**Supplementary Materials**

**Peak Amplitude Sensitivity Analyses**

**ERP Peak Amplitude Measurement Procedures**

Because measuring and analyzing the ERP waveforms across consecutive 100 ms intervals splits the response-locked Gratton dip component into two different measurement windows, and also makes it difficult to determine if observed mean amplitude effects in the stimulus-locked waveforms are due to group differences in amplitude or group differences in latency, we also conducted sensitivity analyses to address these limitations. We used a peak amplitude approach that provides a single measure of the response-locked Gratton dip amplitude and is less sensitive to differences in latency across groups and conditions. Specifically, we measured peak amplitude by first finding the average peak latency within each group for each condition (see SupplementaryTable 1). Positive local peaks were used to measure Gratton dip peak latencies and negative local peaks were used to measure peak latencies for the following LRP associated with activation of the correct response. Because latency measures can be highly sensitive to high-frequency noise potentially present in the waveforms, a low-pass filter (non-causal Butterworth impulse response function, half-amplitude cut-off at 20 Hz, 48 dB/octave roll-off) was applied before extracting peak latency measures. For stimulus-locked waveforms, peak latencies were obtained from a 200 to 300 ms measurement window for the Gratton dip, and from a 200 to 500 ms measurement window for the following negative-going LRP associated with activation of the correct response. For response-locked waveforms, peak latencies were obtained from a -300 to -100 ms measurement window for the Gratton dip, and from a -100 to 0 ms measurement window for the following LRP associated with activation of the correct response.

After obtaining latencies measures, we then extracted Gratton dip peak amplitude and peak amplitude for the following negative-going LRP associated with activation of the correct response using a 50 ms measurement window (± 25 ms) around the mean latencies within each group for each condition from the non-low passed filtered waveforms (see SupplementaryTable 2). Because there was not an observable Gratton dip present in the weak response competition condition in either the stimulus- or response-locked waveforms, peak amplitude for the weak response competition conditions were measured using the average peak latency from the strong response competition condition for the Gratton dip analyses. However, it is important to note that the amplitude measured in this time window in the weak response competition conditions reflects the amplitude of the early portion of negative deflection LRP associated with the activation of the correct response. Consistent with past work (DiStefano et al., 2019; Hoormann et al., 1998; Perri et al., 2019; Raz et al., 2014), this peak amplitude approach was used because it is less sensitive to several of the issues that arise when quantifying peak measures (e.g., high frequency noise, measuring the same process at different times in different participants; Clayson et al., 2013; Luck, 2014). Notably, these issues are particularly relevant for broader waveforms that do not always contain a local peak, such as those characteristic of the stimulus-locked waveforms in the present study.

**Peak Measures Statistical Approach**

A series of 2 (Group: CHR vs. HC) x 2 (Condition: Weak vs. Strong Response Competition) repeated measures ANOVAs were used to examine group effects and interactions for both the Gratton dip peak amplitude measures, and the peak measures for the following negative-going LRP associated with the correct response activation. Two-tailed tests with an alpha level of .05 were used for all statistical tests.

**Peak Amplitude Sensitivity Analyses Results**

Notably, peak amplitude sensitivity analyses were consistent with the primary, a priori mean amplitude quantification and analytic approach. This was the case for both main effects and interactions. See Supplementary Table 3 for descriptive and inferential statistics.

**Peak Amplitude**

***Stimulus-Locked LRP Waveforms***

**Positive peak amplitude (Gratton dip).** As mentioned above, the Gratton dip was only observed in the strong response competition condition (i.e., incongruent flankers) but not the weak response competition condition (i.e., congruent flankers), which led to a significant main effect of condition, *F*(1, 81)=145.41, *p*<.001, ηp2 =.64. Although this same pattern was observed for both groups, both the Gratton dip in the strong response competition condition and the negative deflection LRP in the weak response competition condition were larger in HCs than the CHR participants, leading to a significant group x condition interaction, *F*(1, 81) = 5.23, *p* = .025, ηp2 = .06. Follow-up analyses revealed that the Gratton dip peak amplitude was not significantly different between the CHR group and the HC group [*t*(81)=-1.13,  *p*=.26, *d*=-.25], suggesting that the CHR group did not exhibit a substantial cognitive control deficit in overcoming the incorrect response. By contrast, the amplitude measured in the Gratton dip time window for the weak response competition condition, which reflects the early portion of negative deflection LRP in the weak response competition condition, was smaller for the CHR group relative to the HCs, [*t*(81)=2.11,  *p*=.038, *d*=.46]. There was not a main effect of group (see Supplementary Table 3 for statistics).

**Negative deflection LRP peak amplitude.** Regarding the negative peak amplitude of the waveforms, the negative deflection LRP observed in the weak response competition condition (where no Gratton dip was present) was larger in the HCs than the CHR participants, whereas the negative deflection LRP following the Gratton dip in the strong response competition condition was similar between groups, leading to a significant group x condition interaction, *F*(1, 81)=14.47, *p*<.001, ηp2 =.15. Indeed, follow-up analyses revealed that the negative deflection LRP observed in the weak response competition condition (where no Gratton dip was present) showed a significantly smaller amplitude in the CHR participants compared with controls, reflecting a decreased activation of the correct response, *t*(81)=2.57, *p*=.012, =.56. However, the peak amplitude of the HC and CHR participants was nearly identical in the strong response competition condition, *t*(81)=0.02, *p*=.99, =.00. There was not a main effect of group or condition for the negative going LRP waveforms (see Supplementary Table 3 for statistics). Together, these patterns of findings are consistent with the mean amplitude results obtained from the primary analyses.

***Response-Locked LRP Waveforms***

**Positive peak amplitude (Gratton dip).** Consistent with the stimulus-locked waveforms, the Gratton dip was only observed in the strong response competition condition (i.e., incongruent flankers) but not the weak response competition condition (i.e., congruent flankers), leading to a significant main effect of condition, *F*(1, 81)=15.02, *p*<.001, ηp2 =.17. This effect was of similar magnitude in both groups, and the group main effect and group x condition interaction did not reach significance (see Supplementary Table 3 for statistics).

**Negative deflection LRP peak amplitude.** Regarding comparisons between the peak amplitude of the negative deflection LRP observed in the weak response competition condition (where no Gratton dip was present) and the strong response competition condition, the peak amplitude was larger in the strong response competition condition than in the weak response competition in the CHR participants, whereas the negative deflection LRP peak amplitudes were similar across conditions in the HC participants, leading to a significant group x condition interaction, *F*(1, 81)=10.92, *p*=.001, ηp2 =.12. Indeed, follow-up analyses revealed that the peak amplitude of the negative deflection LRP observed in the weak response competition condition (where no Gratton dip was present) was significantly smaller compared to the strong response competition condition in the CHR participants, *t*(41) = 4.13, *p*<.001, *d* = .64. This pattern was not observed in the HC participants, where the peak amplitude of the negative going LRP was comparable across conditions of weak and strong response competition, *t*(40) = -0.07, *p*=.95, *d* = -.01. In addition, although the negative going LRP in the weak response competition condition was smaller in CHR participants compared to HC participants, this was only marginally significant [*t*(81)=1.75,  *p*=.08, *d*=.39]. Lastly, the negative going LRP was larger under conditions of strong response competition condition compared to weak response competition, leading to main effect of condition, *F*(1, 81)=10.40, *p*=.002, ηp2 =.11. There was not a main effect of group (see Supplementary Table 3 for statistics). This pattern of results within in the response-locked waveforms are also consistent with the mean amplitude analyses.

**Supplementary Table 1**

*Descriptive Statistics for Stimulus- and Response-locked LRP Peak Latency Measures­*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Peak**  **Polarity** | **CHR** | | **HC** | |
|  |  | Weak Response Competition | Strong Response Competition | Weak Response Competition | Strong Response Competition |
| **LRP Peak**  **Latency** |  |  |  |  |  |
| Stimulus-locked | *Gratton Dip*  *(positive peak)* | − | 242.57 (27.07) | − | 242.15 (23.30) |
|  | *LRP*  *(negative peak)* | 324.76 (62.67) | 402.43 (51.61) | 300.63 (46.45) | 377.17 (57.30) |
| Response-locked | *Gratton Dip*  *(positive peak)* | − | -199.52 (55.82) | − | -195.90 (47.44) |
|  | *LRP*  *(negative peak)* | -42.62 (23.83) | -40.76 (17.86) | -44.34 (16.99) | -42.63 (18.94) |

***Note:***Descriptive statistics reflect means and standard deviations (in parentheses). Clinical high-risk = CHR; Healthy controls = HC; LRP = lateralized readiness potential. LRP amplitude reflects mean amplitude in microvolts (μVs) at C3/C4.

**Supplementary Table 2**

*Measurement Windows for Stimulus- and Response-locked LRP Peak Measures­*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Peak**  **Polarity** | **CHR** | | **HC** | |
|  |  | Weak Response Competition | Strong Response Competition | Weak Response Competition | Strong Response Competition |
| **LRP Measurement Window** |  |  |  |  |  |
| Stimulus-locked | *Gratton Dip*  *(positive peak)* | 240 (215 – 265) | 240 (215 – 265) | 240 (215 – 265) | 240 (215 – 265) |
|  | *LRP*  *(negative peak)* | 325 (300 – 350) | 400 (375 – 425) | 300 (275 – 325) | 380 (355 – 405) |
| Response-locked | *Gratton Dip*  *(positive peak)* | -200 (-225 – -175) | -200 (-225 – -175) | -195 (-220 – -170) | -195 (-220 – -170) |
|  | *LRP*  *(negative peak)* | -40 (-65 – -15) | -40 (-65 – -15) | -45 (-70 – -20) | -40 (-65 – -15) |

***Note:***Values reflect mean peak latencies from Supplementary Table 2 (rounded to the nearest multiple of 5) and the 50 ms measurement window around those peak latencies (in parentheses) across groups and conditions. Clinical high-risk = CHR; Healthy controls = HC; LRP = lateralized readiness potential.

**­Supplementary Table 3**

*Descriptive and Inferential Statistics for Stimulus- and Response-locked LRP Peak Amplitude Measures­*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Peak**  **Polarity** | **CHR** | | **HC** | | **Statistics** | | |
|  |  | Weak Response Competition | Strong Response Competition | Weak Response Competition | Strong Response Competition | Group  (*df*=1,81) | Condition  (*df*=1,81) | Group \* Condition  (*df*=1,81) |
| **LRP Peak**  **Amplitude** |  |  |  |  |  |  |  |  |
| Stimulus-locked | *Gratton Dip*  *(positive peak)* | -1.02 (0.74) | 0.26 (0.59) | -1.47 (1.17) | 0.41 (0.59) | *F*=1.64; *p*=.21; *ηp2*=.02 | ***F*=145.41; *p*<.001; *ηp2*=.64** | ***F*=5.23; *p*=.025; *ηp2*=.06** |
|  | *LRP*  *(negative peak)* | -1.68 (0.94) | -1.87 (1.00) | -2.36 (1.41) | -1.87 (1.34) | *F*=1.91; *p*=.17; *ηp2*=.02 | *F*=2.81; *p*=.10; *ηp2*=.03 | ***F*=14.47; *p*<.001; *ηp2*=.15** |
| Response-locked | *Gratton Dip*  *(positive peak)* | -0.04 (0.52) | 0.14 (0.47) | -0.05 (0.52) | 0.40 (0.60) | *F*=2.40; *p*=.13; *ηp2*=.03 | ***F*=15.02; *p*<.001; *ηp2*=.16** | *F*=2.64; *p*=11; *ηp2*=.03 |
|  | *LRP*  *(negative peak)* | -2.36 (0.96) | -2.91 (1.15) | -2.88 (1.65) | -2.88 (1.68) | *F*=0.67; *p*=.41; *ηp2*=.01 | ***F*=10.40; *p*=.002; *ηp2*=.11** | ***F*=10.92; *p*=.001; *ηp2*=.12** |

***Note:***Descriptive statistics reflect means and standard deviations (in parentheses). Clinical high-risk = CHR; Healthy controls = HC; LRP = lateralized readiness potential. LRP amplitude reflects mean amplitude in microvolts (μVs) at C3/C4.

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