Appendix A:

Details on the summary statistics and correlation matrix

This supplementary material provides an extensive walk-through the summary statistics presented in Table 2 of the main document. It also presents the correlation matrix with all the subscales of SATS, expending on Figure 2 of the main document where only SATS total correlations are presented.

Descriptive Statistics and Reliability

In this study, the Cronbach's alpha of the *Statistics Anxiety Scale* total score is .94. For the *Scale of Perfectionism and Excellencism* total score, the Cronbach's alpha is .95. For the *Survey on Attitudes Towards Statistics* and the *Cognitive Emotion Regulation Questionnaire* total scores, Cronbach's alphas are .92 and .86, which corresponds well to the Cronbach's alphas of the original questionnaires. The above Cronbach's alphas are high, indicating strong internal reliability between items. Finally, for the *Cognitive Emotion Regulation Questionnaire* total score, it is .47; the Cronbach's alphas for the Performance goals and Avoidance goals subscales are also quite lower than those reported in the original study.[3] There is no explanation regarding the cause of these two lower Cronbach's alphas.

See Table 2 from the Main Document

The mean of some subscales are relatively high compared to others. Concerning evaluation anxiety in statistics, the mean *M* is 77.6. It is higher than the means of the two other SAS subscales. The same pattern was also which reported large differences between SAS subscales.[1, 2] Regarding the SCOPE, the mean of the excellencism subscale is higher ($M = 80.0$ where *M* denotes the mean) than perfectionism ($M = 56.3$). Higher averages for excellencism

compared to perfectionism and are to be expected as the items on perfectionisms all involve more extreme expressions. We return to these in the next section.

Regarding attitudes toward statistics, participants rated the amount of work required in their statistics courses as high (M = 69.0), a rating higher than for the other subscales of this questionnaire. Regarding academic goals, participants reported on average, being more oriented toward mastery goals (M = 74.4) than toward performance goals or avoidance goals. Finally, with respect to regulation strategies, participants reported using, on average, more adaptive strategies (M = 58.2) than maladaptive ones.

The asymmetry in the distribution of ratings of most questionnaires are acceptable (being between -0.9 and +0.9), which means that statistical analyses can be carried out without any problem. The only exception is evaluation anxiety in statistics, where the asymmetry is -1.24. This pronounced skew is due to a ceiling effect as the mean is 77.6 but the median is 82.1. The excellencism subscale also has a high mean but the ceiling effect is less pronounced as the median is 81.8 for a mean of 80.0 and the standard deviation is narrower. Analyses involving evaluation anxiety in statistics should be regarded as indicative only, as this asymmetry can generate false positives.[6] Luckily, this is not a critical variable in this study.

Pairwise Correlations between all Subscales

Figure A1 provides the complete correlation matrix involving all the subscale scores, including the 6 SATS subscale scores. The figure is available on the OSF as a high resolution image, for easier zoom in. Consult the file *FigureA1.png*, in the subfolder *Supplementary* of the web site https://osf.io/5kyd6/.

Insert Figure A1 about here

References for Appendix A

1 Cantinotti M, Lalande D, Ferlatte, MA, & Cousineau D. Validation de la version francophone du Questionnaire d'anxiété statistique (SAS-F-24). *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement*, 2017; *49*(2): 133-142.

2 McIntee SE, Goulet-Pelletier J C, Williot A, Deck-Léger E, Lalande D, Cantinotti M, & Cousineau D. (Mal)adaptive cognitions as predictors of statistics anxiety. *Statistics Education Research Journal*, 2022; *21*(1): 5.

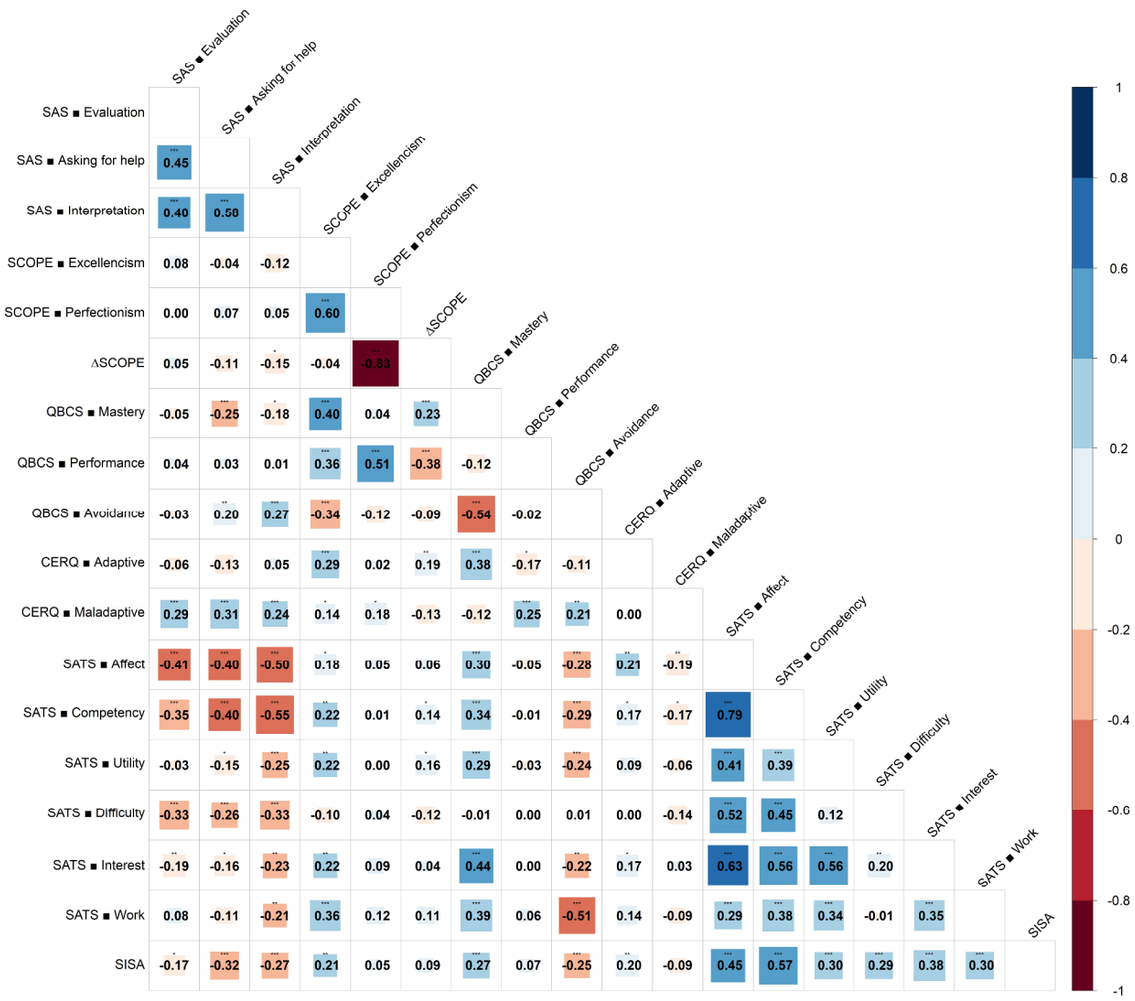
3 Gaudreau P, Racine P, Boivin T, Parent G, Boileau L, & Schellenberg BJI. Striving for excellence or chasing perfection? Differential association with test anxiety for students in tertiary education. [Manuscript submitted for publication]. School of psychology, University of Ottawa. 2024.

4 Gaudreau P, Schellenberg BJI, Gareau A, Kljajic K, & Manoni-Millar S. Because excellencism is more than good enough: On the need to distinguish the pursuit of excellence from the pursuit of perfection.. *Journal of Personality and Social Psychology*, 2022; *122*(6):1117–1145.

5 Pastor DA Barron KE, Miller BJ, & Davis SL. A latent profile analysis of college students' achievement goal orientation. *Contemporary Educational Psychology*, 2007; *32*(1): 8-47.

6 Tabachnick BG, & Fidell LS. *Using Multivariate Statistics* (5th ed.). Pearson Education. 2007.

Figure A1. Correlation matrix across subscales including all the SATS subscales.



Note. * $p < .05$; **: $p < .01$; ***: $p < .001$.

Appendix B:

Computing Prototypes of Excellencists, Perfectionists, and Non-Strivers

In their seven step-plan of analysis to test the hypotheses of the MEP, presented an *interpretational framework* to better characterize the expected scores a perfectionist, an excellencist or a non-excellence/non-perfection striver (herein *non-striver* for concision) would obtain on any variable.[1] The last category represents a person who pursues lower standards than both perfectionism and excellencism. This approach builds representative individuals, defined by one standard deviation above or below the mean of perfectionism and excellencism. It is in a sense trying to build *prototypic* representatives of each category of strivers. Using this technique, one can estimate the effect of excellencism and perfectionism on the different variables by computing the score of such ideal participants. When using this procedure, participants are not separated in categories or groups of any form.[1] To do so, the effect of excellencism and perfectionism scores need to be regressed on the variables before the prototypes can be computed.

Regression Results Using Perfectionism and Excellencism as Predictors

For each variable in the study except the two SCOPE subscales, a multiple regression analysis was performed using perfectionism and excellencism as predictors. Prior to the regression, age and gender were entered as covariates. The results are presented in Table 1, right columns. Mplus syntaxes for multiple regression analyses consistent with the MEP are available at: https://osf.io/8fb49.[1]

The results of the regressions indicate that excellencism is a positive and significant predictor of self-reported **ability** in statistics courses ($B = 0.536$; $SE_B = 0.149$, $p < .001$) while

perfectionism has no influence on it (B = -0.103; SE_B = 0.084, p = .221; B represents the unstandardized regression coefficient). Regarding statistics anxiety, excellencism and perfectionism were found to have no influence on both **evaluation** anxiety in statistics (B = 0.193, SE_B = 0.124, p = .121; and B = -0.60, SE_B = 0.069, p = .389, respectively) and anxiety of **asking for** help in statistics (B = -0.239, SE_B = 0.193, p = .218; and B = 0.149, SE_B = 0.108, p = .170, respectively) while being moderate predictors of **interpretation** anxiety in statistics (B = -0.378; SE_B = 0.156, p = .016; and B = 0.175, SE_B = 0.088, p = .049). The difference in results indicated that excellencism is a strong and negative predictor of anxiety for interpretation.

Excellencism predicts the level of **attitudes** toward statistics (B = 0.344, SE_B = 0.085, p < .001) but perfectionism does not (B = -0.050, SE_B = 0.048, p = .297). This indicated that excellencists have positive attitudes toward statistics.

As for the goals that the students set for themselves in statistics courses, excellencism positively predicts **mastery** goals (B = 0.619; SE_B = 0.084, p < .001); it does not influence **performance** goals (B = 0.099; SE_B = 0.097, p = .312); and it negatively and significantly predicts **avoidance** goals (B = -0.548; SE_B = 0.114, p < .001). On the contrary, perfectionism negatively and significantly predicts **mastery** goals (B = -.198; SE_B = 0.048, p < .001), positively predicts **performance** goals (B = 0.297; SE_B = 0.054, p < .001), and does not influence **avoidance** goals (B = 0.084; SE_B = 0.064, p = .190). Consistent with expectations, perfectionism rather than excellencism is related to suboptimal goals.

Finally, with regards to emotional regulation strategies, excellencism positively and significantly predicts **adaptive** emotion regulation strategies (B = 0.562, SE_B = 0.100, p < .001), and does not influence **maladaptive** ones (B = 0.064; SE_B = 0.097, p = .512). Perfectionism

negatively and significantly predicts adaptive emotion regulation strategies (B = -0.148; SE_B = 0.057, p = .010), and it also doesn't influence maladaptive emotion regulation strategies (B = 0.095; SE_B = 0.055, p = .087).

Prototypic Values for Perfectionists, Excellence Strivers, and Non-Strivers

The prototypic values were calculated using the regression parameters reported above and the following quantities for non-strivers: −1 × SD of excellencism, −1 × SD of perfectionism; for excellence strivers: +1 × SD of excellencism, −1 × SD of perfectionism; and for perfection strivers +1 × SD of excellencism, +1 × SD of perfectionism (see [1], for the details of the computation and the MEP Shiny App (https://model-of-excellencism-and-perfectionism.shinyapps.io/Shiny_Version2/. We rather opted to graph the values in *R* in the present study.

Prototypic values for perfectionism, excellencism and non-striving are presented in Figure 2. Cohen's d_p, quantifying the standardized differences between excellencists, perfectionists, and non-strivers, are provided below. Results show that excellencists and perfectionists have significantly more self-reported **ability** than non-strivers (d_p = 0.595 [0.203, 0.985]; and 0.391 [0.004, 0.776], respectively). Excellencists and perfectionists do not significantly differ on their self-reported ability (d_p = 0.204 [-0.180, +0.587]). Similarly for **attitudes** toward statistics, excellencists and perfectionists significantly differ from non-strivers (d_p = 0.687 [0.291, 1.08]; and d_p = 0.510 [0.120, 0.898]) but do not differ from one another (d_p = 0.176 [-0.207, +0.559]).

See Figure B1 at the end

Regarding statistics anxiety subscales, no significant differences were found between any prototype on **evaluation** anxiety (all d_p ranging from 0.114 to 0.255) or anxiety of **asking** for

help (all d_p ranging from -0.247 to +0.026). As for **interpretation** anxiety, non- strivers had significantly more anxiety than excellence strivers (d_p = -0.431 [-0.817, -0.043]).

More varied differences emerged for achievement goals. Excellencists and perfectionists were both significantly more likely to endorse **mastery** goals than non-strivers (d_p = 1.155 [0.739, 1.566] and d_p = 0.500 [0.110, 0.887]) with excellencists endorsing them more than perfectionists (d_p = 0.655 [0.260, 1.047]). Excellencists did not differ from non-strivers on **performance** goals (d_p = 0.161 [−0.222, +0.544]); only perfectionists differed from the other two (d_p = -0.868 [-1.266, -0.466], d_p = 1.029 [0.619, 1.434] when compared to excellencists and non-strivers respectively). As for **avoidance** goals, non-strivers had higher scores than both excellencists and perfectionists (d_p = -0.813 [-1.209, -0.412];and d_p = -0.590 [-0.980, -0.198] respectively), but the latter two did not differ (d_p = -0.223 [-0.606, +0.161]).

Regarding emotion regulation strategies, all three groups were different. Excellencists were more prone to use **adaptive** emotion regulation strategies than both perfectionists and non-strivers (d_p = 0.425 [0.038, 0.812]; and d_p = 0.922 [0.518, 1.323] respectively). Perfectionists were also above non-strivers (d_p = 0.496 [0.107, 0.884]). Lastly, concerning **maladaptive** emotion regulation strategies, no differences emerged between excellencists and non-strivers (d_p = 0.114 [-0.268, +0.498]) and perfectionists (d_p = -0.301 [-0.685, +0.085]). Perfectionists had more maladaptive strategies than non-strivers (d_p = 0.416 [0.028, 0.801]).

Finally, a prototype analysis was done for **ΔSCOPE**. Excellencists had higher perceptibility of extreme wordings than non-strivers (d_p = 1.347 [0.920, 1.769]), which in turns score higher than perfectionists (d_p = 1.088 [0.675, 1.496]).

Discussion

This study examined the relationship between variables expected to be linked to statistics anxiety, including perfectionism and excellencism. These two strivings were characterized with two distinct analytic approaches, estimating the prototypical scores (this appendix, Figure B1) and classifying the participants (main text, Figure 3). Comparing Figures B1 and 3, some convergence can be seen between the results of the two approaches even if the first is commonly labeled a *variable-centered* analysis and the second, a *person-centered* analysis.[2] They differ however on one important aspect: the variable-centered analysis generates a non-striving prototype whereas the person-centered analysis returned a low-ability profile. The non-striving prototype shows an anxiety of evaluation and an anxiety of asking for help in statistics similar to the other two prototypes, whereas the low-ability profile has higher levels of anxiety. Thus, one should not think that they represent the same type of students.

Statistics Anxiety Based on Prototypes and on Profiles

One contribution of this study is that it examined whether perfectionists and excellencists significantly differ on statistics anxiety and other variables of interests. It was done in two distinct ways: First, the procedure described in [1] was used (this appendix). This procedure generates a snapshot of a typical excellencist, a typical perfectionist, and a typical non-striver. In a second analysis (main text), a classification algorithm was used to cluster the participants in three classes. When considering both analyses simultaneously, one may evaluate more robustly the differences and similarities of excellencists and perfectionists in terms of statistics anxiety by looking at the shared results from both analyses.

Regarding similarities, attitudes toward statistics and self-reported ability to perform statistics are very similar for excellencists and perfectionists. Likewise, excellencists and perfectionists expressed nearly equivalent degrees of statistics anxiety. Regarding the

differences, excellencists are significantly more prone not to pursue goals which emphasize grades (i.e. performance goals) than perfectionists. Also, excellencists have a lower use of maladaptive emotion regulation strategies. These relations, which involve protective factors, strongly indicate that excellencists are less statistically anxious than perfectionists. Yet, none of the analyses supports this hypothesis. There might be a trend for lower anxiety with regards to asking for help and interpretation, but these results are not significant. Two last protective factors are mastery goals and adaptive emotion regulation strategies. They were not more related to excellencists than to perfectionists according to the profile analysis, but they were according to the prototype analysis. However, these two protective factors are associated with ΔSCOPE, which in turn, is associated more with excellencism. Thus, it is unclear at this time if the relation is direct or not (through better discrimination of extreme wordings), but it suggests that excellencists are better protected against statistics anxiety.

References

1 Gaudreau P, Racine P, Boivin T, Parent G, Boileau L, & Schellenberg BJI. Striving for excellence or chasing perfection? Differential association with test anxiety for students in tertiary education. [Manuscript submitted for publication]. School of psychology, University of Ottawa. 2024

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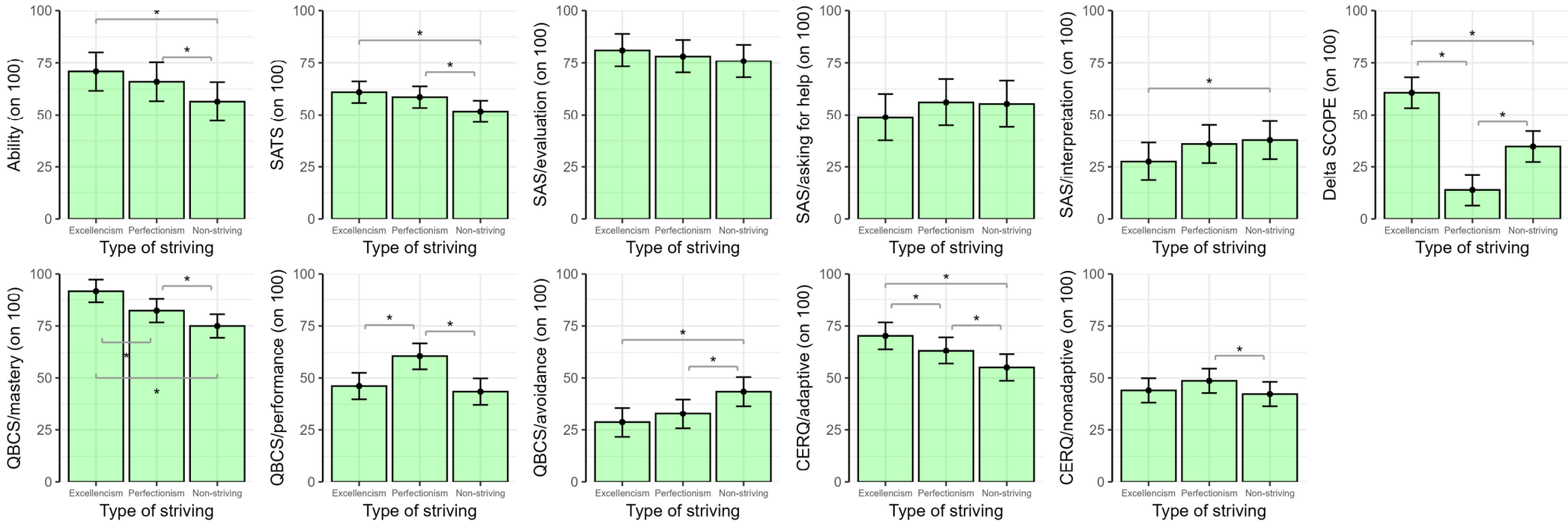
Figure B1. Predicted scores for excellence strivers, perfectionist strivers, and non-strivers on the ten variables examined in the Study. Error bars show difference-adjusted 95% confidence intervals.



Note. * $p < .05$.

Figure S1: Distribution of the Perfectionism subscores from the SCOPE questionnaire.