

# Hair Transplantation in the United States: A Population-based Survey of Female and Male Pattern Baldness

Leonard Knoedler, MD\*

Felix Ruppel\*

Martin Kauke-Navarro, MD†

Doha Obed, MD‡§

Mengfan Wu, MD, PhD¶

Lukas Prantl, MD, PhD\*

P. Niclas Broer, MD, PhD||

Adriana C. Panayi, MD, PhD§\*\*

Samuel Knoedler\*§††

**Background:** Androgenetic alopecia, the most common type of hair loss, can impair the patient's overall mental health. Although there are pharmaceutical and surgical treatments available, little is known about the public standpoint toward hair transplantation (HT).

**Methods:** A sample of individuals living in the United States (n = 1000; male and female participants were equally distributed) was asked to fill out the questionnaire. The online survey was conducted in June 2022.

**Results:** Most participants (42%; n = 416) were between 41 and 60 years of age. Study participants frequently reported that, with their hair loss progressing, they would not feel attractive anymore (n = 400; 40%), nor as confident as before (n = 330; 33%). Although women with minimal hair loss were willing to spend a median price of \$4000 [interquartile range (IQ) IQR \$1000–\$5000], women with extensive hair loss were willing to spend significantly more (median = \$5000; IQR \$3600–\$6375;  $P = 0.011$ ). This was reproducible in men ( $P = 0.033$ ). Although significantly fewer women considered undergoing HT (430 women versus 447 men;  $P < 0.001$ ), female participants were willing to pay more for their HT compared with men ( $P = 0.039$ ).

**Conclusions:** Individuals living in the United States consider hair loss to impair their attractiveness and regard HT as a valuable therapeutic option. More affordable and gender-specific HT should be subject to future research work. (*Plast Reconstr Surg Glob Open* 2023; 11:e5386; doi: [10.1097/GOX.00000000000005386](https://doi.org/10.1097/GOX.00000000000005386); Published online 13 November 2023.)

From the \*Department of Plastic, Hand and Reconstructive Surgery, University Hospital Regensburg, Regensburg, Germany; †Department of Surgery, Division of Plastic Surgery, Yale School of Medicine, New Haven, Conn.; ‡Department of Plastic, Aesthetic, Hand and Reconstructive Surgery, Hannover Medical School, Hannover, Germany; §Division of Plastic Surgery, Department of Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston, Mass.; ¶Department of Plastic Surgery, Peking University Shenzhen Hospital, Shenzhen, Guangdong, China; ||Department of Plastic, Reconstructive, Hand and Burn Surgery, Bogenhausen Academic Teaching Hospital Munich, Munich, Germany; \*\*Department of Hand, Plastic and Reconstructive Surgery, Microsurgery, Burn Trauma Center, BG Trauma Center Ludwigshafen, University of Heidelberg, Ludwigshafen, Germany; and ††Department of Plastic Surgery and Hand Surgery, Klinikum Rechts der Isar, Technical University of Munich, Munich, Germany.

Received for publication February 9, 2023; accepted July 20, 2023.

Panayi and Knoedler contributed equally to this work.

Informed consent was obtained from all subjects involved in the study.

Copyright © 2023 The Authors. Published by Wolters Kluwer Health, Inc. on behalf of The American Society of Plastic Surgeons. This is an open-access article distributed under the terms of the [Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 \(CCBY-NC-ND\)](https://creativecommons.org/licenses/by-nc-nd/4.0/), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

DOI: [10.1097/GOX.00000000000005386](https://doi.org/10.1097/GOX.00000000000005386)

## INTRODUCTION

Luscious hair is considered a hallmark of facial attractiveness, with a natural hairline framing the face and symbolizing youthfulness.<sup>1–3</sup> Androgenetic alopecia (AGA), the most common type of hair loss, has a lifetime prevalence of up to 80% in men and 50% in women, respectively.<sup>4</sup> AGA is an androgen-related condition that develops in genetically predisposed individuals. AGA is characterized by stepwise miniaturization of the hair follicle, resulting from alteration in the hair cycle dynamics. The result is a progressive decline in visible scalp hair density.<sup>5</sup> According to psychological findings, healthy and strong hair signals overall physical health, stamina, and reproductive potential.<sup>6,7</sup> AGA, on the other hand, can impact the patient's self-confidence and overall mental health, resulting in reduced quality of life.<sup>8,9</sup> For example, Alfonso et al outlined that men with hair loss more frequently reported depressive symptoms and were afraid of losing a pivotal part of their personal attractiveness.<sup>8</sup>

Disclosure statements are at the end of this article, following the correspondence information.

Related Digital Media are available in the full-text version of the article on [www.PRSGlobalOpen.com](https://www.PRSGlobalOpen.com).

Interviewing 157 women, Schmitt et al found a correlation between hair loss and symptoms of depression, with an Israeli study reporting similar findings.<sup>10,11</sup> In patients with alopecia areata, Marahatta et al. calculated a prevalence of depression and anxiety of 67% and 73%, respectively.<sup>12</sup> A 2022 study by Razum and Vukasović Hlupić outlined the marked impact of AGA on young men's quality of life.<sup>13</sup>

In recent decades, there have been multiple advancements in hair loss treatment, including pharmacological and surgical techniques. Surgically, hair transplantation (HT) is commonly performed using the follicular unit excision (FUE) (ie, harvesting hair grafts from the donor area by using a circular punch) or strip harvesting (ie, excision of a scalp strip from the occipital area) with patients reporting positive surgery outcomes.<sup>14</sup> More than 735,000 surgical hair restoration procedures were performed worldwide in 2019, yielding a 16% increase from 2016. The estimated worldwide market for surgical hair restoration increased by 10% since 2016 to \$4.6 billion in 2019.<sup>15</sup>

Although the underlying mechanisms of AGA and potential pharmacological and surgical therapy options are under intensive research, there is a scarcity of studies investigating the public opinion of HT among the US population.<sup>16–20</sup> Policy alterations, whether they constitute legislative mandates for insurance coverage for HT in community health plans, may not be implemented without understanding the views of the public. With this survey study, we, therefore, sought to evaluate aspects that influence public opinion toward HT as a treatment option among a sample of 1000 individuals living in the United States. We hypothesized that the participants' standpoint toward HT is influenced by their current hair status (eg, a person with more extensive hair loss is more likely to consider undergoing HT than a person with less extensive hair loss and vice versa).

## MATERIALS AND METHODS

### Basic Survey Procedure

Data were collected using the online questionnaire shown in figure, Supplemental Digital Content 1, which displays a blank questionnaire (<http://links.lww.com/PRSGO/C846>). A random sample of individuals living in the United States (n = 1000; male and female participants were equally distributed; reflecting the demographic distribution of the general US population) was asked to fill out the questionnaire. Based on the CIOMS International Ethical Guidelines for Biomedical Research, participants received \$13.41 per hour for completing the questionnaire.<sup>21</sup> We used a professional e-mail marketing service (Mailchimp, Atlanta, Ga.) to contact individuals living in the United States via e-mail correspondence based on freely accessible national mail registries. A random selection of participants received mail notification about this study after being identified as living in the United States and aged 18 years or older,

### Takeaways

**Question:** Although pharmaceutical treatments for hair loss are well researched, little is known about public and gender-specific attitudes toward hair transplantation (HT).

**Findings:** A representative sample of US citizens was asked to complete a questionnaire. Study participants frequently reported that hair loss impairs their self-perceived attractiveness and confidence. For both genders, the willingness to pay for HT correlated with the severity of hair loss. Interestingly, although fewer women considered the HT option, female participants were willing to pay significantly more for their HT than male respondents.

**Meaning:** Americans feel that hair loss negatively affects their self-image and view HT as a valuable treatment option.

following a panel prescreening process conducted by the e-mail marketing service. The random selection process was performed using Alteryx (Irvine, Calif.). The online survey was conducted between June 17 and June 27, 2022. Inclusion in this survey required partakers to have internet access and to be literate in English. To reduce bias, participants were not informed about the survey's topic before starting the questionnaire. To assess the opinion of survey participants on HT, we developed a questionnaire composed of 20 questions, six before and after pictures of successful hair transplants, and pictures of the Hamilton–Norwood classification system (HNCS) and Ludwig System (LS) scales.<sup>22,23</sup> The HNCS for men and the LS for women are the two most commonly used classifications for patterns of hair loss.<sup>22–24</sup>

### General Survey Questions

Before beginning the survey, the participants were asked to read introductory information on the aim and content of the survey, at which point they could opt to decline or participate. The survey's content is summarized in Figure 1. To establish an overview of the composition of the response audience, the questionnaire begins with general demographic and socioeconomic questions. Next, participants were requested to look at the HNCS or LS scale depending on their selected gender and evaluate their own hair loss status. Subsequently, before and after pictures of six exemplary HTs (retrieved from RealSelf; <https://www.realself.com>; Seattle, Wash.) along with the following three associated statements were presented: “I think that the hair transplants of the men's and women's hair were successful,” “I would consider myself more attractive after a hair transplant with comparable success,” and “I would be happy after a hair transplant with such before/after results on myself.” Answers were generally in multiple-choice design, with the option to select a single answer. The blank questionnaire and representative HT outcomes are shown in Supplemental Digital Content 1 (<http://links.lww.com/PRSGO/C846>).

Variable	n (%)
<b>Sex</b>	
Female	500 (50)
Male	500 (50)
<b>Age</b>	
18–25	63 (6.3)
26–40	256 (26)
41–60	416 (42)
61–80	234 (23)
81+	31 (3.1)
<b>Hair status</b>	
<b>Female participants</b>	
No hair loss	101 (20)
Ludwig I	171 (34)
Ludwig II	138 (28)
Ludwig III	91 (18)
<b>Male participants</b>	
Norwood I	18 (3.6)
Norwood II	44 (8.8)
Norwood III	60 (12)
Norwood III Vertex	43 (8.6)
Norwood IV	70 (14)
Norwood V	140 (28)
Norwood VI	99 (20)
Norwood VII	26 (5.2)

**Fig. 1.** Patient demographics and characteristics. Participants aged 41–60 represented the most common age group in our study with the biological sex equally distributed across the study population.

## RESULTS

The study population included 1000 participants with female and male participants who were equally distributed ( $n = 500$ ). Most participants (42%;  $n = 416$ ) were between 41 and 60 years of age, with people between 26 and 40 years of age accounting for the second-largest age cohort. Regarding their self-perceived hair loss, 46% ( $n = 229$ ) of female participants and 67% ( $n = 335$ ) of the male participants classified themselves with severe hair loss (ie,  $LS \geq II$ ;  $HNCS \geq IV$ ).<sup>25</sup> Among the female participants, 101 partakers (20%) stated that they would have no hair loss. Detailed participant information is summarized in **Figure 1**.

Study participants frequently reported that with their hair loss progressing, they would not feel attractive anymore ( $n = 400$ ; 40%), nor as confident as before ( $n = 330$ ; 33%). Interestingly, 46% ( $n = 460$ ) of study participants stated that they would often think of what they look like with a completely bald head. Also, 46% ( $n = 460$ ) of our study population admitted that the possible scenario

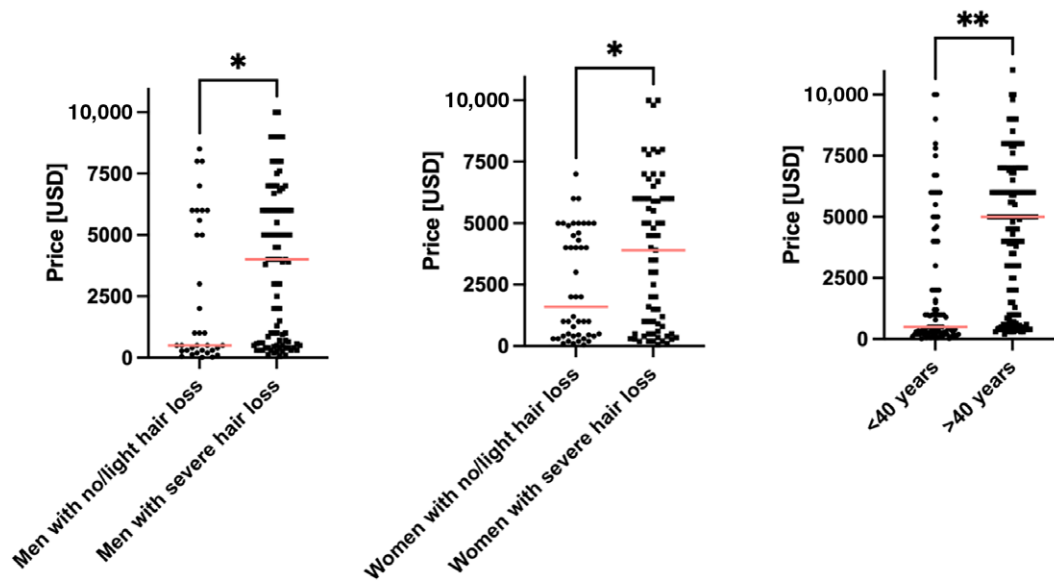
of progressive hair loss would weigh on their shoulders. Overall, 51% ( $n = 510$ ) of study participants tended to be unhappy with their current hair status, whereas the same amount ( $n = 510$ ) would consider undergoing HT. Detailed responses to questions related to the participants' hair status are shown in Supplemental Digital Content 2. (See **figure, Supplemental Digital Content 2**, which displays summary of survey items and responses related to hair status. Interestingly, only 37% of the study participants were satisfied with their current hair status, and 36% of partakers would consider undergoing HT surgery; <http://links.lww.com/PRSGO/C847>.)

Supplemental Digital Content 3 displays the detailed responses to questions related to the participants' hair status with regard to gender and the respective score on the LS/HNCS. [See **figure, Supplemental Digital Content 3**, which displays detailed responses of the survey participants to the questionnaire. Remarkably, female participants with severe hair loss ( $LS \geq II$ ;  $HNCS \geq IV$ ) were more satisfied with their current hair status and showed less willingness to undergo HT surgery. The opposite was true for male partakers; <http://links.lww.com/PRSGO/C848>.]

The median amount of money participants would be willing to pay for HT was \$4700 [interquartile range (IQR) \$1200–\$6000]. Willingness to pay increased significantly with increases in age ( $P < 0.001$ ). Participants younger than 40 years of age were willing to pay a median price of \$2000 (IQR \$1000–\$6000), whereas people older than 40 years of age were willing to pay more than double the price for an HT (median = \$5000; IQR \$3000–\$6000). In general, men were less satisfied with their current hair status than women ( $P < 0.001$ ). To stratify the willingness to pay among the different severity levels of hair loss, we subdivided the survey population into individuals with minimal hair loss ( $LS < II$ ;  $HNCS < IV$ ) and participants with extensive hair loss (ie,  $LS \geq II$ ;  $HNCS \geq IV$ ).<sup>25</sup> Although women with minimal hair loss were willing to spend a median price of \$4000 (IQR \$1000–\$5000), women with extensive hair loss were willing to spend significantly more (median = \$5000; IQR \$3600–\$6375;  $P = 0.011$ ). Men with minimal hair loss were willing to spend a median price of \$3000 (IQR \$1000–\$5600), whereas men with extensive hair loss were willing to spend \$5000 (IQR \$2000–\$6000;  $P = 0.033$ ). Although fewer women considered undergoing HT (430 women versus 447 men;  $P < 0.001$ ), female participants were generally willing to pay more for their HT compared with men ( $P = 0.039$ ). The distribution of willingness-to-pay is shown in **Figure 2**.

## DISCUSSION

The beauty standards of today and the increasing number of celebrities who have evidently undergone HT have not only catalyzed public interest but also helped drive surgical advancements in HT. In this survey of 1000 individuals living in the United States, we aimed to elucidate potential driving factors for men and women to undergo HT and psychological effects of hair



**Fig. 2.** In-depth analysis of willingness to pay. The red line illustrates the mean;  $*P \leq 0.05$ ;  $**P \leq 0.0001$ . Men and women with severe ( $LS \geq II$ ;  $HNCS \geq IV$ ) were willing to spend significantly more on their HT. This was reproducible in partakers aged older than 40 versus younger than 40 years of age.

loss, as well as determine the participants' willingness-to-pay for the HT.

The median price that survey participants were willing to pay for HT was \$4800. The price of HT varies across different countries (eg, Turkish HT clinics commonly offer lower price levels) and depends on the number of transplanted hair grafts, the technique performed (FUE is more expensive than strip harvesting), and more complex medical services, such as robotic FUE or needleless local anesthesia.<sup>26,27</sup> The combination of 88% of survey participants willing to undergo HT and spending a price equal to 10% of the mean US annual personal income on HT underscores that HT is considered a feasible treatment option for hair loss, in terms of monetary factors.<sup>28</sup> Interestingly, hair loss medications such as finasteride (approximately \$0.50/d) and minoxidil (approximately \$0.45/d) are available at a fraction of the price of the surgical procedure.<sup>29</sup> In general, such medications must be taken lifelong to achieve sustainable results. Although HT surgery does not eliminate the need for medical treatment (which is still needed postoperatively to avoid further progression of AGA), it can represent an alternative therapy. Furthermore, despite its FDA approval for male AGA in 1992 and a reported incidence of medication-associated side effects of less than 2%, finasteride has been implicated with side effects.<sup>30,31</sup> Thus, a nonpharmacological surgical procedure represents a potential alternative for individuals living in the United States.

A 2021 study based on 90 worldwide HT clinics reported that the total cost of HT in the US amounts to approximately \$13,610.<sup>32</sup> The gap between the average price of HT on the market and the average willingness-to-pay price from our survey underscores the need for cost-reduction efforts in the field of HT. The implementation of robotic-assisted extraction/implantation devices

represents a potential point of leverage to provide more affordable HT.<sup>33</sup> Kanayama et al evaluated the performance of a robotic recipient site creation device in 31 patients and found the robotic tool to be safe and reliable for clinical use, as well as easily manageable by different HT surgeons.<sup>34</sup> A 2015 Korean study reported similar outcomes in 22 HT patients. The authors outlined the benefits of such devices in overcoming the increasing human error rate when performing repetitive tasks.<sup>35</sup> Of note, current robotic HT systems yield transection rates (ie, the failure of the transplanted hair graft to grow) of 4%–10%.<sup>36</sup> Yet, state-of-the-art systems are priced at approximately \$500,000, therefore representing a long-term investment rather than an immediate cost-reduction factor, and are currently used for only 6% of HT.<sup>15,37</sup> Overall, this is the first study to determine the willingness-to-pay of potential HT candidates.

In our survey population, we found men and women with severe hair loss ( $LS \geq II$ ;  $HNCS \geq IV$ ) were willing to spend significantly more on their HT.<sup>22,23</sup> Women with minimal hair loss were willing to spend a median price of \$4000, whereas women with extensive hair loss would spend \$5000. For men, patients with minimal hair loss were willing to undergo HT priced at \$3000, whereas patients with extensive hair loss were willing to spend \$5000. The willingness to pay more for HT in people with more progressed hair loss underscores the importance of hair status on psychological well-being and self-perceived attractiveness. Female participants with extensive hair loss agreed more strongly with the statement, "With a full head of hair, I think I would have more success in dating" than female participants with minimal hair loss ( $P < 0.0001$ ). Men with extensive hair loss, on the other hand, agreed more strongly with the statement, "With a full head of hair, I think I would have better success in my job" ( $P =$

0.05). This illustrated that people with more progressed hair loss seem to imagine themselves more attractive and successful with a fuller head of hair.

The well-described impact of hair loss on psychological well-being and on quality of life fuels the discussion on the eventual reimbursement of HT by health insurance. Although HT is commonly considered a private cosmetic service and is, as such, not reimbursable, there are some exceptions. Secondary alopecia caused by scarring or burn wounds may be covered by insurance. Advocates of HT reimbursement highlight the enormous economic burden of US adults with depressive disorders, which increased by 38% to \$326,000,000 from 2018 to 2020.<sup>38</sup> Furthermore, they cite the increased US suicide rates, which are the highest recorded in more than 30 years. In contrast, Ceylan et al reported a patient without psychiatric history who developed a major depressive disorder after HT and died of suicide.<sup>39</sup> An Indian study discussed a potential link between body dysmorphic disorder and HT and found that patients with higher body dysmorphic disorder scores are more likely to undergo HT if there is a price reduction for the procedure.<sup>40</sup> Overall, there is a paucity of studies pinpointing the direct and lasting effects of HT on patients' mental health. Thus, randomized controlled trials are needed to corroborate the potential benefits of HT in patients mentally affected by their hair loss condition.

Our analysis revealed a lesser willingness to undergo HT in female participants compared with male participants. Yet, women were willing to spend more on their HT. The first finding aligns with recent statistics by the International Society of Hair Restoration Surgery reporting that 87% of HT patients are male.<sup>15</sup> However, there is a scarcity of studies investigating the price female HT candidates are willing to pay for restoring their hair status. Nevertheless, the increased willingness-to-pay of women for their eventual HT surgery corresponds with previous findings that underscore the central role of hair in women. In general, women spend twice as much on their annual hair care regimen compared with men, with up to 81% of women stating that their hair determines their confidence level.<sup>25</sup> Notably, breast cancer patients even reported their chemotherapy-induced hair loss to be more traumatic and distressing than breast amputation itself.<sup>41</sup> Overall, these findings outline the need for gender-specific techniques in HT to establish it as a valuable alternative for women experiencing hair loss. Although there is a consensus on the importance of gender-specific preoperative consultation among HT surgeons, more efforts are needed toward a gender-specific HT. For example, female patients' demands commonly include a higher postoperative hair density compared with men.<sup>42</sup> To achieve more density, some HT surgeons have proposed that each graft may contain a larger number of hairs. Yet, this approach has resulted in patchy postoperative outcomes and therefore remains to be refined.<sup>42</sup> Uebel et al yet showed that follicular unit transplantation is an excellent option for the treatment of female pattern hair loss patients.<sup>43</sup> It is also important to consider the high prevalence of AGA in the general population, which may cause balding men to

accept their hair loss rather than take countermeasures such as HT.<sup>4</sup>

In summary, individuals living in the United States are willing to pay the price of beauty. Yet, HT has to become more affordable and include more gender-specific strategies. Furthermore, the impact of HT on patients' mental health should be elucidated in larger-scale studies to determine the eventual clinical and economic benefit of HT reimbursement.

### Limitations

The results of the present study ought to be interpreted in light of the following limitations: the questionnaire did not include information on race or the current psychological health of the survey participants. Furthermore, we did not account for geographical variations. Participants aged 41–60 represented the most common age class in our study. This age class is known to be at a high risk for developing AGA, which could impair the objectivity of this study. Yet, we chose this age distribution due to the current US age distribution to render our results more transferrable to the general US public. Possibly, participants with no hair loss could have been confused by certain questions (eg, “Even with my hair loss progressing, I would continue to feel attractive.; “I have often thought about what I would look like with a full head of hair.”). However, we did not receive any feedback from the partakers indicating that they were confused by the question design.

Furthermore, response options such as “rather agree and “rather disagree could have confused the participants. It would have been more appropriate to use the following question style: “1. agree completely, 2. agree somewhat, 3. neither agree nor disagree, 4. disagree somewhat or 5. disagree completely.”<sup>44</sup> Although an upper age limit for HT remains to be determined, HT surgeons should critically evaluate the patient's eligibility for surgery, especially in older age groups.

The age distribution in this study was chosen in close consultation with the survey distributor to ensure high response rates and based on other research work using this age distribution.<sup>45–47</sup> Of note, other age brackets (eg, age by decade) could have been even more appropriate. Participants' willingness to undergo HT could have been assessed before and after the education/survey, as this might have biased partakers' responses, thereby reducing the external validity of the study.

Other forms of hair loss (eg, traction alopecia) which can closely resemble AGA were not investigated in the present work, thus representing a potential confounding factor.<sup>48</sup> Furthermore, hair care approaches and forms of alopecia differ between different races and socioeconomic statuses, therefore representing potential confounders.<sup>49–51</sup>

Exemplary outcomes of HT and informing participants about the study topic before participation could have introduced bias. However, we selected the HT images to give participants a realistic view of the strengths and limitations of HT. The outcome images were preselected independently by two clinicians (A.C.P. and M. K.-N.). A third author then determined appropriate exemplary outcomes based on his 20 years of experience with HT.

Interestingly, our study population showed a distinct distribution pattern with about half of female and male patients self-reporting severe hair loss (LS  $\geq$  II; HNCS  $\geq$  IV). In comparison to similar epidemiological studies, we found relatively high, yet realistic percentages of men and women affected by hair loss.<sup>52,53</sup>

Financial reimbursement according to the CIOMS International Ethical Guidelines for Biomedical Research and socioeconomic status might have influenced study participants' responses.<sup>21</sup> However, to date, no study has investigated the impact of these parameters in the field of HT. Therefore, these limitations warrant further research work. In this study, we used the median as a measure of central tendency to account for the skewness of the data, which was assessed using histograms. Although the participants were not informed about the survey's topic before starting the questionnaire, they were asked to read the information on the aim and content of this study when starting the survey, which can still introduce bias. A further limitation is that the responders independently assessed their own hair loss, but the assessment was not verified by a trained clinician. As such, this introduces subjective bias. Future studies are needed to validate the presented findings globally and help identify factors/determinants influencing patients' willingness to undergo HT. For example, a possible link between social dimensions (eg, relationship status, type of work) and the partakers' answers could be investigated.

## CONCLUSIONS

Individuals living in the United States consider hair loss to impair their attractiveness and regard HT as a valuable therapeutic option in hair loss treatment. Further efforts have to be made toward more affordable and gender-specific HT.

Leonard Knoedler, MD  
Samuel Knoedler

Department of Plastic, Hand and Reconstructive Surgery  
University Hospital Regensburg  
Regensburg, Germany

E-mail: leonard.knoedler@stud.uni-regensburg.de;  
samuel.knoedler@stud.uni-regensburg.de

## DISCLOSURE

The authors have no financial interest to declare in relation to the content of this article.

## REFERENCES

1. Qu Q, Miao Y, Guo ZH, et al. Types of hairline recession in androgenetic alopecia and perceptions of aging in Asian males. *Int J Dermatol*. 2019;58:1191–1196.
2. Natpracha W, Sukanjanapong S, Chanprapaph K, et al. Characterization and classification of different female hairline patterns in the Thai population. *J Cosmet Dermatol*. 2021;20:890–896.
3. Phillips TG, Slomiany WP, Allison R. Hair loss: common causes and treatment. *Am Fam Physician*. 2017;96:371–378.
4. Piraccini BM, Alessandrini A. Androgenetic alopecia. *G Ital Dermatol Venereol*. 2014;149:15–24.
5. Kasumagic-Halilovic E. Trichoscopic findings in androgenetic alopecia. *Med Arch*. 2021;75:109–111.
6. Etcoff N. *Survival of the Prettiest: The Science of Beauty*. New York: Anchor Books; 2011.
7. Fink B, Neuser F, Deloux G, et al. Visual attention to and perception of undamaged and damaged versions of natural and colored female hair. *J Cosmet Dermatol*. 2013;12:78–84.
8. Alfonso M, Richter-Appelt H, Tosti A, et al. The psychosocial impact of hair loss among men: a multinational European study. *Curr Med Res Opin*. 2005;21:1829–1836.
9. Sawant N, Chikhalkar S, Mehta V, et al. Androgenetic alopecia: quality-of-life and associated lifestyle patterns. *Int J Trichology*. 2010;2:81–85.
10. Schmitt JV, Ribeiro CF, Souza FH, et al. Hair loss perception and symptoms of depression in female outpatients attending a general dermatology clinic. *An Bras Dermatol*. 2012;87:412–417.
11. Hoffer L, Achdut N, Shvarts S, et al. Gender differences in psychosocial outcomes of hair loss resulting from childhood irradiation for tinea capitis. *Int J Environ Res Public Health*. 2021;18:7825.
12. Marahatta S, Agrawal S, Adhikari BR. Psychological impact of alopecia areata. *Dermatol Res Pract*. 2020;2020:8879343.
13. Razum J, Vukasović Hlupić T. Quality of life in young men with androgenetic alopecia: a mixed methods study. *J Cosmet Dermatol*. 2022;21:794–801.
14. Rosati P, Barone M, Alessandri Bonetti M, et al. A systematic review of outcomes and patient satisfaction following surgical and non-surgical treatments for hair loss. *Aesthetic Plast Surg*. 2019;43:1523–1535.
15. International Society of Hair Restoration Surgery. 2022 Practice Census Results. Available at [https://ishrs.org/wp-content/uploads/2022/04/Report-2022-ISHRS-Practice-Census\\_04-19-22-FINAL.pdf](https://ishrs.org/wp-content/uploads/2022/04/Report-2022-ISHRS-Practice-Census_04-19-22-FINAL.pdf). Accessed August 12, 2023.
16. Wall D, Meah N, Fagan N, et al. Advances in hair growth. *Fac Rev*. 2022;11:1.
17. York K, Meah N, Bhojru B, et al. A review of the treatment of male pattern hair loss. *Expert Opin Pharmacother*. 2020;21:603–612.
18. Andy G, John M, Mirna S, et al. Controversies in the treatment of androgenetic alopecia: the history of finasteride. *Dermatol Ther*. 2019;32:e12647.
19. Iamsung W, Leerunyakul K, Suchonwanit P. Finasteride and its potential for the treatment of female pattern hair loss: evidence to date. *Drug Des Devel Ther*. 2020;14:951–959.
20. Trüeb RM. Understanding pattern hair loss-hair biology impacted by genes, androgens, prostaglandins and epigenetic factors. *Indian J Plast Surg*. 2021;54:385–392.
21. Council for International Organizations of Medical Sciences (CIOMS). *International Ethical Guidelines for Health-related Research Involving Humans, Fourth Edition*. Geneva: CIOMS; 2016.
22. Ludwig E. Classification of the types of androgenetic alopecia (common baldness) occurring in the female sex. *Br J Dermatol*. 1977;97:247–254.
23. Norwood OT. Male pattern baldness: classification and incidence. *South Med J*. 1975;68:1359–1365.
24. Gupta M, Mysore V. Classifications of patterned hair loss: a review. *J Cutan Aesthet Surg*. 2016;9:3–12.
25. Dinh QQ, Sinclair R. Female pattern hair loss: current treatment concepts. *Clin Interv Aging*. 2007;2:189–199.
26. Pothula SR, Jayanth, BS. Hair transplantation. In Bonanthaya K, Panneerselvam E, Manuel S, Kumar VV, Rai A. eds., *Oral and Maxillofacial Surgery for the Clinician*. Singapore: Springer Nature Singapore; 2021:707–730.
27. Mysore V, Kumaresan M, Garg A, et al. Hair transplant practice guidelines. *J Cutan Aesthet Surg*. 2021;14:265–284.

28. Statista Research Department. Per capita personal income in the U.S. from 1990 to 2021. Available at <https://www.statista.com/statistics/205199/per-capita-personal-income-in-the-us/>. Accessed August 12, 2023.
29. Klifto KM, Othman S, Kovach SJ. Minoxidil, platelet-rich plasma (PRP), or combined minoxidil and PRP for androgenetic alopecia in men: a cost-effectiveness Markov decision analysis of prospective studies. *Cureus*. 2021;13:e20839.
30. Traish AM. Health risks associated with long-term finasteride and dutasteride use: it's time to sound the alarm. *World J Mens Health*. 2020;38:323–337.
31. Suchonwanit P, Iamsung W, Leerunyakul K. Topical finasteride for the treatment of male androgenetic alopecia and female pattern hair loss: a review of the current literature. *J Dermatolog Treat*. 2022;33:643–648.
32. Eflein J. Total cost of a hair transplant in select countries worldwide in 2020 and 2021. Available at <https://www.statista.com/statistics/1233463/hair-transplant-total-cost-selected-countries/>. Accessed August 12, 2023.
33. Gupta AK, Lyons DC, Daigle D, et al. Surgical hair restoration and the advent of a robotic-assisted extraction device. *Skinmed* 2014;12:213–216.
34. Kanayama K, Kato H, Mori M, et al. Robotically assisted recipient site preparation in hair restoration surgery: surgical safety and clinical outcomes in 31 consecutive patients. *Dermatol Surg*. 2021;47:1365–1370.
35. Shin JW, Kwon SH, Kim SA, et al. Characteristics of robotically harvested hair follicles in Koreans. *J Am Acad Dermatol*. 2015;72:146–150.
36. Rose PT, Nusbaum B. Robotic hair restoration. *Dermatol Clin*. 2014;32:97–107.
37. ARTAS iX review –Strengths and limitations. 2019. Available at: <https://www.dhiinternational.com/artas-ix-review/>. Accessed August 12, 2023.
38. Greenberg PE, Fournier AA, Sisitsky T, et al. The economic burden of adults with major depressive disorder in the United States (2010 and 2018). *Pharmacoecon*. 2021;39:653–665.
39. Ceylan ME, Önen Ünsalver B, Evrensel A. Major depressive disorder with religious struggle and completed suicide after hair transplantation. *SAGE Open Med Case Rep*. 2017;5:2050313X1770074–205031317700744.
40. Hafi B, Uvais NA, Afra TP, et al. Hair transplantation, body dysmorphic disorder, and patients' attitude: a survey-based study from south India. *Dermatol Ther*. 2020;33:e13945.
41. Münstedt K, Manthey N, Sachsse S, et al. Changes in self-concept and body image during alopecia induced cancer chemotherapy. *Support Care Cancer*. 1997;5:139–143.
42. The International Society of Hair Restoration Surgery. Ethnic and gender considerations in hair transplantation. Available at <https://ishrs.org/ethnic-and-gender-considerations-in-hair-transplantation-2/>. Accessed August 12, 2023.
43. Uebel CO, Piccinini PS, Spencer LSB, et al. Female pattern hair loss: why the follicular unit transplantation surgical technique remains a good option. *Plast Reconstr Surg*. 2021;147:839–849.
44. Dykema J, Schaeffer NC, Garbarski D, et al. Towards a reconsideration of the use of agree-disagree questions in measuring subjective evaluations. *Res Soc Adm Pharm* 2022;18:2335–2344.
45. Pilarska A, Zimmermann A, Zdun-Ryżewska A. Access to health information in the polish healthcare system-survey research. *Int J Environ Res Public Health*. 2022;19:7320.
46. Bohlken J, Kostev K, Riedel-Heller S, et al. Effect of the COVID-19 pandemic on stress, anxiety, and depressive disorders in German primary care: a cross-sectional study. *J Psychiatr Res*. 2021;143:43–49.
47. FitzGerald EA, Frasso R, Dean LT, et al. Community-generated recommendations regarding the urban nutrition and tobacco environments: a photo-elicitation study in philadelphia. *Prev Chronic Dis*. 2013;10:E98.
48. Sharquie KE, Schwartz RA, Aljanabi WK, et al. Traction alopecia: clinical and cultural patterns. *Indian J Dermatol*. 2021;66:445.
49. Hollins LC, Butt M, Hong J, et al. Research in brief: survey of hair care practices in various ethnic and racial pediatric populations. *Pediatr Dermatol*. 2022;39:494–496.
50. James-Todd T, Senie R, Terry MB. Racial/ethnic differences in hormonally-active hair product use: a plausible risk factor for health disparities. *J Immigr Minor Health*. 2012;14:506–511.
51. Thompson JM, Park MK, Qureshi AA, et al. Race and alopecia areata amongst US women. *J Investig Dermatol Symp Proc*. 2018;19:S47–S50.
52. Rhodes T, Girman CJ, Savin RC, et al. Prevalence of male pattern hair loss in 18-49 year old men. *Dermatol Surg*. 1998;24:1330–1332.
53. DeMuro-Mercon C, Rhodes T, Girman CJ, et al. Male-pattern hair loss in Norwegian men: a community-based study. *Dermatology*. 2000;200:219–222.