Balloon Risk Aversion Task (BRAT):
A Behavioral Measure of Anxious Avoidance in Children and Adolescents

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Introduction

Anxiety and Avoidance: Anxious individuals tend to engage in forms of avoidance. Clinically anxious individuals engage in avoidance of a feared consequence by performing within-situation safety behaviors (Wong & Moulds, 2010). Avoidance and safety behaviors are thought to be sustained by negative reinforcement processes. Negative reinforcement theory suggests that the motivational basis of addictive drugs is the reduction or avoidance of negative affect and related aversive internal states (Wills, Vaccaro, & McNamara, 1992). Many studies investigating risk taking in adolescents have examined the effects positive reinforcement have on adolescents and childhood (Lejeuz, Read, Kahler, Richards, Ramsey, Stuart, Strong, & Brown, 2002). Few if any studies have evaluated negative reinforcement with a behavioral task, though negative reinforcement is clearly a sustaining factor for anxiety concerns. Previous work indicates that loss anticipation promotes more conservative choices on risk tasks (Winkielman, Knutson, Paulus, & Trujillo, 2007).

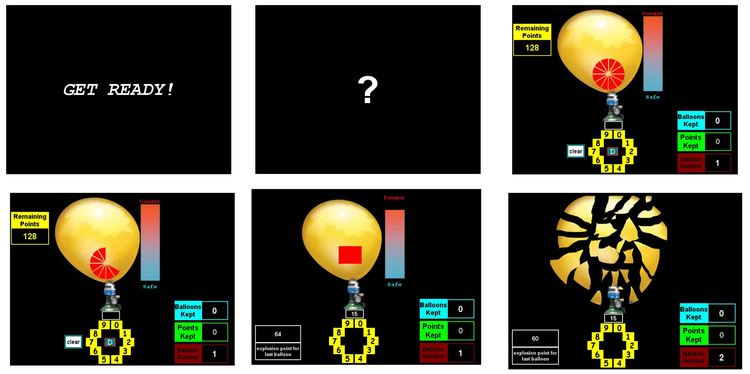
Avoidance and Balloon task: In an effort to assess negative-reinforcement processes, the Balloon Risk Aversion Task (BRAT) measures avoidance and risk-taking behavior through a computerized task. A participant is presented with a balloon, which inflates before them to a point of nearly bursting. A danger meter to the right of the balloon indicates the degree of 'danger' of the balloon popping. The participant is asked to choose an amount to deflate the balloon by, in an effort to prevent the balloon from popping (also reducing the danger meter). Avoidance is then measured by the number of points taken from a full balloon. The more points an individual subtracts from the balloon, the more an individual demonstrates a greater effort to avoid popping the balloon. A bar is displayed on the right hand of the screen indicating the likelihood the balloon will pop. To create a sense of urgency and anticipatory anxiety, an eight second timer is displayed on the screen, as well. If the participant fails to deflate any points from the balloon, the balloon is certain to pop.

Loss Aversion: Within the balloon task, participants are told they have the opportunity to win and lose points, which will result in the possibility of earning money (~$10). By introducing the possibility of the balloon popping, the participants should be motivated to keep the balloon from popping, in order to avoid the loss of the balloon, and the loss of points.

Hypotheses: We hypothesize that avoidance on the BRAT (mean pumps deflated) will be positively correlated with anxiety. We hypothesize that anxiety will be negatively correlated with the negative outcome on the BRAT (number of balloons popped). Specifically we predict that the balloon task will be positively correlated with an anxiety measure (SCARED, parent report), as well as with a stressful life events questionnaire and the Eysenck Personality Questionnaire-junior Neuroticism Scale (both self-report).

Method

Balloon Risk Aversion Task: (BRAT, Crowley, Wu & Mayes, 2011) is a computer task developed to behaviorally assess risk aversion. This loss aversion task measures adolescents' avoidance of risk through a balloon task. A fully inflated balloon is presented on the screen, and the goal for the participant is to decrease the balloon's inflation so that it will not pop. A meter is presented next to the balloon to show the likelihood the balloon will pop. An eight second time constraint is placed on the participant's choice to create anticipatory anxiety. Fully inflated, the balloon holds a capacity of 128 points. The mean popping point is 64 pumps. The main behavioral outcome measures an average of the deflation pumps chosen across all balloons and number of balloons popped. One hundred and four adolescents completed the Balloon Risk Aversion Task, as well as a stressful live events and personality measure. Parents reported on their child's anxiety. Fifty-three of the adolescents were female and fifty-one were male. The sample population ranged from ages ten to sixteen.



Questionnaires: The Screen for Children Anxiety Related Emotional Disorders (SCARED) (Birmaher et al., 1999) is a parent-report measure for assessing anxiety disorder symptoms in children and adolescents ages 8 to 18 years. Composed of 41 items, informants are asked the frequency of each symptom on a 3-point-scale: 0 (almost never), 1 (sometimes), and 2 (often). The SCARED questionnaire has four factors: somatic/panic (12 items), generalized anxiety (9 items), separation anxiety (13 items) and social phobia (7 items), which have shown good reliability, with Cronbach's alphas ranging from .70 -.78 across scales. In addition to the SCARED measures, a stressful life events questionnaire (Norris, 1992) is administered, as well as the Eysenck Personality Questionnaire-junior (Eysenck & Eysenck, 1975).

Results

Gender and BRAT task

	Sexcode	N	Mean	Standard Deviation	Std. Error Mean
Pumps Deflated Mean	1.00	51	69.71	14.21	1.99
	2.00	53	75.71	15.96	2.19
Pop Total Max	1.00	51	13.73	3.32	.46
	2.00	53	12.13	3.97	.55

The table above represents the average amount of points males and females choose to deflate from the balloons. Females deflated more points (M=75.71, p<.05) than males chose to deflate (M=69.71, p<.05).

Parent's SCARED Reports

		SCARED Total anxiety	SCARED Panic somatic	SCARED GAD	SCARED Separation	SCARED Social anxiety	SCARED School avoidance
Pumps Deflated Mean	Pearson Correlation	**.237***	**.227***	**.212***	**.207***	.078	.191
	Sig. (2-tailed)	.016	.022	.033	.035	.435	.054
Pop Total Max	Pearson Correlation	**-.261****	**-.252***	**-.230***	**-.206***	-.107	-.193
	Sig. (2-tailed)	.008	.011	.020	.037	.283	.052

EPQ-Junior Correlations

		Psychoticism	Extraversion	Neuroticism	Negative life events total
Pumps Deflated Mean	Pearson Correlation	-.028	.044	-.025	**.214***
	Sig. (2-tailed)	.780	.662	.802	.030
Pop Total Max	Pearson Correlation	.096	-.045	-.017	**-.239***
	Sig. (2-tailed)	.335	.653	.863	.015

Results

Although there was no significant interaction between age and gender within the BRAT, we found that females (M=75.71, SD=15.96, SEM=2.19, p<.05) subtracted a greater amount from the balloons than the male subjects (M=69.71, SD=14.21, SEM=1.99, p<.05) and males tended to pop more balloons (M=13.73, p<.05) than females (M=12.13, p<.05). No significant correlations were found between age and the average number of pumps (r=-.075, ns). When comparing the average number of pumps during the balloon task to the anxiety measures, a statistically significant correlation was found between the SCARED total anxiety measure and the average number of pumps (r=.237, p<.05). In addition to the total anxiety score, the BRAT is positively correlated with reported panic and somatic symptoms (r=.227, p<.05), negative life events (r=.214, p<.05), GAD symptoms (r=.212, p<.05) and separation anxiety symptoms (r=.207, p<.05). The BRAT was unrelated to neuroticism (r=.025, ns), psychoticism (r=.028, ns), social anxiety (r=.078, ns) and school avoidance (r=.191, ns). Perceived negative life events predicted the average number of pumps deflated (+) and balloons popped (-).

Summary and Discussion

Supporting our hypothesis, the Balloon Risk Aversion Task is positively correlated to the SCARED parent reports of child total anxiety, generalized anxiety disorder symptoms, somatic and panic symptoms and separation anxiety symptoms. In addition to the SCARED measures, the task is positively correlated with negative life events. This evidence supports the prospect of implementing the BRAT as a predictor of anxiety. Results showed, however, that the BRAT does not have a significant relationship with school avoidance, nor the personality measures indexed by the EPQ-junior. The positive correlation between the BRAT task and the negative life events questionnaire suggests the stressful role negative events play in the development of anxiety and avoidance of undesired situations. This relationship indicates the BRAT task's strength and ability to measure anxiety and avoidance in children adolescents.

Females displayed a higher average of pumps deflated on the BRAT; therefore, one can assume that females from the ages ten to sixteen seek a greater amount of avoidance from risk than males, at least in terms of this behavioral task. Future research should attempt to determine the avoidance profile for each age and gender.

Obtaining a behavioral measure for negative reinforcement as well as a predictor for anxiety and Generalized Anxiety Disorder symptoms provides new horizons for studying adolescents and profiling avoidance type behavior. Future work will examine the extent to which avoidance on the BRAT predicts clinical levels of anxiety and risk for anxiety disorders. Electrophysiological and neuroimaging studies are currently underway examining patterns of neural response to avoidance on the BRAT.

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