

Online Supplemental Materials for:

Preliminary evidence that testosterone's association with aggression depends on self-construal

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In Study 1, we had available data to analyze the small proportion of PSAP button presses that represented unprovoked aggressive responses ( $M = 2.27\%$ ,  $SD = .04$ ). These responses occurred within the first 45 seconds of the PSAP and only approximately 33% of our study participants engaged in any unprovoked aggressive responses. Additionally, the highly skewed, over-dispersed, count-nature of our data lended itself more appropriately to analyses with a negative binomial regression (Hilbe, 2011), which we examined with two models. Using generalized linear models and a negative binomial distribution, we investigated if self-construal moderated the association between basal testosterone and unprovoked aggression (Model 1), as well as the association between testosterone dynamics and unprovoked aggression (Model 2). All predictors were standardized prior to computing interaction terms, and aggression button presses were divided by 10 to provide an index of points stolen rather than an index of button presses. This computation was performed so that the index of aggression more closely conformed to that of the negative binomial distribution. Supporting this decision, our models with the number of points stolen had a better fit (indexed by Akaike's Information Criteria;  $AIC = 165.16$  and  $164.86$  for the basal and reactive testosterone models, respectively) than the models with the number of button presses ( $AIC = 441.99$  and  $439.13$  for the basal and reactive testosterone models, respectively). Simple slopes of the interaction effects are presented in Supplemental Figure 1 using the online tools provided by Dawson (2014) for analyzing interactions when using poisson, negative binomial, and other outcome distributions using a log link. Simple slopes were tested using the "computer" method recommended by Aiken & West (1991), evaluating the simple slopes of basal testosterone and testosterone residuals at  $\pm 1$   $SD$ s of self-construal.

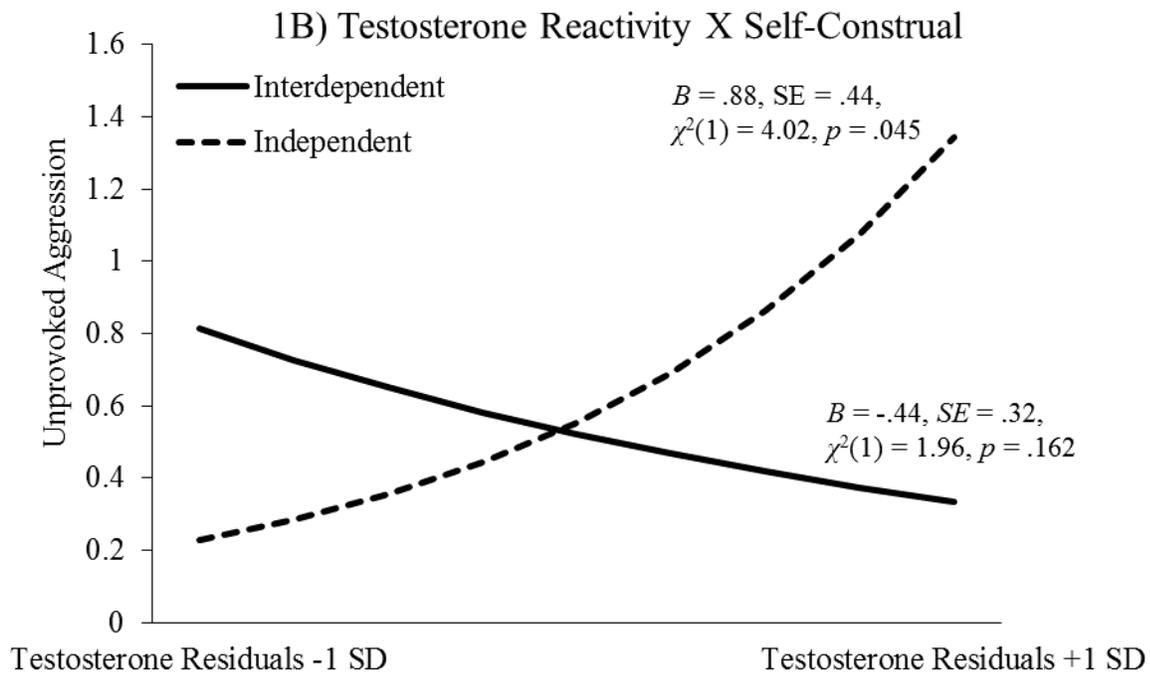
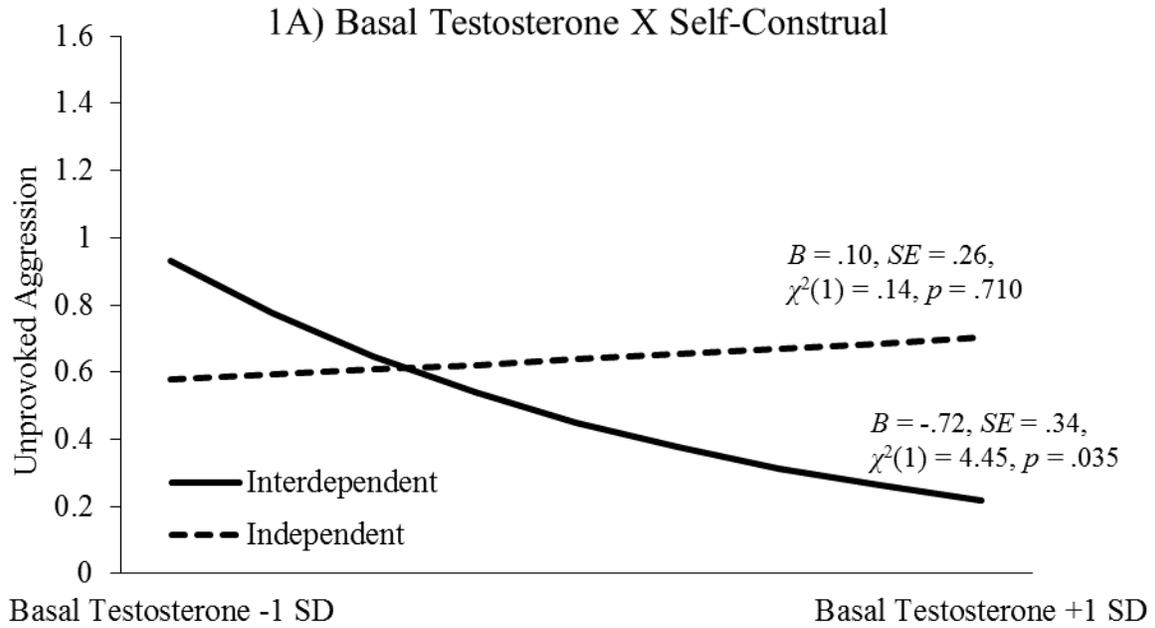
The results of the two moderated negative binomial models are presented in Supplemental Table 1, whereas the simple slopes analysis are presented in Supplemental Figure

1. The basal testosterone X self-construal interaction (Model 1) was marginally significant ( $B = .41$ ,  $SE = .22$ ,  $\chi^2(1) = 3.37$ ,  $p = .066$ ). The pattern of simple slopes was parallel to the analysis in the main body of the text; basal testosterone was negatively associated with aggression in more interdependent individuals, but not associated with aggression in independents (See Supplemental Figure 1a). In model 2, there was a significant testosterone residuals X self-construal interaction ( $B = .66$ ,  $SE = .30$ ,  $\chi^2(1) = 4.92$ ,  $p = .027$ ). Again, similar to the main text, testosterone residuals were positively associated with aggression in independents, but not associated with aggression in interdependents.

**Supplemental Table 1.** Moderated Negative Binomial Analysis for Unprovoked Aggression

Negative Binomial Models	<i>B</i>	<i>SE</i>	$\chi^2(1)$	<i>p</i>
Model 1:				
Basal T	-.31	.21	2.25	.134
Self-Construal	.17	.20	.76	.383
Self-Construal X Basal T	.41	.22	3.37	.066
Model 2:				
T Reactivity	.03	.19	.03	.866
Self-Construal	.22	.24	.84	.359
Self-Construal X T Reactivity	.66	.30	4.92	.027

**Supplemental Figure 1.** Simple Slopes of Moderated Negative Binomial Analysis for Unprovoked Aggression



Note: Lines represent the associations basal testosterone and testosterone residuals have with unprovoked aggression responses, plotted at +1 (more independent) and -1 (more interdependent) SDs of Self-construal.

## References

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*.

Newbury Park, London: Sage.

Dawson, J. F. (2014). Moderation in management research: What, why, when and how. *Journal*

*of Business and Psychology*, 29, 1-19.

Hilbe, J. M. (2011). *Negative binomial regression*. Cambridge University Press.