

Appendix F. Differential Item Functioning of PROMIS-PLUS Heart Failure Items by Domain and Condition, Cross-sectional Sample

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Overview of Patient-Reported Outcome Measurement Information System (PROMIS)-PLUS Osteoarthritis of the Knee domain tables in this Appendix:

1. Ability to Engage in SRA
2. Depression
3. Fatigue
4. Pain Interference
5. Physical Function
6. Satisfaction with SRA
7. Sleep Disturbance

Note: Only domains with four or more items were analyzed here.

Appendix F, Table 1: Differential Item Functioning of Ability to Participate in Social Roles and Activities Domain, OA-K cross-sectional sample

Items	Chi ² Values		McFadden Pseudo R ² Change Value		DIF Interpret.
	Uniform Model 1 v 2	Non-uniform Model 2 v 3	Uniform Model 1 v 2	Non-uniform Model 2 v 3	
Sex (male vs. female)					
I have trouble accomplishing my usual work (include work at home)	0.572	0.280	0.000	0.001	No
I have trouble doing everything for work that I want to do (include work at home)	0.469	0.890	0.000	0.000	No
I have to limit social activities at home	0.002	0.145	0.006	0.001	No
I have to limit social activities outside my home	0.531	0.019	0.000	0.003	No
I have trouble participating in recreational activities with others	0.003	0.118	0.005	0.002	No
I have trouble doing all the leisure activities with others that I want to do	0.310	0.027	0.001	0.003	No
I have trouble doing all of the work that is really important to me (include work at home)	0.655	0.127	0.000	0.001	No
I have trouble doing all of the work that I feel I should do (include work at home)	0.686	0.238	0.000	0.001	No
Age (≤55 vs. >55)					
I have trouble accomplishing my usual work (include work at home)	0.451	0.243	0.000	0.001	No
I have trouble doing everything for work that I want to do (include work at home)	0.807	0.809	0.000	0.000	No
I have to limit social activities at home	0.013	0.327	0.004	0.001	No
I have to limit social activities outside my home	0.050	0.151	0.002	0.001	No

Items	Chi ² Values		McFadden Pseudo R ² Change Value		DIF Interpret.
	Uniform Model 1 v 2	Non-uniform Model 2 v 3	Uniform Model 1 v 2	Non-uniform Model 2 v 3	
Age (≤ 55 vs. >55) - continued					
I have trouble participating in recreational activities with others	0.011	0.827	0.004	0.000	No
I have trouble doing all the leisure activities with others that I want to do	0.422	0.496	0.000	0.000	No
I have trouble doing all of the work that is really important to me (include work at home)	0.151	0.483	0.001	0.000	No
I have trouble doing all of the work that I feel I should do (include work at home)	0.505	0.563	0.000	0.000	No
Education (completed college or not)					
I have trouble accomplishing my usual work (include work at home)	0.733	0.479	0.000	0.000	No
I have trouble doing everything for work that I want to do (include work at home)	0.538	0.614	0.000	0.000	No
I have to limit social activities at home	0.039	0.529	0.003	0.000	No
I have to limit social activities outside my home	0.174	0.868	0.001	0.000	No
I have trouble participating in recreational activities with others	0.034	0.438	0.003	0.000	No
I have trouble doing all the leisure activities with others that I want to do	0.844	0.670	0.000	0.000	No
I have trouble doing all of the work that is really important to me (include work at home)	0.366	0.150	0.001	0.001	No
I have trouble doing all of the work that I feel I should do (include work at home)	0.131	0.665	0.002	0.000	No

Abbreviation: DIF is Differential Item Functioning, Interpret. is Interpretation. Models: Model 1 = ability explanatory term only; Model 2 = ability + group explanatory terms; Model 3 = ability + group + ability-by-group interaction explanatory terms.

Appendix F, Table 2: Differential Item Functioning of Depression Domain, OA-K cross-sectional sample

Items	Chi ² Values		McFadden Pseudo R ² Change Value		DIF Interpret.
	Uniform Model 1 v 2	Non-uniform Model 2 v 3	Uniform Model 1 v 2	Non-uniform Model 2 v 3	
Sex (male vs. female)					
In the past 7 days, I felt depressed	0.300	0.602	0.001	0.000	No
In the past 7 days, I felt unhappy	0.800	0.937	0.000	0.000	No
In the past 7 days, I withdrew from other people	0.019	0.560	0.003	0.000	No
In the past 7 days, I felt lonely	0.235	0.452	0.001	0.000	No
Age (≤55 vs. >55)					
In the past 7 days, I felt depressed	0.120	0.124	0.001	0.001	No
In the past 7 days, I felt unhappy	0.060	0.030	0.002	0.003	No
In the past 7 days, I withdrew from other people	0.085	0.640	0.002	0.000	No
In the past 7 days, I felt lonely	0.729	0.985	0.000	0.000	No
Education (completed college or not)					
In the past 7 days, I felt depressed	0.840	0.085	0.000	0.002	No
In the past 7 days, I felt unhappy	0.565	0.445	0.000	0.000	No
In the past 7 days, I withdrew from other people	0.571	0.167	0.000	0.001	No
In the past 7 days, I felt lonely	0.873	0.562	0.000	0.000	No

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Appendix F, Table 3: Differential Item Functioning of Fatigue Domain, OA-K cross-sectional sample

Items	Chi ² Values		McFadden Pseudo R ²		DIF Interpret.
	Uniform	Non-uniform	Uniform	Non-uniform	
	Model 1 v 2	Model 2 v 3	Model 1 v 2	Model 2 v 3	
Sex (male vs. female)					
In the past 7 days, how often did you experience extreme exhaustion?	0.228	0.636	0.001	0.000	No
In the past 7 days, how often did you feel tired even when you hadn't done anything?	0.610	0.457	0.000	0.000	No
In the past 7 days, how often were you bothered by your fatigue?	0.996	0.547	0.000	0.000	No
In the past 7 days, how often did you have to push yourself to get things done because of your fatigue?	0.058	0.124	0.002	0.001	No
In the past 7 days, how often did your fatigue make you feel less alert?	0.274	0.012	0.001	0.004	No
In the past 7 days, how often were you too tired to leave the house?	0.672	0.695	0.000	0.000	No
During the past 7 days: I have to limit my social activity because I am tired	0.024	0.035	0.003	0.003	No
During the past 7 days: I feel fatigued	0.170	0.568	0.001	0.000	No
Age (≤55 vs. >55)					
In the past 7 days, how often did you experience extreme exhaustion?	0.016	0.888	0.003	0.000	No
In the past 7 days, how often did you feel tired even when you hadn't done anything?	0.043	0.858	0.003	0.000	No
In the past 7 days, how often were you bothered by your fatigue?	0.270	0.875	0.001	0.000	No
In the past 7 days, how often did you have to push yourself to get things done because of your fatigue?	0.232	0.429	0.001	0.000	No

Items	Chi ² Values		McFadden Pseudo R ²		DIF Interpret.
	Uniform	Non-uniform	Uniform	Non-uniform	
	Model 1 v 2	Model 2 v 3	Model 1 v 2	Model 2 v 3	
Age (≤55 vs. >55) - continued					
In the past 7 days, how often did your fatigue make you feel less alert?	0.312	0.411	0.001	0.000	No
In the past 7 days, how often were you too tired to leave the house?	0.184	0.716	0.001	0.000	No
During the past 7 days: I have to limit my social activity because I am tired	0.190	0.207	0.001	0.001	No
During the past 7 days: I feel fatigued	0.394	0.414	0.000	0.000	No
Education (completed college or not)					
In the past 7 days, how often did you experience extreme exhaustion?	0.306	0.075	0.001	0.002	No
In the past 7 days, how often did you feel tired even when you hadn't done anything?	0.007	0.388	0.004	0.001	No
In the past 7 days, how often were you bothered by your fatigue?	0.171	0.021	0.001	0.003	No
In the past 7 days, how often did you have to push yourself to get things done because of your fatigue?	0.739	0.506	0.000	0.000	No
In the past 7 days, how often did your fatigue make you feel less alert?	0.180	0.048	0.001	0.002	No
In the past 7 days, how often were you too tired to leave the house?	0.288	0.254	0.001	0.001	No
During the past 7 days: I have to limit my social activity because I am tired	0.054	0.045	0.002	0.002	No
During the past 7 days: I feel fatigued	0.243	0.186	0.001	0.001	No

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Appendix F, Table 4: Differential Item Functioning of Pain Interference Domain, OA-K cross-sectional sample

Items	Chi ² Values		McFadden Pseudo R ² Change Value		DIF Interpret.
	Uniform Model 1 v 2	Non-uniform Model 2 v 3	Uniform Model 1 v 2	Non-uniform Model 2 v 3	
Sex (male vs. female)					
In the past 7 days...					
How much did pain interfere with your enjoyment of life?	0.758	0.137	0.000	0.001	No
How much did pain interfere with your close personal relationships?	0.001	0.909	0.007	0.000	No
How much did pain interfere with your day to day activities?	0.144	0.661	0.001	0.000	No
How much did pain interfere with your ability to work (include work at home)?	0.983	0.729	0.000	0.000	No
How much did pain interfere with your ability to participate in social activities?	0.002	0.962	0.005	0.000	No
How much did pain interfere with your ability to remember things?	0.000	0.725	0.009	0.000	No
How irritable did you feel because of pain?	0.001	0.551	0.006	0.000	No
How often did pain prevent you from walking more than 1 mile?	0.001	0.376	0.006	0.000	No
How much did knee pain limit your daily activities?	0.176	0.299	0.001	0.001	No
How much did knee pain interfere with your walking?	0.234	0.483	0.001	0.000	No
How much did knee pain interfere with going up stairs?	0.000	0.830	0.009	0.000	No
How much did knee pain interfere with going down stairs?	0.081	0.109	0.002	0.001	No
How often did knee pain make you feel depressed?	0.563	0.651	0.000	0.000	No

Items	Chi ² Values		McFadden Pseudo R ² Change Value		DIF Interpret.
	Uniform Model 1 v 2	Non-uniform Model 2 v 3	Uniform Model 1 v 2	Non-uniform Model 2 v 3	
Age (≤55 vs. >55)					
In the past 7 days...					
How much did pain interfere with your enjoyment of life?	0.691	0.077	0.000	0.002	No
How much did pain interfere with your close personal relationships?	0.000	0.372	0.011	0.000	No
How much did pain interfere with your day to day activities?	0.307	0.831	0.001	0.000	No
How much did pain interfere with your ability to work (include work at home)?	0.522	0.279	0.000	0.001	No
How much did pain interfere with your ability to participate in social activities?	0.944	0.163	0.000	0.001	No
How much did pain interfere with your ability to remember things?	0.000	0.563	0.033	0.000	No
How irritable did you feel because of pain?	0.000	0.850	0.011	0.000	No
How often did pain prevent you from walking more than 1 mile?	0.000	0.048	0.022	0.002	No
How much did knee pain limit your daily activities?	0.001	0.758	0.006	0.000	No
How much did knee pain interfere with your walking?	0.085	0.291	0.002	0.001	No
How much did knee pain interfere with going up stairs?	0.075	0.573	0.002	0.000	No
How much did knee pain interfere with going down stairs?	0.055	0.201	0.002	0.001	No
How often did knee pain make you feel depressed?	0.000	0.454	0.013	0.000	No

Items	Chi ² Values		McFadden Pseudo R ² Change Value		DIF Interpret.
	Uniform Model 1 v 2	Non-uniform Model 2 v 3	Uniform Model 1 v 2	Non-uniform Model 2 v 3	
Education (completed college or not)					
In the past 7 days...					
How much did pain interfere with your enjoyment of life?	0.229	0.480	0.001	0.000	No
How much did pain interfere with your close personal relationships?	0.034	0.892	0.003	0.000	No
How much did pain interfere with your day to day activities?	0.649	0.032	0.000	0.003	No
How much did pain interfere with your ability to work (include work at home)?	0.238	0.801	0.001	0.000	No
How much did pain interfere with your ability to participate in social activities?	0.004	0.243	0.005	0.001	No
How much did pain interfere with your ability to remember things?	0.000	0.409	0.010	0.000	No
How irritable did you feel because of pain?	0.997	0.051	0.000	0.002	No
How often did pain prevent you from walking more than 1 mile?	0.000	0.099	0.013	0.002	No
How much did knee pain limit your daily activities?	0.319	0.545	0.001	0.000	No
How much did knee pain interfere with your walking?	0.001	0.731	0.006	0.000	No
How much did knee pain interfere with going up stairs?	0.051	0.511	0.002	0.000	No
How much did knee pain interfere with going down stairs?	0.898	0.794	0.000	0.000	No
How often did knee pain make you feel depressed?	0.326	0.925	0.001	0.000	No

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Appendix F, Table 5: Differential Item Functioning of Physical Function Domain, OA-K cross-sectional sample

Items	Chi ² Values		McFadden Pseudo R ² Change Value		DIF Interpret.
	Uniform	Non-uniform	Uniform	Non-uniform	
	Model 1 v 2	Model 2 v 3	Model 1 v 2	Model 2 v 3	
Sex (male vs. female)					
Are you able to go for a walk of at least 15 minutes?	0.998	0.738	0.000	0.000	No
Are you able to walk a block (about 100 m) on flat ground?	0.340	0.192	0.001	0.001	No
Are you able to run 100 yards (100 m)?	0.000	0.153	0.015	0.001	No
Does your health now limit you in climbing one flight of stairs?	0.110	0.780	0.002	0.000	No
Are you able to stand unsupported for 10 minutes?	0.026	0.410	0.003	0.000	No
Are you able to walk at a normal speed?	0.947	0.929	0.000	0.000	No
Are you able to sit on and get up from the toilet?	0.000	0.204	0.013	0.001	No
Does your health now limit you in walking more than a mile (1.6 km)?	0.007	0.112	0.004	0.001	No
Are you able to straighten your knee?	0.000	0.787	0.013	0.000	No
Are you able to bend your knee?	0.003	0.100	0.006	0.002	No
Does your knee condition limit you in walking on uneven ground?	0.146	0.256	0.002	0.001	No
I use a cane, walker, or other support to prevent a fall.	0.038	0.468	0.002	0.000	No
My concern about falling limits the things I can do.	0.084	0.069	0.002	0.002	No
Age (≤55 vs. >55)					
Are you able to go for a walk of at least 15 minutes?	0.226	0.474	0.001	0.000	No
Are you able to walk a block (about 100 m) on flat ground?	0.023	0.036	0.003	0.003	No
Are you able to run 100 yards (100 m)?	0.000	0.621	0.026	0.000	No
Does your health now limit you in climbing one flight of stairs?	0.829	0.158	0.000	0.001	No
Are you able to stand unsupported for 10 minutes?	0.794	0.084	0.000	0.002	No
Are you able to walk at a normal speed?	0.058	0.848	0.002	0.000	No
Are you able to sit on and get up from the toilet?	0.000	0.016	0.013	0.004	No
Does your health now limit you in walking more than a mile (1.6 km)?	0.000	0.414	0.014	0.000	No
Are you able to straighten your knee?	0.000	0.029	0.017	0.003	No
Are you able to bend your knee?	0.000	0.006	0.015	0.005	No
Does your knee condition limit you in walking on uneven ground?	0.102	0.558	0.002	0.000	No
I use a cane, walker, or other support to prevent a fall.	0.007	0.577	0.004	0.000	No
My concern about falling limits the things I can do.	0.877	0.182	0.000	0.001	No

Items	Chi ² Values		McFadden Pseudo R ²		DIF Interpret.
	Uniform	Non-uniform	Uniform	Non-uniform	
	Model 1 v 2	Model 2 v 3	Model 1 v 2	Model 2 v 3	
Education (completed college or not)					
Are you able to go for a walk of at least 15 minutes?	0.114	0.945	0.002	0.000	No
Are you able to walk a block (about 100 m) on flat ground?	0.091	0.555	0.002	0.000	No
Are you able to run 100 yards (100 m)?	0.000	0.902	0.019	0.000	No
Does your health now limit you in climbing one flight of stairs?	0.585	0.459	0.000	0.000	No
Are you able to stand unsupported for 10 minutes?	0.012	0.079	0.004	0.002	No
Are you able to walk at a normal speed?	0.639	0.933	0.000	0.000	No
Are you able to sit on and get up from the toilet?	0.000	0.326	0.010	0.001	No
Does your health now limit you in walking more than a mile (1.6 km)?	0.000	0.625	0.013	0.000	No
Are you able to straighten your knee?	0.115	0.818	0.002	0.000	No
Are you able to bend your knee?	0.085	0.784	0.002	0.000	No
Does your knee condition limit you in walking on uneven ground?	0.237	0.591	0.001	0.000	No
I use a cane, walker, or other support to prevent a fall.	0.001	0.272	0.007	0.001	No
My concern about falling limits the things I can do.	0.296	0.552	0.001	0.000	No

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Appendix F, Table 6: Differential Item Functioning of Satisfaction with Social Roles and Activities Domain, OA-K cross-sectional sample

Items	<u>Chi² Values</u>		<u>McFadden Pseudo R² Change</u>		DIF Interpret.
	Uniform	Non-uniform	Uniform	Non-uniform	
	Model 1 v 2	Model 2 v 3	Model 1 v 2	Model 2 v 3	
Sex (male vs. female)					
I am satisfied with how much work I can do (include work at home)	0.163	0.852	0.001	0.000	No
I am satisfied with my ability to do household chores/tasks	0.116	0.149	0.001	0.001	No
I am satisfied with my ability to socialize with friends	0.188	0.066	0.001	0.002	No
I am satisfied with my ability to do things for my family	0.852	0.825	0.000	0.000	No
I am satisfied with my ability to do the work that is really important to me (include work at home)	0.115	0.789	0.001	0.000	No
I am satisfied with my current level of social activity	0.804	0.665	0.000	0.000	No
I am satisfied with my ability to participate in family activities	0.023	0.166	0.003	0.001	No
I am satisfied with my ability to do things for fun outside my home	0.558	0.298	0.000	0.001	No
In the past 7 days... I am satisfied with my ability to do the activities that are important to me.	0.018	0.325	0.003	0.001	No
Age (≤55 vs. >55)					
I am satisfied with how much work I can do (include work at home)	0.002	0.683	0.005	0.000	No
I am satisfied with my ability to do household chores/tasks	0.311	0.639	0.001	0.000	No
I am satisfied with my ability to socialize with friends	0.155	0.312	0.001	0.001	No
I am satisfied with my ability to do things for my family	0.547	0.169	0.000	0.001	No
I am satisfied with my ability to do the work that is really important to me (include work at home)	0.002	0.596	0.005	0.000	No
I am satisfied with my current level of social activity	0.060	0.883	0.002	0.000	No

Items	Chi ² Values		McFadden Pseudo R ² Change		DIF Interpret.
	Uniform	Non-uniform	Uniform	Non-uniform	
	Model 1 v 2	Model 2 v 3	Model 1 v 2	Model 2 v 3	
Age (≤55 vs. >55) - continued					
I am satisfied with my ability to participate in family activities	0.057	0.081	0.002	0.002	No
I am satisfied with my ability to do things for fun outside my home	0.708	0.271	0.000	0.001	No
In the past 7 days... I am satisfied with my ability to do the activities that are important to me.	0.084	0.043	0.002	0.002	No
Education (completed college or not)					
I am satisfied with how much work I can do (include work at home)	0.349	0.999	0.001	0.000	No
I am satisfied with my ability to do household chores/tasks	0.657	0.648	0.000	0.000	No
I am satisfied with my ability to socialize with friends	0.389	0.294	0.000	0.001	No
I am satisfied with my ability to do things for my family	0.583	0.955	0.000	0.000	No
I am satisfied with my ability to do the work that is really important to me (include work at home)	0.046	0.871	0.002	0.000	No
I am satisfied with my current level of social activity	0.580	0.721	0.000	0.000	No
I am satisfied with my ability to participate in family activities	0.474	0.238	0.000	0.001	No
I am satisfied with my ability to do things for fun outside my home	0.902	0.499	0.000	0.000	No
In the past 7 days... I am satisfied with my ability to do the activities that are important to me.	0.247	0.953	0.001	0.000	No

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Appendix F, Table 7: Differential Item Functioning of Sleep Disturbance Domain, OA-K cross-sectional sample

Items	Chi ² Values		McFadden Pseudo R ² Change Value		DIF Interpret.
	Uniform Model 1 v 2	Non-uniform Model 2 v 3	Uniform Model 1 v 2	Non-uniform Model 2 v 3	
Sex (male vs. female)					
In the past 7 days...					
My sleep quality was...	0.188	0.683	0.001	0.000	No
I got enough sleep.	0.752	0.288	0.000	0.001	No
I had trouble sleeping.	0.243	0.361	0.001	0.001	No
My sleep was restful.	0.171	0.014	0.001	0.004	No
My sleep was restless.	0.509	0.519	0.000	0.000	No
It was easy for me to fall asleep.	0.045	0.028	0.002	0.003	No
Age (≤55 vs. >55)					
In the past 7 days...					
My sleep quality was...	0.674	0.676	0.000	0.000	No
I got enough sleep.	0.197	0.223	0.001	0.001	No
I had trouble sleeping.	0.480	0.727	0.000	0.000	No
My sleep was restful.	0.460	0.001	0.000	0.006	No
My sleep was restless.	0.625	0.227	0.000	0.001	No
It was easy for me to fall asleep.	0.008	0.103	0.004	0.002	No
Education (completed college or not)					
In the past 7 days...					
My sleep quality was...	0.199	0.263	0.001	0.001	No
I got enough sleep.	0.304	0.055	0.001	0.002	No
I had trouble sleeping.	0.055	0.180	0.002	0.001	No
My sleep was restful.	0.325	0.280	0.001	0.001	No
My sleep was restless.	0.893	0.083	0.000	0.002	No
It was easy for me to fall asleep.	0.744	0.918	0.000	0.000	No

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