The Loss Aversion Bias: Variations Related to ADHD Symptomatology

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Abstract

The goal of the present study was to determine if individuals with high ADHD symptomatology differed from those with low symptomatology in the loss aversion bias. Undergraduates (*N*=68; 75% women) completed questionnaires measuring ADHD symptomatology and loss aversion, as well as the Balloon Analog Risk Task. On several items, individuals with high ADHD symptomatology (*n*=31) were less loss averse than individuals with low symptomatology (*p*s < .05), even after controlling for individual differences in risk taking. Future research should examine if reduced loss aversion in those with high ADHD symptomatology is related to diminished sensitivity to everyday punishments.

Introduction

Decision-making can be influenced by a variety of factors such as norms, framing, and cognitive biases.

- Once such bias proposed by Kahneman and Tversky's (1979) prospect theory is the **loss aversion bias**, which is when individuals, on average, appear to be more averse to losses than they are attracted to equivalent gains.

Researchers have found that there are individual differences in the extent to which people display loss aversion and have begun to examine which factors predict the presence and strength of loss aversion (e.g., Boyce, Wood, & Ferguson, 2016).

- One potential factor that has yet to be examined is symptoms associated with Attention-Deficit/Hyperactivity Disorder (ADHD).
- Individuals with ADHD have been shown to process rewards and punishments differently than typical individuals (Masunami, Okazaki, & Maekawa, 2009), which suggests they may place different relative weights on gains and losses when making decisions compared with non-affected people.

Goal of the Study

The goal of the present study was to determine if young adults high in ADHD symptomatology (as measured along a continuum as opposed to a clinical diagnosis) differed from those low in ADHD symptomatology in the loss aversion bias.

Method

Participants & Procedure

Undergraduates (*N*=68; 75% women; 66% Caucasian) completed an ADHD screening measure upon entry to College. Those who scored below the 25th (low symptomatology; *n*=37) and above the 75th (high symptomatology; *n*=31) percentiles for their class year on both ADHD subscales were invited to complete a questionnaire and computer task in a lab setting. Participants ranged in age from 18 to 22 years old (*M* = 19.53, *SD* = 1.18) when they participated in the lab portion of the study.

Materials

ADHD Symptomatology

- 35-item modified version of the Adult Rating Scale (Weyandt, Linterman & Rice, 1995), which measures both inattentive and hyperactive/impulsive symptoms associated with ADHD

Loss Aversion

- 6 forced-choice items that included a 50/50 bet involving losses

> Sample item: Choose the gamble you would prefer
> $0 for sure
> OR
> 50% chance of gaining $100 and 50% chance of losing $100

- 1 forced-choice item: Choose between: A sure loss of $750 OR a 75% chance to lose $1000 and a 25% chance to lose nothing
- 2 items measured on an interval scale

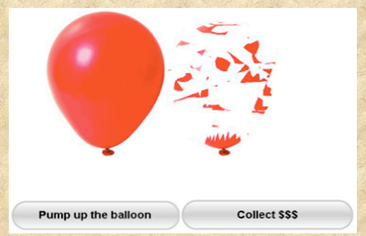
> Sample item:
> How likely is it that you would accept a gamble with a 50% chance to win $60 and 50% chance to lose $25
>
1	2	3	4	5
Very unlikely	Unlikely	Undecided	Likely	Very Likely

Risky Behavior

- Adjusted average number of pumps on unexploded balloons from a modified Balloon Analog Risk Task (BART; Lejuez et al., 2002), with higher scores indicating greater risk taking

Goal: make as much money as you can

Every successful pump adds 5¢ to "bank"



If balloon explodes before pressing "collect $$$," total in "bank" lost for that balloon

Table 1

Chi-square tests of ADHD symptomatology and loss aversion item choices

Certainty value	*f* certainty		50% gain/ 50% lose	*f* bet		χ^2	*p*
	High Sx	Low Sx		High Sx	Low Sx		
$0	29	35	$500/$1500	2	2	.03	.855
$0	22	33	$1000/$1000	8	4	2.83	.092
$0	9	23	$1500/$500	22	14	7.43	.006
$0	19	31	$2000/$1000	12	6	4.39	.036
$0	17	30	$100/$100	14	7	5.44	.02
$0	3	12	$60/$25	27	25	4.80	.028

Note. Sx = ADHD symptomatology

Results

- On four of the six forced-choice items assessing loss aversion via a 50/50 bet, those with high ADHD symptomatology were more likely to accept the bet than expected.
- On one of these items the difference approached significance.

ADHD status was not related to the other forced-choice bet:

- Few participants were willing to choose a sure loss of $750, regardless of ADHD symptomatology (n_{high}= 5; n_{low}= 6).
- Most participants chose to take the risk of losing $1000 for the 25% chance to lose $0 ($n_{high}$= 26; n_{low}= 31; *p* = .992).

Results (cont'd)

On one of the two scale items assessing loss aversion, those with high symptomatology were more likely to accept the bet (*M* = 2.67; *SD* = .92) than individuals with low symptomatology (*M* = 2.03, *SD* = .83), *t*(65) = 2.98, *p*=.004 (see Figure 1). There was not a significant difference for the other item (High: *M* = 3.71, *SD* = .94; Low: *M* = 3.39, *SD* = 1.02); *t*(65) = 1.33, *p*=.188.

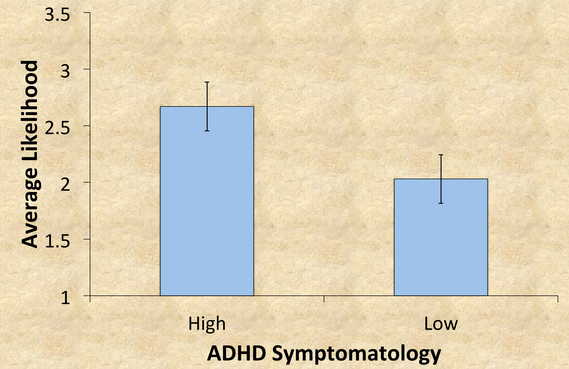


Figure 1. Average likelihood of accepting a bet with a 50% chance to win $100 and a 50% chance to lose $100 as a function of ADHD symptomatology

Because those with high symptomatology had greater adjusted average number of pumps on the BART (*M* = 13.86; *SD* = 2.53) than those with low symptomatology (*M* = 10.76, *SD* = 1.77), *t*(65) = 3.57, *p*=.001, all analyses were repeated controlling for this risk variable using logistic/linear regression. All previously significant findings remained significant (*p*s ranged from .016 to .049) and the previously marginal difference for the 50/50 symmetrical bet at $1000 became significant after controlling for risk taking (*p* = .041).

Discussion

- Individuals with greater ADHD symptomatology were less loss averse than non-affected individuals, unless the loss involved a great deal of money (i.e., $1500; both groups preferred $0 with certainty) or a very small amount of money (i.e., $25; both groups equally likely to accept a bet).
- This decreased loss aversion was not just the result of a preference for risk.

It is unclear if these group differences in loss aversion arise because of a decreased sensitivity to losses, an increased sensitivity to gains, or both among those with high ADHD symptomatology.

Directions for Future Research

Future research should examine neurological processes related to loss aversion in these two groups as well as the relationship of reduced loss aversion to diminished sensitivity to punishments and losses in everyday life. Such research may provide insight into why those with ADHD respond better to behavioral modification programs that emphasize immediate and salient rewards.

References

Boyce, C.J., Wood, A.M., & Ferguson, E. (2016). Individual differences in loss aversion: Conscientiousness predicts how life satisfaction responds to losses versus gains in income. *Personality and Social Psychology Bulletin, 42,* 471-484.

Kahneman, D. & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47,* 263-291.

Lejeuz, C.W., Read, J.P., Kahler, C.W., Richards, J.B., Ramsey, S.E., Stuart, G.L., & ... Brown, R.A. (2002). Evaluation of a behavioral measure of risk taking: The Balloon Analogue Risk Task (BART). *Journal of Experimental Psychology: Applied, 8,* 75-84.

Masunami. T., Okazaki, S., & Maekawa, H. (2009). Decision-making patterns and sensitivity to reward and punishment in children with attention-deficit hyperactivity disorder. *International Journal of Psychophysiology, 72,* 283-288.

Weyandt, L.L., Linterman, I., & Rice, J.A. (1995). Reported prevalence of attentional difficulties in a general sample of college students. *Journal of Psychopathology and Behavioral Assessment, 17,* 293-304.