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| **Supplementary material 1. Summary of revisions to PEAKS-NQ**  |
|  | B | C | D | E | F | Total |
| Original number of questions | 13 | 36 | 14 | 13 | 7 | 83 |
| Original score  | 13 | 41 | 23 | 23 | 17 | 117 |
| Questions removed |  |  |  |  |  |  |
| Question too easy | 7 | 11 | - | - | - | 18 |
| Outfit/Infit | - | 1 | - | - | - | 1 |
| DIF | - | 1 | - | - | 1 | 2 |
| Relevance | - | - | 3 | 8 | 1 | 12 |
| Questions modified | - | 1 | 3 | 2 | 1 | 7 |
| Final number of questions | 6 | 23 | 11 | 5 | 5 | 50 |
| Final score  | 6 | 28 | 20 | 9 | 12 | 75 |

Table records only when the whole question is removed, not just options from the questions.

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| **Supplementary material 2. Summary of modifications to PEAKS-NQ** |
| Item label | Reason/s flagged | Outcome |
| B1 – Food group sort | Difficulty | Question removed |
| B2 – Food group sort | Difficulty | Question removed |
| B4 – Food group sort | Difficulty | Question removed |
| B6 – Food group sort | Difficulty | Question removed |
| B8 – Food group sort | Difficulty | Question removed |
| B10 – Food group sort | Difficulty | Question removed |
| B12 – Food group sort | Difficulty | Question removed |
| C3 – Macronutrient identification | Difficulty | Question removed |
| C4 – Macronutrient identification | Difficulty | Question removed |
| C6 – Macronutrient identification | Difficulty | Question removed |
| C7 – Macronutrient identification | Difficulty | Question removed |
| C9 – Macronutrient identification | Difficulty | Question removed |
| C10 – Macronutrient identification | Difficulty | Question removed |
| C11 – Macronutrient identification | Difficulty | Question removed  |
| C12 – Macronutrient identification | Difficulty | Question removed |
| C24 – Micronutrient roles | OMNSQ = 1.49; DC = -1.72; p = 0.01 | Question removed |
| C25 – Micronutrient roles | DC = 4.07; p= 0.03 | Question removed |
| C26D – Identifying healthy fats | OMNSQ = 1.54 | Retained |
| C26E – Identifying healthy fats | OMNSQ = 1.72 | Retained |
| C26F – Identifying healthy fats | DC = 2.68; p = 0.01 | Retained |
| C27 – Iron sources | Difficulty | Question removed |
| C29 – Iron sources | OMNSQ = 1.73 | Retained |
| C31 – Calcium sources | Difficulty | Question removed |
| C33 – Fibre sources | Difficulty | Question removed |
| C36D – Enhancing iron absorption | OMNSQ = 1.95; IMNSQ = 1.53; PMC = -0.05; DC = -1.87; p < 0.01 | Modified – option changed |
| C36E – Enhancing iron absorption | DC = -1.31; p < 0.01 | Retained |
| C39 – Daily carbohydrate recommendations  | Relevance | Question removed |
| C40 – CHO recommendations during training | Relevance | Question removed |
| D1A – Nutrients for recovery | OMNSQ = 1.57 | Modified – Option removedQuestion retained |
| D1B – Nutrients for recovery | OMNSQ = 1.56; DC = -1.43; p < 0.01 | Modified – Picture changed |
| D1C – Nutrients for recovery  | OMNSQ = 1.61 | Modified – Picture changed |
| D2 – Rapid recovery recommendations | OMNSQ = 2.29; DC = 4.09; p < 0.01 | Modified – Question wording changed  |
| D3B – Inadequate CHO symptoms | OMNSQ = 1.69; DC = -2.00; p < 0.01 | Modified – Question wording changed  |
| D3C – Inadequate CHO symptoms | DC = -1.16; p = 0.01 | Modified –Option removedQuestion retained |
| D3H – Inadequate CHO symptoms | OMNSQ = 3.12; PMC = -0.04; DC = -2.76; p < 0.01 | Modified –Option removedQuestion retained |
| D4 – Fuelling for endurance exercise | Relevance | Question removed |
| D8A – Gaining lean body mass  | DC = 3.35; p < 0.01 | Retained |
| D9A – Gaining lean body mass | DC = 2.01; p = 0.01 | Retained |
| E1 – Pre-competition fuelling | Relevance | Question removed |
| E3D – Assessing hydration | OMNSQ = 2.16; DC = -1.86; p < 0.01 | Modified – Option removed |
| E5E – Fluid replacement choices | OMNSQ = 2.27; IMNSQ = 1.88; PMC = -0.34; DC = -4.43; p < 0.01 | Modified – Question wording changed |
| E6 – Sports drink concentration | Relevance | Question removed |
| E7 – Post exercise rehydration | DC = 2.24; p = 0.01 | Retained |
| E8 – Travel nutrition | Relevance | Question removed |
| E8F | OMNSQ = 2.64; PMC = -0.04; DC = =1.98; p = 0.03 |
| E9 – Travel nutrition | Relevance | Question removed |
| E10 – Pre-competition meals 1 | Relevance | Question removed |
| E11 – Pre-competition meals 2 | Relevance | Question removed |
| E12 – Pre-competition meals 3 | Relevance | Question removed |
| E13 – Pre-competition meals 4 | Relevance | Question removed |
| F4 – Supplement risk |  | Question removed |
| F4A  | OMNSQ = 2.24; DC = -1.36; p < 0.01 |
| F4B | OMNSQ = 2.63; IMNSQ = 1.41; DC = -1.67; p < 0.01 |
| F4C | OMNSQ = 2.31; DC = -2.14; p < 0.01 |
| F4D | OMNSQ = 2.53; IMNSQ = 1.41; PMC = -0.04; DC = -1.56; p < 0.01 |
| F5 – RED-S |  | Modified – Options removedQuestion retained |
| F5B | OMNSQ = 2.09; DC = -1.86; p < 0.01 |
| F5E | DC = -2.14; p < 0.01 |
| F6 – Nutrition for extreme environments | Relevance | Question removed |
| F6C | DC = -1.35; p < 0.01 |
| F6D | DC = -1.29; p < 0.01 |

DIF, differential item functioning, DC, DIF contrast, OMNSQ, outfit mean square, IMNSQ, infit mean square, PMC, point measure correlation, CHO, carbohydrates

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| **Supplementary material 3. Summary of items identified by further Rasch analysis** |
| Item label | Reason/s flagged |
| Items retained from initial analysis and requires further evaluation in future studies |
| C26D – Identifying healthy fats | OMNSQ = 1.70; DC = -1.53; p = 0.03 |
| C26E – Identifying healthy fats | OMNSQ = 2.02 |
| C26F – Identifying healthy fats | DC = 2.47; p = 0.02 |
| C29 – Iron sources | OMNSQ = 2.02; DC = -2.46; p < 0.01 |
| C36E – Enhancing iron absorption | OMNSQ – 1.56; DC = -1.54; p < 0.01 |
| D1C – Nutrients for recovery | OMNSQ – 1.67 |
| D6D – Losing fat  | DC = -1.21; p = 0.05 |
| D8A – Gaining lean body mass | DC = 3.14; p < 0.01 |
| E3B – Assessing hydration | OMNSQ = 1.89 |
| Items that have had modifications made since initial analysis that require further evaluation |
| C36D – Enhancing iron absorption | OMNSQ = 2.19; IMNSQ = 1.67; PMC = -0.05; DC = -2.11; p = <0.01 |
| D1B – Nutrients for recovery | OMNSQ = 1.70; IMNSQ = 1.47; DC = -1.66; p < 0.01 |
| D2 – Rapid recovery recommendations | OMNSQ = 3.00; DC = -2.39; p < 0.01 |
| D3B – Inadequate CHO symptoms | OMNSQ = 1.90; DC = -2.24; p < 0.01 |
| E5E – Fluid replacement choices | OMNSQ = 2.61; IMNSQ = 2.03; PMC = -0.34DC = -4.68; p = <0.01 |
| Items not identified in initial analysis and require future investigation |
| E3A – Assessing hydration | OMNSQ = 1.67 |
| F7C – Nutrition for extreme heat | OMNSQ = 1.50 |

DIF, differential item functioning, DC, DIF contrast, OMNSQ, outfit mean square, IMNSQ, infit mean square, PMC, point measure correlation, CHO, carbohydrates

The original PCA of residuals showed that 69.2% of raw variance was explained by the principal component with an Eigenvalue of 8.85 in the first contrast compared to the second PCA of residuals which demonstrated that 70.2% of raw variance was explained by the principal component with an Eigenvalue of 6.13 in the first contrast. The Eigenvalue corresponds to the number of items that may potentially measure a different construct(1, 2). The Eigenvalue is acceptable given the large number of items in the Rasch analysis, as only a very small proportion of items may measure a secondary construct.

1. Linacre JM. A User's Guide to W I N S T E P S® M I N I S T E P Rasch-model computer programs. Program manual 4.0.0. 2017. Report No.: 0-941938-03-4.

2. Rasch measurement applications in quantitative educational research. 1st ed. 2020. ed. Khine MS, editor. Singapore: Springer Singapore; 2020.