

# Home Body Dryer for Your Health and Comfort

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## Abstract

This paper aims to research the design of a body dryer for household use, which was previously used in public facilities such as bathhouses and gyms. To consider the user context, a user study was conducted, and on-site observations and interviews were carried out to identify suitable environments in homes. Through this process, a vertical design was adopted as an efficient form for efficient drying body, and features such as underwear storage were added to enhance the usability of the body dryer. Ultimately, by designing a vertical body dryer that considers user environment, the goal is to pioneer the body dryer market.

## 1. Introduction

### 1-1. Background and Purpose

There may have been experiences when you felt damp after taking a shower and putting on your underwear. Forgetting the refreshing feeling of the shower moment due to the lingering moisture on the body can be disappointing. To address this, public facilities such as bathhouses, gyms, and swimming pools provide body dryers to shorten the time of busy modern individuals and offer a more refreshing sensation. However, when it comes to targeting households with such body dryers, the response has been less enthusiastic. This can be attributed to a lack of understanding of user context and the residential structure in Korea.

Based on this background, the purpose of this study is to design a body dryer that considers the characteristics of humans. In other words, I aim to propose a new form of body dryer that takes into account user environments and contexts, which were not adequately considered in previous products. To achieve this, I conducted user surveys more qualitatively using methods such as ethnography and gained insights to derive ideas and solutions. Then, I defined the design problem, validated the form, and aimed to pioneer a new body dryer market that considers scalability in the future.

### 1-2. Product Analysis

The existing body dryers available in Korea operate by blowing air vertically from the bottom when a person stands on the device. Unlike conventional fans, these body dryers emit a vertical airflow, which enables more efficient drying of key areas such as the groin and armpits. The strong airflow allows for quick drying of the body within a short period of time. The product's design, utilizing the feet for operation, allows users to use it without bending their waist, resulting in positive feedback in terms of usability.

Such body dryers come with various features. Basic features include power functions, automatic weight detection, a high waterproof rating, and pressure-relieving and antimicrobial footrest. Additionally, they offer various adjustment modes for user convenience, such as a heater mode to adjust the temperature and a mode to control the intensity of the airflow. There are also wellness features that consider health-related trends, such as infrared and negative ion airflow.

By analyzing the official website of Shinsung Delta Tech, the first domestic developer of body dryers, and reviews on various websites, the strengths and weaknesses of the product were identified. The key advantages can be summarized as follows: First, it quickly removes moisture from the body, leaving it in a soft and dry state. Second, it effectively dries hard-to-dry areas like the feet and groin, areas with a towel and reducing the risk of conditions like reduces towel waste, making it environmentally friendly. Third, it minimizing excessive towel usage and reducing laundry, it consumes less electricity compared to washing machines. Furthermore, it provides an improved environment for users by offering a pleasant atmosphere through fast drying.

However, there are clear disadvantages as well. First, regardless of the intensity of the airflow, the basic noise level was found to be high. Even with the lowest setting, the noise was comparable to that of most hair dryers, and with the strongest setting, it was significantly louder and could be burdensome to the ears when used continuously for an extended period. Second, the temperature control was inadequate. As

the drying process relies on airflow on the moist body, even when warm air was emitted, it was perceived as less warm or even cold by many users. There were also numerous reviews mentioning that it took a long time for warm air to come out.

Overall, the evaluation indicates that this product falls into the category of home appliances that are convenient but not essential for daily life, similar to childcare products. Many people were willing to use it for the convenience it provides, but most hesitated to purchase due to the relatively high price. It was considered an optimal household appliance for gifting purposes, but it still lacked sufficient features for general household use. Therefore, the product analysis revealed the need to improve the design and features of the product to make it more suitable for households.



Figure 1: The existing body dryer of Ozwind

## 2. Research Method

### 2-1. Competitive analysis

Before conducting a comprehensive user survey, a competitive analysis was conducted to identify the competitive advantages that the existing body dryers should have. After analyzing several similar and competing products, three main types were identified: footpad-type, wall-mounted, and standing-type dryers. Overall, the common features included a waterproof rating of IPX4 (protection against splashing water from all directions) since the product is used after showering. However, there were cases where certain products, like the Otrouve, had a lower waterproof rating of IPX1 (protection against vertically falling water) because they were designed for use outside the bathroom.

In addition to the waterproof rating, there were common features such as airflow adjustment, warm air mode, and automatic weight detection. However, there were slight differences in noise level, weight, and foothold attachment/ detachment function. The focus should be on the noise level, which was measured to

range from a minimum of 63dB to a maximum of 85dB. This level of noise is similar to that of regular hair dryers and can potentially cause hearing problems if there is prolonged exposure to the noise.

Most importantly, it was possible to identify the competitive advantages of each company. Otrouve body dryer highlighted its unique feature of providing floral and woody scents through separate cartridges and colognes. BodyWind highlighted its high cost-effectiveness and the characteristic of producing low noise levels of up to 70dB or less as its main features. On the other hand, Baetum promoted its wall-mounted body dryer, specifically designed for the Y-zone, with the ability to be used like a conventional dryer by using a handle. Paseco, currently the best-selling body dryer, divided the airflow adjustment function into three levels (low/medium/high) and attracted popularity with its high performance and stylish design.

In this regard, Ozwind, the first domestic body dryer developed by Shinsung Delta Tech, aimed to differentiate itself by focusing on basic functions such as infrared, antimicrobial, and pressure-relieving foothold. Additionally, a model that could measure body weight was introduced to target user expansion. However, the weight detection function received mixed opinions about its accuracy, which hindered significant consumer response. Therefore, based on the competitive advantages obtained through the competitive analysis, the goal of the user survey was to identify the wellness trends or requirements preferred by the general and find Ozwind's unique competitive advantage.

						
	BodyWind	Otrouve	Paseco	Baetoom	Standing	Ozwind
Shape	Foothold	Foothold	Foothold	Wall hanging	Installation	Foothold
Air volume control	2stage (Strong/Weak)	2stage (Normal/Turbo)	3stage (Scent/Weak/Strong)	2stage (Normal/Turbo)	2stage (Strong/Weak)	2stage (Normal/Turbo)
Waterproof	IPX grade 4	IPX grade 1	IPX grade 4	IPX grade 4	IPX grade 4	IPX grade 4
Noise	Min: 69.3dB Max: 70.5dB	64.2dB	Min: 76dB Max: 85dB	63dB	No info.	Min: 69.7dB Max: 75.3dB
Weight	About 5kg	5.2kg	7.4kg	About 2kg	No info.	8.5kg
Characteristic	Cost-effectiveness A low noise	Fragrance function Separate cartridges	The No. 1 seller	Wall-mounted Y zone care	Wall installation Whole body	Antibacterial Chiropractic

Table 1: Competitive analysis

### 2-2. Interview

In this research, the core element was to reflect the various inconveniences and requirements that arise from the act of drying oneself after showering or bathing, which is closely associated with our daily routines. Therefore, through the user study I aimed to observe in detail the process of humans showering and

drying and gather insights and idea points through questioning about their related experiences. Additionally, to determine the suitable form for a home body dryer, on-site surveys were conducted, considering various residential structures, layouts, and workflows.

The user study in this research employed two main methods. Firstly, an ethnographic approach was used to directly observe the process of humans drying themselves in their own homes. Researchers visited the living environments where the body dryer would be used, observed and recorded the process of humans showering and drying while wearing clothes. Through this, interviews were conducted with adequately sensitized participants regarding their showering, drying, and body dryer usage experiences, and additional audio recordings were made.

Secondly, floor plan diagrams were created to understand bathroom layouts and workflows. The size of the bathroom, which can be considered a closely related area to the body dryer, was measured, and the placement was examined while creating floor plan diagrams. Based on the floor plans, it was possible to anticipate the form of the body dryer and its potential placement. In particular, existing floor plans provided by the construction industry for houses and apartments were also utilized for analysis.



**Figure 2:** The process of the user study

**(1) Home visit interview**

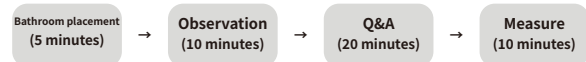
Based on the user research plan, the first user study was conducted to identify the suitable form and areas for improvement of the home body dryer. Particularly, considering various sizes and household types, home visit interviews were conducted with a total of five participants. The aim was to gather diverse experiences and understand the differences in bathroom structures based on the sizes of the homes. The following is a representative list of questions asked during the home visit interviews.

**[Shower Environment Questions]**

- How much time does it take to dry your body, and what were the inconveniences you faced?
- What were the inconveniences and noise levels you experienced while using a hair dryer?
- What is the first thing you do or the information you seek after taking a shower?

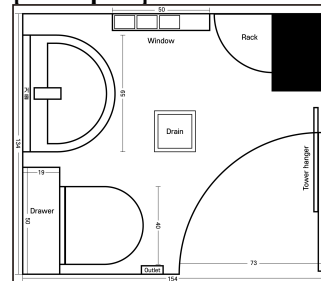
**[Body Dryer Usage Experience Questions]**

- Are you familiar with a body dryer?
- If you don't use one, what are the reasons?
- If you have a body dryer, where do you think you would place it for use?.

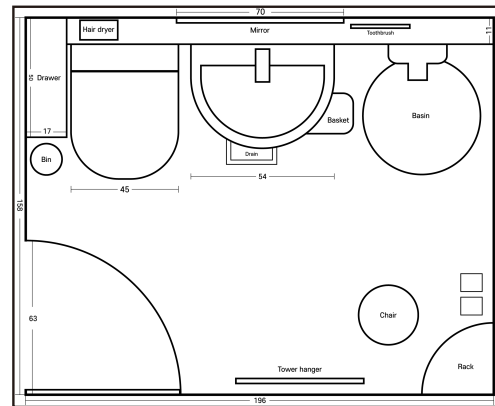


**Figure 3:** The process of home visit interview

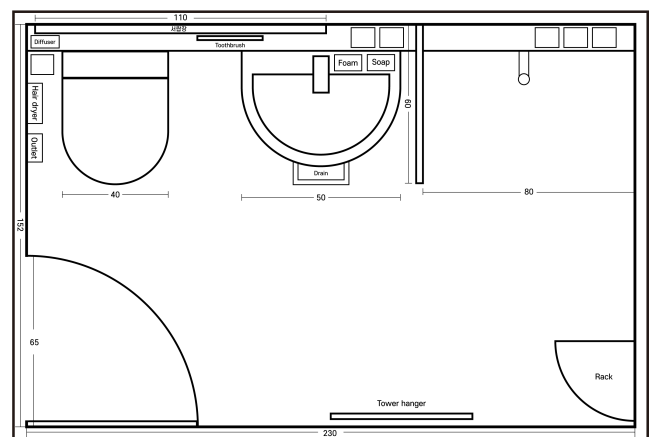
**[Floor plan]**



**Figure 4:** Studio apartment (23m<sup>2</sup>)



**Figure 5:** General apartment (66m<sup>2</sup>)



**Figure 6:** Rental apartment (112m<sup>2</sup>)

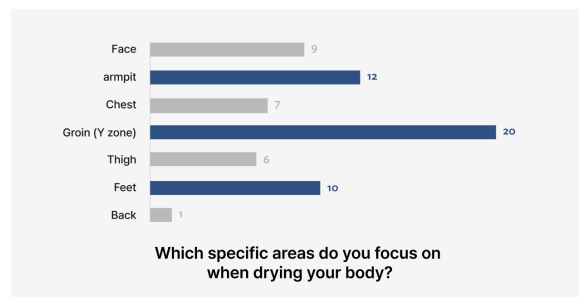


The survey targeted 44 individuals in the age group of 20 to 40, with 24 male participants and 20 female participants. Representative questions included:

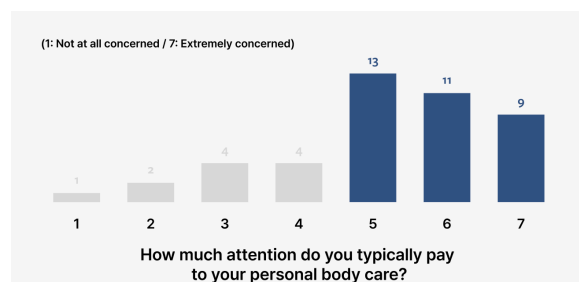
**Survey tool:** Google form

**[Survey on Products and Services for Post-Shower Body Drying and Care]**

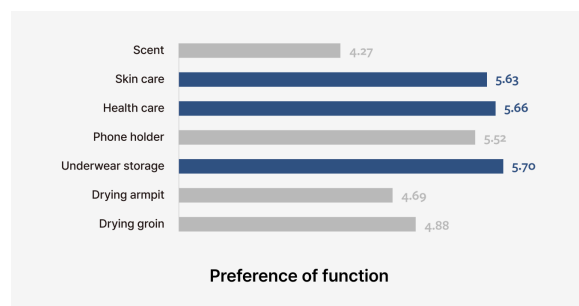
- Shower frequency and space
- Methods and tools for drying the body
- Specific areas of focus during drying
- Discomfort experienced during the drying process
- Preferences for key features (Underwear hanger, weight analysis, skin condition measurement)
- Areas participants wish to dry more intensively
- Desired app-related services (User-customized mode setting, today's weather information, etc.)
- Personal interest in health management



**Graph 1:** Which specific areas do you focus on when drying your body?



**Graph 2:** How much attention do you typically pay to your personal body care?



**Graph 3:** The average of the preference of function

**3. Result**

**3-1. Design concept and direction**

Through on-site surveys, floor plan creation, interviews, surveys, and methods such as Size Korea, I am able to determine the form, functionality, and suitable locations for the body dryer.

**(1) Form**

There were several issues with the existing footrest form. Firstly, it did not harmonize with other household appliances. Most household appliances typically have a vertical tower or a horizontal shelf-like form. The footrest's form did not aesthetically align with these. Secondly, the upward-only airflow did not provide a comprehensive drying experience, especially for the groin area. Thirdly, it occupied a significant amount of space. People perceived it as unnecessary since the body dryer itself was considered less essential compared to other appliances, resulting in excessive space usage.

To address these issues, we decided on a vertical form to enhance aesthetics, designed to evoke a feeling of overall body drying. Additionally, we retained the existing footrest form to create affordance, encouraging users to step onto the device. Additionally, a display screen has been added to view the measured weight and seamlessly integrate with the app service."

**(2) Functionality**

Through interviews and user surveys, I am able to investigate preferences and needs for various functions. **i) Power:** Standby mode. When turned on, it enters a state where the phone and body dryer can be connected via Bluetooth. It also allows for weight measurement without airflow.

- Weight measurement
- Bluetooth (App service)

**ii) Area-specific Drying Modes:** Set drying modes for different body areas, allowing separate drying for the body and feet. Selectable from standby mode.

- Both: Body & feet
- Body: Only body drying
- Feet: Only feet drying

**iii) Heat Mode:** Icon for setting warm airflow.

- Basic setting: cool
- Heat setting: warm

**iv) Turbo Mode:** Icon for adjusting the airflow intensity. 3 precise intensity setting.

- Low: for diffusing
- Medium: for regular
- High: for fast drying

### (3) Product height

Typically, water flows downward, making the upper body relatively easier to dry compared to the lower body. However, areas like the head and armpits are challenging to dry, requiring the addition of a hairdryer. Within the feasible range for processing this body dryer, I set a suitable height considering the average height of an adult's groin, ranging from 100cm to 110cm.



Figure 11: Low fidelity prototyping test with isofoam

This height facilitates easy drying of the groin, knees, and feet, and an additional diagonal airflow has been designed to allow easy drying of the y-zone area. The height of the footrest is set at approximately 8cm to ensure easy access and to create affordance that encourages users to step onto it, considering the shape of the foot. Magnets are used to connect the footrest and the dryer.

### (4) Suitable Locations

The suitable location for using the body dryer varies depending on the user's environment. It is commonly placed in personal spaces or areas where it can be used immediately after showering, mainly categorized as inside the bathroom, in front of the bathroom door, or in the room. For placement inside the bathroom, a high waterproof rating (IPX 4 or above) is required, and it should be used in a spacious bathroom to prevent water splashes and electrical shock. Therefore, it may not be suitable for the typical house structure in Korea.

Placing it in front of the bathroom door is a common choice, often suitable for studio apartments or close-knit families. Since the body dryer is mostly used with minimal clothing or a shower gown, it adapts well to such environments, suitable for families or households with this lifestyle. Some users even place it in their master bedroom, directly connected to the bathroom, providing a personal space for use. This scenario is often seen in newlyweds or middle-aged couples, where some family members have separate living patterns, making it suitable for placement in personal spaces.

## 3-2. Making

### (1) Sketch

Through sketches, the product's specific form evolved. Contemplating a design suitable for homes, we focused on three key features: **a vertical form, a display for checking weight, and a footrest that can be elevated.** During this process, there was feedback comparing it to a typical, rigid scale. To address this, we sought references in appliance design, emphasizing curved and cohesive shapes rather than distinct segments. As a result, I am able to achieve an organic and harmonious form.

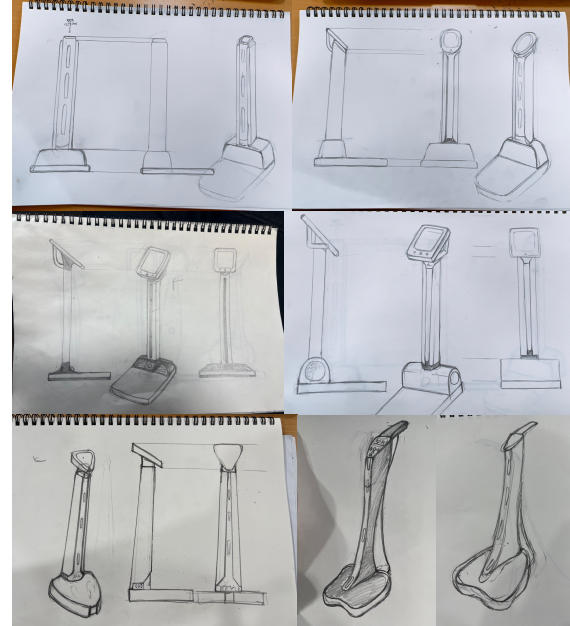


Figure 12: The process of sketches



Figure 13: The reference of sketches



Figure 14: Moodboard

**(2) Modeling**

Based on the sketches, we progressed through several stages of modeling. In the initial phases, we used the extrude tool to confirm a rough shape based on height. As the design for different heights was finalized, we ultimately employed the loft tool to create a curved form. Subsequently, we adjusted specific dimensions for processing using ABS 50T material, finalizing the model.



Figure 15: The process of modeling

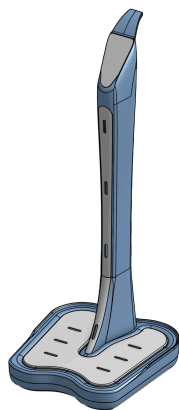


Figure 16: The final modeling of home body dryer

**(3) Logo and branding**

To convey the direct experience of the refreshing sensation of the wind, I created the branding 'windling', a compound word of 'wind' and 'handling.'



Figure 17: The logo of windling (home body dryer)

**(4) Display design**

The display is arranged in an inverted triangular shape, suitable for the vertical structure of the body dryer. It is configured horizontally, with power, heat and turbo modes equally placed. The parts for drying are intuitively placed vertically, ensuring easy recognition with body and feet icons.

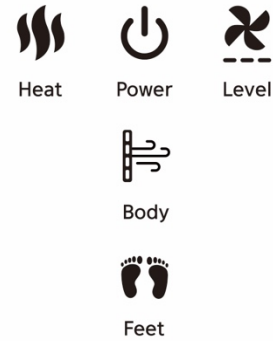


Figure 18: The display design of windling

**(5) Rendering**

In terms of color, I aimed for a combination of black and white to complement existing home appliances and provide a sophisticated feel. During the rendering phase, I utilized black and ivory colors.

**Dominant color:** B52 (Color of Montana white)

**Sub color:** Ancient White (Color of Montana white)



Figure 19: The color of windling (Left: B52, Right: Ancient white)



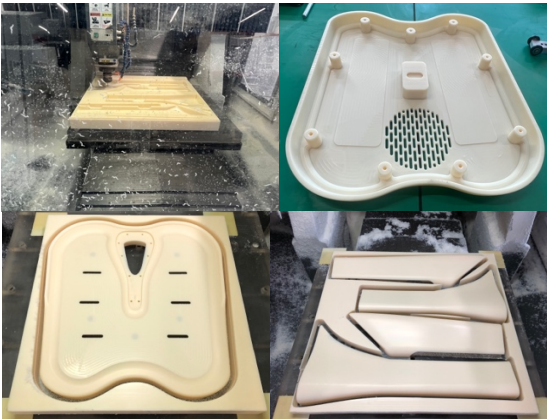
Figure 20: The rendering image and exploded view



**Figure 21:** The rendering image with background

**(6) Prototyping**

I utilized ABS material with a thickness of 50T and, with the assistance of Mr. Yook, created a prototype at a scale close to 1:1 using CNC machining. The parts were individually manufactured using CNC machining and then assembled. To enhance the feature of stepping on the footrest, I also added pillars to the internal structure.

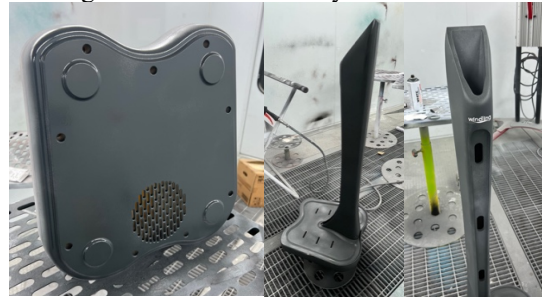


**Figure 22:** The process of CNC machining



**Figure 23:** The final model through CNC machining

In the final model, due to spray issues, we replaced the color with creamy white instead of ancient white. I also designed a logo imprint on the body part. Afterward, I finished it with a finishing material to enhance glossiness and durability.

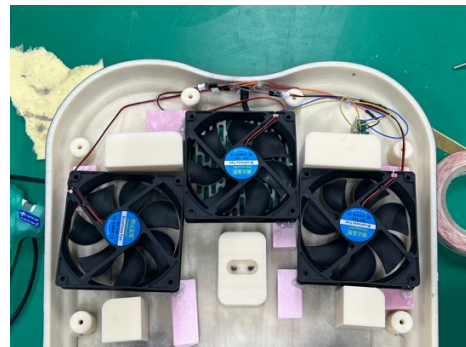


**Figure 24:** The process of painting



**Figure 25:** The final prototyping (Without holder)

For the display, I couldn't implement it in reality. However, to simulate the sensation of airflow, we used three Arduino 12V cooling fans with 0.5Amp each on both sides of the footrest and the body part.



**Figure 26:** The internal design structure



### 3-3. App service

The Windling Body Dryer not only allows users to check their weight in real-time but also integrates with a dedicated app to record weight changes on a graph, based on insights from user studies on health information. Users can customize the app for real-time weight awareness and record weight changes every time they use the body dryer, making health management easy. Unlike InBody, which requires a dry body for accurate results, the focus here is on enhancing the weight analysis function through app integration.



Figure 27: The UI of APP

### 3-4. Master plan

The development direction of the Windling Body Dryer is a customer-centric premium home appliance. The body dryer is not an essential household appliance necessary for daily life, but it should evolve into a premium home appliance that satisfies a diverse range of customers in various ways, similar to conventional massage chairs, transcending the notion of being an excess household gadget.

Therefore, looking ahead over the next 5 years, the market that body dryers should explore can be characterized as 'personalization.' Accordingly, developing features like fragrance diffusion, foot drying, functions for pets, and whole body drying in a detachable form is essential. This approach allows customers to choose the options they desire. Creating a premium signature model capable of accommodating all these features aims to elevate the Windling Body Dryer into a luxury product.

	옵션1	옵션2	옵션3	옵션4	옵션5
형태	for sensitive	for pet	for foot-health care	for whole body	for premium
핵심 기능	방향 기능 및 저소음 음악 모드 (후각, 청각, 촉각 자극)	노출 탈부착형 드라이블/드라이어, 바닥 부분 털 집진 기능 (떨어들이는 기능)	발물 드라이어에 대고 말릴 때, 발 건조 정도 (확실히 건조가 되었는지), 습진, 무좀 등의 발 건강 상태를 측정할 수 있도록 하는 것.	저소음 헤어 드라이기 추가 설치 상태와 하체 모두 원하는 형태로 건조할 수 있는 기능	모든 기능 복합 탈부착식으로 원하는 기능을 커스터마이징할 수 있는 제품

Table 2: The table of optional function (Master plan for 5 years)

## 4. Discussion

### 4-1. Research method

During this project, there were several limitations, one of which pertained to the research methods employed. Conducting interviews and surveys helped in understanding user demand and preferences for home appliances, including the body dryer. However, there are areas for improvement in this process.

Firstly, the interviews involved home visits and home-related interviews, with a total of 10 participants (5 in the first round and 5 in the second). The data collected were qualitative, and the subjective nature of the data extraction could potentially limit the objectivity of the results. Additionally, drawing conclusions from the opinions of only 10 individuals may introduce bias into the project.

For the survey, 44 participants (24 males and 20 females) were targeted through online surveys. While the gender distribution and the overall number of participants were reasonable for obtaining objective data, the fact that the survey was mainly answered by individuals in their 20s is a limitation. However, considering that the survey results generally aligned with the interview findings across different age groups, the current results seem reliable.

Recognizing these limitations, future research should aim for a more diverse sample, considering different age groups and user demographics. By addressing this in future studies, more robust and inclusive results can be obtained. Therefore, acknowledging these limitations and discussing them in future research would be beneficial.

### 4-2. Design and Visualization

From a design and visualization perspective, there are several considerations to be taken into account. The appliance needs to harmonize with other household appliances and, in the case of the body dryer, should evoke a sensation of the body being effectively dried. Various affordances were considered, leading to the decision to adopt a vertical design. However, an in-depth user validation test to confirm whether this vertical design is truly suitable for users has not been conducted. To overcome this limitation, conducting workshops focused on user experience during the development process would be beneficial.

Furthermore, the chosen colors and shapes have not been verified to ensure they align with current trends and harmonize well with existing home appliances. To address this, conducting surveys or workshops related to the form and demand of the product is crucial. This validation process is essential for shaping the direction of future research.

## 5. Conclusion

Until now, the market for body dryers has been relatively limited, mostly used in public facilities such as gyms or bathhouses, reflecting the demand for quick drying and convenience. However, in a home context, where users may have a bit more time or need assistance in activities post-shower, catering to these scenarios becomes crucial.

Therefore, the Windling Body Dryer has been designed with home users in mind, enhancing user convenience by incorporating features such as underwear and mobile phone holder. Additionally, recognizing the growing interest in home training and exercise, the product proposes weight display and app services to make it easy for users to obtain information about their physical health. The vertical design aims to create a feeling of overall body drying and facilitate various post-shower activities, and the incorporation of affordances on the footrest enhances the product's accessibility.

Given the relatively low awareness and usage frequency of body dryers, the Windling Body Dryer needs to delve into the concept similarly to massage chairs, targeting a niche user demand. This project is well-positioned to address these considerations, and overcoming the identified limitations can lead to the design of a better body dryer. Looking ahead, developing a customer-centric premium body dryer based on the outlined plan could pave the way for exploring and expanding the body dryer market in the future.

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## References

- [1] Yoon, Y. kyung. (2021). A Study on Mobile App Interface Design for Companion Animal Care. *Journal of Cultural Product & Design*, 65, 293–302.
- [2] Woo, J., Park, J., Woo, D., & Oh, S. (1994). Analysis of Noise Characteristics of Hair Dryer. *Journal of Cultural Product & Design*, 11–15.
- [3] Bowman, A., Scottish SPCA, Dowell, F.J., and Evans, N.P. (2017) 'The effect of different genres of music on the stress levels of kennelled dogs'. *Physiology and Behavior*, 171, pp. 207-215.
- [4] Oh, Y., & Park, J. (2020). Emotional State of Companion Dogs by Sensory Stimuli. *Journal of Cultural Product & Design*.
- [5] No, H. (2020). The Key to Wellness Is People and Brains. *DBpia*, 97, 9–11.