

# Comparison Study: Pediatric FGID Pre-Post HRV Biofeedback Measures

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## Abstract

Estimates suggest that there is a high prevalence of pediatric functional gastrointestinal disorders (FGID), including but not limited to Irritable Bowel Syndrome (IBS) Gastrointestinal (GI) Rumination Syndrome. FGID symptoms—including recurring pain, diarrhea, nausea, and constipation—can be especially disruptive to life domains central for youth, such as social activities and academic performance, due to the serious and sometimes unpredictable discomforts associated with the disorders. For instance, youth might report frequent school absences due to FGID, which could increase their stress and impair psychological functioning. In turn, these school absences and stressors can further intensify their FGID-related pain. Researchers have established that children and adolescents with an FGID present with compromised heart rate variability (HRV) and vagal tone values, in comparison to their non-FGID counterparts. Based on a compilation of individual cases, the current study compares pre and post HRV presentations in youth treated with HRV biofeedback, following an FGID diagnosis. HRV measures were supplemented by patient self-report assessments regarding symptom frequency and intensity, which primarily used a 1-10 pain scale for the latter. Finally, the study provides information regarding the efficacy of HRV biofeedback as a means to increase HRV and strengthen vagal tone in children and adolescents with an FGID. Specifically, pre-post comparisons of resting psychophysiological measures, namely those pertaining to heart rate (mean HR, SDNN), indices of autonomic homeostasis (RMSSD) and indices of vagal tone strength (lnHF) are included in the study.

## Purpose

The study was conducted to determine the efficacy of utilizing HRV biofeedback in pediatric populations suffering with FGID symptoms. Previous findings consistently indicate the significant positive effect of HRV biofeedback on adult populations suffering with FGID. The current study aims to provide further data regarding the effects in pediatric populations. Positive results will provide clinicians and researchers the opportunity to implement HRV biofeedback in their practice or research studies, with the goal of reducing symptomatology.

## Methods

A total of 63 participants, under age 18, were recruited from the Center for Applied Biobehavioral Services and Rady's Children's Hospital between 2018 and 2020. Eligibility criteria for the study included persistent FGID symptoms, such as vomiting, IBS, rumination syndrome, nausea, diarrhea, and dyspepsia. Pre and post treatment resting 5-minute HRV measurements were taken as well as pre and post FGID symptom severity. HRV measurements were primarily collected using the GP8 and GP12 systems. Physiodata and Kubios systems were used to download and interpret the HRV readings. Patient self-report ratings regarding symptom severity were as follows: Worse, No Change, Improved, Much Improved, and Complete Remission.

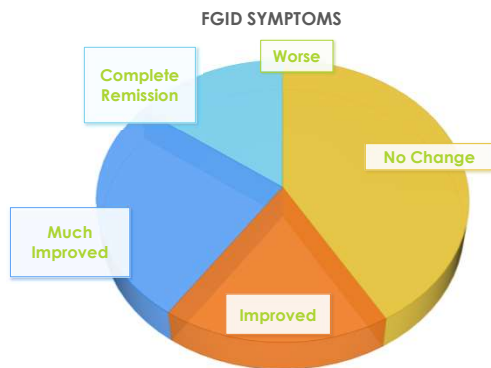
## Discussion

The study demonstrated the efficacy of HRV biofeedback in the reduction of FGID symptoms in pediatric populations. No participants reported worsening symptoms and 61% indicated a reduction in their symptoms. Additionally, improvements were seen across all HRV indices except for heart rate, which showed no change. HRV improvements are indicative of improvements in vagal tone and autonomic homeostasis. Findings support the relationship between gastrointestinal disorders and autonomic dysregulation in children. Further research is needed in this area to determine causal relationships.

## Clinical Implications

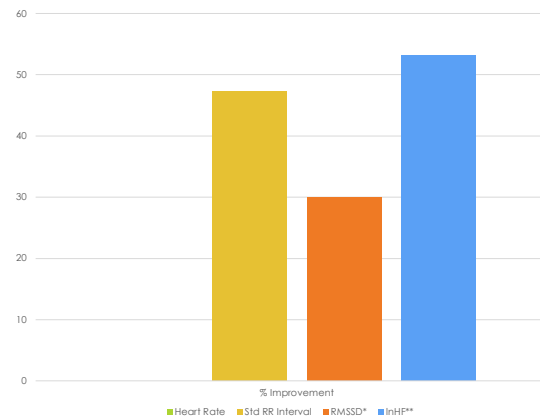
Results from this study indicate that HRV biofeedback is an effective intervention for treating children suffering from FGID symptoms. These findings are exciting and they provide support for HRV biofeedback as an alternative for treatment-resistant clients. Clinicians in health care settings could benefit from regularly implementing HRV biofeedback as part of their treatment modalities. Larger scale research is needed to establish external validity, causality, and longitudinal benefits.

## Results



N=63 Much improved or complete remission=57%, Improved or better= 61%

HRV Measurements



\*=Root Mean Square of Successive Differences = Indicator of Autonomic Homeostasis

\*\*= Natural Log of High Frequency HRV= Indicator of Vagal Tone

## References

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