Estimating Meaningful Change for the Impact of Weight on Self-Perception (IW-SP) Questionnaire Among People with Type 2 Diabetes

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INTRODUCTION

- Approximately 90% of patients with type 2 diabetes (T2D) are living with obesity or overweight.[1]
- The Impact of Weight on Self-Perception Questionnaire (IW-SP)[2] is a three-item patient-reported outcome measure of self-perception regarding body weight and has been used in clinical trials (**Figure 1**).
- While interpreting the meaningfulness of change on the IW-SP in trials is crucial, no minimally important difference (MID) estimate has been published.
- The objective of the current study was to estimate an MID for improvement in the IW-SP in patients with T2D by performing a secondary analysis of the SURPASS-2 trial data, a 40-week, randomized, open-label trial comparing the efficacy and safety of tirzepatide (5,10, or 15 mg) to semaglutide (1 mg) as an add-on to metformin in adults with type 2 diabetes.[3]

Methods

Study Design

- Analyses estimating an MID for the IW-SP used SURPASS-2 clinical trial data.
- The SURPASS-2 trial did not include a global scale regarding self-perception of body weight
- The current study used multiple exploratory anchors to gather a body of evidence supporting a meaningful change in the IW-SP.
- The exploratory anchors included weight loss and scales from conceptually related patient reported outcomes (PRO) used in the trial: the APPADL[4] and the IWQOL-Lite-CT.[5]
  - Both PROs have established MIDs in people living with either T2D or obesity:
    - APPADL = (6–14 points) and the IWQOL-Lite-CT[6] physical composite (13.5 points), physical function composite (14.6 points), psychosocial composite (16.2 points), and total score (16.6 points).

Figure 1. IW-SP

Impact of Weight on Self Perceptions (IW-SP)

The following questions ask about ways in which your weight may affect your self-perceptions. For each question, please mark the one option that best describes you.

	Never	Rarely	Sometimes	Frequently	Always
1. How often do you feel unhappy with your appearance due to your weight?	5	4	3	2	1
2. When going out in public, how often do you feel self-conscious due to your weight?	5	4	3	2	1
3. When comparing yourself to others, how often do you feel unhappy, due to your weight?	5	4	3	2	1

The IW-SP total scores are derived by summing the item scores and dividing by the number of items. The score can be transformed to a range from 0–100.
For permission to reproduce or use the IW-SP for free, please contact copyright@lilly.com.

- Two IWQOL-Lite-CT items measuring self-perception associated with body weight were also used as anchors:
  - **Item 7:** *I feel less confident because of my weight (never, rarely, sometimes, usually, always)*
  - **Item 20:** *I feel frustrated or upset with myself about my weight* (not at all true, a little true, moderately true, mostly true, completely true).
- Analyses were conducted in two stages: one to estimate IW-SP MID (2/3 of sample) and a second to confirm the estimate (1/3 of sample)
- Design notes:
  - Change = Baseline to Week 40 or end of trial (EOT)
  - As most participants in trial lost weight, only MID for improvement was estimated
  - All analyses are *post hoc* and pooled across treatment arms

Analyses

- The following anchors were included in the analyses based on content relevance, > 0.3 rho relationship with change in IW-SP, and lack of redundance with other anchors.
  - IW-SP improvement corresponding to existing MID estimates APPADL and the IWQOL-Lite-CT scales
  - A 1-point change for 2 individual **Item 7** and **Item 20** from the IWQOL-Lite-CT
  - IW-SP and other PRO change scores predicted by 10% weight loss
- Responsiveness assessed by ANCOVA models compared IW-SP change scores between participants with different degrees of anchor change using GLM
- Distribution-based approaches compared change scores to a measure of variability (1/2 SD) supported anchor-based methods
- Probability density function (PDF) plots were generated to visualize change scores across the range of anchor change
- Triangulation: derive a single IW-SP MID estimate by considering all of the findings of the anchor- and distribution- based analyses across estimation and confirmation stages

KEY RESULTS

- Triangulation
  - Both the estimation and confirmation stages converged on an IW-SP MID for improvement of 25-points transformed score, 1-point raw score (**Table 1**)
    - This corresponds to a one category improvement, on average, across each of the three IW-SP questions (**Figure 1**)
    - Distribution-based estimates were smaller than anchor-based estimates, but sufficiently close to be considered supportive
    - Visual representation in the form of cumulative distribution function (CDF) plots from the estimation stage also support the estimate (**Figure 2**)

Table 1. Triangulation: IW-SP Change Scores Corresponding to Minimally Important Difference[a] in Exploratory Anchors and Distribution-Based Analyses

Scale	Transformed Score Improvement (0–100 points)			IW-SP Raw Scale Units Improvement (1–5-point scale)			Total # of Response Categories Improved across all 3 items		
	Estimation	Confirmation	Difference	Estimation	Confirmation	Difference	Estimation	Confirmation	Difference
IWQOL-Lite-CT Physical[b]	16.8	16.7	0.1	0.67	0.67	0	2.03	2.03	0
IWQOL-Lite-CT Physical[b] Function	19.6	21.1	-1.5	0.78	0.84	-0.06	2.36	2.55	-0.19
IWQOL-Lite-CT Psychosocial[b,c]	20.8	22.3	-1.5	0.83	0.89	-0.06	2.52	2.7	-0.18
IWQOL-Lite-CT Total[b]	20.4	20.8	-0.4	0.82	0.83	-0.01	2.48	2.52	-0.04
IWQOL-Lite-CT Item #7[b,c]	22.6	25.9	-3.3	0.9	1.04	-0.14	2.73	3.15	-0.42
IWQOL-Lite-CT Item #20[b,c]	24.2	26.9	-2.7	0.97	1.08	-0.11	2.94	3.27	-0.33
APPADL Total	18.3	17.3	1	0.73	0.69	0.04	2.21	2.09	0.12
Distribution, 1/2 SD	15.03	15.3	-0.27	0.6	0.61	-0.01	1.82	1.85	-0.03
Weight Change (10%)[d]	15.7	19.1	-3.4	0.63	0.76	-0.13	1.91	2.3	-0.39
Mean (SD)	19.72 (3.0)	20.79 (4.2)	-1.07 (1.5)	0.79 (0.1)	0.83 (0.2)	-0.04 (0.1)	2.39 (0.4)	2.52 (0.5)	-0.13 (0.2)
Minimum Score	15.03	15.3	-3.3	0.6	0.61	-0.14	1.82	1.85	-0.42
Maximum Score	24.2	26.9	1	0.97	1.08	0.04	2.94	3.27	0.12

APPADL=Ability to Perform Physical Activities of Daily Living; IW-SP=Impact of Weight on Self-Perception Questionnaire; IWQOL-Lite-CT=Impact of Weight on Quality of Life-Lite Clinical Trials Version; MID=minimal important difference; SD=standard deviation; [a] Corresponding to 0.75 to <1.25 MID for scales, 1-point improvement for IWQOL Items #7 and #20, and half SD for distribution-based analysis; [b] Showed significant difference in responsiveness analysis between 0.75 to <1.25 MID vs. <0.25 MID; [c] Showed significant difference in responsiveness analysis between adjacent anchor categories: 0.75 to <1.25 MID vs. 0.25 to <.75 MID for the IWQOL-Lite-CT Psychosocial Scale; No change vs. 1-point improvement for the IWQOL-Lite-CT Items. [d] Weight Change included for reference, but not included in calculations as it did not meet a priori criteria for inclusion as anchor

Results

Sociodemographics

- N = 1,878: n = 1,252 in the estimation group and n = 626 in the confirmation group (**Table 2**)
- Estimation and confirmation groups were similar in terms of demographics (**Table 2**) and weight loss (**Table 3**)
- A descriptive summary of the changes in PRO and weight change variables is shown in **Table 3**.

Table 2: Sociodemographic and Clinical Characteristics for the Total Sample, MID Estimation Group, and MID Confirmation Group

	Total (N=1,878)	MID Estimation (N=1,252)	MID Confirmation (N=626)
Sex, n (%)			
Female	996 (53.0%)	661 (52.8%)	335 (53.5%)
Ethnicity, n (%)			
Hispanic or Latino	1317 (70.1%)	869 (69.4%)	448 (71.6%)
Not Hispanic or Latino	561 (29.9%)	383 (30.6%)	178 (28.4%)
Race, n (%)			
American Indian or Alaska native	208 (11.1%)	129 (10.3%)	79 (12.6%)
Asian	25 (1.3%)	16 (1.3%)	9 (1.4%)
Black or African American	79 (4.2%)	61 (4.9%)	18 (2.9%)
Native Hawaiian or other Pacific Islander	3 (0.2%)	1 (0.1%)	2 (0.3%)
White	1551 (82.6%)	1036 (82.7%)	515 (82.3%)
Multiple	12 (0.6%)	9 (0.7%)	3 (0.5%)
Age (Years), n (%)	56.6 (10.4)	56.5 (10.5)	56.7 (10.3)
Weight, n (%)	93.7 (21.9)	93.7 (22)	93.8 (21.6)
Baseline BMI, n (%)	34.2 (6.9)	34.1 (6.8)	34.5 (7.1)

A1C=glycated hemoglobin; BMI=body mass index; MID=minimal important difference

Table 3: Descriptive Summary of PRO and Weight Change[a] Scores

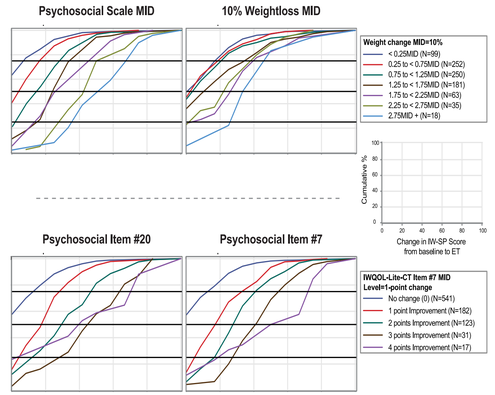
Score Change	Estimation		Confirmation	
	N	Mean Weight Change (SD)	N	Mean Weight Change (SD)
IW-SP Score	1200	10.0 (26.3)	603	11.7 (27.2)
IWQOL-Lite-CT Physical Scale	1197	8.7 (18.9)	602	9.7 (20.2)
IWQOL-Lite-CT Physical Function Scale	1197	9.5 (20.5)	602	10.6 (22.1)
IWQOL-Lite-CT Psychosocial Scale	1197	8.2 (18.3)	602	9.8 (20.2)
IWQOL-Lite-CT Total Score	1196	8.4 (16.9)	602	9.8 (18.5)
APPADL Score	1199	5.8 (17.7)	602	6.3 (19.4)
IWQOL-Lite-CT Item #7	1197	-0.3 (1.1)	602	-0.4 (1.1)
IWQOL-Lite-CT Item #20	1195	-0.3 (1.2)	602	-0.5 (1.2)
Weight (KG, % Change)	1188	-9.0 (7.4)	598	-9.9 (7.3)

APPADL = Ability to Perform Physical Activities of Daily Living; IW-SP = Impact of Weight on Self-Perception; IWQOL-Lite-CT = Impact of Weight on Quality of Life-Lite Clinical Trials Version; MID = minimal important difference; PRO = patient-reported outcome; SD = standard deviation; [a] Baseline to EOT

Responsiveness and Meaningful Change Analyses

- Responsiveness
  - Most change was in the expected direction for both estimation and confirmation analyses, showing self-perception regarding weight improved as anchor categories improved or as weight was lost.
  - Significant omnibus effects (i.e., across all groups) were shown for all anchoring scales for both estimation and confirmation groups
  - Comparisons of the smallest possible change category differences were significant only when using conceptually related scales as anchors: the IWQOL-Lite-CT Psychosocial Scale and the 2 individual items comprising that scale.

Figure 2. CDFs for Impact of Weight on Self Perception (IW-SP)



References:

1. CDC. National Diabetes Statistics Report, 2017: Estimates of Diabetes and Its Burden in the United States. https://stacks.cdc.gov/view/cdc/46743. Published 2017. Accessed: 14 March 2023.
2. Hayes RP, DeLozier AM. *Diabetes Technol Ther*. 2015;17(3):210-214.
3. Frias JP, et al. *N Engl J Med.* 2021;385(6):503-515. NCT03987919
4. Hayes RP, et al. *Diabetes Technol Ther.* 2012;14(12):1118-1125.
5. Kolotkin RL, et al. *Clin Obes.* 2017;7(5):290-299.
6. Kolotkin RL, et al. *Clin Obes*. 2021;11(5):e12477.

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