**Table 2. Summary of Methodological Controls Adopted for Research Studies Included in the Systematic Review.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Authors** | **Sex** | **Age**  **(yrs)** | **Body Mass**  **(kg)** | **BMI (Kg·m-2) Body Fat (%)** | **Time of Day** | **Alcohol** | **Caffeine** | **Smoking** | **Vigorous**  **Exercise** | **Food** | **Participants** | | Giles et al. 2016 | 20  (17 M, 3 F) | 29 ±10 | 75.9 ± 9.5 | - | - | - | Not allowed “prior to test” | - | - | 2 hrs  Light meal | Healthy |  | | Montano et al. 2015 | 20  (9 M, 11 F) | 26 ± 5 | - | 24.7 ± 3.8 | 07.00 - 10.00 | 24 hrs | - | - | 24 hrs |  | Healthy | | De Rezende-Barbosa  et al. 2015 | 30  (30 M, 0 F) | 21 ± 1 | 92.7 ± 11.1 | 24.2 ± 4.0 | 13.00 - 19.00 | 12 hrs | 12 hrs | Non-smokers | - | - | Healthy | | Vasconcellos et al. 2015 | 15  (15M, 0 F) | 15 ± 2 | 91.2 ± 21.6 | 28.3 ± 3.0  42.0 ± 6.5 | - | - | 24 hrs | - | 24 hrs | 8 hrs fast | Healthy | | Dourado & Guerra 2013 | 31  (14 M, 17 F) | 57 ± 9 | 76.0 ± 14.0 | 28.0 ± 3.0 | - | - | - | Non-smokers | - | - | Healthy  Active | | Wallen et al. 2012 | 341  (139 M, 202 F) | 52 | - | - | 07.00 - 11.30 | 24 hrs | Not allowed “morning of trial” | 2 hrs | 24 hrs | 10 hrs fast | Healthy  Active | | Weippert et al. 2010 | 19  (19 M, 0 F) | 24 | 77.3 ± 7.0 | - | - | - | - | - | - | - | Healthy  Active | | Porto & Junqueira 2009 | 34  (15 M, 18 F) | 26 ± 8 | - | - | - | 12 hrs | 12 hrs | Non-smokers  12 hrs | 12 hrs | 2-4 hrs  Light meal | Healthy/ Clinical  Sedentary/  Active | | Nunan et al. 2009 | 33  (19 M, 14 F) | 34 M  48 F | 74.6 ± 15.6 | - | 08.00 - 13.00 | 24 hrs | Not allowed  “on test day” | “Not on test day” | 24 hrs | 2 hrs  Light meal | Healthy  Active | | Nunan et al. 2008 | 33  (19 M, 14 F) | 34 M  48 F | 74.6 ± 15.6 | - | 08.00 - 13.00 | 24 hrs | Not allowed  “on test day” | “Not on test day” | 24 hrs | 2 hrs  Light meal | Healthy  Active | | Vanerlei et al. 2008 | 15  (15, 0 F) | 21 ± 1 | 77.2 ± 10.9 | 24.3 ± 3.1 | 06.00 - 10.00  2 hrs of waking | 12 hrs | 12 hrs | Non-smokers | - | 2 hrs  Light meal | Healthy  Active | | Gamelin et al. 2006 | 18  (18 M, 0 F) | 27 ± 2 | 77.1 ± 7.7 | - | 06.00 – 10.00  2 hrs of waking | - | 24 hrs | Non-smokers | - | - | Healthy  Active | | Kingsley et al. 2005 | 8  (6 / 2) | 29 ± 4 | 77.5 ± 11.2 | - | - | - | - | - | - | - | - | |

**Table 2. Summary of Methodological Controls Adopted for Research Studies Included in the Systematic Review (continued).**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Authors** | **Sample epoch** | **Laboratory Conditions** | **Protocol** | **Pre-stabilisation time period** | **Breathing**  **Pattern** | **Equipment**  ECG  Polar® HRM | **Inter-Beat Interval**  **Pre-Processing software** | **HRV Analysis**  **Software** |
|  |  |  |  |  |  |  |  |  |
| Giles et al. 2016 | 256 s | 21 ± 1oC | Supine  Stand | 5 min  2 min | Controlled  0.20 Hz  12 breaths·min-1 | 3-lead ECG  Polar® V800™ | MP36, Biopac, MatLab  Polar Flow web service | Kubios  Kubios |
| Montano et al. 2015 | 300 s | - | Supine | 20 min | - | Powerlab 30 series  Polar® RS800CX™ | -  Polar Precision 5.0 | Kubios  Kubios |
| De Rezende-Barbosa  et al. 2015 | 20 min | 21-23oC | Supine | 10 min | Spontaneous | Bio1000 LNYX  Polar® RS800G3™ | Bio-inspector 1.8  Polar Precision 5.0 | Kubios  Kubios |
| Vasconcellos et al. 2015 | 300 s | 22-24oC  Quiet, semi-dark | Supine | 20 min | Spontaneous | 3-lead ECG  Polar® RS800CX™ | Micromed, Elite Ergo  Polar Precision 5.0 | Kubios  Kubios |
| Dourado & Guerra 2013 | 300 s | - | Exercise  (Ventilatory Threshold) | - | - | - | - | - |
| Wallen et al. 2012 | 300 s | - | Supine | 5 min | - | 3-lead ECG  Polar® RS800CX™ | Polar Precision 5.0 | Kubios  Kubios |
| Weippert et al. 2010 | 300 s | - | Supine | 3-5 min | Controlled  0.20 Hz  12 breaths·min-1 | 5-lead ECG  Polar® S810™ | Padsy 5.0  Polar Precision 4.0 | -  - |
| Porto & Junqueira 2009 | 300 s | 22-28oC  Quiet | Supine  Stand | 10-15 min  2 min | - | -  Polar® S810™ | -  Polar Precision 4.0 | MATLAB 5.03 (Mathsworks Inc.) |
| Nunan et al. 2009 | 300 s | Thermo-neutral  Quiet | Supine | Minimum  3 min | - | 12-lead ECG  Polar® S810™ | CardioPerfect  Polar Precision 3.0 | CardioPerfect  Polar Precision |
| Nunan et al. 2008 | 300 s | Thermo-neutral  Quiet | Supine | Minimum  3 min | - | 12-lead ECG  Polar® S810™ | CardioPerfect  Polar Precision 3.0 | CardioPerfect  Polar Precision |
| Vanderlei et al. 2008 | 300 s | 22-24oC  RH 50-60%  Quiet, semi-dark | Supine  Sub-maximal Exercise  (60% HRmax) | 20 min | - | Bio 1000 LYNX  Polar® S810™ | Bio-inspector 1.8  Polar Precision 3.0 | MATLAB 5.03 (Mathsworks Inc.) |
| Gamelin et al. 2006 | 256 s | 19-21oC  Quiet, semi-dark | Supine  Stand | 10 min | Controlled  0.20 Hz  12 breaths·min-1 | 2-lead ECG  Polar® S810™ | Physiotrace, Estaris  Polar Precision 3.0 | Physiotrace, Estaris  Polar Precision Performance 3.0 |
| Kingsley et al. 2005 | 60 s | - | Supine  Sub-maximal Exercise  (40-100% HR max) | - | Spontaneous | 3-lead ECG  Polar® S810™ | Reynolds Pathfinder, v 8.4  Polar Precision 3.0 | Reynolds Pathfinder, v 8.4  Polar Precision 3.0 |

**Table 3. Validity of Short-Term Inter-Beat Interval Time Series Data Derived from Polar® Heart Rate Monitors Under Stable and Provocative Conditions.**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Group**  **features** | **ECG**  **(mean ± SD)** | | **HRM**  **(mean ± SD)** | | **ICC**  **(95% CI)** | | **Mean Bias (SD)**  **#Median** | | **Limits of Agreement**  **(90%\* or 95%)** | | **Valid**  **Measure**  **(ICC / LOA)** | |
| **RR Count** |  | |  | |  | |  | |  | |  | |  | |
| Vasconcellos et al. 2015 | Supine | | 345 ± 42 | | 345 ± 45 | | 0.99 (0.96 to 0.99) | | -0.14 ± 7.3 | | -14.4 to 14.3  Uncorrected data | | Yes / Yes | |
| Wallen et al. 2012 | Supine | | 318 | | 336 | | - | | - | | - | | Unclear | |
| Porto & Junqueira 2009 | Supine  Stand | | 318 ± 46  404 ± 6.1 | | 320 ± 46  406 ± 6.1 | | - | | -2.00#  -2.61 | | -  -7.70 to 2.48 | | Unclear  Yes | |
| Nunan et al. 2008 | Supine | | 319 ± 55 | | 320 ± 53 | | 0.96 (0.92 to 0.98) | | 1.4 ± 11.6 | | -21.8 to 24.6  Corrected data | | Yes / Yes | |
| Vanderlei et al. 2008 | Supine | | 402 ± 62 | | 401 ± 62 | | 1.00 (1.00 to 1.00) | | 1.0 | | - | | Yes | |
| Gamelin et al. 2006 | Supine  Stand | | 631  549  estimated total/sample size | | 630  548  estimated total/sample size | | 0.99  0.99 | | 0.9 ± 6.0  - | | -11.0 to 13.0  - | | Yes  Yes | |
| **Error Detection (%)** |  | |  | |  | |  | |  | |  | |  | |
| Giles et al. 2016 | Supine  Stand | | -  - | | -  - | | -  - | | 0.082%  0.089% | | -  - | | Yes  Yes | |
| Wallen et al. 2012 | Supine | | 21 errant beats | | 3 errant beats | | - | | 85.7% | | - | | No | |
| Vanderlei et al. 2008 | Supine  60% VO2 max | | 7.0 ± 1.08  4.2 ± 0.43 | | 6.9 ± 1.16  4.1 ± 0.27 | | 0.99 (0.96 to 1.00)  0.65 (-0.05 to 0.88) | | 0.10%  0.10% | | -  - | | Yes  No | |
| Vanderlei et al. 2008 | Supine | | - | | - | | - | | 6.93% | | - | | Unclear | |
| Gamelin et al. 2006 | Supine | | - | | - | | - | | 0.40% | | - | | Yes | |
| Kingsley et al. 2006 | Supine | | - | | - | | - | | 0.32% | | - | | Yes | |

**Table 3. Validity of Short-Term Inter-Beat Interval Time Series Data Derived from Polar® Heart Rate Monitors Under Stable and Provocative Conditions (continued).**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Group**  **features** | **ECG**  **(mean ± SD)** | **HRM**  **(mean ± SD)** | **ICC**  **(95% CI)** | **Mean Bias (SD)**  **#Median** | **Limits of Agreement**  **(90%\* or 95%)** | **Valid**  **Measure**  **(ICC / LOA)** |
| **RR Interval (ms)** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | Data unclear | Data unclear | - | 0.06 ± 2.24  0.59 ± 1.14 | -4.33 to 4.45  -1.70 ± 2.87 | Yes  Yes |
| Montano et al. 2016 | Supine | 1026 ± 1.15 | 1016 ± 1.15 | 0.99 | 10.0 ± 1.02 (SEE) | 8.0 to 12.0 | Yes / Yes |
| Vasconcellos et al. 2015 | Supine | 875 ± 109 | 885 ± 122 | 0.98 (0.94 to 0.99) | -10.1 ± 20.9 | -51.9 to 31.7 | Yes / No |
| Weippert et al. 2010 | Supine |  |  | 1.00 (1.00 to 1.00) | -0.41 ± 7.35 | -15.1 to 14.3 | Yes/ Yes |
| Nunan et al. 2009 | Supine | 1004 ± 158 | 1001 ± 158 | 0.99 (0.98 to 1.00)  (Pearson) | 2.4 |  | Yes |
| Porto & Junqueira 2009 | Supine  Stand | 949 ± 141  745 ± 16 | 951 ± 151  746 ± 116 | -  - | -1.85 ± 2.26  -0.70 ± 1.60 | -6.37 to 2.67  -3.89 to 2.50 | Yes  Yes |
| Nunan et al. 2008 | Supine | 965 ± 173 | 970 ±168 | 0.98 ( 0.95 to 0.99) | 2.5 ± 30.9 | -59.3 to 64.2 | Yes / No |
| Gamelinet al. 2006 | Supine  Stand | Data unclear  Data unclear | Data unclear  Data unclear | 0.99  0.99 | 0.9 ± 6.0  1.0 ± 3.7 | -11.0 to 13.0  -6.0 to 8.5  (estimated from  corrected data figure) | Yes / Yes |
| Kingsleyet al. 2005 | Supine  <40% VO2 max  40-60% VO2 max  60-80% VO2 max  80-100% VO2 max | -  -  -  -  - | -  -  -  -  - | 1.00  1.00  0.99  0.98  0.93 | -0.06 ± 2.93  -  -  -  - | -5.92 to 5.89  -6.79 to 6.75  -8.21 to 8.26  -8.37 to 8.35  -9.16 to 9.10 | Yes / Yes  Yes / Yes  Yes / Yes  Yes / Yes  Yes / Yes |

**Table 3. Validity of Short-Term Inter-Beat Interval Time Series Data Derived from Polar® Heart Rate Monitors Under Stable and Provocative Conditions (continued).**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Group**  **features** | **ECG**  **(mean ± SD)** | **HRM**  **(mean ± SD)** | **ICC**  **(95% CI)** | **Mean Bias (SD)**  **#Median** | **Limits of Agreement**  **(90%\* or 95%)** | **Valid**  **Measure**  **(ICC / LOA)** |
| **RMSSD (ms)** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | 55.9 ± 37.8  30.9 ± 18.24 | 55.9 ± 37.8  30.6 ± 18.14 | 1.00 (1.00 to 1.00)  1.00 (1.00 to 1.00) | 0.00 ± 0.16  0.03 ± 0.16 | -0.32 to 0.32  -0.28 to 0.34 | Yes / Yes  Yes / Yes |
| Montano et al. 2016 | Supine | 46.0 ± 1.7 | 54.1 ± 1.6 | 0.96 | -8.1 ± 1.16 (SEE) | -10.4 to -5.8 | Yes / No |
| De Rezende-Barbosa et al. 2016 | Supine | - | - | 0.99 (0.97 to 0.99) | 1.48 ± 1.24 | -0.95 to 3.91 | Yes / Yes |
| Vasconcellos et al. 2015 | Supine | 88 ± 55 | 68 ± 24 | 0.90 (0.75 to 0.80) | 13.8 ± 15.9 | -18.0 to 45.6 | Yes / No |
| Wallen et al. 2012 | Group (<45 yrs)  Male  Female | -  -  - | -  -  - | 0.95 (0.93 to 0.97)  1.00 (1.00 to 1.00)  0.91 (0.84 to 0.94) | -  -0.21 ± 3.00  -0.70 ± 10.6 | -  -5.79 to 6.21  -20.5 to 21.9 | Yes / Yes  Yes / No |
| Porto & Junqueira 2009 | Supine  Stand | 60.4 ± 35.7  24.5 ± 7.6 | 59.6 ± 36.5  22.3 ± 7.9 | -  - | 0.90#  1.70# | -  - | -  - |
| Nunan et al. 2009 | Supine | 44 x/÷ 1.8 | 41 x/÷ 1.7 | 0.97 (0.94 to 0.99) | 0.92 | - | Yes |
| Nunan et al. 2008 | Supine | 45.6 ± 2.01 | 42.5 ± 1.86 | 0.88 (0.77 to 0.94) | 0.95 ± 0.71 | 0.54 to 1.66 | Yes / Yes |
| Vanderlei et al. 2008 | Supine  60% VO2 max | 52.84 ± 15.94  12.21 ± 5.69 | 53.12 ± 16.29  11.45 ± 4.76 | 1.00 (0.98 to 1.00)  0.93 (0.79 to 0.98) | -  - | -  - | Yes  Yes |
| Gamelin et al. 2006 | Supine  Stand | 46.7 ± 23.7  21.1 ± 8.9 | 46.5 ± 23.7  20.7 ± 8.6 | 0.99  0.99 | 0.21 ± 0.69  0.46 ± 0.81 | -1.17 to 1.58  -1.15 to 2.07 | Yes / Yes  Yes / Yes |
| **pNN50 (%)** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | 29.1 ± 23.1  7.2 ± 7.8 | 29.3 ±24.0  7.3 ± 8.0 | 1.00 (1.00 to 1.00)  1.00 (0.99 to 1.00) | -0.25 ± 0.48  -0.04 ± 0.69 | -1.20 to 0.70  -1.42 to 1.34 | Yes / Yes  Yes /Yes |
| Vasconcellos et al. 2015 | Supine | 44 ± 20 | 38 ± 14 | 0.77 (0.47 to 0.92) | 5.6 ± 10.3 | -15.0 to 26.2 | No / No |
| Porto and Junqueira 2009 | Supine  Stand | 30.1 ± 20.4  4.10 ± 4.93 | 32.3 ± 20.9  4.36 ± 5.63 | -  - | -2.20 ± 1.67  0.01# | -5.53 to 1.13  - | Yes |
| Vanderlei et al. 2008 | Supine  60% VO2 max | 29.46 ± 12.73  0.65 ± 1.20 | 29.73 ± 12.89  0.42 ± 0.66 | 0.99 (0.98 to 0.99)  0.87 (0.61 to 0.96) | -  - | -  - | Yes  No |
| Gamelin et al. 2006 | Supine  Stand | 26.2 ± 20.8  4.1 ± 5.5 | 25.9 ± 20.7  4.0 ± 5.4 | 0.99  0.97 | 0.29 ± 1.38  0.10 ± 0.57 | -2.47 to 3.04  -1.03 to 1.23 | Yes / Yes  Yes / Yes |

**Table 3. Validity of Short-Term Inter-Beat Interval Time Series Data Derived from Polar® Heart Rate Monitors Under Stable and Provocative Conditions (continued).**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Group**  **features** | **ECG**  **(mean ± SD)** | **HRM**  **(mean ± SD)** | **ICC**  **(95% CI)** | **Mean Bias (SD)**  **#Median** | **Limits of Agreement**  **(90%\* or 95%)** | **Valid**  **Measure**  **(ICC / LOA)** |
| **SDNN (ms2)** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | 61.4 ± 32.0  52.0 ± 16.7 | 61.4 ± 32.0  52.0 ± 16.7 | 1.00 (1.00 to 1.00)  1.00 (1.00 to 1.00) | * 1. ± 0.12   2. ± 0.10 | -0.22 to 0.24  -0.17 to 0.22 | Yes / Yes  Yes / Yes |
| Montano et al. 2016 | Supine | 57.3 ± 1.52 | 63.1 ± 1.49 | 0.97 | -5.8 ± 1.1 (SEE) | -8.0 to -3.6 | Yes / |
| De Rezende-Barbosa et al. 2016 | Supine | - | - | 0.99 (0.97 to 0.99) | 1.51 ± 0.91 | -0.27 to 3.29 | Yes / Yes |
| Wallen et al. 2012 | Group (<45 yrs)  Male  Female | -  -  - | -  -  - | 0.87 (0.81 to 0.91)  1.00 (0.99 to 1.00)  0.75 (0.61 to 0.85) | -  -0.22 ± 2.44  -4.1 ± 26.5 | -  -5.10 to 4.66  -57.1 to 48.9 | Yes  Yes / Yes  No / No |
| Porto & Junqueira 2009 | Supine  Stand | 61.2 ± 31.2  46.8 ± 12.3 | 60.9 ± 32.7  46.6 ±12.1 | -  - | 0.32 ± 0.98  0.24 ± 0.86 | -1.65 to 2.28  -1.47 to 1.96 | Yes  Yes |
| Nunan et al. 2009 | Supine | 58 x/÷ 1.5 | 56 x/÷ 1.5 | 0.99 (0.98 to 1.00) | 0.97 | - | Yes |
| Nunan et al. 2008 | Supine | 60.9 ± 1.57 | 60.3 ± 1.60¥ | 0.94 (0.88 to 0.97) | -0.06 | 0.68 to 1.45 | Yes / Yes |
| Gamelin et al. 2006 | Supine  Stand | 50.2 ± 18.8  41.4 ± 13.1 | 50.1 ± 18.8  41.4 ± 13.0 | 0.99  0.99 | 0.08 ± 0.27  0.06 ± 0.17 | -0.47 to 0.63  -0.28 to 0.40 | Yes / Yes  Yes / Yes |
| **LF (ms2)** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | 1050.9 ± 994.3  1371.9 ± 1132.9 | 1051.8 ± 994.9  1371.3 ± 1133.3 | 1.00 (1.00 to 1.00)  1.00 (1.00 to 1.00) | -0.95 ± 2.70  0.58 ± 3.63 | -6.25 to 4.36  -6.67 to 7.83 | Yes / Yes  Yes / Yes |
| Montano et al. 2016 | Supine | 827 ± 2.95 | 799 ± 2.76 | 0.98 | 28.0 ± 1.25 (SEE) | 25.6 to 30.5 | Yes / No |
| De Rezende-Barbosa et al. 2016 | Supine | - | - | 0.94 (0.87 to 0.97) | 36.3 ± 40.1 | -42.3 to 114.9 | Yes / No |
| Wallen et al. 2012 | Group (<45 yrs)  Male  Female | -  -  - | -  -  - | 0.95 (0.93 to 0.97)  1.00 (1.00 to 1.00)  0.91 (0.84 to 0.94) | -  45.1 ± 337.3  -0.33 ± 362.9 | -  -629.5 to 719.7  -725.5 to 726.1 | Yes  Yes / No  Yes / No |
| Nunan et al. 2009 | Supine | 904 x/÷ 2.4 | 960 x/÷ 2.2 | 0.94 (0.87 to 0.97) | 1.06 |  | Yes |
| Nunan et al. 2008 | Supine | 1012.3 ± 2.5 | 916.0 ± 3.0 | 0.84 (0.70 to 0.92) | 1.19 | 0.32 to 4.44 | No / Yes |
| Gamelin et al. 2006 | Supine  Stand | 192.0 ± 119.4  243.7 ± 180.6 | 192.8 ± 122.1  244.6 ± 180.3 | 0.99  0.99 | 0.06 ± 2.94  -0.86 ± 2.90 | -5.82 to 5.94  -6.66 to 4.94 | Yes / Yes  Yes / Yes |
| Kingsleyet al. 2005 | Supine  Exercise  <40% VO2 max  40-60% VO2 max  60-80% VO2 max | -  -  -  - | -  -  -  - | -  -  -  - | -  -  -  - | -6.6 to 7.3  -2.7 to 2.3  -1.6 to 1.6  -0.3 to 0.3 | Yes / Yes  Yes / Yes  Yes / Yes  Yes / Yes |

**Table 3. Validity of Short-Term Inter-Beat Interval Time Series Data Derived from Polar® Heart Rate Monitors Under Stable and Provocative Conditions (continued).**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Group**  **features** | **ECG**  **(mean ± SD)** | **HRM**  **(mean ± SD)** | **ICC**  **(95% CI)** | **Mean Bias (SD)**  **#Median** | **Limits of Agreement**  **(90%\* or 95%)** | **Valid**  **Measure**  **(ICC / LOA)** |
| **HF (ms2)** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | 183.0 ± 2212.3  652.3 ± 754.0 | 1826.5 ± 2216.2  647.9 ± 742.4 | 1.00 (1.00 to1.00)  1.00 (1.00 to1.00) | 0.45 ± 14.5  4.33 ± 14.7 | -27.95 to 28.84  -25.1 to 33.7 | Yes / Yes  Yes / Yes |
| Montano et al. 2016 | Supine | 843 ± 2.94 | 1071 ± 2.96 | 0.96 | -228 ± 1.35 (SEE) | -230.7 to -225.4 | Yes / No |
| De Rezende-Barbosa et al. 2016 | Supine | - | - | 0.95 (0.90 to 0.98) | 27.3 ± 84.1 | -137.5 to 192.1 | Yes / No |
| Wallen et al. 2012 | Group (<45 yrs)  Male  Female | -  -  - | -  -  - | 0.92 (0.90 to 0.94)  0.98 (0.97 to 0.99)  0.88 (0.84 to 0.91) | -  -70.1 ± 236.9  -3.00 ± 641.0 | -  -543.9 to 403.7  -1285.0 to 1279.0 | Yes  Yes / No  Yes / No |
| Nunan et al. 2009 | Supine | 608 x/÷ 2.8 | 557 x/÷ 2.7 | 0.94 (0.87 to 0.97) | 0.92 | - | Yes |
| Nunan et al. 2008 | Supine | 584 ± 3.22 | 493 ± 3.71 | 0.81 (0.65 to 0.91) | - | - | No |
| Gamelin et al. 2006 | Supine  Stand | 335.0 ± 429.8  67.1 ± 64.9 | 333.9 ± 428.9  64.9 ± 62.1 | 0.99  0.99 | 0.39 ± 4.51  2.13 ± 4.42 | -8.63 to 9.42  -6.72 to 10.97 | Yes / Yes  Yes / Yes |
| Kingsleyet al. 2005 | Supine  <40% VO2 max  40-60% VO2 max  60-80% VO2 max  80-100% VO2 max | -  -  -  -  - | -  -  -  -  - | -  -  -  -  - | -  -  -  -  - | -5.6 to 7.6  -4.1 to 3.5  -1.1 to 0.7  -0.5 to 0.2  -0.4 to 0.4 | Yes / Yes  Yes / Yes  Yes / Yes  Yes / Yes  Yes / Yes |
| **LF (nu)** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | 41.0 ± 15.9  70.1 ± 13.2 | 41.1 ± 16.1  70.2 ± 13.1 | 1.00 (1.00 to 1.00)  1.00 (1.00 to 1.00) | -0.08 ± 0.33  -0.05 ± 0.39 | -0.72 to 0.56  -0.83 ± 0.74 | Yes / Yes  Yes / Yes |
| De Rezende-Barbosa et al. 2016 | Supine | - | - | 0.87 (0.74 to 0.94) | 0.03 ± 1.12 | - 2.2 to 2.2 | No / Yes |
| Vasconcellos et al. 2015 | Supine | 48 ± 21 | 56 ± 17 | 0.70 (0.31 to 0.89) | -7.5 ± 13.6 | -34.7 to 19.7 | No / No |
| Weippert et al. 2012 | Supine | 0.61 ± 0.15 | 0.62 ± 0.15 | 0.90 (0.88 to 0.92) | -0.01 ± 0.00 | - | Yes |
| Nunan et al. 2009 | Supine | 61 ± 15 | 63 ± 13 | 0.86 (0.73 to 0.93) | -2.7 | - | No |
| Nunan, *et al*., 2008 | Supine | 58.5 ± 18.6 | 62.9 ± 14.5 | 0.73 (0.51 to 0.86) | 3.1 ± 11.6 | -20.1 to 26.3 | No / No |
| Vanderlei et al. 2008 | Supine  60% VO2 max | 60.53 ± 14.78  80.40 ± 10.10 | 61.67 ± 13.97  80.33 ± 9.87 | 0.98 (0.93 to 0.99)  0.97 (0.92 to 0.99) | -  - | -  - | Yes  Yes |
| Gamelin et al. 2006 | Supine  Stand | 44.9 ± 22.5  77.4 ± 15.5 | 45.0 ± 22.9  77.9 ± 15.2 | 0.99  0.98 | 0.03 ± 0.97  -0.47 ± 1.53 | -1.90 to 1.96  -3.53 to 2.58 | Yes / Yes  Yes / Yes |

**Table 3. Validity of Short-Term Inter-Beat Interval Time Series Data Derived from Polar® Heart Rate Monitors Under Stable and Provocative Conditions (continued).**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **HF (nu)** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | 58.9 ± 15.9  29.8 ± 13.1 | 58.8 ± 16.0  29.7 ± 13.1 | 1.00 (1.00 to1.00)  1.00 (1.00 to1.00) | 0.08 ± 0.33  0.05 ± 0.39 | -0.57 to 0.72  -0.73 to 0.83 | Yes / Yes  Yes / Yes |
| De Rezende-Barbosa et al. 2016 | Supine | - | - | 0.87 (0.74 to 0.94) | -0.04 ± 1.12 | - 2.2 to 2.2 | No / Yes |
| Vasconcellos et al. 2015 | Supine | 52 ± 21 | 44 ± 17 | 0.70 (0.32 to 0.89) | 7.6 ± 13.5 | -19.4 to 34.6 | No / No |
| Weippert et al. 2012 | Supine | 0.28 ± 0.14 | 0.28 ± 0.14 | 0.99 (0.99 to 0.99) | 0.00 ± 0.00 | - | Yes |
| Nunan et al. 2009 | Supine | 40 ± 15 | 37 ± 13 | 0.85 (0.71 to 0.92) | -2.9 | - | No |
| Nunan et al. 2008 | Supine | 6.50 ± 1.10 | 6.38 ± 1.16 | 0.81 (0.62 to 0.91) | -3.3 ± 11.7 | -26.7 to 20.1 | No / No |
| Vanderlei et al. 2008 | Supine  60% VO2 max | 39.47 ± 14.78  19.60 ± 10.10 | 38.33 ± 13.97  19.70 ± 9.87 | 0.98 (0.93 to 0.99)  0.97 (0.92 to 0.99) | -  - | -  - | Yes  Yes |
| Gamelin et al. 2006 | Supine  Stand | 55.0 ± 22.5  22.6 ± 15.5 | 55.0 ± 22.9  22.1 ± 15.2 | 0.99  0.98 | 0.03 ± 0.97  0.47 ± 1.53 | -1.96 to 1.90  -2.58 to 3.53 | Yes / Yes  Yes / Yes |
| **LF/HF** |  |  |  |  |  |  |  |
| Giles et al. 2016 | Supine  Stand | 1.0 ± 1.4  3.2 ± 2.4 | 1.1 ± 1.6  3.2 ± 2.4 | 0.99 (0.98 to 1.00)  1.00 (0.99 to1.00) | -0.04 ± 0.39  -0.01 ± 0.17 | -0.43 to 0.35  -0.35 to 0.33 | Yes / Yes  Yes / Yes |
| Montano et al. 2016 | Supine | 1.0 ± 0.2 | 1.0 ± 0.2 | 0.99 | 0.04 ± 0.03 (SEE) | -0.10 to 0.02 | Yes / Yes |
|  | Supine | - | - | 0.91 (0.81 to 0.96) | 0.12 ± 0.60 | -1.1 to 1.3 | Yes / Yes |
| Vasconcellos et al. 2015 | Supine | 1.3 ± 1.2 | 1.6 ± 1.2 | 0.92 (0.77 to 0.97) | -0.30 ± 0.40 | -1.1 to 0.5 | Yes / Yes |
| Nunan et al. 2009 | Supine | 1.9 x/÷ 2.0 | 2.0 x/÷ 1.8 | 0.87 (0.74 to0.93) | 1.05 |  | No |
| Nunan et al. 2008 | Supine | 2.1 ± 1.9 | 2.2 ± 1.5 | 0.87 (0.76 to 0.94) | 0.06 ± 1.12 | -2.2 to 2.29 | Yes / No |
| Vanderlei et al. 2008 | Supine  60% VO2 max | 1.9 ± 1.0  5.1 ± 2.3 | 1.94 ± 1.0  5.0 ± 2.3 | 0.98 (0.95 to 0.99)  0.94 (0.83 to 0.98) | -  - | -  - | Yes  Yes |
| Gamelin et al. 2006 | Supine  Stand | 1.2 ± 1.2  6.8 ± 7.3 | 1.3 ± 1.2  6.8 ± 7.3 | 0.99  0.98 | -0.02 ± 0.08  -0.03 ± 0.41 | -0.18 to 0.13  -0.85 to 0.78 | Yes / Yes  Yes / Yes |

Where feasible non-reported data were calculated from available data presented by authors to provide more comprehensive comparisons. ¥ Back transformed data from Ln10, # median;