, you won’t do well in school.
3. If you get bad grades, it’s not your fault.
4. If you don’t do well on your schoolwork, it’s because the work is too hard.

Academic Self-Efficacy (Kosovich, Hulleman, Barron, & Getty, 2015)
1. I know I can learn the material in my classes.
2. I believe that I can be successful in my classes.
3. I am confident that I can understand the material in my classes.

Self-Interested Motives for Learning (Yeager et al., 2014)
1. I want to get a good job.
2. I want to leave my parents’ house.
3. I want to earn more money.
4. I want to have fun and make new friends.

Self-Transcendent Motives for Learning (Yeager et al., 2014)
1. I want to learn things that will help me make a positive impact on the world.
2. I want to gain skills that I can use in a job that helps others.
3. I want to become an educated citizen who can contribute to society.