ORIGINAL ARTICLE

Towards a taxonomy for assessing and classifying the needs of curly hair: A mixed method, ethnographic and quantitative data study

Gabriela Daniels[1] | Maxi Heitmayer[2]

[1]Cosmetic Science Research Group, University of the Arts London, London, UK

[2]Fashion Business School, University of the Arts London, London, UK

Correspondence
Gabriela Daniels, Cosmetic Science Research Group, University of the Arts London, London, UK.
Email: g.n.daniels@fashion.arts.ac.uk

Abstract

Hair defined as curly has an elliptical cross sectional area and unique 3D form. While the chemical, morphological and mechanical characteristics of such hair are being explored using a range of analytical techniques, hair assembly (head of hair) characteristics and individual behaviour are difficult to determine via tress-based instrumental and sensory testing. Since the demand for more efficacious and personalized products is expected to gain pace, this project sets the groundwork for developing a taxonomy for exploring and classifying curly hair needs from an individual's perspective. A mixed-method exploratory sequential design was used to gather information from people with curly hair starting with a novel in the field of cosmetics qualitative research method, Subjective Evidence-Based Ethnography (SEBE) ($n=14$) and followed by an online survey ($n=212$). The SEBE data analysis identified four common hair goals (aesthetic, haptic, practical and emotive) and a group of perceptions related to hair management routines. The survey explored the relationship of these hair goals with hair perceptions, hair esteem, hair characteristics and demographic variables. The findings suggest that hair goals and perceptions are stronger predictors of hair esteem than other characteristics such as hair length or curl type. Hence, a taxonomy for classifying curly hair should facilitate the development of more appropriate products, and product testing methods should incorporate such personal information in addition to objective fibre and hair assembly data. The focus of this study is on curly hair due to the lack of established methods for its objective evaluation and the personal challenges faced by people with curly and textured hair; however, the approach could be adopted to include straighter hair types.

KEYWORDS
hair classification, hair curl, hair esteem, hair geometry, hair goals, hair needs assessment

Résumé

Les cheveux décrits comme bouclés ont une surface transversale elliptique et une forme tridimensionnelle unique. Si les caractéristiques chimiques, morphologiques et mécaniques de ces cheveux sont étudiées à l'aide de diverses techniques d'analyse, il reste difficile de déterminer les caractéristiques de l'assemblage capillaire (tête du cheveu) et le comportement individuel d'une chevelure via des analyses instrumentales de la tresse et des tests sensoriels. La demande de produits plus efficaces et personnalisés allant sans doute augmenter à l'avenir, ce projet pose les bases d'une taxonomie visant à étudier et à classer les besoins liés aux cheveux bouclés du point de vue de la personne qui les porte. Une approche séquentielle à méthodes mixtes a été utilisée pour recueillir des informations qualitatives auprès de personnes ayant des cheveux bouclés à l'aide d'une ethnographie factuelle subjective (Subjective Evidence-Based Ethnography, SEBE) (n = 14), suivie d'une enquête en ligne (n = 228). L'analyse des données SEBE a permis d'identifier quatre objectifs capillaires fréquents et un ensemble de perceptions liées aux routines de gestion des cheveux. L'enquête a étudié la relation entre ces objectifs capillaires et la perception des cheveux, l'estime de soi liée aux cheveux, les caractéristiques des cheveux et les variables démographiques. Les résultats suggèrent que les objectifs et les perceptions des cheveux constituent des facteurs prédictifs plus puissants de l'estime de soi liée aux cheveux que d'autres caractéristiques comme la longueur des cheveux ou le type de boucle. Par conséquent, une taxonomie pour classer les cheveux bouclés doit faciliter le développement de produits plus appropriés, et les méthodes de test des produits devraient incorporer ces informations personnelles en plus des données objectives sur les fibres et les assemblages capillaires. Cette étude se concentre sur les cheveux bouclés en raison du manque de méthodes établies pour évaluer objectivement ce type de cheveux et des défis personnels auxquels les personnes ayant des cheveux bouclés et à texture sont confrontées. Toutefois, l'approche adoptée ici pourrait aussi permettre d'étudier les cheveux plus raides.

INTRODUCTION

Human hair comes in a variety of natural 3D forms ranging from completely straight fibres to fibres with tight curls and twists. To support scientific studies of hair, a classification reflecting curl diameter and the number of crests within a certain hair length was proposed in the past which identified eight hair types, ranging from the straightest to the curliest hair [1]. While relatively simple, this scientific classification could not be used in daily contexts where the consumer and hair-affiliated professionals such as hairdressers and trichologists needed consistent reference points to quickly assess the hair's 3D form and to make recommendations for products or care routines. Born out of this necessity, other hair typing systems have emerged, the most popular being the one developed by the American hairdresser

Andre Walker classifying the hair into four main groups [2]. Casual references to this system in social media, often accompanied by simple visualizations of single fibres, have encouraged consumers to type their own hair for the purpose of product choice and hair routine optimization.

Figure 1 displays an illustration capturing the essence of the online visualizations. More prescriptive and holistic variations of this system, often for hairdresser training purposes, also provide text-based descriptions of the hair assembly [3].

From a scientific point of view, curlier hair types have been reported as having a progressively more elliptic cross sectional shape and a smaller cross sectional surface area, as well as an uneven distribution of cuticle cells, bilateral cortex cell distribution and increased fragility [4]. Within the curlier hair types (V–VIII), similar

FIGURE 1 Visualizations of single fibres and the corresponding hair assembly based on the orginal Andre Walker classification and text descriptors. An expanded version, where groups 3 and 4 include a third subgroup (C), is used in this study.
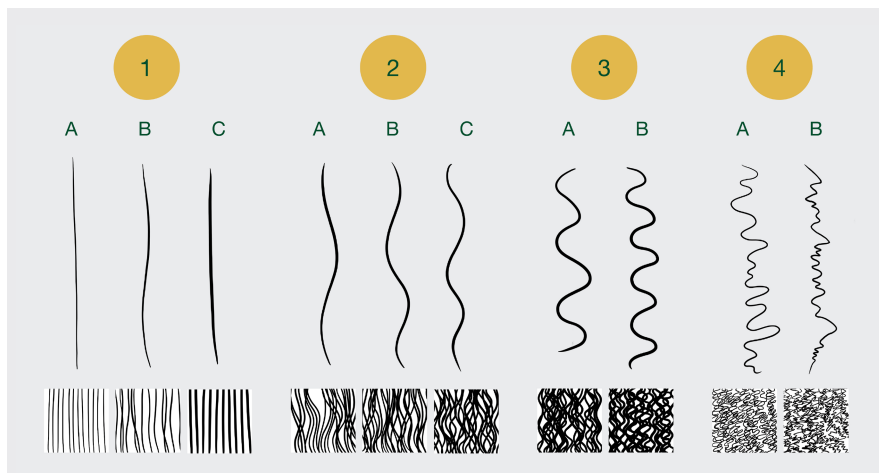
correlations between the curl type and ellipticity, cross sectional area, Young modulus and break stress have been reported, underscoring the imperative for further differentiation of the properties and care requirements of very curly/textured hair [5]. Advances of hair fibre science based on the combined progress in the fields of protein chemistry, analytical techniques and physical and mechanical testing have not yet been able to explore in more detail the underlining hair composition and morphology accounting for these correlations; however, a system to support cross-disciplinary hair science development has been published with the aim to facilitate such approaches [6]. From a scientific and practical view, experimentation based on the geometric curl classification could be enhanced by more precise contextualization to practical hair management. Due to the fibres' 3D shape, curly hair assembly is characterized by the absence of alignment, increased volume, difficulties with applying products over large surface area and combing. Two types of studies of hair assembly behaviours in relation to these characteristics have been commonly conducted so far: instrumental and sensory. Most early instrumental studies of hair assembly were focused on alignment and volume and were conducted on straight hair, wavy hair or hair described as frizzy [7, 8] and did not cover the full range of curl types and textures. Sensory studies of hair are also important assembly assessment methods; however, human haptic experiences of hair have been difficult to measure; hence, it is common to aim to align or correlate these with instrumental measures [9, 10]. Associations of human assessors' emotional responses with hair tactile properties assessed by psychophysiological data points such as finger pulse (peripheral blood flow), palm skin conductance (electrodermal) and facial muscle (electromyographic) activity have been reported too, thus highlighting the potential for 'emotionalising' the consumer's interactions with products [11]. Consumer testing in less controlled environments is also important for ensuring that product

effects measured instrumentally and sensorially in laboratory conditions are of magnitude and relevance that are meaningful to the consumer. However, products' effects on curly and very curly hair were not sufficiently discriminated by trained naïve panellists conducting at-home evaluation, hence more research in subjective curly hair assessment is needed to ensure the robustness of methods [12]. Thus, research in curly hair assembly properties and behaviour does not sufficiently reflect the different curl types, and the controlled variables such as product use, application and styling technique may not be reflective of the consumer's realities. Hence, it is of value to the scientific community to explore human behaviour and experience with curly hair holistically, so that testing reflects user context better.

Beyond its biological function, scalp hair plays a role in the formation of the individual's personal and social identity and as such is a subject of specific age and gender stereotypes [13–15]. Furthermore, appreciation for hair symbolism in the contexts of society, power and religion has been weaved in human history and art over centuries [16]. Thus, hair has been a subject of research in the fields of anthropology, social psychology and social sciences. In relation to cosmetic usage, hair has been studied mostly from a colour-related perspective, with lighter natural hair colours being more commonly associated with youth, while the effect of hair length is less consistent and interacts with skin colour [17, 18]. Notably, the published studies utilize artificial images (head drawings or highly manipulated images), presumably to eliminate the impact of facial features, and are based on straighter hair types only. The experimental design also reflects the historic market dominance of Eurocentric hair standards in terms of the natural curl and colour combinations which are featured in the research. However, to address this bias would be difficult due to the complexity of designing appropriate experiments with curly hair due to a larger variance in its appearance.

Studies exploring the role of hair for individual well-being are exclusively focused on pathologies of hair growth and fibre. While causal effect of hairstyling practices on hair growth disorders is not always clear, Traction Alopecia and Central Centrifugal Cicatricial Alopecia have been commonly reported in connection to hairstyling practices that apply high mechanical stress and/or chemical damage to the fibre and its follicular unit [19]. These conditions frequently occur among individuals with textured hair because of widely used styling methods like braiding, platting and relaxation, thus preventive measures such as alternative styling practices would support long-term hair-related wellbeing.

A notable strand of research on very curly hair are social studies related to the significance of Black women's hair for their personal, cultural and social identity in historical context as well as in the context of increasing age, gender, ethnic and geo-racial diversity of aesthetic standards and appreciation of these in the media and public life. For several centuries, Black people's hairstyles have been suppressed whilst Caucasian hair's characteristics (straight, sleek and long) were elevated as ultimate beauty standards [20]. This has resulted in the heightened significance of Black hair's personal and political dimensions, both on an individual and societal level [21]. While conventional corporate and context-specific hairstyling standards of neat and controlled hair persist, there is a growing trend for keeping and styling very curly hair in ways which preserve its natural shape and are reflective of the cultural and social belonging of the individual [22]. This trend has been supported by social media where communities providing practical advice are formed [23, 24]. However, the quality and reliability of online information is variable.

In summary, this wide-ranging research on hair suggests that the aesthetics and the management practices of curly hair are determined by the hair's inherent properties and by its significance for the individual's personal and social identity manifested in styling choices. However, advancements in the material and social scientific studies of hair are not connected in a meaningful way that supports easy and reliable style choices, routines and products for people with varieties of curly hair. Furthermore, in the field of hair testing, there is a notable gap in the established methodologies for assessing curly fibre form as well as product effects at fibre and assembly level.

Study objective

The objective of this study was to set the groundwork for developing a taxonomy for exploring and classifying curly hair needs and management practices from the individual's point of view. Such a taxonomy could function in conjunction with the proposed fibre science system incorporating the analytical, morphological and mechanical studies of hair [6] and will inform the development of more accurate and consumer relevant assembly testing methods.

METHODS

This paper is based on a mixed methods exploratory sequential design (Table 1), starting with a qualitative study using Subjective Evidence-Based Ethnography (SEBE). Ethnography is the systematic description of individuals or groups of people and their cultures, habits and differences, often carried out in situ, that is, in the naturally occurring contexts of those being studied [25]. The contribution of this method is in its capacity to elicit insights into individuals' behaviours and habits that are not so easily recalled or reported via other qualitative research methods such as interviews and focus groups. The second stage comprises a quantitative study based on an online survey conducted over two steps. The rationale for the chosen research design is to firstly generate, via the qualitative research, a conceptual curly hair care experience framework that could be then applied and tested via a quantitative study. The project was funded by University of the Arts, London (UAL) research fund and ethical approval was granted by LCF Research Ethics Committee on 21/11/2022. A cosmetic scientist specializing in hair fibre science and a social psychologist specializing in in situ research collaborated throughout all stages of the research, offering an interdisciplinary perspective to the entire process.

Qualitative stage: Subjective evidence-based ethnography (SEBE)

Participant selection

Fourteen participants were recruited following a screening interview confirming that they had met the following inclusion criteria: to be above the age of 18 years; to wear their natural hair at the time of the research (no extensions, hair relaxing or perming); to be identified visually as hair types: 2C, 3A, 3B, 3C, 4A 4B and 4C, to have no known skin and scalp allergies and conditions. The participants' demographic and hair-specific data are listed in Table 2.

Informed consent was sought prior to data collection. After the data collection was concluded, the participants were debriefed, hence this study strictly followed the rigorous ethical guidelines developed for SEBE [26].

TABLE 1 Visualization for the Mixed-Methods Sequential Explanatory Design, including all stages in the sequence they were conducted.

Stages	Procedure	Outcome
Qualitative 1 Subjective evidence-based ethnography study	Convenience sampling, participants required to meet inclusion criteria	Invitation to screening
	Screening interview	Participants $n = 14$
	First-person perspective in situ hair styling routine self-recording	Video recording
	Replay interview (recorded)	Transcripts
Qualitative 2 Thematic analysis	Coding	Codebook
	Themes review and consolidation	Themes
	Theme final definition and labelling	Conceptual hair goal framework
Quantitative 1 Pre-screening	Open recruitment via Prolific Academic	$n = 2000$ respondents
	Screening questions for curl type self-identification (using visual categories) and for hair and skin disease	Participant pool identified
Quantitative 2 Survey	Invitation of eligible participants via Prolific Academic	300 participants invited
	24 Likert scale questions published via Qualtrics	$n = 233$ responses
Quantitative 3 Data analysis	Attention checks and data cleaning	Valid responses $n = 212$
	Data distribution and statistical assumption tests Internal consistency check (Cronbach alpha)	Appropriate tests determined
	Spearman rank correlations Hierarchical robust regression	Correlations and hair esteem predictors
Integration of qualitative and quantitative data	Highlight the conceptual model's relative validity and generalizability. Outline areas for further research	

Note: Within each stage, sub steps with the related procedures and outcomes have been listed.

Data collection

Firstly, each participant generated a video recording while completing a routine hairstyling process at home (routine being defined as not related to a specific occasion or to a major change in hairstyle). This approach preserved important space, time and routine-related cognitive processes. This First-Person Perspective (FPP) data was then used as a basis for a Replay-Interview (RIW) whereby the participants and the researchers viewed together the recording and discussed its content, thus encompassing details of the natural setting of the recording and the language used by the participant in relation to their hair and routines. The strength of SEBE is that the joined viewing of the recording aids the participants' memory to provide a more accurate recollection, while the RIW will encourage an analytic discussion that is less influenced by the researcher's subjectivity [27, 28]. To the authors' knowledge, this is the first time SEBE has been used in the context of hair care. It is further argued that this approach reduces the researcher's bias as they are less likely to ignore or emphasize elements of the studied situation based on their own experience, in this case their own hair type and prior research expertise. Furthermore, it allows participants to construct meaning and interpretations of their own actions in conversation with the researcher, whereas they might not have been able to verbalize spontaneously some aspects of their hairstyling practices without the recording due to the intuitive nature of the process.

The submitted video recordings (FPP data) lasted 12 min 5 s on average, ranging from 2 min 35 s to 47 min 18 s. The interviews (RIW) lasted 37 min on average, ranging from 26 to 51 min. The interviews were recorded and transcribed using automated transcription software. The transcripts were reviewed for accuracy. All video files were saved in a GDPR-compliant manner following the UAL data handling regulations. After the interviews, all participants were reimbursed with a £50 gift voucher.

Data analysis

The RIW transcripts were analysed following the principles of thematic analysis [29] as listed below:

- Initial coding and identifying themes: The researchers identified themes both independently and through discussions of the transcripts.

TABLE 2 Demographic and hair-related descriptors of the SEBE participants.

PID	Age	Self-described ethnicity	Curl type	Hair length	Hair care place	Frequency of wash (days)	Video length
P1	31	Mixed British/Afro-Caribbean	4B	Below shoulder length when dry	Bathroom	7–14	3 min 46 s
P2	22	Black British	4C	3Short, equal length	Bathroom	7	5 min 58 s
P3	25	Mixed Irish/Jamaican	3B	Shoulder length	Bathroom or bedroom	7	18 min 36 s
P4	24	British (originally Sudanese)	3B	Shoulder length	Bathroom	7	7 min 4 s
P5	32	Black British	4C	30 cm or more when dry	Bedroom	14	7 min 56 s
P6	31	Bahraini-African	4A	10 cm below shoulders	Bathroom	7–10	47 min 18 s
P7	25	White British	3A	10 cm below shoulders	Bedroom	7	15 min 19 s
P8	30	Spanish (LatAm origin)	3A	Slightly below shoulder	Bathroom	2–3	2 min 35 s
P9		Black British	4B	Shoulder length	Bedroom	7	4 min 49 s
P10	26	Mixed British/Afro-Caribbean	4A	40 cm below shoulder	Bathroom and bedroom	7	17 min 37 s
P11	22	British Caribbean	4C	Below shoulder	Bathroom	7–10	4 min 1 s
P12	24	Black Mixed	3C	40 cm below shoulders	Bedroom	7–14	8 min 54 s
P13	52	White British	3A	20 cm shoulders	Bathroom	7	2 min 19 s
P14	56	White British	3A	Above shoulders	Bathroom	7	2 min 58 s

- Immerging themes review and consolidation: The researchers discussed and reorganized the fully coded interview material under the core emerging themes and subthemes.
- Defining and labelling themes: The researchers consolidated the themes into five major themes with 3–4 subthemes.

Quantitative data stage

Participant selection

Recruitment of participants took place via Prolific Academic (Prolific Academic Ltd, UK) Female participants resident in the United Kingdom were invited to participate in an initial screener study ($n=2000$). Participants were provided with an information sheet and then shown illustrations of the Walker Curl Type classification (WCT) and were asked to classify their hair using these scales and to indicate their hair length when dry and unstretched. Participants took a median time of 1 min 36 s to complete the screener survey and were compensated with £0.15 for their time via Prolific Academic. Following that, 233 participants who had indicated their curl type as 3C or higher and were invited to participate in the full study and 228 people attempted to fill it completely.

Data collection

A survey comprising 24 questions was developed and published via Qualtrics (Qualtrics, USA). The participants were provided with an information sheet and asked to provide again hair descriptive data as per the screening survey as well as some general demographic information. They were then asked to indicate their agreement with a list of statements pertaining to their hair goals, their perceptions of hair care and their hair esteem using Likert-scales (1 = 'strongly disagree', 5 = 'strongly agree'). The statements used in the goals and perception sections were composed based on the themes emerging from the SEBE analysis. The Hair Esteem group of questions was adapted from the Rosenberg Self-esteem scale [30] and adjusted following and initial application of the scale in a study of Black Women with natural (non-relaxed) hair [31]. The participants took a median time of 8 min 3 s to complete the main survey and were compensated with £1.5 for their time.

Data analysis

Data were downloaded and cleaned using Excel. Four incomplete responses were removed and further 12 participants did not pass attention checks or indicated they did not fill in the survey with diligence and were excluded from the analysis. This is a conservative approach but aims to ensure data quality, bearing in mind that online participants already tend to be more attentive than subject pool participants [32]. This resulted in a final sample of $n=212$. Data were then analysed using StataSE 17.0 (StataCorp, USA). Composite scores for aesthetic, haptic, practical and emotional goals and for hair esteem were created. Testing for normality based on skewness and kurtosis revealed that all demographic and hair-related variables in the sample were generally not normally distributed except for hair length. The four hair goals generally did not exhibit significant kurtosis, and only haptic goal exhibited significant skewness to the right. Similarly, hair esteem did not exhibit significant kurtosis, but was significantly skewed to the right. While these findings do not cause too much concern, a conservative approach was taken and Spearman correlations and hierarchical robust (Ordinary Least Squares—OLS) regressions, respectively, were run where appropriate. Cronbach's α, as a measure of internal consistency within the groups of questions constructed for each goal, was as follows: high for hair esteem (0.92), emotive goals (0.74) and haptic goals (0.71), and moderate for practical goals (0.65) and aesthetic goals (0.56).

RESULTS

Qualitative findings

Four major themes emerged from the analysis of the RIW material: perceptions and hair goals, processes and practices, products and tools, and people. Within the limitations of this study, only the theme of perceptions and hair goals was analysed further and followed up with the online survey. The other themes emerging from this rich ethnographic analysis will be investigated in further work.

Four groups of hair goals were identified: Aesthetic (visual) Goals, Haptic Goals, Practical Goals and Emotive Goals. Each group comprised of several subgoals which could effectively be used as targets of cosmetic product, tool and routine interventions (Figure 2).

Aesthetic goals	Haptic goals	Practical goals	Emotive goals
• sleek hair	• smooth hair	• quick results	• healthy hair
• less frizz	• soft hair	• easiness	• natural hair
• curl definition	• less tangled hair	• longevity of style	• gaining recongnition

FIGURE 2 Subjective evidence-based ethnography data analysis outcome, identifying four main hair styling goals with respective subgoals (*n*=14).

Aesthetic goals

The hair's appearance related to texture was of high relevance, while colour and overall assembly form determined by the style/haircut were less important. Due to the 3D form of individual fibres, the array of curly hair visibly occupies more space and has uneven surface due to the lack of alignment between individual hairs. Two of the aesthetic goals were orientated towards partially overcoming these natural characteristics of curly hair: making hair less frizzy and making it look sleek at the surface. Hair frizz was a particularly high concern: 'My hair gets really frizzy...as soon as it's dry, you can tell because even the curl itself will get frizzy, with hair poking out' (P4), 'I usually tend to concentrate on the ends because that's where the frizz is and around the front where the frizz is too, my hair has changed with age, it's gone more frizzy' (P13).

Sleek hair was specifically significant for styles involving the hair being pulled into a bun or ponytail for highly textured hair, while overall shape formation and volume control appeared more important for loose curly and coiled hair. An additional goal related to frizz was achieving a sufficiently long-lasting effect in the context of daily activities, fluctuating ambient humidity or overall hairstyle longevity. For some styles where hair was not tied, curl definition was a typical goal enforced by comparisons with peers and social influences. 'I would probably want, like, tighter curls just for aesthetic reasons. So many people have tight curls and they're really defined, and they just look great all the time'. (P7). Gloss was also mentioned, but it was of a lesser significance to the other aesthetic goals.

Haptic goals

While still related to the hair 3D form, the haptic experience and goals were notably difficult to describe. The value of the SEBE method was in facilitating the emergence of a negotiated subjective meaning of each tactile hair quality. Hair smoothness was a common subgoal and it appeared related to, but different from, visual qualities such as sleek, not frizzy hair since smoothness was experienced by the fingers. Another facet of this subgoal was being able to run fingers through the hair, while in contrast with that, the

undesirable quality of knottiness of the hair was described as something to avoid or manage. The alternative interpretation of this goal is less tangled hair.

The FPP material revealed that most participants used their hands extensively to manipulate and check their hair in addition to being guided by looking at themselves in the mirror. This behaviour prompted discussions around the seeing and feeling perceptions and habits of participants: 'If I can't get to an angle and I can't see myself, I would feel it. And if it's a bit rough, I would be like, okay, what's going on? Usually, I can do it without seeing. So, if it's smooth, I'm fine' (P6).

Hair softness was another common subgoal which was subjective in the way individuals related to their hair. One way of explaining it was by using comparisons with how hair feels when wet: '...it's pretty much like when I wash my hair... it's hydrated. I'm trying to get that same feel on dry hair, yeah' (P11). A common aspect of these haptic subgoals was their transience as they were best met immediately after hair washing and conditioning, but the results diminished after several days.

Practical goals

These goals emerged from the conversations around routines and product usage participants had recorded. The concept of practicality was subjective and highly contextual to other aspects of the participants' lives such as work or planning the week ahead. The most common element of practicality was time efficiency: 'I don't have the time, and everything has to just be very quick, very like minimum effort and even drying my hair, you know, that can take 15 minutes and I just don't have the time to dedicate to that' (P13); 'The leave-in (conditioner) and the curl cream, ... just one too many steps. If I can have both in one, it would be ideal ... I noticed that I needed both'. (P6).

Easiness of hair management, for example, how easy it is to do/undo braids depending on their size, ease of achieving a neat look for work or minimal maintenance of styles between weekly washes was important subgoal. This strong emphasis on efficiency suggests that aesthetic goals are balanced by practical goals, not in terms of compromising the hair appearance but with regard to seeking faster, convenient and longer lasting results.

Emotive goals

The emotive subgoals were covert and only emerged gradually in the RIW while the participants were explaining the observed routines and other aspects of their lives that seemed related to hair. The emotive subgoals were wide-ranging, but a common undercurrent was that people's hair management decisions and practices were not purely practical or driven by aesthetics. One theme was maintaining 'healthy hair' through a variety of mindful choices of styles, using specific salon treatments, regular trims or observing how hair is changing with age. These actions evolved around the concept that hair required nurturing which, in turn, would bring benefits such as a sense of well-being or self-confidence. Keeping natural hair was mentioned by three participants with textured hair, but related explicitly to aesthetics, which suggests that these two goals are interrelated. Another emotive subgoal was gaining recognition from others, thus strengthening the evidence of the social significance of hair.

Negative emotions related to hair were voiced too. These varied from memories of angst with the nature of curly hair's appearance and how it was managed during childhood, to feeling frustrated with the daily effort it still involved. 'I don't hate my hair... But I do hate the time that I have to spend standing and doing stuff like that [referring to the styling process]' (P8).

To further explore the significance of mixed emotive experiences, participants were asked if they perceived their hair care routines as a form of selfcare or a chore. The responses were nuanced but with a strong emphasis on the need to put special time aside for hair care and on the physical effort involved in some of the styles.

Quantitative findings

Descriptive statistics

Participants in the sample were 39.6 years old on average, ranging from 19 to 77 years. About 50% of participants identified their curl type as 3A (47.6%), followed by 3B (20.3%), and 4C (10.85) and hair length was normally distributed. Table 3 provides an overview over the various demographic and hair-related variables.

Exploratory analyses based on pairwise correlations

Hair goals and hair esteem
Hair goals were positively correlated with each other at the highest significance level ($p < 0.001$), except for haptic and practical goals $r(210) = 0.112$, $p = 0.105$. Hair esteem was positively correlated with aesthetic goals ($r(210) = 0.152$, $p = 0.027$) and emotive goals ($r(210) = 0.45$, $p < 0.001$), but not with the other goals. Hence, the higher aesthetic and emotive hair goals of the participant were, the higher their hair esteem was. Exploring hair esteem and the covariates in the sample in more detail only identified a positive association for hair esteem and age $r(210) = 0.172$, $p = 0.012$, that is, older participants reported higher hair esteem. Table S1 reports all correlations. Table 4 provides an overview of the correlations between the four goals and hair esteem.

Hair length versus WCT, hair esteem and hair goals
A significant negative association between hair length and WCT was found $r(210) = -0.223$, $p < 0.001$, meaning the curlier the hair, the shorter it is likely to be. Notably, there

TABLE 3 Overview of demographic and hair-related variables of the survey participants.

Variable	Distribution in our sample
Age (years)	Average 39.6, Median 37, SD 13.13, range 19–77
Hair length (cm)	35.9% 20–30, 24.5% 30–40, 23.1% 10–20, 9% >40 and 8% <10
Hairstyle	29.7% loose hair long, 20.3% loose hair short, 17.9% bun, 16.5% ponytail, 12.7%% pleat/weave and 2.8% loosely pleated
Education	45.8% Bachelor's degree, 16.5% Master's degree, 16% Vocational or technical training, 16% Secondary education, 4.3% Associate's degree or equivalent, 0.95% doctoral degree and 0.47% no formal education
Ethnicity	White 65.1%, Black 20.8%, Mixed 10.8% and Asian 3.3%
Household Income	40.1% 30–59 k, 24.1% 15–29 k, 9.9% >15 k, 9.9% >80 k, 9.4% 60-80 k, 6.6% Prefer not to say
Walker Curl Type with (WCT)	47.6% 3A, 20.3% 3B, 10.85% 4C, 8% 3C, 8% 4A, 5.2% 4B

TABLE 4 Correlations between the four goals and hair esteem.

	Aesthetic goals	Practical goals	Haptic goals	Emotive goals	Hair esteem
Aesthetic goals	1				
Practical goals	0.295*** $p < 0.001$	1			
Haptic goals	0.428*** $p < 0.001$	0.112 $p = 0.107$	1		
Emotive goals	0.479*** $p < 0.001$	0.322*** $p < 0.001$	0.309*** $p < 0.001$	1	
Hair esteem	0.152* $p = 0.027$	0.13 $p = 0.059$	0.046 $p = 0.501$	0.45*** $p < 0.001$	1

Note: Reported Spearman rank correlation coefficients (r) and p-values. Emotive goals are correlated with aesthetic, practical and haptic goals. Hair esteem is only correlated with emotive goals.

*Significant at the 0.05 level. ***Significant at the 0.001 level.

were no significant correlations between hair length and the four hair goals and hair esteem.

Feeling or seeing hair versus hair goals and hair esteem
Correlations of specific relevance to hair care processes were observed; positive correlations between feeling during hair care and aesthetic goals ($r(210) = 0.188$, $p = 0.006$), haptic goals ($r(210) = 0.152$, $p = 0.027$), emotive goals ($r(210) = 0.339$, $p < 0.001$) and hair esteem ($r(210) = 0.186$, $p = 0.007$); positive correlations between seeing during hair care and aesthetic goals ($r(210) = 0.177$, $p = 0.001$) and practical goals ($r(210) = 0.165$, $p = 0.016$). Thus, feeling hair during styling appears to be associated with goals and hair esteem more broadly than relying on seeing.

Demographics and hair-related data, perceptions of self-care or chore, time investment, hair esteem and goals
A negative relationship between perceiving hair care as a chore and age $r(210) = -0.207$, $p = 0.003$, and a positive relationship between perceiving hair care as a chore and WCT ($r(210) = 0.265$, $p < 0.001$) were found, meaning those perceiving hair care as a chore were more likely to be younger and have curlier hair. Positive correlations between investing time into learning about hair and age ($r(210) = -0.215$, $p = 0.002$), hair length ($r(210) = 0.147$, $p = 0.032$) and those perceiving hair care as self-care ($r(210) = 0.214$, $p = 0.002$) were observed.

Perceiving hair care as self-care was positively correlated with emotive goals ($r(210) = 0.240$, $p < 0.001$) and hair esteem ($r(210) = 0.315$, $p < 0.001$) while perceiving hair care as a chore was positively correlated with practical goals ($r(210) = 0.153$, $p = 0.026$) and negatively correlated with emotive goals ($r(210) = -0.150$, $p = 0.029$) and hair esteem ($r(210) = -0.403$, $p < 0.001$). Finally, positive correlations between investing time into learning about hair and practical goals ($r(210) = 0.136$, $p = 0.049$),

emotive goals ($r(210) = 0.384$, $p < 0.001$), and hair esteem ($r(210) = 0.248$, $p < 0.001$) were found too. In summary, participants with high emotive goals were more likely to perceive hair care as a form of self-care and to invest time in learning about hair and had higher hair esteem. Those with high practical goals were more likely to perceive hair care as a chore and had lower hair esteem.

Inferential analysis of hair esteem
A hierarchical robust OLS regression was fitted measuring which study variables are predictors of hair esteem. In model 1, only demographics and hair characteristics were included as predictors. In model 2, the four hair goals were added, and in model 3, the hair care perceptions and habits. In model 4, the demographics and hair characteristics predictors were removed to only include the four goals, the hair care perceptions and habits. In the basic model ($R^2 = 0.096$), education ($\beta = 0.143$, $p = 0.048$), age ($\beta = 0.225$, $p = 0.001$) and hair length ($\beta = 0.149$, $p = 0.041$) were positively correlated with hair esteem. When adding the goals in the intermediate model ($R^2 = 0.255$), age remained positively associated ($\beta = 0.164$, $p = 0.009$), and emotive goal was significantly positively associated with hair esteem ($\beta = 0.476$, $p < 0.001$), while the association between hair esteem and education ($p = 0.105$) and hair esteem and ethnicity (0.399) become insignificant. In the full model, finally, emotive goals ($\beta = 0.302$, $p < 0.001$) and perceptions of hair care as self-care ($\beta = 0.158$, $p = 0.025$) were significantly positively associated with hair esteem, and haptic goals ($\beta = -0.149$, $p = 0.027$) and perceptions of hair care as a chore ($\beta = -0.342$, $p < 0.001$) are significantly negatively associated with hair esteem, while the overall R^2 increased to 0.405. Removing demographics then resulted in the same outcome as model 3 in terms of significant associations, with the overall R^2 of the reduced model only marginally decreasing to 0.36. The full set of analyses are presented in Table 5.

TABLE 5   Results of hierarchical regression analysis for hair esteem.

IVs	(1) β	(1) p	(2) β	(2) p	(3) β	(3) p	(4) β	(4) p
Education	0.143 *	0.048	0.116	0.105	0.081	0.211		
Age	0.225 ***	0.001	0.164 **	0.009	0.103	0.093		
Ethnicity	0.218*	0.039	0.082	0.399	−0.017	0.856		
Household income	0.009	0.875	0.051	0.312	0.092	0.072		
Hairstyle	−0.102	0.225	−0.118	0.136	−0.132	0.056		
Hair length	0.149 *	0.041	0.103	0.134	0.111	0.072		
Walker curl type	−0.011	0.923	−0.031	0.754	0.126	0.187		
Aesthetic goals			−0.007	0.924	0.019	0.787	0.005	0.943
Practical goals			−0.089	0.205	−0.001	0.987	0.013	0.820
Haptic goals			−0.128	0.088	−0.149 *	0.027	−0.151 *	0.016
Emotive goals			0.476 ***	<0.001	0.302 ***	<0.001	0.312 ***	<0.001
Feeling					0.039	0.549	0.059	0.372
Seeing					−0.085	0.15	−0.053	0.352
Self-care					0.158 *	0.025	0.153	0.034
Chore					−0.342 ***	<0.001	−0.341 ***	<0.001
Time Investment					0.113	0.088	0.112	0.056
Obs.	212		212		212		212	
F	$F_{(7, 204)} = 3.58$		$F_{(11, 200)} = 7.03$		$F_{(16, 195)} = 9.1$		$F_{(9, 202)} = 13.97$	
R^2	0.096		0.255		0.405		0.36	

Note: Model 1 = hair esteem versus demographic and hair descriptors as Independent variables(IVs). Model 2 = Model 1 plus IVs for the four hair goals. Model 3 = Model 2 plus IVs for hair care perceptions and time investment. Model 4 = Model 3 without IVs for demographic and hair descriptors. For each model, the beta coefficient explains the change in the hair esteem associated with one unit change of each IV, while holding the other IVs constant. The higher the value, the more significant the IV is in the model. For each model, R^2 reports how well the relevant IVs explain the model. The higher R^2, the better the model fits the data.

*Significant at the 0.05 level. **Significant at the 0.01 level. ***Significant at the 0.001 level.

DISCUSSION

The qualitative stage of this project identified four important groups of goals which were common to all women with curly hair. Thus, the goal framework has the potential for generalization that can be used towards developing a taxonomy for classifying and evaluating curly hair.

Visual aesthetic goals were very important for participants as observed via SEBE in the general context of getting ready for a normal day (meaning going to work or college). Hair without frizz was the most common subgoal and only slightly varied in meaning according to the hairstyles. Additionally, curl definition and sleekness were the consumer's ways of referring to better hair alignment partly contextualized to the different hair lengths and styles represented in the sample. Significantly, despite the wide variety of curl type and hair length represented at this stage, the individuals' aesthetic subgoals were only very moderately adapted to their hair characteristics such as length and curl and not explicitly related to external factors such as fashion trends, social media and

personal networks. Humidity has a significant impact on frizz, and all participants referenced this in the context of frizz increase over time or curl shrinkage. Water sorption isotherms demonstrate that at 95% relative humidity, virgin hair can absorb 25.78% of its dry weight in water [33]; hence, the aesthetic goal for curly hair is explicitly linked to humidity resistance and practical goals.

Haptic goals were commonly expressed as a combination of smoothness and softness. When the meaning of these tactile experiences was explored further, most participants resorted to comparisons and analogies. This underscores the subjectivity of haptic hair experiences in contrast to the relative universality of the elements of the visual goal. A common mentioning of softness alongside moisture and hydration in the interviews suggests that the state of semidry hair might be the 'golden' standard for softness. As human skin cannot sense moisture directly, we rely on additional sensory input to construct this experience. The moisture sensation of hair tresses has been positively correlated to the temperature drop experienced by the skin of the fingers touching the hair, with highly

curly and frizzy hair being perceived as drier due to its 3D volume and fibre's form [34]. Hence, SEBE demonstrated a strong potential to support further work in developing relevant and measurable dimensions of the haptic quality of very curly hair.

SEBE also allowed for an exploration of how much seeing and feeling was involved in the styling process as all participants were continuously and simultaneously looking at and feeling their hair. Observing their own recorded behaviour, participants mostly agreed that both senses were deployed simultaneously and subconsciously throughout the routines. Hence, the visual aesthetic and haptic goals were universal and interlinked.

Beyond the immediate sensory experience, all participants reflected on the time, effort and emotions related to the hair itself and the process. Thus, the emergence of the other two common goals, practical and emotive completed the goal framework.

Practical goals, such as efficacy, ease of application and longevity were subjective in nature as they not only represented an assessment of how well the aesthetic and haptic goals were achieved but also, importantly, one's investment of time, effort and cost of the products needed. There are no reported attempts to create a framework of these influences beyond traditional market data reports; however, a brief reference to connecting consumers preferences to evaluative methodology for testing several curly hair types has been recently reported [35]. In purely technical terms, some practical goals are reflected in typical instrumental testing of hair tresses such as frizz reduction and combing under controlled humidity. These controlled experiments can be effective in discriminating between products, but their relevance to the consumer experience is highly dependent on instrumental settings [36] and so far, these are less well understood in the context of very curly hair. Moreover, the relative subjectivity of some of the practical goals dictates that product efficacy would be best assessed by consumers.

The participants' perceptions of hair practices as self-care or a chore suggested that instead of a dichotomy, this is a range on which individuals' balances lie. However, it was clear from the SEBE analysis that participants' curly hair presented a range of challenges that framed many of the routines as a chore. This could be one reason for the proliferation of online communities supporting hair care practices for those with the curliest hair and addressing practical goals which might be otherwise seen as chores by presenting them as therapeutic self-care experiences [37].

Although the SEBE method was not specifically intended to probe emotions around the hair appearance and past experiences with it, the participants were aware of and referred to their emotive goals throughout the RIW. This phenomenon could be partially attributed to the self-selection sampling approach resulting mostly in participants who had stronger emotive hair goals in the first place; however, the diverse demographics, curl type and emotions underscored the significance of these goals for the conceptual framework.

In summary, the SEBE technique provided rich and detailed insights which formed the conceptual framework of hair goals and hair care perceptions of relevance to very curly/textured hair. The potential of this technique for exploring the multisensory experience and intuitive processes of hair management has been demonstrated. The role of the quantitative stage was to test the hair goals framework and provide generalizability. To complement the framework, a hair esteem measure was introduced in the survey. The hair esteem measure was not validated; however, the number and wording of the questions and the scale used in this project were retained as per the original and hair-adapted versions reported in the Methods section (Table S2). Furthermore, in this study, the individuals' results were not analysed in terms of categorizing them as high or low, but they were treated as ranking data entered for further analysis.

The associations between the hair goals and hair esteem were of particular interest. The results highlight that the importance of practical goals is associated with achieving aesthetic and emotive goals but not with achieving haptic goals. This could be due to the less clearly defined and discriminatory haptic experiences of curly hair already reported in the literature. Higher importance of aesthetic and emotive goals was also predictive of higher hair esteem, while practical and haptic goals did not correlate with hair esteem. Hence, the more important the hair aesthetic is, the more important the different emotive subgoals are and the higher the hair esteem of the person is. Another important finding is that the hair goals are not correlated with hair length, and that hair length and degree of curl were not correlated with hair esteem.

In summary, all correlates suggest that hair form/shape dominates hair goals and practices for individuals with curly hair, and that having longer, or curlier hair does not predict how they might feel about it, while the hair goals they set themselves to achieve do.

There was no association between mostly relying on feeling one's hair and mostly relying on seeing it, a result corroborating the interview findings that the two senses were experienced as one when conditioning and styling the hair. A reliance on seeing was associated with aesthetic and practical goals, thus corroborating the qualitative data in the sense that visual hair self-assessment is important for the simultaneous achievement of the aesthetic and practical subgoals for effective and time-saving routine. However, the feeling element of the styling process cannot be ignored, as it was associated with aesthetic, haptic

and emotive goals. As it is likely to involve a complex multisensory experience of the hair and the product textures and is of high relevance in assessing product performance objectively and subjectively.

Participants who perceived hair care as self-care were likely to invest more time in learning about hair and did not perceive hair care as a chore. The summary of correlates related to hair goals suggests that these participants also tend to focus on emotive goals, while those who see hair care as a chore are more likely to focus on practical goals. The length of hair was not a predictor of any of these perceptions, but those with curlier hair were more likely to view their routine as a chore, and so were the older participants. In summary, the quantitative findings highlight the interplay between perceptions, demographics and hair goals.

Finally, the OLS regression analysis provided an insight into the relative predictive effect of the above emerging model's parameters for the individual's hair esteem. The model development highlights that demographic and hair characteristics have a relatively low predictive power. The strongest predictors of hair esteem in the full model were the emotive goal and the perception of hair care as self-care, both positively associated, while haptic goal and the perception of hair care as a chore were negatively associated. This suggests that research into curly hair should pay more attention to individual's perceptions and goals rather than focusing on demographics and hair characteristics such as length. The findings open a rich avenue for further research into better understanding consumer needs and developing products that meet them.

In summary, the qualitative and quantitative data underscore the importance of personalized approach to catering for different hair care practices over and above the scientifically defined and measured interactions between hair and cosmetic products. Moreover, the application of this mixed method approach brought to the forefront the following key findings: the time and practical challenges with caring for curly hair are significant for the individuals, the hair esteem reflects the goals and perceptions and less so the hair geometry, length and status. The four different types of hair goals, the perceptions of the hair routines, the time investment and the personal hair esteem contribute significantly to a potential taxonomy for studying curly and textured hair needs and management practices at another level.

Limitations of this study

The two stages of this study were based on convenience sampling. The participants may thus not represent a full range of practices and perceptions. However, the methodological power of the sample sizes is adequate, and the data could therefore be considered sufficiently generalizable. While the measures of the four hair goals have been developed based on the SEBE stage and are, thus, ecologically valid, Cronbach's α levels, particularly for practical and aesthetic goals suggest that there is some conceptual heterogeneity in the measurement of these items still. As work on the hair goal taxonomy progresses, further development of the scale items to increase reliability of measurement will be crucial for further work. Finally, to complete the taxonomy, the remaining three elements of personal experience (products, practices and people) should be added.

CONCLUSION

This study foregrounds the concept that a taxonomy of hair-specific and person-specific data facilitates product development and enhanced product efficacy testing as well as greater product and routine personalization. Such a taxonomy could be broadly based on a classification encompassing four dimensions: (i) hair-specific data based on known relationships between hair geometry, morphology and properties; (ii) hair status in relation to chemical or thermal treatments; (iii) hair goals and perceptions; and (iv) product and place-related information. Further steps in this process involve modelling and testing some data in the context of a consumer study. While the focus of this study and taxonomy is on curly hair with its specific structural and practical characteristics, the approach could be adopted to include straighter hair types.

CONFLICT OF INTEREST STATEMENT
The authors acknowledge no conflict of interest.

ORCID
Gabriela Daniels https://orcid.org/0000-0002-1754-5184

REFERENCES
1. Loussouarn G, Garcel AL, Lozano I, Collaudin C, Porter C, Panhard S, et al. Worldwide diversity of hair curliness: a new method of assessment. Int J Dermatol. 2007;46:2–6.

2. George V. Understanding hair types and formulating for 4C hair. *Happi Magazine* [Internet]. [cited 2022 Oct 21]. Available from: https://www.happi.com/issues/2022-11-01/view_dear-valerie/understanding-hair-types-and-formulating-for-4c-hair/

3. Gittens S. Hair dressing for African and curly hair types from cross-cultural perspective. 3rd ed. Andover, UK: Cengage Learning EMEA; 2015. p. 25–6.

4. Daniels G, Fraser A, Westgate GE. How different is human hair? A critical appraisal of the reported differences in global hair fibre characteristics and properties towards defining a more relevant framework for hair type classification. Int J Cosmet Sci. 2023;45:50–61. https://doi.org/10.1111/ics.12819

5. Porter CE, Dixon F, Khine CC, Pistorio B, Bryant H, De La Mettrie R. The behavior of hair from different countries. J Cosmet Sci. 2009;60:97–109.

6. Cloete E, Khumalo NP, Ngoepe MN. The what, why and how of curly hair: a review. Proc Math Phys Eng Sci. 2019;475:20190516. https://doi.org/10.1098/rspa.2019.0516

7. Drovetskaya TV, Diantonio EF, Kreeger RL, Amos JL, Frank DP. New high-charge density hydrophobically modified cationic HEC polymers for improved co-deposition of benefit agents and serious conditioning for problem hair. J Cosmet Sci. 2007;58:421–34.

8. Dussaud A, Fieschi-Corso L. Influence of functionalised silicone on hair fiber-fiber interactions and on the relationships with the macroscopic behaviour of hair assembly. J Cosmet Sci. 2009;60:261–71.

9. Assmus U, Augustin P, Hensen H, Hossel P, Lang G, Leidreiter H, et al. Determination of the feel of hair after cosmetic treatment – sensory and objective test methods. IFSCC Magazine. 2008;11(2):121–8.

10. Galliano A, Kempf JY, Fougere M, Applebaum M, Wolfram LJ, Maibach H. Comparing touch senses of naïve and expert panels through treated hair swatches: which associated wordings correlate with hair physical properties? Int J Cosmet Sci. 2017;39:653–63. https://doi.org/10.1111/ics.12428

11. Boucsein W, Schaefer F, Kefel M, Busch P, Eisfeld W. Objective emotional assessment of tactile hair properties and their modulation by different product worlds. Int J Cosmet Sci. 2002;24:135–50. https://doi.org/10.1046/j.1467-2494.2002.00129.x

12. Tabary C, Pouradier F, Belkebla S, Panhard S, Carvalho L, Vincenzi F. Validation of hair type diversification for recruiting shampoo panellists without losing data relevance. Int J Cosmet Sci. 2020;42:590–5. https://doi.org/10.1111/ics.12650

13. Synnott A. Shame and glory: a sociology of hair. Br J Sociol. 1987;38(3):381–413.

14. Cecil V, Pendry LF, Salvatore J, Mycroft H, Kurz T. Gendered ageism and gray hair: must older women choose between feeling authentic and looking competent? J Women Aging. 2021;34:210–25. https://doi.org/10.1080/08952841.2021.1899744

15. Heinrichsmeier R. 'So long as there's hair there still': displaying lack of interest as a practice for negotiating social norms of appearance for older women. Ageing Soc. 2019;39:1360–86. https://doi.org/10.1017/S0144686X17001544

16. Tarlo E. Entanglement the secret lives of hair. London, UK: Ownworld Publications; 2016.

17. Swami V, Furnham A, Joshi K. The influence of skin tone, hair length, and hair colour on ratings of women's physical attractiveness, health and fertility. Scand J Psychol. 2008;49:429–37. https://doi.org/10.1111/j.1467-9450.2008.00651.x

18. Fink B, Liebner K, Müller A, Hirn T, Mckelvey G, Lankhof J. Hair colour and skin colour together influence perceptions of age, health and attractiveness in lightly pigmented young women. Int J Cosmet Sci. 2018;40:303–12. https://doi.org/10.1111/ics.12467

19. He A, Haskin A, Okoye G. Starring Alopecias related to hair-styling practices. In: Aguh C, Okoye G, editors. Fundamentals of ethnic hair, the dermatologist's perspective. Cham, Switzerland: Spinger International Publishing; 2017. https://doi.org/10.1007/978-3-319-45695-9

20. Greensword N-KS. Historicizing black hair politics: a framework for contextualizing race politics. Sociol Compass. 2022;16:e13015. https://doi.org/10.1111/soc4.13015

21. Canella G. #BlackIsBeautiful: the radical politics of black hair. Vis Stud. 2020;35:273–84. https://doi.org/10.1080/1472586X.2020.1789501

22. Williams B, Collier J, Anderson-Wadley BL, Stokes TN, Coghill KB. "Should I straighten my hair?": narratives of black college women with natural hair. J Women Gend High Educ. 2022;15:134–56. https://doi.org/10.1080/26379112.2022.2067861

23. Mbunyuza-Memani L. Embracing natural hair: online spaces of self-definition, e-sisterhoods and resistance. Communicare. 2019;38:17–35.

24. Goins MR. Afro love: counter-literacies in Brazilian natural hair communities. Afr Black Diaspora. 2021;14:99–115. https://doi.org/10.1080/17528631.2022.2091378

25. Geertz C. The interpretation of cultures. New York, NY: Basic Books; 1973.

26. Everri M, Heitmayer M, Yamin-Slotkus P, Lahlou S. Ethical challenges of using video for qualitative research and ethnography: state of the art and prospective solutions. In: Lähdesmäki T, Koskinen-Koivisto E, Čeginskas V, Koistinen A, editors. Challenges and solutions in ethnographic research: ethnography with a twist. Milton Park: Routledge; 2020. p. 68–83.

27. Lahlou S, Bellu S, Boesen-Mariani S. Subjective evidence based ethnography: method and applications. Integr Psychol Behav Sci. 2015;49:216–38. https://doi.org/10.1007/s12124-014-9288-9

28. Lahlou S. How can we capture the subject's perspective? An evidence-based approach for the social scientist. Soc Sci J. 2011;50:607–55. https://doi.org/10.1177/0539018411411033

29. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3:77–101. https://doi.org/10.1191/1478088706qp063oa

30. Rosenberg M. Society and the adolescent self-image. Princeton, NJ: Princeton University Press; 1965.

31. Johnson TA, Bankhead T. Hair it is: examining the experiences of black women with natural hair. Open J Soc Sci. 2014;2:86–100. https://doi.org/10.4236/jss.2014.21010

32. Hauser DJ, Schwarz N. Attentive Turkers: MTurk participants perform better on online attention checks than do subject pool participants. Behav Res Methods. 2016;48:400–7. https://doi.org/10.3758/s13428-015-0578-z

33. Barba C, Martí M, Manich AM, Carilla J, Parra JL, Coderch L. Water absorption/desorption of human hair and nails. Thermochim Acta. 2010;503-504:33–9. https://doi.org/10.1016/j.tca.2010.03.004

34. Tanamachi H. Temperature as a moisture cue in haptics on hair. Int J Cosmet Sci. 2011;33:25–36. https://doi.org/10.1111/j.1468-2494.2010.00586.x

35. Marchioretto S, Engerer P. Fundamental understanding of highly textured hair through technical investigation and social listening for high-performance solutions aimed at natural textures. IFSCC Magazine. 2023;26(3):245–52.

36. New S, Daniels G, Gummer CL. Measuring the frequency of consumer hair combing and magnitude of combing forces on individual hairs in a tress and the implications for product evaluation and claims substantiation. Int J Cosmet Sci. 2018;40:461–6. https://doi.org/10.1111/ics.12485

37. Davis D, Mbilishaka A, Templeton T. From about "me" to about "we": therapeutic interventions natural hair bloggers (1). J Soc Media Soc. 2018;8:105–12.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Daniels G, Heitmayer M. Towards a taxonomy for assessing and classifying the needs of curly hair: A mixed method, ethnographic and quantitative data study. Int J Cosmet Sci. 2024;00:1–15. https://doi.org/10.1111/ics.12952