

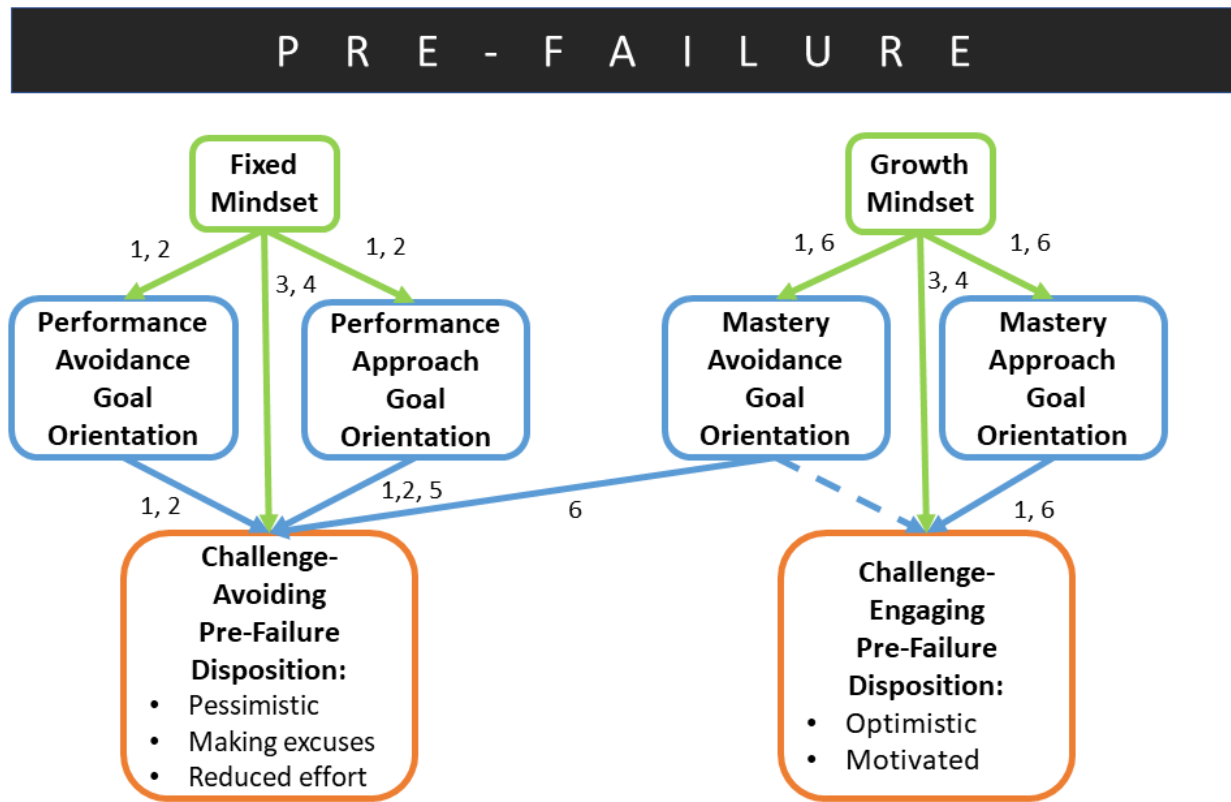
# Supplemental Material

*CBE—Life Sciences Education*

Henry *et al.*

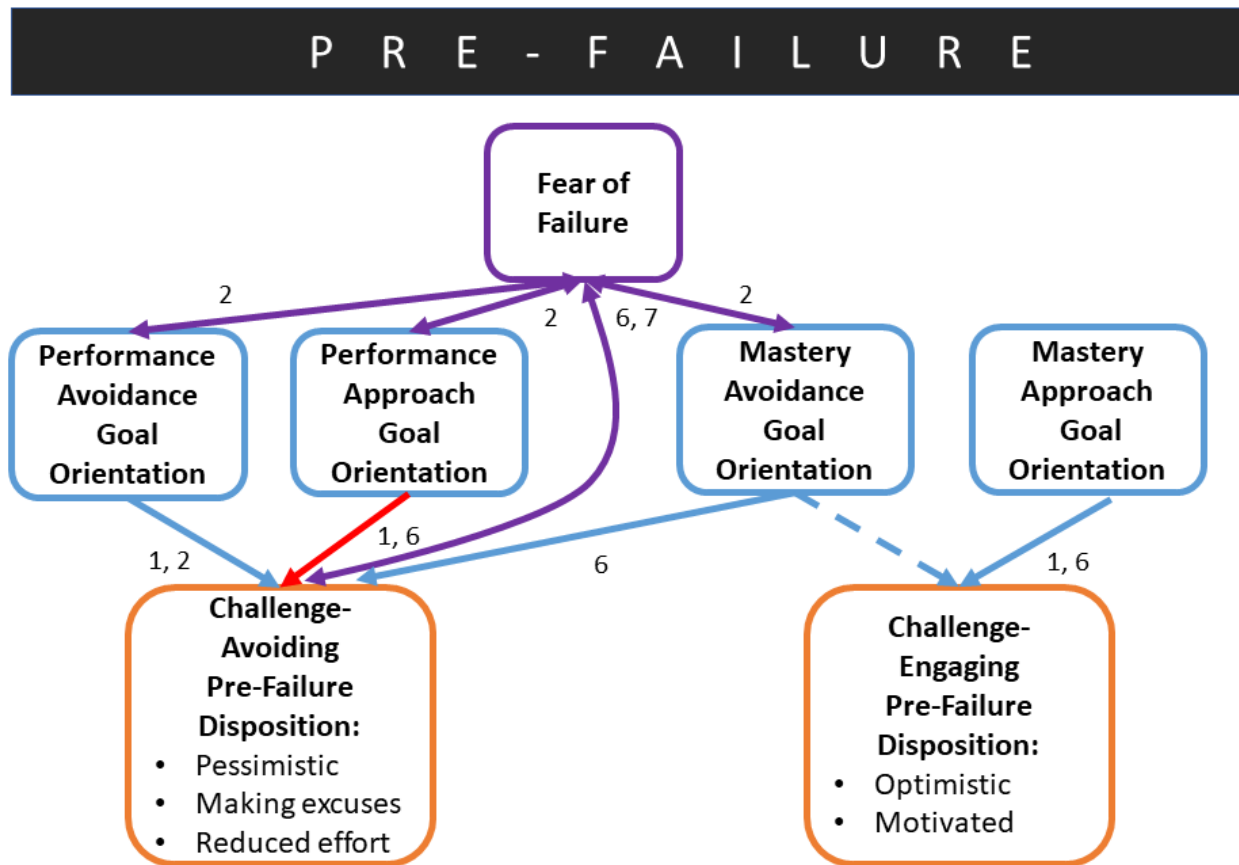
## Supplement A – Empirical support for modeled relationships

This supplement contains each mini-model presented in the paper (Figures 1-4) with numeric annotations corresponding to supporting references. A majority of the work referenced or below is outside of undergraduate STEM contexts. Therefore, we continue to view the connections present in each mini-model as *predictions* of relationships that might occur in *undergraduate STEM contexts*, despite the fact that many of the connections are well supported in other contexts, such as K-12 learning.



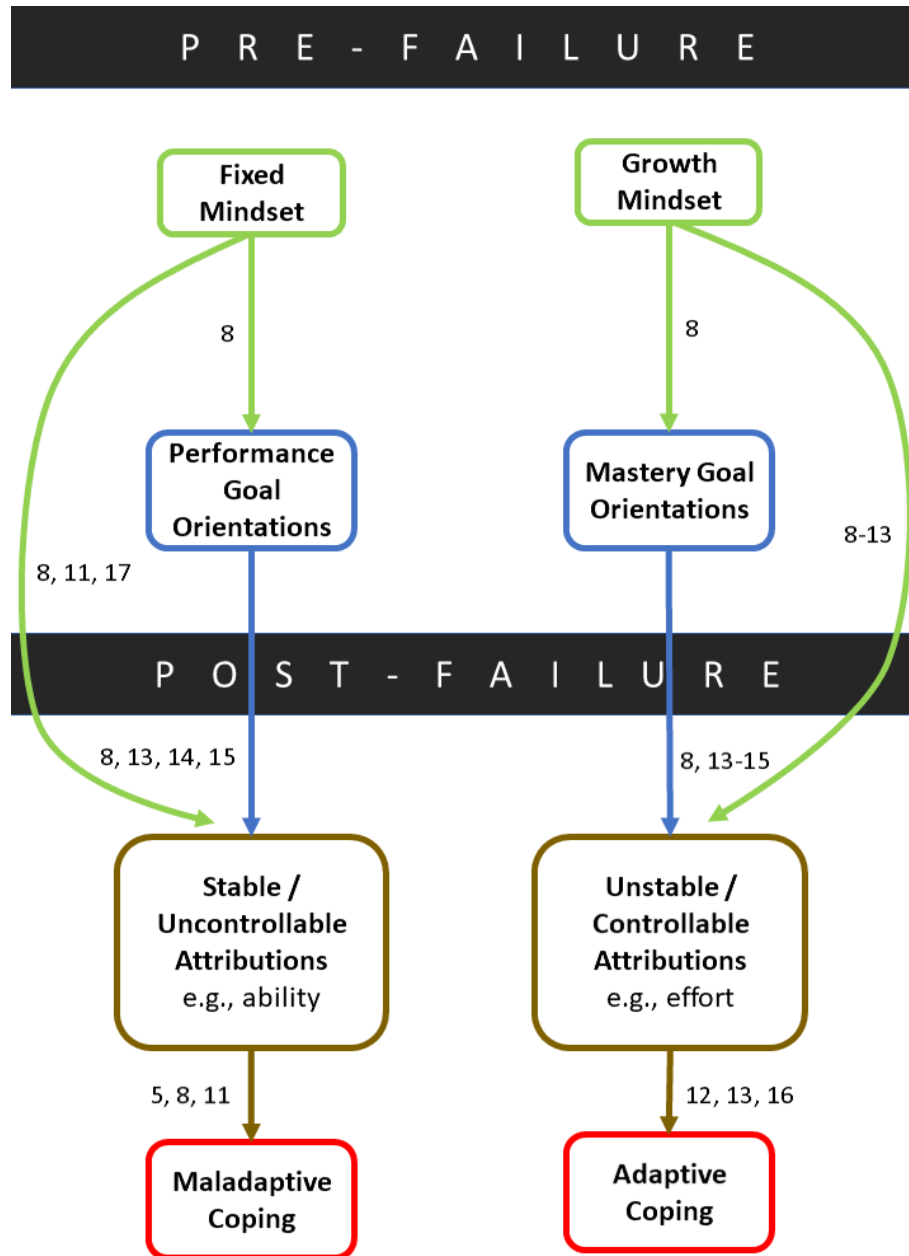
### Supplemental Figure 1

**Mini-Model 1- Mindset and Goal Orientations:** Predicted relationships between mindset (green), goal-orientation (blue), and pre-failure disposition (orange) for undergraduate STEM contexts. Growth mindset leads to a challenge-engaging pre-failure disposition; fixed mindset, by contrast, leads to a challenge-avoiding pre-failure disposition. Growth mindset leads to mastery goal orientations, while fixed mindset leads to performance goal orientations. Performance goals lead to a challenge-avoiding disposition. Mastery approach goals lead to a challenge-engaging disposition and mastery avoidance goals tend to lead to challenge-avoiding dispositions. We predict, however, that some individuals with mastery avoidance goals may express a challenge-engaging disposition though we did not find empirical support for this connection (dashed line). Where relationships are described in the literature outside of undergraduate STEM contexts (solid lines), representative publications are presented numerically.



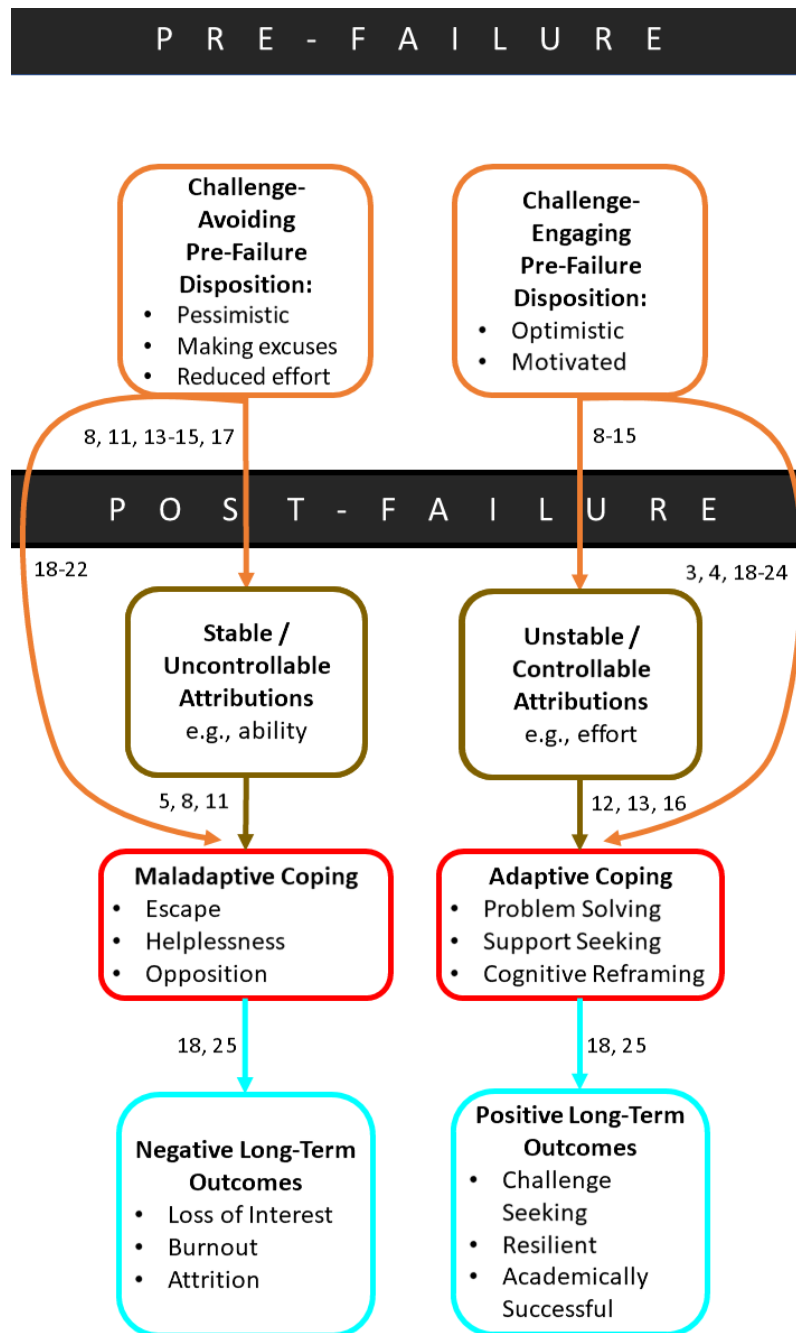
### Supplemental Figure 2

**Mini-Model 2 - FF and Goal Orientations:** Predicted relationships between fear of failure (purple), goal orientation (blue) and pre-failure disposition (orange) for undergraduate STEM contexts. Reciprocal relationships exist between FF and challenge-avoiding pre-failure dispositions and also between FF and three of the four goal orientations: mastery avoidance, performance approach, and performance avoidance. Goal orientations may directly influence the different pre-failure dispositions. Note that performance approach goal orientations are hypothesized to be related to *lower levels* of challenge-avoiding behaviors like making excuses and reduced efforts when combined with higher FF (red line), which is different than predictions in mini-model 1 in the absence of FF. Where relationships are described in the literature outside of undergraduate STEM contexts (solid lines), representative publications are presented numerically.



**Supplemental Figure 3**  
**Mini-Model 3. Attribution**  
**Attribution**

Predicted relationships between mindsets (green), goal orientations (blue), attribution style (brown), and coping style (red) for undergraduate STEM contexts. Those with a growth mindset and a mastery orientation style are more likely to attribute the cause of a failure to something within their control to change. This, in turn, is related to more adaptive coping behaviors. By contrast, those with fixed mindsets and performance goal orientations are likely to judge failures as resulting from something beyond their control, which is related to maladaptive coping. Where relationships have previously been described in the literature outside of undergraduate STEM contexts (solid lines), representative publications are presented numerically.



#### Supplemental Figure 4

**Mini-Model 4 - Pre-failure dispositions, Coping, and Long Term Outcomes:** Predicted relationships between pre-failure dispositions (orange), attributions (brown), coping responses (red), and long term outcomes (turquoise) for undergraduate STEM contexts. Individuals with challenge-engaging dispositions are likely to attribute failure to unstable and controllable causes and engage in adaptive coping. These students are likely to experience academic success. Individuals with challenge-avoiding dispositions are likely to attribute failure to stable and uncontrollable causes and engage in maladaptive coping. This likely leads to loss of interest in the STEM discipline, burnout, and often attrition. Where relationships are described in the literature outside of undergraduate STEM contexts (solid lines), representative publications are presented numerically.

### Mini-model References

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