**Supplement 2. Exploratory subgroup analyses of the concurrent validity and test-retest reliability of the ART.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 1. Variables of test-retest reliability (ART 1 – ART 2) of the Astrand-Rhyming Test analysed in 32 male participants.** | | | | | | | | |
|  | r | ICC (95% CI) | SEM | MDC95 | Mean difference (SD) | t-value | P | CV |
| Estimated VO₂ max (ml/kg/min) with age correction factor | .88 | .87 (.75 - .93) | 5.08 | 14.08 | .16 (7.35) | .12 | .90 | 29.3 |
| Estimated VO₂ max (ml/kg/min) without age correction factor | .86 | .86 (.73 - .93) | 4.70 | 13.03 | .28 (6.80) | .23 | .82 | 28.3 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SEM = Standard Error of Measurement, MDC95 = Minimal Detectable Change at 95% confidence interval, SD = Standard Deviation, CV = Coefficient of Variation. | | | | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 2. Variables of concurrent validity (ART 1 – CPET) of the Astrand-Rhyming Test analysed in 23 male participants.** | | | | | |
|  | r | ICC (95% CI) | Mean difference (SD) | t-value | P |
| VO₂ max (ml/kg/min) with age correction factor used for ART 1 | .75 | .59 (.03 - .83) | 8.32 (8.84) | 4.51 | <.001 |
| VO₂ max (ml/kg/min) without age correction factor used for ART 1 | .73 | .68 (.33 - .86) | 4.63 (8.30) | 2.67 | .010 |
| *Note.* r = Spearman correlation*,* ART = Astrand-Rhyming Test,ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SD = Standard Deviation. | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 3. Variables of test-retest reliability (ART 1 – ART 2) of the Astrand-Rhyming Test analysed in 13 female participants.** | | | | | | | | |
|  | r | ICC (95% CI) | SEM | MDC95 | Mean difference (SD) | t-value | P | CV |
| Estimated VO₂ max (ml/kg/min) with age correction factor | .47 | .67 (.21 - .89) | 5.03 | 13.94 | .83 (7.25) | .41 | .69 | 21.61 |
| Estimated VO₂ max (ml/kg/min) without age correction factor | .62 | .72 (.30 - .91) | 4.74 | 13.14 | .75 (6.86) | .39 | .70 | 22.73 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SEM = Standard Error of Measurement, MDC95 = Minimal Detectable Change at 95% confidence interval, SD = Standard Deviation, CV = Coefficient of Variation. | | | | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 4. Variables of concurrent validity (ART 1 – CPET) of the Astrand-Rhyming Test analysed in 10 female participants.** | | | | | |
|  | r | ICC (95% CI) | Mean difference (SD) | t-value | P |
| VO₂ max (ml/kg/min) with age correction factor used for ART 1 | .70 | .44 (-.12 - .83) | 9.96 (7.11) | 4.43 | .002 |
| VO₂ max (ml/kg/min) without age correction factor used for ART 1 | .67 | .53 (-.10 - .86) | 8.21 (7.09) | 3.66 | .005 |
| *Note.* r = Spearman correlation*,* ART = Astrand-Rhyming Test,ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SD = Standard Deviation. | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 5. Variables of test-retest reliability (ART 1 – ART 2) of the Astrand-Rhyming Test analysed in 34 participants (N = 26 males) aged ≤ 15 years.** | | | | | | | | |
|  | r | ICC (95% CI) | SEM | MDC95 | Mean difference (SD) | t-value | P | CV |
| Estimated VO₂ max (ml/kg/min) with age correction factor | .85 | .83 (.69 - .91) | 5.21 | 14.44 | -.38 (7.36) | -.298 | .77 | 26.09 |
| Estimated VO₂ max (ml/kg/min) without age correction factor | .84 | .83 (.69 - .91) | 4.69 | 13.00 | -.30 (6.71) | -.261 | .80 | 25.75 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SEM = Standard Error of Measurement, MDC95 = Minimal Detectable Change at 95% confidence interval, SD = Standard Deviation, CV = Coefficient of Variation. | | | | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 6. Variables of concurrent validity (ART 1 – CPET) of the Astrand-Rhyming Test analysed in 25 participants (N = 19 males) aged ≤ 15 years.** | | | | | |
|  | r | ICC (95% CI) | Mean difference (SD) | t-value | P |
| VO₂ max (ml/kg/min) with age correction factor used for ART 1 | .73 | .51 (-.04 - .79) | 9.33 (8.98) | 5.196 | <.001 |
| VO₂ max (ml/kg/min) without age correction factor used for ART 1 | .72 | .61 (.24 - .82) | 5.23 (8.66) | 3.020 | .006 |
| *Note.* r = Spearman correlation*,* ART = Astrand-Rhyming Test,ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SD = Standard Deviation. | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Table 7. Variables of test-retest reliability (ART 1 – ART 2) of the Astrand-Rhyming Test analysed in 11 participants (N = 6 males) aged > 15 years.** | | | | | | | | |
|  | r | ICC (95% CI) | SEM | MDC95 | Mean difference (SD) | t-value | P | CV |
| Estimated VO₂ max (ml/kg/min) | .79 | .84 (.53 - .95) | 4.85 | 13.44 | 2.61 (6.67) | 1.298 | .22 | 31.16 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SEM = Standard Error of Measurement, MDC95 = Minimal Detectable Change at 95% confidence interval, SD = Standard Deviation, CV = Coefficient of Variation. | | | | | | | | |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Table 8. Variables of concurrent validity (ART 1 – CPET) of the Astrand-Rhyming Test analysed in 8 participants (N = 4 males) aged > 15 years.** | | | | | |
|  | r | ICC (95% CI) | Mean difference (SD) | t-value | P |
| VO₂ max (ml/kg/min) | .88 | .77 (-.03 - .96) | 7.21 (5.76) | 3.543 | .009 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SD = Standard Deviation. | | | | | |

**Table 9. Variables of test-retest reliability (ART 1 – ART 2) of the Astrand-Rhyming Test analysed in subgroups of participants achieving (i.e., an average of ≥ 60 minutes MVPA/day), achieving at least half (i.e., an average of 30 to 59 minutes MVPA/day) and not even achieving half (i.e., an average of < 30 minutes MVPA/day) of the WHO recommendations for PA.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Av. MVPA/day ≥ 60 min.  N = 14 (11 males) | | Av. MVPA/day 30-59 min.  N = 20 (13 males) | | Av. MVPA/day < 30 min.  N = 7 (5 males) | |
|  | With ACF | Without ACF | With ACF | Without ACF | With ACF | Without ACF |
| r | .77 | .72 | .83 | .82 | .96 | .96 |
| ICC (95% CI) | .87 (.64 - .95) | .85 (.61 - .95) | .84 (.65 - .93) | .83 (.62 - .93) | .86 (.38 - .98) | .85 (.34 - .97) |
| SEM | 7.30 | 7.23 | 4.74 | 4.36 | 4.52 | 4.12 |
| MDC95 | 20.23 | 20.04 | 13.14 | 12.09 | 12.53 | 11.42 |
| Mean difference (SD) | -1.92 (7.94) | -1.61 (7.45) | 1.62 (6.67) | 1.56 (6.18) | -.41 (6.75) | -.36 (6.16) |
| t-value | -.905 | -.810 | 1.083 | 1.129 | -.162 | -.153 |
| P | .38 | .43 | .29 | .27 | .88 | .88 |
| CV | 29.48 | 28.40 | 26.62 | 25.65 | 30.47 | 28.82 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SEM = Standard Error of Measurement, MDC95 = Minimal Detectable Change at 95% confidence interval, SD = Standard Deviation, CV = Coefficient of Variation, Av. = average, MVPA = Moderate to Vigorous Physical Activity, ACF = Age Correction Factor. The analyses were performed based on the sample of 41 participants (n = 29 males) with valid accelerometry data. | | | | | | |

**Table 10. Variables of concurrent validity (ART 1 – CPET) of the Astrand-Rhyming Test analysed in subgroups of participants achieving (i.e., an average of ≥ 60 minutes MVPA/day), achieving at least half (i.e., an average of 30 to 59 minutes MVPA/day) and not even achieving half (i.e., an average of < 30 minutes MVPA/day) of the WHO recommendations for PA.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Av. MVPA/day ≥ 60 min.  N = 10 (7 males) | | Av. MVPA/day 30-59 min.  N = 15 (11 males) | | Av. MVPA/day < 30 min.  N = 5 (3 males) | |
|  | With ACF | Without ACF | With ACF | Without ACF | With ACF | Without ACF |
| r | .77 | .73 | .73 | .69 | .20 | .20 |
| ICC (95% CI) | .77 (-.05 - .95) | .80 (.27 - .95) | .52 (.002 - .82) | .59 (.16 - .84) | .002 (-.26 - .67) | .139 (-.30 - .80) |
| Mean difference (SD) | 8.03 (5.65) | 5.29 (6.58) | 8.57 (10.43) | 5.09 (9.79) | 10.88 (9.39) | 8.04 (8.45) |
| t-value | 4.498 | 2.543 | 3.181 | 2.012 | 2.592 | 2.128 |
| P | .001 | .03 | .007 | .06 | .06 | .10 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, , SD = Standard Deviation, Av. = average, MVPA = Moderate to Vigorous Physical Activity, ACF = Age Correction Factor. The analyses were performed based on the sample of 41 participants with valid accelerometry data (n = 29 males). | | | | | | |

**Table 11. Variables of test-retest reliability (ART 1 – ART 2) of the Astrand-Rhyming Test analysed in subgroups of participants based on their level of adaptive behaviour, assessed via the Adaptive Behavior Assessment System Third Edition (ABAS-3).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Below average (GACS < 85)  N = 28 (20 males) | | Average (GACS 85 – 115)  N = 14 (10 males) | | Above average (GACS > 115)  N = 2 (2 males) | |
|  | With ACF | Without ACF | With ACF | Without ACF | With ACF | Without ACF |
| r | .81 | .84 | .86 | .81 | 1.00 | 1.00 |
| ICC (95% CI) | .85 (.70 - .93) | .84 (.68 - .92) | .85 (.61 - .95) | .84 (.57 - .95) | -.68 (-.75 - -.75) | -.67 (-.74 - -.74) |
| SEM | 5.02 | 4.68 | 5.66 | 5.15 | 0.80 | 0.75 |
| MDC95 | 13.91 | 12.97 | 15.69 | 14.28 | 2.22 | 2.08 |
| Mean difference (SD) | 1.14 (7.17) | 1.11 (6.70) | -1.30 (8.04) | -1.04 (7.47) | 2.25 (2.76) | 2.10 (2.55) |
| t-value | .840 | .881 | -.605 | .522 | 1.154 | 1.167 |
| P | .41 | .39 | .56 | .61 | 0.46 | .45 |
| CV | 28.54 | 27.81 | 30.06 | 28.26 | 3.38 | 3.41 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SEM = Standard Error of Measurement, MDC95 = Minimal Detectable Change at 95% confidence interval, SD = Standard Deviation, CV = Coefficient of Variation, GACS = General Adaptive Composite Score, ACF = Age Correction Factor. The analyses were performed based on the sample of 44 participants (n = 32 males) with ABAS-3 data.  **Table 12. Variables of concurrent validity (ART 1 – CPET) of the Astrand-Rhyming Test analysed in subgroups of participants based on their level of adaptive behaviour, assessed via the Adaptive Behavior Assessment System Third Edition (ABAS-3)**.   |  |  |  |  |  | | --- | --- | --- | --- | --- | |  | Below average (GACS < 85)  N = 22 (15 males) | | Average (GACS 85 – 115)  N = 9 (7 males) | | |  | With ACF | Without ACF | With ACF | Without ACF | | r | .82 | .80 | .53 | .43 | | ICC (95% CI) | .63 (-.04 - .87) | .70 (.20 - .89) | .40 (-.15 - .81) | .42 (-.20 - .82) | | Mean difference (SD) | 10.1 (8.5) | 6.74 (8.24) | 6.24 (8.21) | 3.9 (8.2) | | t-value | 5.559 | 3.839 | 2.282 | 1.427 | | P | <.001 | <.001 | .05 | .19 | | *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SD = Standard Deviation, GACS = General Adaptive Composite Score, ACF = Age Correction Factor. The analyses were performed based on the sample of 44 participants (n = 32 males) with ABAS-3 data. Concurrent validity analyses of the subgroup of participants with a GACS score > 115 were not performed, as only one participant was able to effectively perform a maximal exercise test on the CPET. | | | | | | | | | | | |

**Table 13. Variables of test-retest reliability (ART 1 – ART 2) of the Astrand-Rhyming Test analysed in subgroups of participants based on their level of social responsiveness, assessed via the Social Responsiveness Scale Second Edition (SRS-2).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Normal level of SR (T-score 40 – 60)  N = 5 (4 males) | | Mild to moderate deficits in SR (T-score 61 – 75)  N = 15 (13 males) | | Severe deficits in SR (T-score ≥ 76)  N = 24 (15 males) | |
|  | With ACF | Without ACF | With ACF | Without ACF | With ACF | Without ACF |
| r | .80 | .90 | .88 | .88 | .80 | .77 |
| ICC (95% CI) | .81 (.15 - .98) | .78 (.08 - .97) | .93 (.80 - .98) | .92 (.79 - .97) | .77 (.53 - .89) | .75 (.50 - .89) |
| SEM | 4.73 | 4.54 | 4.36 | 4.24 | 5.58 | 5.19 |
| MDC95 | 13.11 | 12.58 | 12.09 | 11.75 | 15.47 | 14.39 |
| Mean difference (SD) | 4.00 (6.09) | 3.94 (5.89) | .29 (6.38) | .49 (6.07) | -.26 (8.09) | -.26 (7.41) |
| t-value | 1.469 | 1.497 | .178 | .310 | -.156 | -.171 |
| P | .216 | .209 | .861 | .761 | .877 | .866 |
| CV | 24.36 | 23.03 | 36.25 | 35.24 | 24.72 | 23.81 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SEM = Standard Error of Measurement, MDC95 = Minimal Detectable Change at 95% confidence interval, SD = Standard Deviation, CV = Coefficient of Variation, SR = Social Responsiveness, ACF = Age Correction Factor. The analyses were performed based on the sample of 44 participants (n = 32 males) with SRS-2 data. | | | | | | |

**Table 14. Variables of concurrent validity (ART 1 – CPET) of the Astrand-Rhyming Test analysed in subgroups of participants based on their level of social responsiveness, assessed via the Social Responsiveness Scale Second Edition (SRS-2).**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Normal level of SR (T-score 40 – 60)  N = 5 (4 males) | | Mild to moderate deficits in SR (T-score 61 – 75)  N = 11(9 males) | | Severe deficits in SR (T-score ≥ 76)  N = 16 (10 males) | |
|  | With ACF | Without ACF | With ACF | Without ACF | With ACF | Without ACF |
| r | .90 | .90 | .90 | .86 | .71 | .68 |
| ICC (95% CI) | .46 (-.20 - .91) | .54 (-.20 - .93) | .70 (-.08 - .93) | .77 (.15 - .94) | .56 (.01 - .84) | .64 (.20 - .86) |
| Mean difference (SD) | 9.40 (9.28) | 6.82 (8.56) | 9.08 (6.18) | 6.11 (6.61) | 8.82 (9.77) | 5.49 (9.22) |
| t-value | 2.266 | 1.782 | 4.877 | 3.068 | 3.610 | 2.380 |
| P | .086 | .149 | <.001 | .012 | .003 | .031 |
| *Note.* r = Spearman correlation*,* ICC = Intraclass Correlation Coefficient (3,1) absolute agreement, CI = Confidence Interval, SD = Standard Deviation, SR = Social Responsiveness, ACF = Age Correction Factor. The analyses were performed based on the sample of 44 participants (n = 32 males) with complete ABAS-3 data. | | | | | | |