



SKIN-Q©

A User's Guide for Researchers and Clinicians

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1. What is the SKIN-Q?

The SKIN-Q is a rigorously developed patient-reported outcome measure (PROM) that can be used to precisely measure patient satisfaction with any form of minimally invasive aesthetic treatment from the patient perspective [1]. The SKIN-Q can be used to evaluate outcomes for aesthetic treatments that aim to tighten, slim, reshape, and/or rejuvenate the appearance of the skin on different parts of the face and body.

The SKIN-Q includes two item libraries. One item library includes 58 items that measure satisfaction with how the skin *looks*. The other item library includes 22 items that measure satisfaction with how the skin *feels*. In addition to the item libraries, 5 short-form scales were derived from the published SKIN-Q item libraries. These scales, which measure skin quality, skin rejuvenation, and facial movement, were created as examples of how the item libraries can be utilized. These short forms can be used in clinical trials of aesthetic treatments as well as clinical care with patients. The SKIN-Q also includes a 10-item treatment outcome scale.

It is also possible to customize a fit-for-purpose short-form scale by choosing a subset of items from the item libraries. Please contact us for more information about scale customization: qportfolioteam@gmail.com.

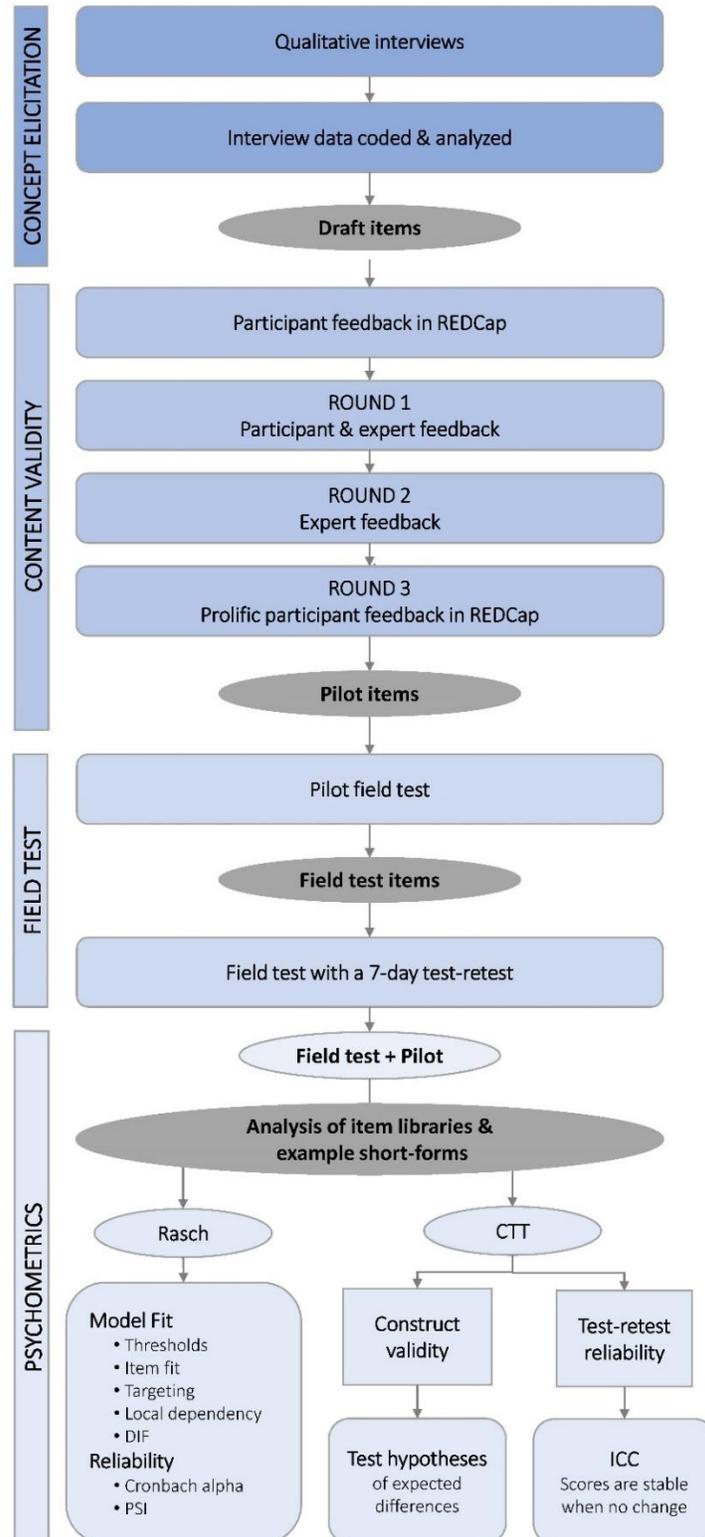
2. What Makes the SKIN-Q Different to Traditional PROMs?

Standard practice for PROM design has involved the development of short-form scales composed of a limited set of items (i.e., questions) for use in a specific context of use [2-3]. More recently, PROM developers have created item banks and libraries to provide a flexible approach to health outcome assessment. With item banks and libraries, it is possible to customize fit-for-purpose short-form scales by choosing a subset of items that represent the most important concepts for a specific patient population or context of use. This approach aims to maximize content validity and minimize patient burden. Short-form scales can be scored by calibrating scores to the full set of items (i.e., item-bank approach [4-5]), or by using estimates from independent samples (i.e., item-library approach [6]).

3. How Was the SKIN-Q Developed and Validated?

To develop the SKIN-Q, we followed internationally recommended guidelines for PROM development to ensure the SKIN-Q would meet the requirements of regulatory bodies [7-11]. Our team's mixed methods, multi-phase approach to developing the SKIN-Q is shown in Figure 1. Briefly, between October 2021 to March 2022 we conducted 26 concept elicitation interviews. Table 1 shows sample characteristics and Table 2 shows the sample's treatment history. Concepts from patients were developed into items that were refined with input from 12 experts, 11 clinic patients, and an online sample of 174 Prolific participants.

Figure 1: The multiphase mixed methods approach our team followed to develop SKIN-Q. (Reprinted from Klassen AF, Pusic AL, Kaur M, et al. The SKIN-Q: An Innovative Patient-Reported Outcome Measure for Evaluating Minimally Invasive Skin Treatments for the Face and Body. *Facial Plast Surg Aesth Med.* 2024 May-Jun;26(3):247-255.)



The psychometric properties of SKIN-Q were examined in a sample of 657 Prolific participants who provided 713 assessments (see Tables 1-2 for sample and treatment characteristics). We used Rasch Measurement Theory (RMT), a modern psychometric approach [12-13]. The RMT analysis provided evidence of reliability and validity for both sets of items [1]. All items had ordered thresholds and good item fit. Reliability was high with person separation index (PSI) and Cronbach alpha values ≥ 0.95 . More than 100 participants took part in a test-retest reliability study between 7-14 days after the initial assessment. The intraclass correlation coefficient (ICC) values were ≥ 0.85 . The RMT analysis provided evidence of reliability and validity of five short-form scales. These scales measure skin rejuvenation (e.g., healthy, youthful, rejuvenated), skin quality (e.g., firm, smooth, hydrated), and facial function (e.g., smile, frown, squint). Further information about the psychometric performance of SKIN-Q is available in our open access publication [1]. A separate publication describes the 10-item SKIN-Q Treatment Outcome scale [14]. For this scale, data fit the Rasch model (Chi-square = 50.46, df=40, p=0.124) and the scale evidenced high reliability, with PSI and Cronbach alpha values > 0.87 . For the test-retest, 136 participants completed the Treatment Outcome scale a second time within 7-14 days. The ICC for the test-retest was 0.89 (95% CI = 0.85, 0.92).

4. Skin Feels Item Descriptions

The full set of items developed and validated totaled 22. The four response options provided measure satisfaction with how the skin feels. The time frame for reporting asks respondents to answer based on the past week. All 22 items are relevant to facial skin and skin on the body. We have organized the items according to the clinical hierarchy from the RMT analysis. This means that people in the sample were the most satisfied with the item “how natural your skin feels”, and the least satisfied with the item “how flawless your skin feels”. Table 3 below shows the items included in the two published short-form scales that measure Skin Rejuvenation and Skin Quality.

Table 1: Participant characteristics (number, %)

		Qualitative Sample	Prolific			
			Cognitive sample		Psychometric Sample	
		N=26	N=174	%	N=657	%
SAMPLE	Body only	0	45	25.9	62	9.5
	Face only	26	123	70.7	539	82.0
	Face and Body	6	6	3.4	56	8.5
COUNTRY	Canada	6	31	17.8	105	16.0
	USA	20	143	82.2	550	83.7
	Missing	0	0	0	2	0.3
AGE	20-29	3	44	25.3	200	30.4
	30-39	6	46	26.4	218	33.2
	40-49	7	30	17.2	112	17.1
	50-59	6	35	20.1	81	12.3
	≥60	4	19	10.9	46	7.0
GENDER	Woman	23	142	81.6	537	81.7
	Man	3	29	16.7	108	16.4
	Gender diverse	0	3	1.7	9	1.4
	Prefer to not answer	0	0	0	2	0.3
RACE	White	22	127	73.0	443	67.4
	Black	2	15	8.6	45	6.8
	Latin American	0	15	8.6	33	5.0
	East Asian	0	12	6.9	41	6.2
	Middle Eastern	0	5	2.9	9	1.4
	South Asian	1	4	2.3	15	2.3
	Southeast Asian	1	4	2.3	11	1.7
	Indigenous	0	1	0.6	2	0.3
	Mixed Race	0	0	0.0	54	8.2
	Other	0	1	0.6	4	0.6
MARITAL STATUS	Married/Common Law	16	78	44.8	310	47.2
	Single	7	61	35.1	266	40.5
	Divorced	2	26	14.9	61	9.3
	Separated	0	3	1.7	7	1.1
	Widowed	1	2	1.1	3	0.5
	Other / Prefer not to answer	0	4	2.3	10	1.6
FITZPATRICK SKIN TYPE	Always burn and never tan	2	9	5.2	50	7.6
	Usually burn and minimally tan	9	45	25.9	163	24.8
	Mild burn and then tan	9	64	36.8	229	34.9
	Rarely burn and always tan	4	33	19.0	144	21.9
	Rarely burn and tan very easily	1	15	8.6	58	8.8
	Never burn and never tan	1	8	4.6	13	2.0
HIGHEST EDUCATION	Some high school	0	2	1.1	3	0.5
	High school	1	11	6.3	35	5.3
	Some college, trade or university	4	24	13.8	102	15.5
	College, trade or university degree	9	98	56.3	333	50.7
	Some Masters or Doctoral degree	0	7	4.0	42	6.4
	Masters or Doctoral degree	11	31	17.8	141	21.5
Missing / Prefer to not answer	1	1	0.6	1	0.2	

Table 2: Treatment history reported by the qualitative sample and Prolific participants (Number, %)

		Qualitative Sample	Prolific			
			Cognitive Sample		Field-test Sample	
		N=26	N=180	%	N=657*	%
FACIAL TREATMENTS						
INJECTABLE	Botox	18	76	42.2	240	36.5
	Filler	17	71	39.4	167	25.4
	Platelet-Rich Plasma	1	7	3.9	25	3.8
	Skin Booster	0	0	0.0	23	3.5
RESURFACING	Microdermabrasion	7	59	32.8	240	36.5
	Chemical peel	16	51	28.3	260	39.6
	Hydrafacial	2	40	22.2	280	42.6
	Laser	14	37	20.6	120	18.3
	Microneedling	2	30	16.7	148	22.5
	Light therapy	14	25	13.9	94	14.3
SKIN TIGHTENING	Radio-Frequency	7	11	6.1	61	9.3
	High-Intensity Ultrasound	0	9	5.0	49	7.5
	Thread lift	1	6	3.3	29	4.4
FAT REMOVAL	Fat removal	1	6	3.3	29	4.4
BODY TREATMENTS						
INJECTABLES	Filler	0	17	9.4	41	6.2
	Skin Booster	0	0	0.0	18	2.7
RESURFACING	Laser	1	0	0.0	0	0
FAT REDUCTION	Fat removal	0	6	3.3	22	3.3
	Cryolipolysis	2	28	15.6	47	7.1
	Laser Lipolysis	0	10	5.6	20	3.0
	Radio-frequency	1	8	4.4	15	2.3
	High-Intensity Focused Electromagnetic	4	0	0.0	0	0
SKIN TIGHTENING	High-Intensity Ultrasound	0	13	7.2	38	5.8
	Radio-frequency	2	14	7.8	29	4.4
	Intense Pulsed Light and Radio-frequency	0	8	4.4	20	3.0
CELLULITE	Cellulite Treatment	0	17	9.4	35	5.3

*Number of unique participants

Note: Tables 1 and 2 were reproduced from Klassen AF, Pusic AL, Kaur M, et al. The SKIN-Q: An Innovative Patient-Reported Outcome Measure for Evaluating Minimally Invasive Skin Treatments for the Face and Body. *Facial Plast Surg Aesth Med*. 2024 May-Jun;26(3):247-255.

Table 3: Skin Feels item library and short-form scales

Full set of items	Short Forms	
	Skin Rejuvenation	Skin Quality
1. Natural	-	-
2. Clean	-	-
3. Thick	-	✓
4. Comfortable	-	-
5. Nice*	-	-
6. Soft	-	✓
7. Healthy	✓	-
8. Good	✓	-
9. Tight	-	✓
10. Firm	-	✓
11. Full	-	✓
12. Age Feels*	-	-
13. Smooth	-	✓
14. Youthful	✓	-
15. Refreshed	✓	-
16. Elasticity	-	✓
17. Rejuvenated	✓	-
18. Hydrated	-	✓
19. Clear	-	-
20. Texture	-	✓
21. New	✓	-
22. Flawless	-	-

Note: * indicates items in the library not in field-test publication [1]

5. Skin Looks Item Descriptions

The full set of items developed and validated totaled 58. The four response options provided measure satisfaction with how the skin looks (very dissatisfied, somewhat dissatisfied, somewhat satisfied, very satisfied). The time frame for reporting asks respondents to answer based on how their skin looks now. We have organized the items by the clinical hierarchy from the RMT analysis. This means that people in the sample were most satisfied with the item that asks “how your skin looks when you look your best”, and least satisfied with the item that asks “how flawless your skin looks”. All 58 items are relevant to facial skin, and 40 are relevant to skin on the body. Table 4 below shows the items included in the three published short-form scales measuring Skin

Rejuvenation, Skin Quality, and Facial Movement. Table 4 also shows the subset of 40 items that can be used to measure outcomes for skin on the body.

Table 4: Skin Looks item library and short-form scales

Full set of items	Body Skin	Short Forms		
		Skin Rejuvenation	Skin Quality	Facial Movement
1. Look best		-	-	-
2. Natural	✓	-	-	-
3. Go out		-	-	-
4. Compared*	✓	-	-	-
5. Relaxed look	✓	-	-	-
6. With makeup		-	-	-
7. Smile		-	-	✓
8. Thick	✓	-	✓	-
9. Laugh		-	-	✓
10. Soft	✓	-	✓	-
11. Face relaxed		-	-	✓
12. Show expression		-	-	✓
13. Age	✓	-	-	-
14. Clean*	✓	-	-	-
15. Raise eyebrows		-	-	✓
16. Healthy	✓	✓	-	-
17. Young	✓	-	-	-
18. Fresh	✓	✓	-	-
19. Full	✓	-	✓	-
20. Lifted	✓	-	✓	-
21. Tight	✓	-	✓	-
22. Overall quality	✓	-	-	-
23. Squint		-	-	✓
24. Elasticity	✓	-	✓	-
25. Firm	✓	-	✓	-
26. Nice*	✓	-	-	-
27. Photos	✓	-	-	-
28. Youthful	✓	✓	-	-
29. Refreshed*	✓	-	-	-
30. Rested		-	-	-
31. Good	✓	✓	-	-

32. Bright	✓	✓	-	-
33. Frown		-	-	✓
34. Angles	✓	-	-	-
35. Smooth	✓	-	✓	-
36. Vibrant	✓	✓	-	-
37. Attractive	✓	-	-	-
38. Mirror*	✓	-	-	-
39. End of day*	-	-	-	-
40. Tone (color)	✓	-	-	-
41. Rejuvenated	✓	✓	-	-
42. Lines*	✓	-	-	-
43. Clear*	-	-	-	-
44. On screen		-	-	-
45. Hydrated	✓	-	✓	-
46. Prolife	✓	-	-	-
47. Without makeup		-	-	-
48. Even tone	✓	-	✓	-
49. Glow	✓	✓	-	-
50. Texture	✓	-	✓	-
51. Refreshed makes you		-	-	-
52. Even-colored*	✓	-	-	-
53. Wake up*	-	-	-	-
54. Radiant	✓	✓	-	-
55. Pores*	-	-	-	-
56. Up close	✓	-	-	-
57. Bright light	✓	-	-	-
58. Flawless	✓	-	✓	-

Note: * indicates items in the library not in field-test publication [1]

6. Treatment Outcome Item Descriptions

The Treatment Outcome scale includes 10 items, with response options that measure how much someone agrees with statements about treatment (definitely disagree, somewhat disagree, somewhat agree, definitely agree). The items are statements such as the result looking natural and turning out great and feeling better about oneself and happier.

Table 5: Shortened Treatment Outcome scale items to use in a publication

natural	satisfied
improvement	feel better
great	feel happier
feel good	change
look better	confident

7. Using the SKIN-Q

You are able to license the SKIN-Q short-form scales described in this User Guide. In addition, SKIN-Q item libraries provide clinicians and researchers with the opportunity to pick a set of items to create a precise study-specific scale to measure outcomes for a procedure or product, or for use in clinical care. This approach reduces patient burden and maximizes content validity. If you would like support to license a customized study-specific scale, please email your request to qportfolioteam@gmail.com.

We anticipate that most researchers and clinicians will use SKIN-Q short-form scales. However, if you would like to inquire about the use of the full item libraries, please email qportfolioteam@gmail.com.

8. Administration of the SKIN-Q

The SKIN-Q is designed to be completed by adults on their own (self-report). Brief instructions are provided at the start of each scale. The SKIN-Q was field-tested using a REDCap survey [15]. You may use the paper and pencil format or create an online version for ease of administration in non-profit academic research (e.g., REDCap) and in clinical care (e.g., hospital EMR such as Epic).

If you plan to have an ePRO company capture and manage SKIN-Q data collection, the ePRO company may need a license. If you have had or plan to have an ePRO company convert the SKIN-Q into an electronic format, e-conversion review and certification is required. Please email qportfolioteam@gmail.com.

9. Scoring the SKIN-Q

The item libraries are independently functioning as they measure different but related constructs (i.e., appearance and psychological function). For both libraries, higher scores represent a better outcome (i.e., higher satisfaction or better function). The full item library can be scored. To obtain a score, the raw scores for the items are added up and linearized using Conversion Tables, which is based on the psychometric analysis. The transformed scores will range from 0 (worst) to 100 (best). To discuss the use of the full item libraries, please contact qportfolioteam@gmail.com.

10. Scoring SKIN-Q Short-Form Scales

Each short-form scale can be licensed for use. These scales are independently functioning. Higher scores represent a better outcome (i.e., higher satisfaction with skin). To obtain a score, the raw scores for a short-form's items are added up and linearized using the Conversion Tables we provide, which are based on the Rasch analysis.

When you license the SKIN-Q, you will be provided with the Conversion Table(s) to score the short-form scale(s). The scoring algorithm is based on the subset of items in the short-form rather than the full set of items in the item library.

On the following page is an example of how to compute the score using the SKIN-Q Skin Rejuvenation short-form scale from the *skin feels* item library. First, you compute the **sum score** by adding the raw scores for items 1 to 6. In the example, the sum score = 17. Second, you will find the sum score in the Skin Rejuvenation Conversion Table, shown below the scale. The sum score of 17 is then converted to 60.

11. How to Deal With Missing Data

The choice of how to handle missing data, such as whether or not to impute the mean when there is missing data, is ultimately up to the end user of SKIN-Q. Our suggestion follows the most common method for scoring when there is missing data, which is to impute a missing value using the mean value of responses to completed items if 50% or more of the items are answered. This method is recommended in the scoring manuals of numerous widely used PROMs, such as the SF-36 generic questionnaire used extensively in research for decades [16-17]. As such, SKIN-Q scores can be computed if missing data is less than 50% of the scale's items. In this approach, the within person mean for the completed items can be imputed for the missing items prior to computing a total raw score. For example, for the 6-item scale described above, if someone has not responded to all the items, but has responded to ≥ 3 items, all other items for that person could be imputed with the within-person mean (rounded to the nearest integer), and a summed score calculated. Alternatively, for the 6-item scale, if someone has responded to ≤ 3 items, the summed score for this person would be classified as missing data.

SKIN FEELS: SKIN REJUVENATION

These questions ask about how your SKIN FEELS.

With your SKIN in mind, in the PAST WEEK, how dissatisfied or satisfied have you been with:

	VERY DISSATISFIED	SOMEWHAT DISSATISFIED	SOMEWHAT SATISFIED	VERY SATISFIED
1. How healthy your skin feels?	1	2	3	4
2. How good your skin feels?	1	2	3	4
3. How youthful your skin feels?	1	2	3	4
4. How refreshed your skin feels?	1	2	3	4
5. How rejuvenated your skin feels?	1	2	3	4
6. How new your skin feels?	1	2	3	4

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SKIN FEELS: REJUVENATION CONVERSION TABLE

Instructions: Higher scores reflect a better outcome. If missing data is less than 50% of the scale's items, for each missing item, we suggest you calculate and impute the within-person mean of the completed items. For an example, see the SKIN-Q User's Guide. Use the Conversion Table below to convert the raw summed scale score into a score from 0 (worst) to 100 (best).

SUM SCORE	RASCH TRANSFORMED SCORE (0 TO 100)
6	0
7	8
8	14
9	19
10	24
11	29
12	34
13	39
14	45
15	49
16	54
17	60
18	66
19	72
20	77
21	82
22	87
23	93
24	100

12. Conditions of Use

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Use of the SKIN-Q requires completion of a licensing agreement. The use of the SKIN-Q short-form scales in non-profit academic research and in clinical care is free of charge. The use of the SKIN-Q by “for-profit” organizations (e.g., pharmaceutical companies or sponsored by pharmaceutical companies, contract research organizations, ePRO companies) is subject to a licensing fee.

To obtain a license to use the SKIN-Q, please use the following link:

<https://research.mcmaster.ca/industry-investors/technologies-available-for-licensing/request-for-license/>

For questions regarding a SKIN-Q license, please contact:

Licensing Assistant
McMaster Industry Liaison Office (MILO)
McMaster Innovation Park, Suite 305
175 Longwood Rd S, Hamilton ON L8P 0A1
milo@mcmaster.ca

PLEASE NOTE

When you sign a SKIN-Q license, you agree to the following terms:

- **You will not modify, adapt, or create another derivative work from the SKIN-Q**
- **You will not sell, sublicense, rent, loan, or transfer the SKIN-Q to anyone**
- **You will not reproduce any SKIN-Q scales in publications or other materials**
- **You will not translate the SKIN-Q without permission from our team**

For questions regarding study design and optimal use of the SKIN-Q item libraries, please contact:

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13. Frequently Asked Questions

Do I have to use all items in SKIN-Q item libraries?

Each item library functions independently, as do the short-form scales. It is not necessary for a patient to complete all short-form scales described in this User Guide. A researcher or clinician may select any of the short-form scales depending on the particular purpose of the study or use. Please contact qportfolioteam@gmail.com to request a study-specific scale.

Can I delete or add or change any items or response options of the SKIN-Q?

You cannot add or change the wording of any items or response options of either of the SKIN-Q libraries or any of the short-form scales. Any modification to the content of the SKIN-Q is prohibited under copyright laws. Making changes to the SKIN-Q would invalidate its psychometric properties.

Can I reproduce SKIN-Q in a publication or other document (e.g., PhD thesis)?

According to the licensing agreement, you cannot reproduce the content of SKIN-Q item libraries or short-form scales verbatim in a publication. However, it is possible to show shortened versions of each item. The shortened forms of items that can be used in a publication are shown above in Tables 3-5.

Can I translate SKIN-Q scales into a new language?

Yes, with permission, you can translate the SKIN-Q into different languages. Before starting a translation, check our translations list on www.qportfolio.org to see if there is a translation in the language you need. If there is not a translation in the language you need, you will need to obtain permission from our team, sign a translation licensing agreement, and receive information on the methods you need to follow. Email us at qportfolioteam@gmail.com for more information. Please note that the developers of the SKIN-Q own the copyright of all translations of the SKIN-Q.

Are there specific time points when patients complete the scales?

A researcher or clinician can decide the time points to use to administer the SKIN-Q.

Does it cost money to use SKIN-Q?

Use of SKIN-Q published short-form scales described in this User Guide are free for non-profit users. For-profit users should contact McMaster University for information about fees for using the item libraries and short-form scales (milo@mcmaster.ca).

14. References

1. Klassen AF, Pusic AL, Kaur M, et al. The SKIN-Q: An Innovative Patient-Reported Outcome Measure for Evaluating Minimally Invasive Skin Treatments for the Face and Body. *Facial Plast Surg Aesthet Med*. 2024 May-Jun;26(3):247-255.

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