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The Effects of Competition on Exercise Intensity and the User Experience of Exercise, during Virtual Reality Bicycling for Young Adults

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**Supplemental Tables**

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| --- | --- | --- | --- |
|  | **Mauchly Test**  (2) | **Greenhouse-Geisser**  () | **rmANOVA**  (F) |
| **Heart Rate (% Max)** | 2 (2) = 15.28  p <0.001 |  = 0.67 | F(1.33, 30.65) =24.85  p < 0.001, 2partial = 0.519 |
| **Raw Cadence (RPM)** | 2 (2) = 20.02  p <0.001 |  = 0.63 | F(1.26, 30.36) =42.06  p < 0.001, 2partial = 0.637 |
| **Normalized Cadence (% faster than baseline)** | 2 (2) = 20.71  p <0.001 |  = 0.63 | F(1.26, 30.12) =41.57  p < 0.001, 2partial = 0.634 |

**Table S1: Omnibus Tests for Exercise Intensity (Aim 1).** Results of the Mauchly test for sphericity, Greenhouse-Geisser corrections, and repeated measured ANOVA are shown for all measures of exercise intensity (Aim 1).

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Feedback & Competition Other** | **Feedback &**  **Competition Self** | **Competition Other & Competition Self** |
| **Heart Rate (% Max)** | t(24) = -4.74  p < 0.001 | W=284  p < 0.001 | W=118  p > 0.0167 |
| **Raw Cadence (RPM)** | t(24)= -6.04  p < 0.001 | t(24)= -7.53  p < 0.001 | t(24) = -1.92  p >0.0167 |
| **Normalized Cadence (% faster than baseline)** | W=312  p < 0.001 | W=321  p < 0.001 | t(24) = -2.04  p > 0.0167 |

**Table S2:** **Post-Hoc Tests for Exercise Intensity (Aim 1).** Results of the post-hoc tests between conditions for all 3 comparisons are shown for the measures of exercise intensity (Aim 1). T-values are included for comparisons for which the assumption of normality was upheld (paired t-tests) and Wilcoxon signed rank-test scores (W) are shown for comparisons that are not normally distributed.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Feedback & Competition Other** | **Feedback &**  **Competition Self** | **Competition Other & Competition Self** |
| **Change in RPE**  **(End – Start)** | t(23)= -5.15  p < 0.001 | t(23) = -6.79  p < 0.001 | t(24) = -2.16  p > 0.0167 |
| **Endpoint RPE ( / 20)** | W= 286.0  p < 0.001 | W = 291.0  p < 0.001 | W= 62.0  p > 0.0167 |
| **IMI Effort ( / 7)** | W=258.5  p = 0.002 | W=243  p = 0.001 | W=39.5  p >0.0167 |
|  | | | |
| **IMI Enjoyment ( / 7)** | t(24) = -1.60  p > 0.0167 | W = 32.5  p = 0.007 | W = 81.5  p >0.0167 |
| **IMI Total ( / 7)** | t(24) = -3.05  p = 0.006 | t(24) = -3.73  p = 0.001 | t(24) = -1.44  p > 0.0167 |

**Table S4:** **Post-Hoc Tests for User Experience of Exercise (Aim 2).** Results of the post-hoc tests between conditions for all 3 comparisons are shown for the measures of user experience of exercise (Aim 2). T-values are included for comparisons for which the assumption of normality was upheld (paired t-tests) and Wilcoxon signed rank-test scores (W) are shown for comparisons that are not normally distributed.

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Mauchly Test**  (2) | **Greenhouse-Geisser**  () | **rmANOVA**  (F) |
| **Change in RPE**  **(End – Start)** | 2 (2) = 9.33  p =0.009 |  = 0.74 | F(1.49, 34.18) =31.27  p < 0.001, 2partial = 0.576 |
| **Endpoint RPE ( / 20)** | χ2 (2) = 16.07  p < 0.001 |  = 0.67 | F(1.33, 31.9) = 34.03  p < 0.001, η2partial = 0.586 |
| **IMI Effort ( / 7)** | 2 (2) = 19.88  p <0.001 |  = 0.63 | F(1.27, 30.41) =14.33  p < 0.001, 2partial = 0.374 |
|  | | | |
| **IMI Enjoyment ( / 7)** | 2 (2) = 2.38  p >0.05 | NA | F(2, 48) = 3.83  p = 0.029, 2partial = 0.138 |
| **IMI Total ( / 7)** | 2 (2) = 11.97  p = 0.003 |  = 0.71 | F(1.42, 34.15) = 10.48  p < 0.001, 2partial = 0.304 |

**Table S3: Omnibus Tests for User Experience of Exercise (Aim 2).** Results of the Mauchly test for sphericity, Greenhouse-Geisser corrections, and repeated measured ANOVA are shown for all measures of the user experience of exercise (Aim 2).

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Mauchly Test**  (2) | **Greenhouse-Geisser**  () | **rmANOVA**  (F) |
| **Task Focus (%)** | 2 (2) = 9.92  p = 0.007 |  = 0.73 | F(1.45, 31.97) =3.32  p = 0.063, 2partial = 0.131 |
| **Roadside Gazes (%)** | 2 (2) = 23.54  p < 0.001 |  = 0.60 | F(1.20, 26.29) = 4.32, p = 0.041, 2partial = 0.164 |
| **Rightward Gazes (%)** | 2 (2) = 28.35  p <0.001 |  = 0.57 | F(1.15, 25.28) =3.69  p = 0.061, 2partial = 0.144 |
| **Water Gazes (%)** | (2 (2) = 16.24, p <0.001 |  = 0.65 | F(1.30, 28.60) = 5.86  p = 0.016, 2partial = 0.210 |

**Table S5: Omnibus Tests for Measures of Visual Attention (Aim 3).** Results of the Mauchly test for sphericity, Greenhouse-Geisser corrections, and repeated measured ANOVA are shown for all measures of visual attention (Aim 3).

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Feedback & Competition Other** | **Feedback &**  **Competition Self** | **Competition Other & Competition Self** |
| **Task Focus (%)** | NA | NA | NA |
| **Roadside Gazes (%)** | W = 71.0  p = 0.042 | W = 31.0  p = 0.002 | W = 166.0  p >0.0167 |
| **Rightward Gazes (%)** | NA | NA | NA |
| **Water Gazes (%)** | W = 36.0  p = 0.031 | W = 27.0  p = 0.011 | W = 73.0  p > 0.0167 |

**Table S6:** **Post-Hoc Tests for Measures of Visual Attention (Aim 3).** Results of the post-hoc tests between conditions for all 3 comparisons are shown for the measures of visual attention (Aim 3). T-values are included for comparisons for which the assumption of normality was upheld (paired t-tests) and Wilcoxon signed rank-test scores (W) are shown for comparisons that are not normally distributed.

**Intrinsic Motivation Inventory (IMI)**

For each of the following statements, please indicate how true it is for you, using the scale:

**I enjoyed doing this activity very much.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I think I am pretty good at this activity.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I didn’t try very hard to do well at this activity.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**This activity was fun to do.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**This was an activity that I couldn’t do very well.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**It was important to me to do well at this task.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I thought this was a boring activity.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I tried very hard on this activity.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**This activity did not hold my attention at all.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I put a lot of effort into this.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I would describe this activity as very interesting.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I didn’t put much energy into this.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I thought this activity was quite enjoyable.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I would be willing to do this again because it has some value to me.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**While I was doing this activity, I was thinking about how much I enjoyed it.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**I believe doing this activity could be beneficial to me.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Not at all true Somewhat true Very true

**Figure S1: Intrinsic Motivation Inventory (IMI).** TheIMI consisting of 16 items includes the complete subscales of interest / enjoyment (7 items) and effort / importance (5 items) and partial subscales of value / usefulness (2 items) and competence (2 items).