Heart Rate Variability in Response to a Brief Mindfulness Intervention and Throughout Pediatric Venipuncture: Exploring Parent and Child Self and Co-Regulation

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Introduction

Needles can be distressing for kids & parents and if unmanaged, kids are at greater risk of suffering & parents may struggle to respond to their child effectively. Thus, distress regulation is important.

Distress regulation & co-regulation can be measured by heart rate variability (HRV; variation in time between heart beats).

Mindfulness is one distress regulation strategy that may change the way kids relate to the needle & help parents shift from self to other-oriented responses

Research Questions

1. How do parents & children self-regulate throughout pediatric venipuncture?
2. Are dyads coordinated in their regulatory responding?
3. Does a brief mindfulness intervention affect this pattern of responding?

Methods

Sample: 61 parent-child dyads participating in a larger single-site, two-arm, parallel-group randomized control trial at **McMaster Children's Hospital**
(registration number: NCT03941717; see Moline et al., 2020 for protocol)

Children (33 boys) between 7 and 12 years (M_{age} = 9, *SD* = 1.59). Parents (49 females) between 29 and 67 years of age (M_{age} = 42, *SD* = 5.77).

Randomization

Control: Unfocused attention
Intervention: Brief mindfulness

Listening task

Dyads listened to a 5-minute audio: 1) Control; or 2) Intervention

Procedure

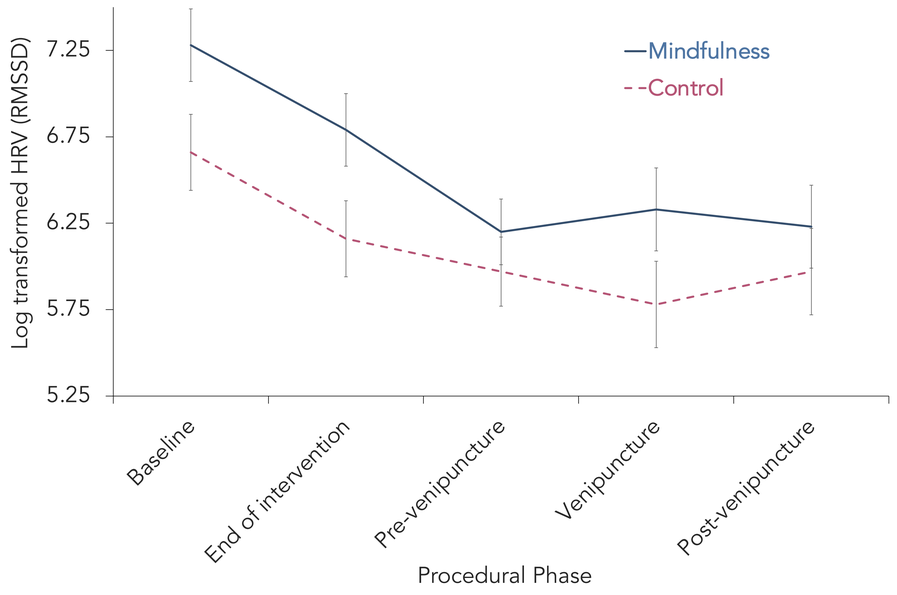
Parent joined child for the venipuncture (provided as usual)

HRV extracted

- **Baseline HRV** (first 30s audio)
- **End intervention** (last 30s audio)
- **Pre-venipuncture** (30s pre-insertion)
- **Venipuncture** (30s post-insertion)
- **Post-venipuncture** (30s post-removal)

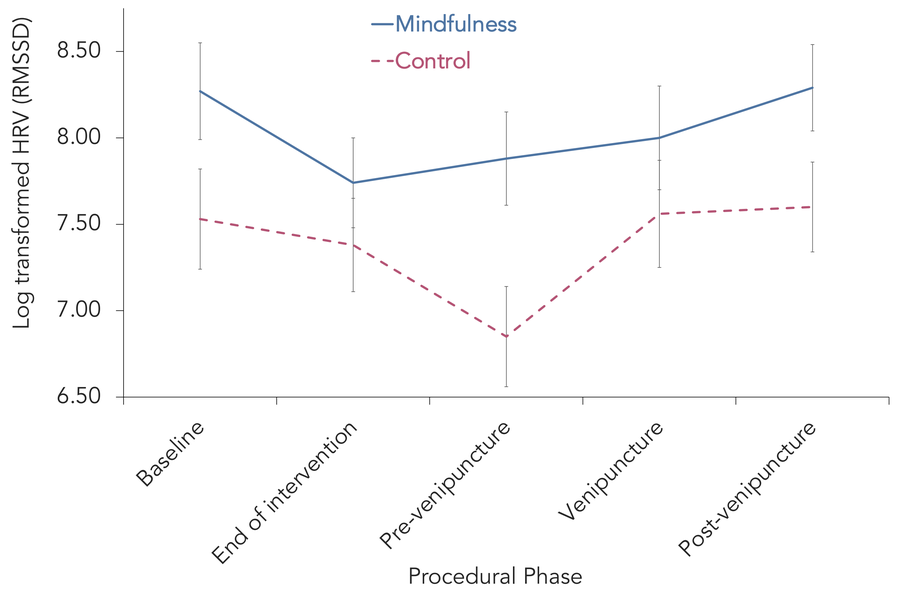
Analyses & Results

1. Parent self-regulation: Two-way mixed ANOVAs



Parents in both groups showed reactivity before venipuncture & no return to baseline

2. Child self-regulation: Two-way mixed ANOVAs



Children in the mindfulness group showed low reactivity & regulation post-venipuncture; children in control group showed reactivity pre-venipuncture & quick regulation

Results Continued

3. Parent & child co-regulation: bivariate correlations

Baseline: r = .19, p = .21
End of intervention: r = .25, p = .12
Pre-venipuncture: r = -.05, p = .64
Venipuncture: r = .01, p = .92
Post-venipuncture: r = .07, p = .63

Pattern of non-synchrony emerged between parent & child HRV at each time point

Discussion

Results provide foundational knowledge on parent & child regulatory responses throughout venipuncture, and physiological responses to a brief, mindfulness intervention

Dyads were not coordinated in their responses. Parents may worry about the appointment more generally, whereas kids' worry may be more proximal to the needle insertion

Future work may use a finer level of analysis (e.g., time-varying HRV estimates, ultra-short recordings)

Take home message: Dyads may have differences in what aspects of the procedure they are focusing on or view as distressing and thus differences in when reactivity occurs & when regulation is required.

Select References

Appelhans & Luecken (2006); Birnie et al. (2016); Caes et al. (2014); Creavy et al. (2020); Goubert et al. (2008); Laborde et al. (2017, 2018); McMurtry et al. (2015); Moline et al. (2020); Petter et al. (2013); Vervoort et al. (2014, 2019); Vervoort & Trost (2017)

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