

Additional File 1 – Summary of Fit Statistics for the Initial to Final Model of the SF-HDQ Domains

| Model | Description | Number of Items | Sample Size | Item Thresholds Ordered | X ² Fit Statistic (degrees of freedom; p value) <i>Ideal not significant</i> | Cronbach's alpha <i>Ideal ≥0.70</i> | Person Separation Index (PSI) <i>Ideal ≥0.70</i> | Items with Fit Residuals (>+/-2.5) with significance after Bonferroni adjustment (0.05/# items in original domain) Item (Fit residual) | Unidimensionality (Proportion of t-tests significant) <i>Ideal ≤5%</i> | Differential Item Functioning (DIF) |
|--|--|-----------------|-------------|---|--|--|---|---|---|-------------------------------------|
| PHYSICAL DOMAIN | | | | | | | | | | |
| Initial Model 1 | All 20 items in the original domain | 20 items | 1010 | 3 items disordered HDQ3, HDQ8, HDQ15 | 476 (df:180; p=0.00) | 0.903 | 0.869 | Not assessed | Not assessed | Not assessed |
| Model 5 | Rescored HDQ3 ^a HDQ8 ^a Deleted HDQ15 because rescoring nonsensical | 19 items | 1010 | All items ordered | 511 (df:171; P<0.001) | 0.899 | 0.867 | 4 items HDQ9 (9.71) HDQ12 (-3.32) HDQ13 (-3.174) HDQ8 (-2.64) HDQ2 (3.68) ^c | Not assessed | Not assessed |
| Model 10 | Deleted HDQ9 HDQ2 HDQ12 HDQ8 HDQ13 | 14 items | 999 | All items ordered | 196 (df:126; P<0.001) | 0.877 | 0.827 | None | 3.1% | No DIF |
| Added HDQ13 (muscle cramps) back into model because this item was not correlated highly with aches or pains (maybe distinct) but not similar enough to merge with HDQ14 I have stomach cramps. | | | | | | | | | | |
| Model 13 | Deleted HDQ18 HDQ19 HDQ16 | 12 items | 982 | All items ordered | 179 (df: 108; p<0.001) | 0.872 | 0.818 | HDQ17 (3.08) ^c (trouble sleeping) retained because item considered clinically important. | 0.61% | No DIF |
| Model 18 FINAL | Deleted HDQ14 HDQ6 HDQ16 | 10 items | 981 | All items ordered | 154 (df: 90; p<0.001) | 0.848 | 0.790 | None | 0.41% | No DIF |

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|--------------------------------|--|-----------------|-------------|-------------------------|--|--|---|---|---|-------------------------------------|
| COGNITIVE DOMAIN | | | | | | | | | | |
| Initial & Final | No changes to 3 items in original domain | 3 items | 730 | All items ordered | 76 (df: 21; p<0.001) | 0.710 | 0.776 | HDQ21 (2.76) ⁱ | 1.23% | No DIF |
| MENTAL-EMOTIONAL DOMAIN | | | | | | | | | | |
| Initial Model 1 | All 11 items in original domain | 11 items | 967 | All items ordered | 360 (df: 99; p<0.001) | 0.928 | 0.891 | HDQ28 (10.90) HDQ33 (-5.07) HDQ29 (-5.00) HDQ30 (-3.81) HDQ34 (3.07) | 3.93% | HDQ34 (country) |
| Model 6 | Deleted HDQ28 HDQ33 HDQ29 HDQ34 HDQ30 | 6 items | 918 | All items ordered | 67 (df: 54; p=0.11) ^c | 0.868 | 0.810 | HDQ31 (3.02) ^c | 1.63% | No DIF |
| Model 7 FINAL | Deleted HDQ31 (large residual although not statistically significant; but determined not clinically important) | 5 items | 903 | All items ordered | 54 (df: 45; p=0.17) ^d | 0.849 | 0.792 | None | 1.14% | No DIF |

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|---------------------------|--|-----------------|-------------|---|--|--|---|---|---|--|
| UNCERTAINTY DOMAIN | | | | | | | | | | |
| Initial Model 1 | All 14 original items in the model | 14 items | 995 | 5 items disordered HDQ42 HDQ43 HDQ45 HDQ47 HDQ48 | 544 (df: 126; p<0.001) | 0.918 | 0.899 | Not assessed | Not assessed | Not assessed |
| Model 12 | Rescored ^a HDQ43 HDQ45 Deleted HDQ42 HDQ47 HDQ48 as rescoring nonsensical | 11 items | 977 | All items ordered | 381 (df: 99; p<0.001) | 0.906 | 0.885 | HDQ46 (7.64) HDQ44 (6.91) HDQ37 (-5.53) HDQ38 (-4.71) HDQ35 (-4.61) HDQ36 (-2.66) | 9.72% | Not assessed |
| Model 15 | Deleted HDQ46 HDQ44 HDQ45 (largest residual) | 8 items | 947 | All items ordered | 235 (df: 72; p<0.001) | 0.896 | 0.871 | HDQ40 (5.21) HDQ43 (4.56) HDQ37 (-5.01) HDQ38 (-3.56) HDQ35 (-2.60) | 2.53% | HDQ40 (country) (likely attributed to more Irish working compared with CAD participants) |
| Model 17 | Deleted HDQ40 HDQ37 | 6 items | 931 | All items ordered | 84 (df: 54; p=0.006) | 0.860 | 0.817 | HDQ38 (-3.19) | 2.26% | No DIF |
| Model 18 | Deleted HDQ38 | 5 items | 925 | All items ordered | 75 (df: 45; p=0.003) | 0.818 | 0.761 | None | 1.62% | No DIF |
| Model 19 | Added HDQ38 back into model Deleted HDQ43 | 5 items | 921 | All items ordered | 58 (df: 45; p=0.09) ^d | 0.844 | 0.796 | None | 2.17% | No DIF |

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|---|--|-----------------|-------------|-------------------------|--|--|---|---|---|--|
| We went back to Model 15 (8 items) to explore an alternate 5 item combination for better model fit. | | | | | | | | | | |
| Model 23 | Deleted HDQ37 HDQ43 not considered as clinically relevant in current state of combination ART | 6 items | 936 | All items ordered | 97 (df: 54; p<0.001) | 0.860 | 0.825 | None | 0.85% | HDQ40 (country) Significant DIF but not >1.0 logit difference (likely attributed to more Irish working compared with CAD participants). |
| Model 24 FINAL | Deleted HDQ38 | 5 items | 930 | All items ordered | 59 (df: 45; p=0.10) ^d | 0.823 | 0.780 | None | 1.72% | HDQ40 (country) >1.0 logit difference and item considered clinically important (likely attributed to more Irish working compared with CAD participants) |
| DIFFICULTIES WITH DAY-TO-DAY ACTIVITIES DOMAIN | | | | | | | | | | |
| Initial Model 1 | All 9 original items in the model | 9 items | 753 | All items ordered | 295 (df: 81; p<0.001) | 0.881 | 0.796 | HDQ56 (8.02) ^e HDQ52 (-4.79) HDQ55 (-4.50) HDQ53 (-3.44) ^c | 3.85% | Not assessed |
| Model 3 | Deleted HDQ56 ^e HDQ52 | 7 items | 701 | All items ordered | 81 (df: 63; p=0.06) ^c | 0.857 | 0.775 | None | 5.28% | No DIF |
| Model 4 | Deleted HDQ51 | 6 items | 679 | All items ordered | 105 (df: 54; p<0.001) | 0.833 | 0.735 | None | 5.15% | No DIF |
| Model 9 - FINAL | Deleted HDQ57 ^f | 5 items | 675 | All items ordered | 77 (df: 45; p=0.002) | 0.795 | 0.690 | None | 0.74% | No DIF |

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|----------------------|---|-----------------|-------------|--------------------------------------|--|--|---|---|---|--|
| SOCIAL DOMAIN | | | | | | | | | | |
| Initial Model 1 | All 12 items in the model | 12 items | 966 | 2 items disordered HDQ63 HDQ67 | 337 (df: 108; p<0.001) | 0.903 | 0.862 | HDQ67 (6.22) HDQ68 (-5.18) HDQ66 (-5.07) HDQ64 (4.96) HDQ59 (-3.77) | Not assessed | Not assessed |
| Model 4 | Rescored HDQ63 ^b HDQ67 ^b | 12 items | 966 | All items ordered | 306 (df: 108; p<0.001) | 0.898 | 0.862 | HDQ64 (6.06) HDQ68 (-4.17) HDQ66 (-4.32) HDQ59 (-3.92) | Not assessed | Not assessed |
| Model 7 | Deleted HDQ64 HDQ59 HDQ66 | 9 items | 986 | All items ordered | 182.24 (df: 81; p<0.001) | 0.856 | 0.806 | HDQ60 (-2.70) HDQ68 (-2.59) | 4.18% | HDQ65 (country) HDQ67 (country) |
| Model 16 - FINAL | Deleted HDQ60 HDQ61 | 7 items | 943 | All items ordered | 87 (df: 63; p=0.03) | 0.794 | 0.745 | HDQ68 (-3.14) ^g | 1.27% | HDQ63 (country) ^h HDQ65 (country) ^h HDQ69 (country) ^h |

Notes: Sample size varied as we omitted extreme values from model analyses.

^a Items rescored to 4 categories;

^b Items rescored to 3 categories;

^c Item has absolute F value fit residual >2.5, but not significant with Bonferroni adjustment for that domain. Items listed in order of descending absolute F value

^d Model fit X² test - p value not significant (indication of model fit) – achieved for mental-emotional and uncertainty domains;

^e HDQ56 (trouble keeping track of finances) – deleted this item; item severity may be due to item interpreted as financial insecurity rather than ability to keep track of finances as daily activity as intended by the item;

^f HDQ57 (trouble getting around, such as driving or taking public transportation) - Deleted because large DIF in graph analysis for country and this item could be considered captured with HDQ55 (trouble getting out to do errands) because one may need to get around in order to conduct errands;

^g HDQ68 (tend to isolate self from others) retained because subsequent model with this item deleted demonstrated worse fit (lower PSI);

^h DIF for country (HDQ63: housing; HDQ65: find it hard to ask others for help; HDQ69: find it hard to take part in leisure or recreational activities). Items retained given clinical importance and expected cultural differences between samples of Canadian and Irish participants;

ⁱ HDQ21 – Significant Residual >2.5: retained this item because the cognitive domain has a minimum of 3 items.