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# Subjective Measures of MZ and DZ Twins during Anxiety-Provoking Tasks

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## Introduction

Though brief anxiety is a healthy response to stress, persistent anxiety threatens an individual's day-to-day living and elicits negative responses. An individual's development is predisposed by DNA and influenced by the individual's environment and experiences. In other words, both nature and nurture influence an individual's anxiety response. The environmental stresses we are exposed to like being in an abusive relationship or having a poor diet negatively alter the epigenome as unmethylated CPG sites become hypermethylated and shut down gene expression, perhaps leading to an altered anxiety response. In the study, 84 monozygotic and 153 dizygotic adolescent twins pairs, ages 15 to 20 years, participated in a carbon dioxide breathing (CO<sub>2</sub>) task and a trier social stress task (TSST) and subjective experiences of anxiety were measured using subjective units of distress (SUDS). The study aims were to compare SUDS ratings in the CO<sub>2</sub> task to SUDS ratings in the TSST to determine which task produces greater anxiety and to evaluate the relationship between anxiety-provoking tasks and subjective experiences of anxiety in MZ and DZ adolescent twins. The data was analyzed using correlational models.

## Methods

### Participants

Participants included MZ twins and DZ twins ages 15 to 20 discordant for history of MDD. Twins were recruited through the VCU, Mid-Atlantic Twin Registry. There were 84 MZ twin pairs and 153 DZ twin pairs in the study.

### Procedure

#### 1. CO<sub>2</sub> breathing task:

The participants were fitted with a facemask covering the nose and mouth. The participant was asked not to speak during the task unless he or she needed to stop the task. The participants sat in a chair and breathed the room air for a 5-minute baseline, which was followed by 8 minutes of the 7.5% CO<sub>2</sub> enriched air (Fig. 5). There was a 5-minute recovery period at the end, in which the participant breathed in room air again. The participants were unaware of when they inhaled the CO<sub>2</sub> enriched air.

#### 2. Trier social stress test task:

The participant is given 10 minutes to plan a 5-minute speech for their dream job and three confederates enter the room at the end of the planning period. The spokesperson asks the participant to begin the speech and the confederates sit in silence for 10 minutes. The participant is then asked to do mental math, subtracting out loud for 5 minutes.

#### 3. Subjective Anxiety Ratings:

In the 7.5% CO<sub>2</sub> breathing task and after the TSST task, participants self-reported on their anxiety/distress levels using a 0-100 point scale, where 0 meant no anxiety and 100 meant the worst anxiety ever experienced.

## Results

[DataSet1] E:\AYATS Lab Data\MZ Twins co2 task suds.sav

Correlations		EF_CO2_12_min_SUDS.1	EF_CO2_12_min_SUDS.2
EF_CO2_12_min_SUDS.1	Pearson Correlation	1	.079
	Sig. (2-tailed)		.579
	N	61	51
EF_CO2_12_min_SUDS.2	Pearson Correlation	.079	1
	Sig. (2-tailed)	.579	
	N	51	61

Figure 1. MZ Twins CO<sub>2</sub> Breathing Task Correlation Model

[DataSet1] E:\DZ Twins co2 task suds.sav

Correlations		EF_CO2_12_min_SUDS.1	EF_CO2_12_min_SUDS.2
EF_CO2_12_min_SUDS.1	Pearson Correlation	1	.069
	Sig. (2-tailed)		.527
	N	118	87
EF_CO2_12_min_SUDS.2	Pearson Correlation	.069	1
	Sig. (2-tailed)	.527	
	N	87	105

Figure 2. DZ Twins CO<sub>2</sub> Breathing Task Correlation Model

The correlation between SUDS ratings for MZ twins in the CO<sub>2</sub> breathing task was 0.079 with a significance value of 0.579 (Fig. 1). The correlation between SUDS ratings for dizygotic twins in the CO<sub>2</sub> breathing task was 0.069 with a significance value of 0.527 (Fig. 2).

[DataSet3] E:\AYATS Lab Data\MZ Twins Trier SUDS.sav

Correlations		Trier_SU_DS.1	Trier_SU_DS.2
Trier_SUDS.1	Pearson Correlation	1	.235
	Sig. (2-tailed)		.064
	N	70	63
Trier_SUDS.2	Pearson Correlation	.235	1
	Sig. (2-tailed)	.064	
	N	63	63

Figure 3. MZ Twins TSST Correlation Model

[DataSet1] E:\AYATS Lab Data\DZ Twins Trier SUDS.sav

Correlations		EF_Post_Trier_SU_DS.1	EF_Post_Trier_SU_DS.2
EF_Post_Trier_SU_DS.1	Pearson Correlation	1	.176
	Sig. (2-tailed)		.067
	N	126	109
EF_Post_Trier_SU_DS.2	Pearson Correlation	.176	1
	Sig. (2-tailed)	.067	
	N	109	109

Figure 4. DZ Twins TSST Correlation Model

In the Trier Social Stress Test task, the correlation between SUDS ratings for monozygotic twins was 0.235 with a significance value of 0.064 (Fig. 3) and the correlation between SUDS ratings for DZ twins was 0.176 with a significance value of 0.067 (Fig. 4).

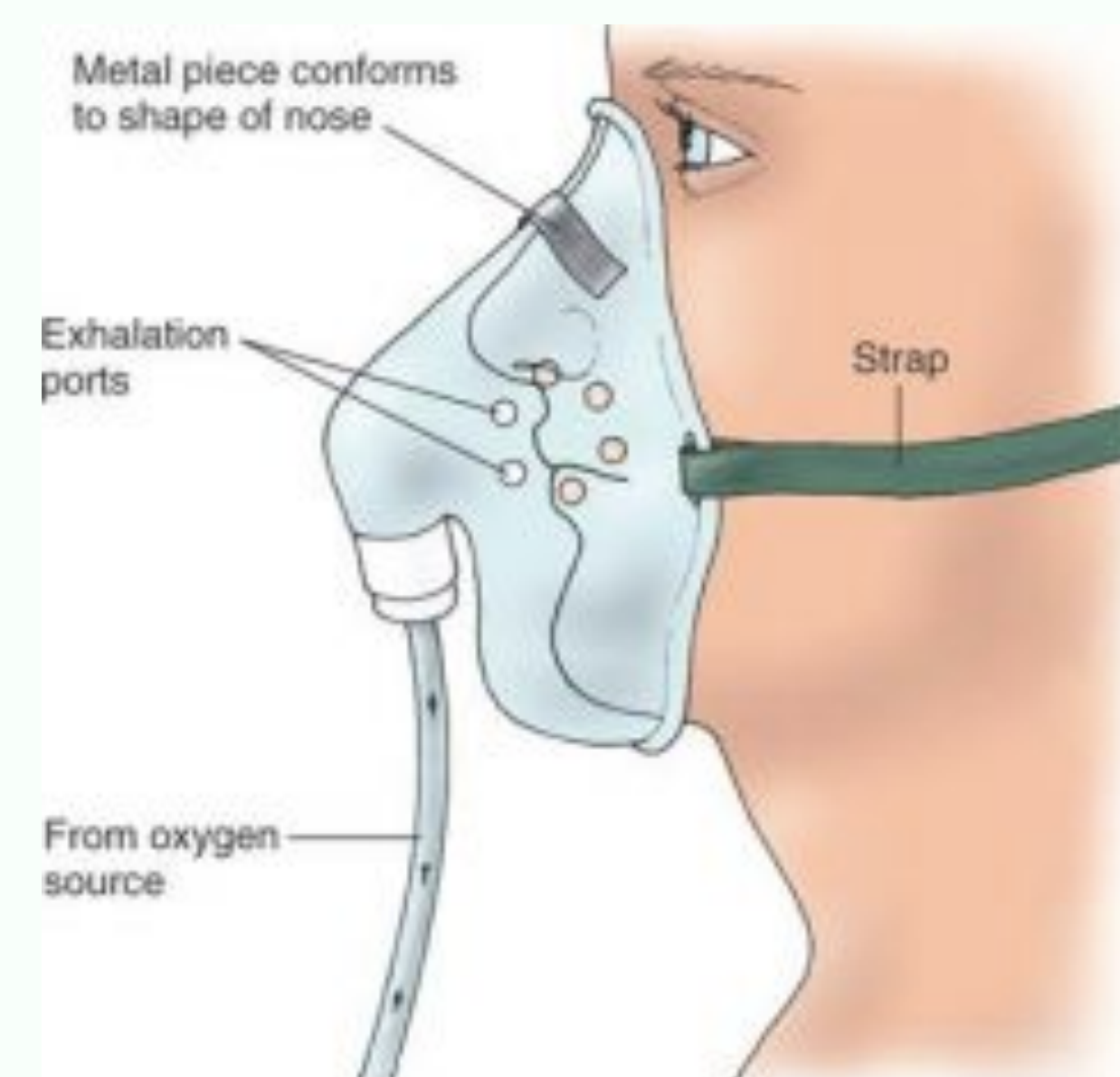


Figure 5. Participants breathe 7% CO<sub>2</sub> enriched air for 8 minutes.

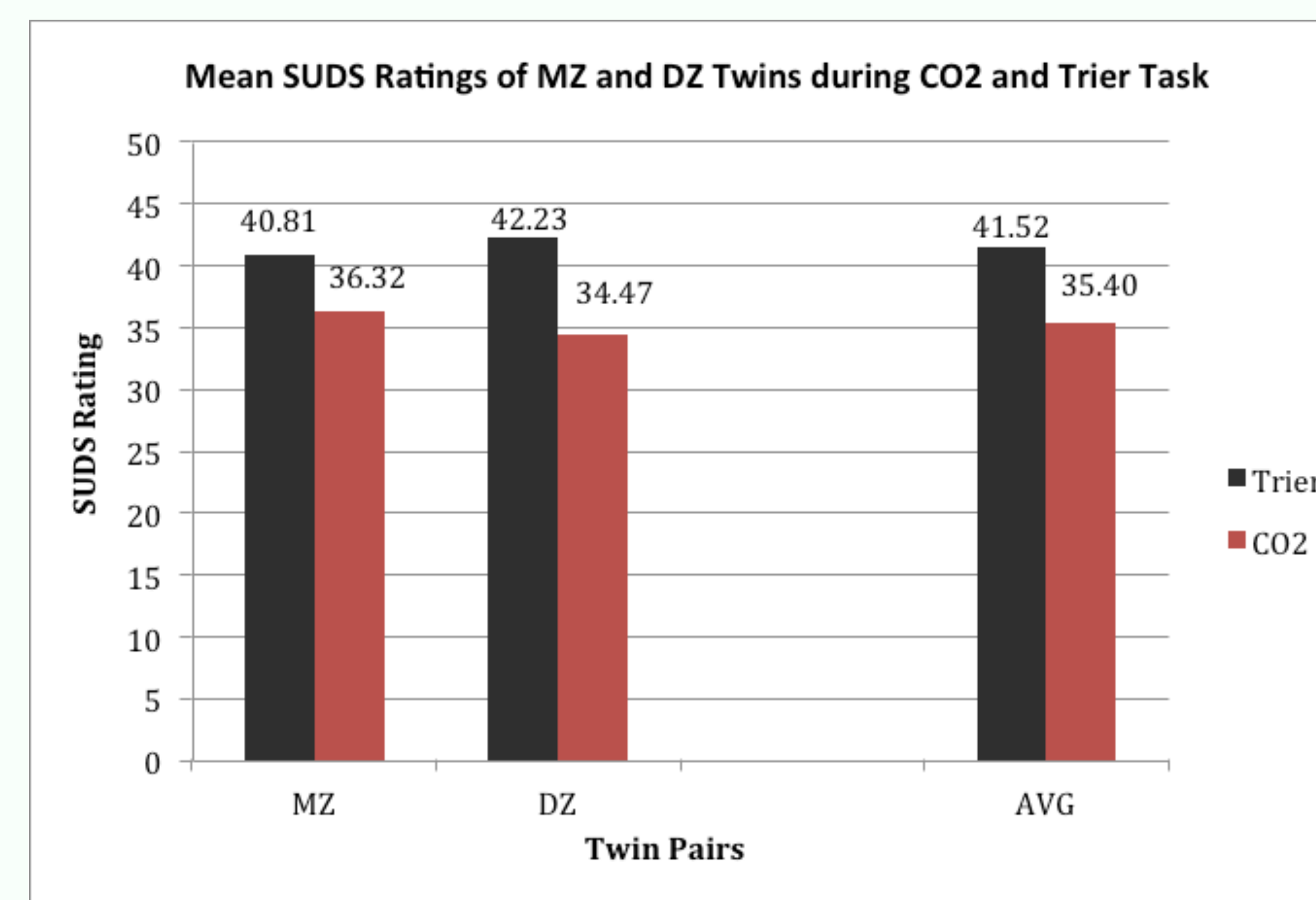


Figure 6. Mean SUDS Ratings of MZ and DZ Twins during CO<sub>2</sub> and Trier Task

## Discussion

The results indicate that there was not a significant correlation of SUDS ratings between monozygotic twins or dizygotic twins in either the CO<sub>2</sub> breathing task or TSST task. Though insignificant, there were higher SUDS correlations between monozygotic twins than between dizygotic twins. The significance value for MZ twins was noticeably lower in the trier task compared to the carbon dioxide task. The mean SUDS ratings for MZ twins and DZ twins were higher in the trier task than the CO<sub>2</sub> task (Fig. 6), implying that the trier task is a better inducer of anxiety than the CO<sub>2</sub> task. The trier task seems to be a more realistic measure of anxiety response, because it is more resembling of day-to-day social activities than a carbon dioxide breathing task. The hypothesis that SUDS responses in MZ twins during the CO<sub>2</sub> breathing task and trier social stress task will be more closely related than SUDS responses in DZ twins during the same tasks was true; however, it was not statistically significantly. The hypothesis that the TSST would produce higher SUDS ratings than the CO<sub>2</sub> breathing task for both MZ and DZ twins was marginally significant. The fear of anxiety-related sensations is known as anxiety sensitivity. The belief that certain sensations have harmful consequences results in an anxiety response. The individual will become uneasy when the anxiety symptom is felt and will want to avoid associations with the experience. The anxiety sensitivity theory proposes that there are some individuals that are more prone to respond to anxiety symptoms in this type of manner (Stein, Jang and Livesley, 1999). The individual is more likely to feel anxiety symptoms of alarm, danger and threat if the individual's level of anxiety sensitivity is higher (Stein, Jang and Livesley, 1999).

## Conclusion

The results shed light on the impact of anxiety on subjective experiences during the trier task and carbon dioxide task. The clinical implications of the research include identifying pre-diagnosis markers that predict the likelihood of an individual to develop anxiety and constructing effective treatment plans based on self-reported responses. Though anxiety disorders are treatable, patients may be in denial and the stigma associated with mental illnesses prevents many from seeking help. The self-reported measures (SUDS) may be used to predict the onset of anxiety. Further study is needed to evaluate the heritability of anxiety response.

## Limitations

The sample was only Caucasian twins, so results cannot be generalized to other races or ethnicities.

## Cited Sources

Stein, Murray, Kerry Jang and John Livesley. "Heritability of Anxiety Sensitivity: A Twin Study" *American Journal of Psychiatry*. 1999. 246-251. Web. 14 Oct. 2015.

## Acknowledgements

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