Angle Design Aesthetics and Hairline Naturalness Outcomes Following DHI Hair Restoration

A Prospective, Dual-Rater Observational Study at Vera Clinic

Vera Clinic Academy, Istanbul, Turkey

Abstract

Background: Hairline naturalness after hair transplantation is influenced by graft exit angle, but the literature lacks studies combining objective angle measurement with blinded-rater naturalness assessment; this study evaluated the association between zone-specific exit angle deviation and blinded-rater naturalness at 12 months after DHI hairline restoration.

Methods: Prospective observational study of 140 patients (420 zone-level observations: temporal, transition, central), analyzed with a cumulative-link ordinal model and patient-cluster bootstrap inference.

Results: Greater angle deviation from the zone-specific target was associated with lower odds of a more natural blinded-rater score (OR 0.76 per degree, 95% CI 0.68–0.86). Naturalness was lowest in the central zone relative to the temporal zone (OR 0.40, 95% CI 0.28–0.55) and highest with better donor area quality (OR 2.12, 95% CI 1.51–3.19). Agreement on the three matched sub-dimensions of hairline location, directional consistency, and irregularity was weaker than on the global item (weighted κ range 0.28–0.34), though the three sub-dimensions still jointly explained a substantial portion of the variance in the rater's global item ($R^2 = 0.65$). Surgeon-level variance was small (ICC $\approx$ 0.01).

Conclusions: Zone-specific exit angle deviation is independently associated with reduced blinded-rater naturalness after DHI hairline restoration, supporting angle precision, not only graft density or donor quality, as a modifiable target for aesthetic outcome.

Keywords: hairline design; exit angle; naturalness; hair transplantation; blinded assessment; trichoscopy

Introduction

Hairline design is widely regarded as the single most consequential determinant of whether a hair transplant result is perceived as natural, more so than graft count or overall density [1]. Exit angle, the direction in which transplanted hair leaves the scalp, is repeatedly identified as a critical technical parameter: hair naturally exits at shallow, zone-specific angles that change across the temporal, transitional, and central regions of the hairline, and deviations from these angles are considered a leading cause of an artificial appearance [2].

Despite the prominence of exit angle in the technical literature on hairline design, outcome studies in this area have tended to rely on one of two approaches. The first is patient-reported satisfaction, often using general aesthetic or dermatologic patient-reported outcome instruments. For example, a modified application of the FACE-Q instrument to hair transplantation reported a substantial increase in self-rated appearance satisfaction from before to six months after surgery [1]. Similarly, a prospective series in East Asian women undergoing hairline-lowering transplantation reported high self-rated satisfaction with hairline appearance on a five-point scale [3]. The second approach uses structured checklists of technical features, including hairline location, irregularity, and exit angle, to define what separates an aesthetically successful transplant from an unsuccessful one, without linking these features statistically to a single quantified naturalness outcome or to blinded external judgment [4].

A recurring limitation across this literature is the near-absence of blinded, independent-rater assessment. Outcome measurement in most published series is either self-reported by the patient or evaluated by the treating surgeon, both of which are vulnerable to expectation and allegiance bias. Blinded-evaluator designs are well established in adjacent areas of aesthetic medicine, for instance, the Global Aesthetic Improvement Scale (GAIS), originally described by Narins et al. [5], is routinely used by blinded evaluators in dermal filler and skin-rejuvenation trials to rate aesthetic change independently of the treating physician or the patient [6]. This methodological standard has not, to our knowledge, been systematically applied to hairline exit-angle outcomes.

General patient-reported outcome measures for hair loss have also matured considerably. The HAIR-Q, a fourteen-item measure developed and psychometrically validated using Rasch measurement theory, demonstrated high reliability for hair-loss-related satisfaction [7], and the FACE-Q Aesthetics Natural Module has extended patient-reported naturalness assessment beyond visual appearance to touch, feel, and expressive dimensions [8]. However, these instruments are designed to capture a patient's global experience of hair loss or aesthetic treatment broadly, rather than a rater's technical judgment of a specific anatomical feature such as hairline exit angle; no validated instrument currently links objective, zone-specific angle measurement to a blinded rater's naturalness judgment of the hairline itself.

The aim of this study was to evaluate the association between objectively measured, zone-specific exit angle deviation (temporal, transitional, and central) and hairline naturalness at 12 months after primary DHI hair restoration, addressing the gap outlined above. We used a dual-layer instrument in which blinded expert raters and patients independently rate structurally parallel, respondent-appropriate

naturalness items. We hypothesized that zone-specific angle deviation is associated with lower blinded-rater naturalness scores, and we secondarily examined agreement between patient and rater judgments and the correspondence between objectively measured and subjectively perceived angle.

Methods

Study Design and Setting

This was a prospective, dual-rater observational study conducted at Vera Clinic (Istanbul, Turkey) between January 2024 and August 2025, with outcome assessment at 12 months post-operatively.

Participants

Consecutive patients undergoing primary DHI (Direct Hair Implantation) hairline restoration were eligible for inclusion. Exclusion criteria were: revision hair transplantation procedures, unstable or actively progressing androgenetic alopecia at the time of surgery, and active scalp infection. All procedures were performed by the same surgical team within the clinic; individual surgeon identity was recorded but is not used as an identified comparison (see Statistical Analysis).

A Monte Carlo simulation-based a priori power analysis was conducted for the ordinal primary outcome, since closed-form power formulas are not available for mixed-effects cumulative-link (proportional-odds) models. The simulation modeled a five-category ordinal naturalness outcome generated from a latent continuous variable with a moderate assumed zone effect (approximating a standardized mean difference of 0.5 between the least and most favorable zones) and category thresholds chosen to reflect a right-skewed marginal distribution consistent with the generally high satisfaction rates reported in the hair transplantation literature [3,9]. Under these assumptions, 210 independent zone-level observations were required for 80% power at $\alpha = 0.05$. Because each patient contributes three correlated zone-level observations, a design effect of 2.0 was applied (assuming an intraclass correlation of approximately 0.5 across zones within patient), yielding a total requirement of 420 zone-level observations, or approximately 140 patients. Enrollment, screening, and attrition details are reported in the Results section.

Procedure

At the time of pre-operative planning, the intended exit angle was documented separately for three anatomically defined zones: the temporal points, the transition (frontal hairline) zone, and the central zone.

At 12 months post-operatively, standardized photographic documentation was obtained under fixed lighting and camera-distance conditions, from three views (frontal, left three-quarter, right three-quarter), with head position referenced to the Frankfurt plane. At the same visit, calibrated trichoscopic imaging was performed at fixed, zone-specific reference points established at the time of surgery, to measure the realized exit angle objectively in each of the three zones.

Measures

Realized exit angle (objective)

Measured via calibrated trichoscopy at each of the three zones, at fixed reference points established at the time of surgery. This is an instrument-derived, quantitative measurement and is analytically distinct from the rater-perceived directional-consistency item described below, which reflects a holistic visual impression from standard photographs rather than a close-focus dermoscopic measurement.

Naturalness assessment: Dual-layer, respondent-matched instrument

Two parallel, structurally equivalent five-point anchored ordinal scales (1 = clearly artificial, 5 = completely natural) were used, covering the same four underlying dimensions but phrased for each respondent group's frame of reference. Item content for the rater instrument was informed by parameters described in an existing hair transplant assessment framework (hairline location, exit angle appearance, and micro/macro irregularity) [4]; the resulting instrument has not been independently psychometrically validated and is treated throughout as study-specific (see Limitations).

Dimension	Blinded expert rater item	Patient self-report item
Hairline location/design	Appropriateness of hairline location and shape	"Does the location and shape of your hairline look natural to you?"
Directional consistency	Perceived directional consistency of hair growth exit (subjective, whole-photograph impression)	"Does the direction your hair grows out of your scalp look natural to you?"
Irregularity	Presence of natural micro/macro irregularity vs. an artificial, uniform appearance	"Does your hairline look like a real hairline, or too even/artificial?"
Global	Overall naturalness of the result	"Overall, how natural does your result look to you?"

Two independent blinded raters, experienced in hair restoration but not involved in the clinical care of study patients, and identified in the manuscript only as Rater 1 and Rater 2, completed the rater instrument for each patient's standardized photograph set. Raters were blinded to zone-specific angle data, surgical technique details beyond "DHI," and all other clinical information; they viewed only the photograph set.

Covariates recorded at baseline: patient age, graft density, and donor area quality (rated by standardized clinical criteria).

Bias

Selection bias was addressed through consecutive enrollment of eligible patients rather than convenience or referral-based sampling. Information bias in outcome assessment was addressed by blinding expert raters to zone-specific angle data and all clinical information. Confounding by individual surgeon was addressed through a variance-partitioning sensitivity check rather than formal covariate adjustment, given the limited number of distinct surgeons within the single surgical team (see Limitations).

Statistical Analysis

Statistical analyses were performed using R (version 4.3.2) with the ordinal package (function clmm) for the cumulative-link mixed-effects model. Cluster-bootstrap resampling and secondary agreement statistics were implemented in Python.

Missing data. The primary mixed-effects model accommodates missing zone-level observations under a missing-at-random assumption without case deletion. If attrition at the 12-month assessment exceeds 10% of enrolled patients, a sensitivity analysis comparing complete-case results to a multiple-imputation approach will be conducted and reported alongside the primary result.

Primary analysis (confirmatory, pre-specified)

For the primary analysis, each patient-zone observation's global naturalness score was derived by averaging the two raters' scores and rounding to the nearest whole scale point. The blinded rater global naturalness item was modeled using a cumulative-link (ordinal logistic) mixed-effects model, with hairline zone, realized exit angle, age, graft density, and donor area quality as fixed effects, and patient as a random intercept to account for within-patient clustering across the three zone-level observations. This is the sole analysis to which the a priori power calculation applies; the significance threshold is $\alpha = 0.05$, uncorrected.

Secondary analyses (exploratory, hypothesis-generating)

The following analyses were treated as a single family for multiplicity control, with Benjamini-Hochberg false discovery rate (FDR) correction applied jointly across the family and both raw and FDR-adjusted (q) values reported. Inter-rater agreement between the two blinded raters was assessed on the global naturalness item using weighted Cohen's kappa, with PABAK reported alongside. Patient-rater agreement was assessed on the global naturalness item using weighted Cohen's kappa, with prevalence-adjusted bias-adjusted kappa (PABAK) reported alongside to address potential distributional skew or ceiling effects; the same agreement analysis was repeated for each of the three matched sub-dimension items individually. The correspondence between objectively measured (trichoscopic) exit angle and the blinded rater's subjective directional-consistency item was examined via correlation. The global naturalness item was regressed on the three sub-dimension items, modeled separately for the rater and patient instruments. Finally, a sensitivity check partitioned the proportion of total outcome variance attributable to surgeon-level clustering within the surgical team, reported as an anonymized variance component without surgeon-level identification or pairwise comparison.

Results

Participant Flow and Baseline Characteristics

A total of 150 patients were enrolled between January 2024 and August 2025. Two patients were excluded after enrollment when an intervening revision procedure was identified at chart review, meeting a pre-specified exclusion criterion. Of the remaining 148 patients, eight (5.4%) were lost to follow-up before the 12-month assessment (three relocated, three withdrew consent, two were unreachable), yielding

a final analytic sample of 140 patients and 420 zone-level observations (temporal, transition, and central zones for each patient). Attrition (8/148, 5.4%) was below the pre-specified 10% threshold for a complete-case versus multiple-imputation sensitivity analysis; this comparison was therefore not performed. Among the 140 patients with 12-month data, all three zone-level observations (temporal, transition, central) were available for every patient, with no partial missingness at the zone level (Table 1).

Table 1. Baseline characteristics of the analytic sample (N = 140)

Characteristic	Value
N analyzed (zone-level observations)	140 patients (420 observations)
Age, mean ± SD (years)	32.8 ± 6.6
Graft density, mean ± SD (FU/cm²)	45.6 ± 7.3
Donor area quality: poor / fair / good, %	15.7 / 43.6 / 40.7
Completed 12-month follow-up, n (%)	140 / 148 (94.6%)

Primary Analysis

In the cumulative-link (ordinal logistic) mixed-effects model of blinded rater global naturalness, greater zone-specific angle deviation was independently associated with lower odds of a more natural rating: for each additional degree of deviation from the zone-specific target angle, the odds of a higher (more natural) rating decreased by an estimated 24% (OR 0.76, 95% CI 0.68–0.86, cluster-bootstrap $p < 0.001$; Table 2). Observed angle deviation ranged from 0.0° to 7.4° (median 1.2°), so this per-degree odds ratio corresponds to a substantial cumulative effect across the observed range — for example, a deviation of 5° versus near-zero deviation corresponds to an estimated odds ratio of approximately 0.25 (0.76^5). Naturalness ratings differed by zone relative to the temporal zone: the central zone showed substantially lower odds of a favorable rating (OR 0.40, 95% CI 0.28–0.55, $p < 0.001$), while the transition zone did not differ significantly from the temporal zone (OR 0.75, 95% CI 0.54–1.03, $p = 0.065$). Donor area quality was strongly associated with naturalness (OR 2.12 per one-category increase, 95% CI 1.51–3.19, $p < 0.001$; Table 2). Patient age (OR 0.98, 95% CI 0.94–1.02, $p = 0.310$) and graft density (OR 1.03, 95% CI 0.99–1.07, $p = 0.165$) were not significantly associated with naturalness ratings in this model.

Table 2. Cumulative-link mixed-effects model of blinded rater global naturalness

Predictor	OR	95% CI	p (bootstrap)
Zone: transition vs. temporal	0.75	0.54–1.03	0.065
Zone: central vs. temporal	0.40	0.28–0.55	<0.001
Angle deviation (per degree)	0.76	0.68–0.86	<0.001
Age (per year, centered)	0.98	0.94–1.02	0.310
Graft density (per unit, centered)	1.03	0.99–1.07	0.165

Donor area quality (per category)	2.12	1.51–3.19	<0.001

The distribution of blinded rater global naturalness scores was right-skewed, with 70.7% of ratings falling in the top two categories (4–5) (Table 3).

Table 3. Distribution of blinded rater global naturalness scores

Score	% of observations
1 (clearly artificial)	1.9%
2	14.8%
3	12.6%
4	42.4%
5 (completely natural)	28.3%

Secondary Analyses

All secondary analyses below were treated as a single family for multiplicity control; raw and Benjamini-Hochberg FDR-adjusted (q) values are reported alongside each estimate.

Table 4. Secondary analyses of patient–rater agreement and angle–perception correspondence

Analysis	Estimate	Raw p	FDR q
Inter-rater agreement, global item Rater 1 vs. Rater 2 (weighted κ)	0.69 (PABAK 0.55)	<0.001	<0.001
Patient-rater agreement, global item (weighted κ)	0.52 (PABAK 0.39)	<0.001	<0.001
Patient-rater agreement, hairline location (weighted κ)	0.34 (PABAK 0.27)	<0.001	<0.001
Patient-rater agreement, directional consistency (weighted κ)	0.28 (PABAK 0.21)	<0.001	<0.001
Patient-rater agreement, irregularity (weighted κ)	0.33 (PABAK 0.26)	<0.001	<0.001
Objective angle deviation vs. rater directional item (Spearman ρ)	-0.18	<0.001	<0.001

Inter-rater agreement between the two blinded raters on the global naturalness item was substantial (weighted $\kappa = 0.69$, PABAK = 0.55; Table 4), supporting the reliability of the pooled rater score used as the outcome in the primary analysis. Patient-rater agreement on the global naturalness item was moderate (weighted $\kappa = 0.52$; PABAK = 0.39; Table 4), indicating that part of the modest raw agreement reflects the skewed, ceiling-leaning distribution of scores rather than poor agreement per se. Patients rated their

own results slightly more favorably than blinded raters on average (mean 3.93 vs. 3.80 on the 1–5 scale), consistent with a small systematic optimism bias rather than a large or clinically concerning discrepancy. Agreement on the three matched sub-dimensions was consistently weaker than on the global item (weighted κ range 0.28–0.34), suggesting that patients and raters converge more reliably on an overall naturalness impression than on its individual technical components.

The objectively measured (trichoscopic) angle deviation correlated modestly with the blinded rater's subjective directional-consistency item (Spearman $\rho = -0.18$, $p < 0.001$), confirming that the two measures are related but far from interchangeable, the rater's holistic visual impression captures additional information beyond the instrument-derived angle measurement alone.

Regressing the global naturalness item on the three matched sub-dimension items showed that all three contributed independently for both instruments. For the blinded rater instrument, hairline location ($\beta = 0.29$, $p < 0.001$), directional consistency ($\beta = 0.24$, $p < 0.001$), and irregularity ($\beta = 0.26$, $p < 0.001$) jointly explained a substantial proportion of variance in the global item ($R^2 = 0.65$). For the patient instrument, the same three sub-dimensions explained less variance in the patient global item ($R^2 = 0.37$), with irregularity ($\beta = 0.27$, $p < 0.001$) and hairline location ($\beta = 0.26$, $p < 0.001$) contributing more than directional consistency ($\beta = 0.17$, $p < 0.001$).

The sensitivity check partitioning outcome variance attributable to surgeon-level clustering within the surgical team showed a small surgeon-level variance component (ICC = 0.01), providing reassurance that the primary angle-naturalness association is unlikely to be driven by systematic differences between individual surgeons within the team.

Discussion

In this prospective, dual-rater observational study, zone-specific exit angle deviation was independently associated with reduced blinded-rater hairline naturalness at 12 months after DHI restoration, after accounting for hairline zone, patient age, graft density, and donor area quality. The central zone was consistently rated less natural than the temporal zone, and donor area quality emerged as a strong independent predictor of naturalness, arguably as strong a driver of the blinded-rater outcome as angle precision itself. Patient and rater judgments agreed moderately on the global naturalness impression, with patients rating their own results only slightly more favorably than blinded raters, and the objectively measured angle correlated with, but did not fully overlap with, the rater's subjective directional impression.

Comparison to Existing Literature

The published literature on hairline outcomes has generally relied on either patient-reported satisfaction using general aesthetic instruments [1,3] or structured technical checklists without a linked, quantified naturalness outcome [4]. Retrospective series report high satisfaction rates using simple percentage or

ordinal patient-report metrics [9], consistent with the right-skewed, ceiling-leaning distribution of naturalness ratings observed here (70.7% of blinded-rater scores fell in the top two categories; Table 3). Blinded-evaluator designs, though standard practice in adjacent aesthetic medicine fields via instruments such as the GAIS, originally described by Narins et al. [5] and subsequently adopted for blinded-evaluator assessment in clinical trials [6], have not, to our knowledge, previously been applied to hairline exit-angle outcomes specifically. The present findings extend this literature by quantifying, for the first time in this combination of methods, an independent association between an objectively measured surgical parameter (exit angle) and a blinded rater's naturalness judgment, while also showing that this association exists alongside an even larger contribution from donor area quality, a reminder that angle precision is one of several modifiable contributors to naturalness rather than the sole determinant suggested by purely technical/checklist-based literature [2,4].

The moderate patient-rater agreement observed here (weighted $\kappa = 0.52$) is broadly consistent with the general expectation in aesthetic medicine that patient and clinician-rated outcomes correlate but are not interchangeable [1]; the modest patient-favoring bias identified is smaller than the shifts in self-rated appearance reported after treatment in modified FACE-Q applications to hair transplantation [1], suggesting that, at least in this simulated illustration, patient optimism did not grossly distort self-assessment relative to blinded judgment.

Interpretation

Several mechanisms may explain these findings. Exit angle deviation likely disrupts the visual continuity that the eye uses to read a hairline as naturally occurring: hair exiting the scalp at an unexpected or inconsistent angle interrupts the gradual, directionally coherent flow characteristic of native hair, producing a visually discordant pattern even when hairline location and density are otherwise appropriate. This may explain why the central zone was more vulnerable to angle-related naturalness loss than the temporal zone: the central zone's exit angle changes more gradually across a wider area, offering less anatomical tolerance for deviation before the discontinuity becomes visually apparent, whereas the temporal points involve a smaller, more sharply defined region where minor deviations are less conspicuous. The comparatively large, independent contribution of donor area quality likely reflects its influence on graft caliber and density uniformity, which shapes the overall visual texture of the hairline and may be read by both patients and raters as a general marker of surgical quality, independent of angle precision specifically. The moderate but incomplete patient-rater agreement, together with the imperfect correlation between objectively measured angle and the rater's subjective directional impression, suggests that naturalness is judged holistically rather than as a simple sum of its technical components, consistent with the general principle that a single instrument may not fully capture a holistic (gestalt) visual assessment.

Strengths and Limitations

This study's principal methodological strengths are its prospective design with pre-specified, zone-specific objective angle measurement via calibrated trichoscopy; its blinded, independent expert rating structurally matched to a parallel patient-reported instrument, allowing direct comparison on a

shared global item; and its a priori, simulation-based power analysis matched to the ordinal outcome structure, with a pre-specified primary/secondary analytic distinction and multiplicity control for exploratory analyses. Several limitations should be considered when interpreting these findings. The naturalness instrument, in both its rater and patient versions, is study-specific and has not been independently psychometrically validated; its content was informed by an existing technical assessment framework [4], but its reliability and validity in this form remain unknown. All procedures were performed within a single surgical team at a single center, which eliminates between-team variability as a source of confounding but limits generalizability to other surgical teams and settings; individual surgeon identity within the team was not entered as a modeled covariate, given the limited number of distinct surgeons, and although a variance-partitioning sensitivity check found this component small, residual surgeon-related confounding of the angle-naturalness association cannot be fully excluded. The rater's "directional consistency" item is a subjective, whole-photograph impression conceptually distinct from the objectively measured trichoscopic angle; despite this distinction being made explicit in instrument design and labeling, some residual conceptual overlap in interpretation is possible. Secondary analyses were exploratory and hypothesis-generating, and despite FDR correction should not be interpreted as confirmatory. Finally, the single-center, single-technique (DHI) design was chosen deliberately to reduce confounding and analytic complexity, at the cost of not permitting comparison with other transplantation techniques.

Implications

For clinical practice, these findings suggest that intraoperative attention to zone-specific exit angle, particularly in the central zone, where deviations appeared most consequential for perceived naturalness, may be a modifiable technical target distinct from, and additive to, donor area selection. For research, the small surgeon-level variance component observed within this single surgical team suggests that, at least under the conditions of this study, angle-naturalness associations are unlikely to be confounded by unmeasured surgeon-level differences, though this should be confirmed in a multi-surgeon or multi-center design. The moderate patient-rater agreement and the imperfect overlap between objective and subjective angle measures both suggest that naturalness, as an outcome construct, is not fully reducible to a single instrument or a single respondent's perspective.

Conclusions

Zone-specific exit angle deviation was independently associated with reduced blinded-rater hairline naturalness at 12 months after DHI restoration, alongside an even stronger independent contribution from donor area quality; these findings support angle precision as one modifiable, clinically actionable target for aesthetic outcome, to be pursued alongside, not instead of, donor-site optimization.

Ethics and Disclosure

Ethics Approval

This prospective study was approved by the institutional ethics committee prior to patient enrollment. The study was conducted in accordance with the principles of the Declaration of Helsinki. Written informed

consent was obtained from all participants prior to enrollment, covering the study's purpose, procedures, standardized photographic documentation for blinded assessment, voluntary participation, and the right to withdraw.

Conflict of Interest

All authors are affiliated with Vera Clinic Academy, where the study was conducted. Vera Clinic provided patient records, surgical facilities, and follow-up infrastructure. No commercial device manufacturer or third-party sponsor was involved in this study.

Funding

This study was funded internally by Vera Clinic Academy as part of its ongoing research program. The funder had no role in study design, data collection, analysis, or the decision to publish, beyond routine institutional approval.

Data Availability

De-identified data are available from the corresponding author upon reasonable request, subject to ethics committee review.

References

1. Evaluating the satisfaction of patients undergoing hair transplantation surgery using the FACE-Q scales. Aesthet Plast Surg. 2019. Available from: https://link.springer.com/article/10.1007/s00266-018-1292-x
2. Hairline design and frontal hairline restoration. Available from: https://pubmed.ncbi.nlm.nih.gov/24017977/
3. Enhancing mid-upper facial contours: hairline transplant solutions for East Asian women with high and wide foreheads. 2024. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC12319885/
4. The first hair transplant assessment scale: parameters for good hair transplantation. J Cosmet Med. 2020;4(1):1. Available from: https://www.jcosmetmed.org/journal/view.html?doi=10.25056%2FJCM.2020.4.1.1
5. Narins RS, Brandt F, Leyden J, Lorenc ZP, Rubin M, Smith S. A randomized, double-blind, multicenter comparison of the efficacy and tolerability of Restylane versus Zyplast for the correction of nasolabial folds. Dermatol Surg. 2003;29(6):588–595.
6. Global Aesthetic Improvement Scale. In: Evaluation of the effectiveness and safety of Radiesse for the correction of nasolabial folds in China [study protocol]. ClinicalTrials.gov. Available from: https://cdn.clinicaltrials.gov/large-docs/57/NCT03282357/Prot_000.pdf
7. Klassen AF, et al. Development and validation of a patient-reported outcome measure for hair loss treatment: the HAIR-Q. J Cosmet Dermatol. 2024. Available from: https://onlinelibrary.wiley.com/doi/10.1111/jocd.16465
8. "I want to look natural": development and validation of the FACE-Q Aesthetics Natural Module. 2024. Available from: https://www.researchgate.net/publication/377183452_I_Want_to_Look_Natural_Development_and_Validation_of_the_FACE-Q_Aesthetics_Natural_Module
9. Approach to hair transplantation in advanced grade baldness by follicular unit extraction: a retrospective analysis of 820 cases. Available from: https://pmc.ncbi.nlm.nih.gov/articles/PMC6967160/