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# Effects of Social Isolation on Heart Rate Variabilty

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# Heart Rate Variability: Impact of Social Isolation


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## Abstract

The present study looked at the interaction and impact between social isolation and heart rate variability (HRV). Participants in this study included undergraduate (N= 16) students from St. Johns University and the College of Saint Benedict. This study included an online survey that measured neuroticism and anxiety. Social isolation was implemented through a computer program called CyberBall, in which the researchers programmed the "game" to include or exclude the participants. There were two groups in this study, one that started with the isolation condition and ended with the non-isolation, and the second group started with the non-isolation and ended with the isolation condition. RESULTS. More significant results may have been found if more participants were available for this study.


## Introduction

In a study done by Grippo, Lamb, Carter, and Porges (2007), social isolation was to be related with changes in heart rate and this is what these researchers tested in their methods. Fifteen females were tested over a six week period to see how their heart rates would change whether they were in the isolation group or the paired group (non-isolation). Results showed that for the isolation group, there was an increase in resting heart rate and a decrease in heart rate variability. This shows that social isolation does in fact have a role in predicting changes in heart rate and heart rate variability over a period of time. The more important results that concern us is how heart rate variabilities are changed by social isolation.

In a study done by Gouin, Zhou, and Fitzpatrick (2015), social integration was tested as the independent variables while measuring for heart rate variability. International students were tested on how well they were being introduced to the culture of the new country and how lonely they were feeling. This was done through survey measures the researchers put together. The participants also had their HRV tested to see the correlations between these two variables. Researchers found that HRV decreased over time, showing that there may in fact be a link between social communications and heart rate variability.

According to a study by Horsten, Ericson, Perski, Wamala, Schenck-Gustaffson, and Orth-Gomer (1999), social isolation was associated with a decrease in heart-rate variability. The researchers explored associations between psychosocial risk factors including social isolation, anger, and depressive symptoms with heart rate variability in 300 healthy women between the ages of 30-65 years old. Social isolation was measured through the use of a condensed version of the Interpersonal Support Evaluation List. The purpose of this tool is to measure perceptions of social support among individuals in the general population. Those who perceived a lack of social support or social isolation were found to be associated with a decreased heart-rate variability. The findings of this study suggest then that heart-rate variability to be a mediating mechanism that could perhaps help explain the associations that were found among social isolation and other psychosocial risk factors.

## Method

**Participants**

- 16 undergraduate students from St. John's University and the College of Saint Benedict
- 9 Males and 7 females

**Materials**

- Participants were asked to have their heart rate variability measured through the use of a Biopac Machine (Model MP150).
- Three electrodes were used per participant and attached to the body from the Biopac Machine with the use of gel.
- A self-compassion survey was used and administered online through surveymonkey.com.
- An online game titled *CyberBall* was also used and programmed to isolate or exclude participants in one condition and include them in the other.

**Procedure**

Our study utilized an ABA design. Participants first read through and signed a consent form before proceeding with the experiment. Participants were then instructed to attach 3 electrodes with electrode gel to their body. One on the inside of each shoulder, underneath the collar bone and a third underneath the ribcage on the left side.

Participants were then brought to a computer lab and instructed to provide an identification number as well as complete a 20-question neuroticism survey. Following the completion of the survey, participants were brought into a different room to complete the experiment.

Participants were then instructed to attach each of the three leads to their designated electrode on the body. The participants were instructed to sit in a chair, facing a computer screen as they began the CyberBall program. Participants that completed condition 1 first played the game with the other players including them equally by frequently passing a ball to the user. This condition lasted for 5 minutes, participants were instructed to relax for 5 minutes, before beginning condition 2. In condition 2 participants were socially isolated where other players rarely passed them a ball. Following the completion of this final phase, participants provided the same identification number as they had on the survey to allow for complete anonymity in the analysis. Participants were then allowed to remove the leads and electrodes from their body as they were debriefed to the reality of our study.

## Results

- Low neuroticism group showed statistically significant high Frequency heart rate variability $F$ (1, 8) = 5.86, $p < .05$
- RMSSD found statistically significant differences between the high and low neuroticism groups $F$ (1,8)= 10.21, $p < .05$
- There was a statistically significant difference between the high neuroticism and low neuroticism groups. The low neuroticism group showed higher RMSSD scores as well as high frequency heart rate variability. There were no statistically significant results between the included and excluded groups.

## Discussion

Researchers first hypothesis predicted that the isolation condition would produce lower heart rate variability, which was not found to be statistically significant. The second hypothesis researchers had was that the more neurotic a participant was, the lower the heart rate variability would be. Results supported this hypothesis. These results show that neuroticism is an important variable when analyzing heart rate variability.

Improvements could be made in the number of participants as well as in the selection of participants. They were made up of students in an introductory psychology class and received PRIA credit for participating. The number of participants was sixteen total. If there were more participants researchers would better be able to generalize about the population and potentially look at other factors that may vary and influence results. Improvements could be made in the program used.

A future study could examine how other social isolation tasks and conditions impact heart rate variability. The use of heart rate monitors that could be worn by the participants instead of the Biopac machine.

## References


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