The Effects of Heart Rate Variability on Emotional Responding: Age Differences
in Stigmatizing Images

# Producer notes

{Notice to the reader about accessibility: This document meets the Government of Québec SGQRI 008-02 standard to be accessible to anybody, disabled or not. All notices between braces are alternative texts for images, abbreviations or to describe any other information conveyed by sensory characteristics that transmits information, indicates an action, prompts a response, or distinguishes a visual element.

This document was made accessible by service Adaptation de l'Information en Médias Substituts of Institut Nazareth et Louis-Braille being part of CISSS Montérégie-Centre.

955, d'Assigny – door 139
Longueuil (Québec) J4K 5C3
Phone: 450 463-1710, ext. 346
Toll free: 1 800 361-7063, ext. 346
Fax: 450 670-0220
E-mail: braille@inlb.qc.ca

Notes: Make sure you modified your Jaws' reading parameters by activating language detection and most punctuations reading.}

# Special symbols

{ms} minus

{<} downwards arrow

{root} {/root} square root

{eta} small letter eta

# Navigation links

[Producer notes](#_Toc512410037)

[Special symbols](#_Toc512410038)

[Navigation links](#_Toc512410039)

[The Effects of Heart Rate Variability on Emotional Responding: Age Differences in Stigmatizing Images](#_Toc512410040)

[Prevalence of VI](#_Toc512410041)

[Assistive Device Use in Older Adults](#_Toc512410042)

[Assistive Device Use in Younger Adults](#_Toc512410043)

[Most of the time….](#_Toc512410044)

[Stigmatization and Stereotyping](#_Toc512410045)

[Stigma and Objective Measures](#_Toc512410046)

[Bridging the Gap](#_Toc512410047)

[Current Study](#_Toc512410048)

[Methods-Participants](#_Toc512410049)

[Methods-Materials](#_Toc512410050)

[Methods-Photo Stimuli](#_Toc512410051)

[Methods-Measures](#_Toc512410052)

[Data Analysis](#_Toc512410053)

[Variables-Mean RR and STD RR](#_Toc512410054)

[Variables-Mean HR and STD HR](#_Toc512410055)

[Variables-RMSSD (Root Mean Squared of Successive Differences)](#_Toc512410056)

[Descriptive Statistics – Participants](#_Toc512410057)

[ANOVA-MRR](#_Toc512410058)

[ANOVA-MHR](#_Toc512410059)

[ANOVA-RMSSD (Root Mean Sqaured of Successive Differences)](#_Toc512410060)

[Correlational Analysis-Emic](#_Toc512410061)

[Correlational Analysis-EMIC](#_Toc512410062)

[Correlational Analysis-ERA](#_Toc512410063)

[Correlational Analysis-ERA](#_Toc512410064)

[Discussion](#_Toc512410065)

[Limitations / Future Direction](#_Toc512410066)

{Slide 1}

# The Effects of Heart Rate Variability on Emotional Responding: Age Differencesin Stigmatizing Images

Jacob Applebaum

Supervised by Dr. Walter Wittich, and Dr. Aaron Johnson

{Logo: CRIR – Centre de recherche interdisciplinaire en réadaptation du Montréal métropolitain}

{Logo: Université de Montréal}

{Logo: Université Concordia}

{Slide 2}

## Prevalence of VI

* United States
	+ 2.6 million from 18-44 = VI in one or both eyes
	+ 3.7 million from 21-64 = Difficultly seeing words
		- Working age-adults
* Canada
	+ Jutai (2005)
		- CNIB 2002
		- 18-49 = 15,813 LV
		- Half the numbers

{Slide 3}

## Assistive Device Use in Older Adults

* Edward & Jones (1998)
	+ 1405 elderly people aged over 65
	+ 74% = more than one aid (spectacles, hearing aids, walking stick, non-slip bath mat, wheelchair)
	+ 97% owned spectacles and 16% owned hearing aids.

{Slide 4}

## Assistive Device Use in Younger Adults

* LaPlante and Colleagues (1992)
	+ Specific assistive devices a significant proportion of participants were under the age of 25.
	+ (wheelchair, white cane, hearing aid)
* 24 and under = 29% of participants used one these assistive devices
* 25-44 = 24% of participants used one these assistive devices.

{Slide 5}

## Most of the time….

* Bateni & Maki (2005)
	+ 69% of participants reported owning a wheelchair.
	+ Only 27% of participants use their wheelchair.
	+ Half the population = "Other reasons"

{Slide 6}

## Stigmatization and Stereotyping

* Parette and Scherer (2004)
	+ Abandonment of device
	+ Vulnerable/jeopardizes social
* Scherer (2003)
	+ Client in their 20's (hearing aid)

{Slide 7}

## Stigma and Objective Measures

* Subjective/Objective
* Applelhans & Linda (2016); Jentengs, Beckers & Kindt (2013)
	+ Physiological measures for emotional responding

{Slide 8}

## Bridging the Gap

* Chalabev, Sarrazin & Brisswalter (2013)
	+ HRV in response to stereotyping
	+ Participants confronted with negative in-group and out-group scenarios
	+ The results revealed that participants performed better after negative out-group stereotypes were unequivocally linked to performance compared to the control condition.

{Slide 9}

## Current Study

* HRV and age relationship
* Emotional responding to stigmatizing photos
	+ Ages ranging from 18-65+
* Young vs Elderly (Coudin & Alexopoulos, 2010)
* Hypothesis
	+ Participants will have higher HRV when viewing images of young adults with assistive devices and less heart rate variability when viewing images of older individuals with assistive devices

{Slide 10}

## Methods-Participants

* 20 participants (n=20)
* Between 18-30 years of age
* Undergraduate students from the Psychology Department at Concordia University

{Slide 11}

## Methods-Materials

* **Measuring Heart RateVariability (HRV):**
	+ IR heart-rate sensor on left finger
	+ Infra-red photoplethysmography pulse-wave sensor plugged into an Arduino Uno board
	+ Custom code for amplifying and detecting raw heart rate (sample rate of 1000Hz)

{Slide 12}

## Methods-Photo Stimuli

**Young (18-35)**

* With device
{Illustration not described}
* Without device
{Illustration not described}

**Old (65+)**

* With device
{Illustration not described}
* Without device
{Illustration not described}

{Slide 13}

## Methods-Measures

* **Expectations Regarding Age (ERA)**
	+ Sample question: "Quality of life declines as people age"
	+ Likert scale: 1-4
* **Explanatory Model Interview Catalogue (EMIC)**
	+ Sample question: "Would others refuse to visit the home of a person who uses assistive device?"
	+ Yes = 2, Possibly = 1, No = 0 and I don't know = 0

{Slide 14}

## Data Analysis

* 2×2 repeated measures ANOVA
* 2 Independent variables
	+ Device
	+ Age
* 5 dependent variables
	+ Mean RR, STD RR, Mean HR, STD HR and RMSSD (Root Mean Square of Successive Differences)
* Correlational Analysis
	+ Questionnaire scores & Dependent Variables.

{Slide 15}

### Variables-Mean RR and STD RR

#### Frequency-domain

How are the RR intervals modulated?
{Illustration not described or reproduced}

{Slide 16}

### Variables-Mean HR and STD HR

#### Time-domain

How many heartbeats in this timeframe?
{Illustration not described or reproduced}

{Slide 17}

### Variables-RMSSD (Root Mean Squaredof Successive Differences)

RR Interval
{Illustration not described}

{<}

(RR Interval 1 {ms} RR Interval 2)²
+
(RR Interval 2 {ms} RR Interval 3)² ...
{Illustration not described}

{<}

{root}mean of above{/root} = RMSSD

{Slide 18}

### Descriptive Statistics – Participants

* Mean Age and Range: 23 years old (18-27)
* Gender: 1 Male, 19 Females
* Race: 11 NW, 9W
* Other Descriptives: 2 participants reported panic attacks and anxiety

{Slide 19}

### ANOVA-MRR

F(1, 18) = .057, p = .814, {eta}² = .003
{Chart not described}

The ANOVA showed that participants Mean RR did not differ significantly when viewing images of Old and Young individuals with, and without an assistive device.

{Slide 20}

### ANOVA-MHR

F(1, 18) = .850, p = .369, {eta}² = .045
{Chart not described}

The ANOVA showed that participants Mean HR did not differ significantly when viewing images of Old and Young individuals with, and without an assistive device.

{Slide 21}

### ANOVA-RMSSD (Root Mean Sqaured ofSuccessive Differences)

F(1, 18) = .035, p =.855, {eta}² = .002
{Chart not described}

The ANOVA showed that participants RMSSD did not differ significantly when viewing images of Old and Young individuals with, and without an assistive device.

{Slide 22}

### Correlational Analysis-Emic

Mean\_RR\_Dv\_OI
{Chart not described}

* r(19) = .123, p = .606

Mean\_RR\_Dv\_Yo
{Chart not described}

* *r*(18) = .044, *p* = .858

Mean\_RR\_Nd\_OI
{Chart not described}

* *r*(19) = .110, *p* = .643

Mean\_RR\_Nd\_Yo
{Chart not described}

* *r*(19) = .353, *p* = .127

{Slide 23}

### Correlational Analysis-EMIC

RMSSD\_Dv\_OI
{Chart not described}

* *r*(19) = {ms}.176, *p* =.458

RMSSD\_Dv\_Yo
{Chart not described}

* *r*(18) = {ms}.307, *p* = .201

RMSSD\_Nd\_OI
{Chart not described}

* *r*(19) = {ms}.247, *p* = .293

RMSSD\_Nd\_Yo
{Chart not described}

* *r*(19) = .128, *p* = .590.

{Slide 24}

### Correlational Analysis-ERA

Mean\_RR\_Dv\_OI
{Chart not described}

* *r*(19) = {ms}.003, *p* = .991

Mean\_RR\_Dv\_Yo
{Chart not described}

* *r*(18) = {ms}.040, *p* = .871

Mean\_RR\_Nd\_OI
{Chart not described}

* *r*(19) = {ms}.065, *p* = .785

Mean\_RR\_Nd\_Yo
{Chart not described}

* *r*(19) = .027, *p* = .911

{Slide 25}

### Correlational Analysis-ERA

RMSSD\_Dv\_OI
{Chart not described}

* *r*(19) = {ms}.025, *p* =.916

RMSSD\_Dv\_Yo
{Chart not described}

* *r*(18) = {ms}220, *p* = .365

RMSSD\_Nd\_OI
{Chart not described}

* *r*(19) = {ms}.143, *p* = .548

RMSSD\_Nd\_Yo
{Chart not described}

* *r*(19) = {ms}.132, *p* = .580.

{Slide 26}

## Discussion

* Participants did not find these images to be stigmatizing
	+ … is this a good thing?
	+ Possibly due to the advance in technology
		- Rojas-Mendez, Parasuraman & Papadopoulos (2015)

{Slide 27}

## Limitations / Future Direction

* Small sample size
* Cut off score for EMIC?
	+ Total possible score is 30
* Participant Variability
* Older participants?

{Slide 28}

**THE END**