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

Sravya Uppalapati
Virginia Commonwealth University

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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 pairs, ages 15 to 20 years, participated in a carbon dioxide breathing (CO₂) 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 CO₂ 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. CO₂ 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. They participated in a chair and breathed the room air for a 5-minute baseline, which was followed by 8 minutes of the 7.5% CO₂ enriched air (Fig. 5). There was a 5-minute recovery period at the end, in which the participant breathed room air again. The participants were unaware of when they inhaled the CO₂ 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 their dream job. The spokesperson asks the participant to begin 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 was asked not to speak during the task unless they needed to stop the task. They participated in a chair and breathed the room air for a 5-minute baseline, which was followed by 8 minutes of the 7.5% CO₂ enriched air (Fig. 5). There was a 5-minute recovery period at the end, in which the participant breathed room air again. The participants were unaware of when they inhaled the CO₂ enriched air.

3. Subjective Anxiety Ratings: In the 7.5% CO₂ 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

The correlation between SUDS ratings for MZ twins in the CO₂ breathing task was 0.079 with a significance value of 0.579 (Fig. 1). The correlation between SUDS ratings for dizygotic twins in the CO₂ breathing task was 0.069 with a significance value of 0.527 (Fig. 2).

The correlation between SUDS ratings for MZ twins during the TSST task was 0.235 with a significance value of 0.064 (Fig. 3) and the correlation between SUDS ratings for DZ twins during the TSST task was 0.176 with a significance value of 0.067 (Fig. 4).

Discussion

The results indicate that there was a significant correlation of SUDS ratings between monzygotic twins or dizygotic twins in either the CO₂ breathing task or TSST task. Though insignificant, there were higher SUDS correlations between monzygotic 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 CO₂ task (Fig. 6), implying that the trier task is a better inducer of anxiety than the CO₂ 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 CO₂ breathing task and trier social stress test task will be more closely related than SUDS responses in DZ twins during the same tasks was true; however, it was not statistically significant. The hypothesis that the TSST would produce higher SUDS ratings than the CO₂ 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 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). 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 CO₂ 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 significant. The hypothesis that the TSST would produce higher SUDS ratings than the CO₂ 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 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


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