



DNB311: ID7 | N11086718

Reducing Stigma Through Spacer Design for Adolescents with Asthma

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7th September 2025
Word Count: 3953



Authenticity Statement

This is to certify that to the best of my knowledge, the content of this report is my own work. This report has not been submitted for any subject or for other purposes. I certify that the intellectual content of this report is the product of my own work and that all the assistance received in preparing this report and sources have been acknowledged.

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7th September, 2025

AI Use Statement

For the purpose of this report, I have utilised the Generative AI program, ChatGPT to assist in various of ways. Specifically, I used it to reduce word count, proof read to ensure a consistent academic tone, calculating percentages in my data, verify mentioning of main and sub themes in my survey and observations were correct and to ensure all grammatical sentence structures were correct.

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Executive Summary

Asthma is one of the most common chronic conditions among adolescents, yet the use of a spacer, which is essential for effective inhaler administration, is often associated with stigma. Existing spacer designs prioritise clinical functionality over aesthetics, resulting in products that are bulky, conspicuous, and lacking personal expression. This contributes to embarrassment, social anxiety, and reduced adherence, particularly among adolescents navigating identity and peer acceptance.

Benchmarking of current spacer products highlights a lack of innovation in appearance, portability, and user-centred design, despite their clinical effectiveness. Existing devices largely focus on children or adults, overlooking adolescent needs for discretion, comfort, and a sense of normality.

Primary and secondary research indicate that adolescents value discreet, portable, and customisable spacers that feel socially acceptable. By integrating user feedback, ergonomic design principles, and thoughtful consideration of appearance, this report identifies an opportunity to reimagine asthma spacers. A redesigned product could reduce stigma, support confident and consistent medication use, and bridge functionality with aesthetics. This underscores the potential for a new spacer that better aligns with adolescent preferences while remaining effective for users across all ages.

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01

Introduction and Visualisation



Introduction

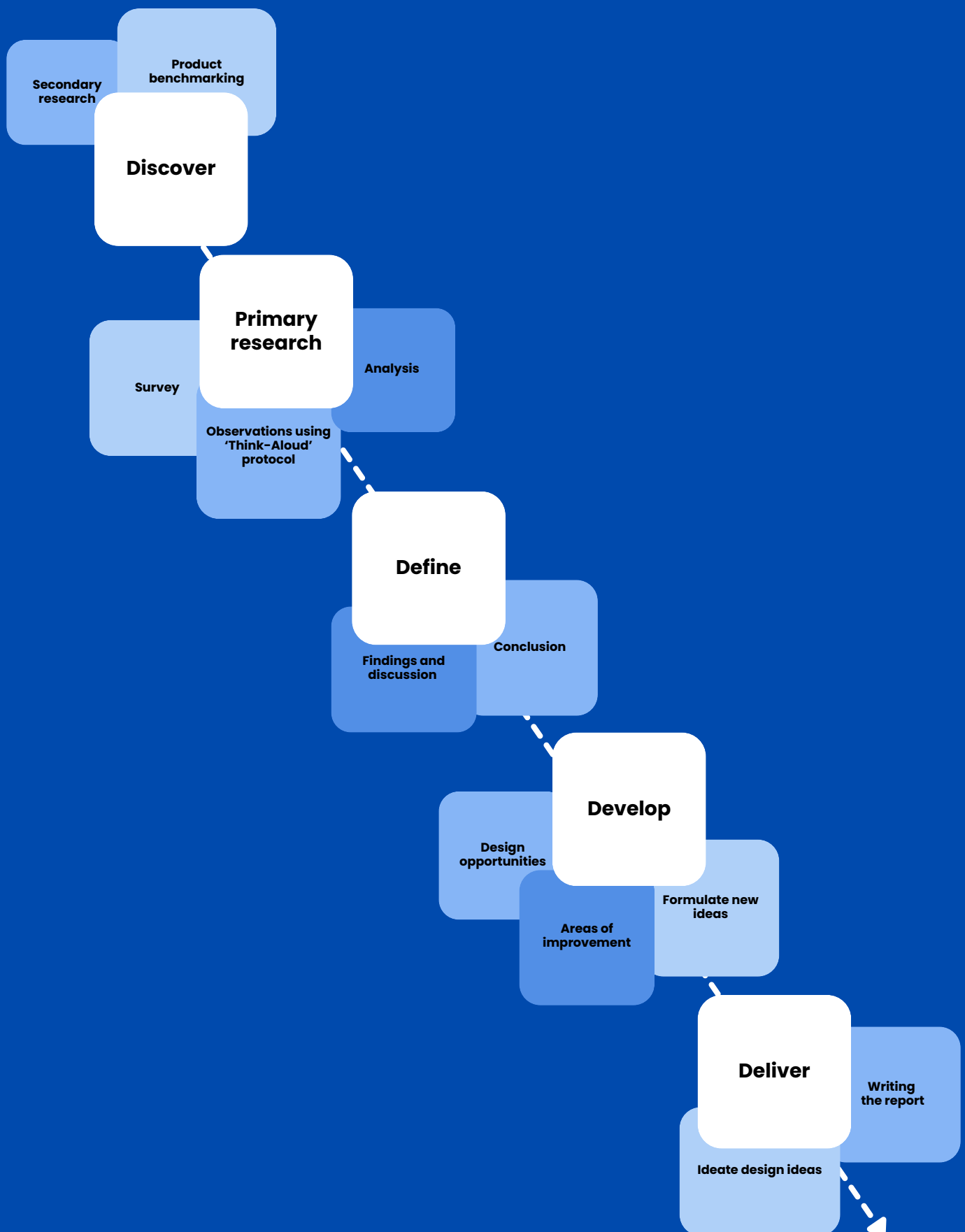
Asthma is a respiratory condition affecting over 339 million people worldwide ([World Health Organisation, 2020](#)), with around 2.8 million Australians living with the condition. An estimated 10.2% of Australians aged 15–24 (over 315,000) report having asthma ([Asthma Australia, 2025](#)), while an additional 10% (around 460,000) of children aged 0–14 are also living with asthma as a long-term condition. It is characterised by chronic inflammation of the airways, producing symptoms such as wheezing, shortness of breath, coughing, and chest tightness due to narrowing of the airways ([Australian Institute of Health and Welfare, 2022, 2024](#)). Managing asthma during adolescence is especially important, as this is a stage where independence, identity, and social acceptance begin to shape health-related behaviours.



The aim of this project is to understand how the design of asthma spacers influences adolescents' confidence and willingness to use them, particularly in relation to stigma when using the device in public. It also considers how avoiding spacer use affects health outcomes, as improper medication delivery can increase risk of poor symptom management.

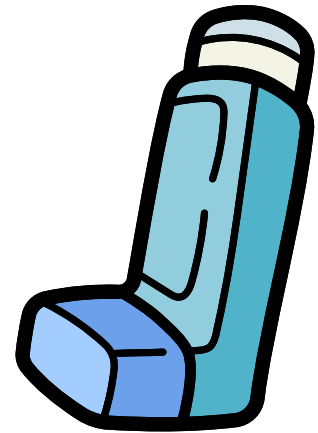
Despite their importance for effective treatment, many adolescents avoid using spacers due to embarrassment, fear of standing out, or experiences of bullying. Stigma around visible medical devices can create barriers to treatment, often resulting in poorer health outcomes and heightened anxiety about managing symptoms in social settings ([Asthma Australia, 2022](#)). Current spacer designs largely prioritise function, with limited consideration of how their medical appearance impacts social use. While studies have explored the challenges of living with asthma, there is little research on how design directly contributes to stigma or how products could be reimaged. Addressing this gap presents a design opportunity to create socially acceptable, user-centred spacers that empower adolescents to manage their condition with confidence, reduce stigma, and ultimately improve long-term health outcomes.

Report Visualisation



Background

Asthma is one of the most common chronic conditions among adolescents, affecting their ability to engage better in daily life and sometimes leading to reduced participation in physical and social activities. Effective management often requires the use of inhalers or preventer medications, frequently delivered through a spacer device, to ensure correct dosage and lung deposition ([National Asthma Council Australia, 2024](#)). Using an asthma spacer is essential for ensuring proper medication delivery to the lungs. Spacers significantly improve drug deposition by reducing oropharyngeal loss and overcoming coordination challenges associated with inhalers, leading to better asthma control and potentially fewer side effects ([Abrolat et al., 2001](#)). However, consistent use of these treatments is challenging for young people, who may avoid carrying or using spacers due to feelings of embarrassment or fear of being judged.



Adolescence is a developmental stage marked by heightened sensitivity to peer perception and social belonging ([Pfeifer and Berkman, 2018](#)), which can intensify stigma around visible medical devices. Research on assistive devices shows that stigma often arises when design prioritises functionality over aesthetics, leading to clinical, bulky, or conspicuous products that affect social perception and assimilation. Visible features and lack of concealability can even “add disabilities,” making users appear more visibly different. As many devices are designed by engineers rather than industrial designers, they rarely function as objects of personal expression or support a sense of normality in daily life ([Jacobson, 2010](#)).

Background



Image source: [National Asthma Council Australia, 2024](#).

Spacer devices, however, have remained largely unchanged in appearance for decades. Their bulky, clinical, and child-oriented designs fail to reflect the needs of teenagers, who are especially vulnerable to peer scrutiny. While current models aim to be functional for both children and adults,

they often overlook adolescent users and their desire for products that feel discreet, personal, or socially acceptable.

While there is limited existing research directly linking spacer design to confidence or stigma, it can be inferred from related health fields that there is a strong relationship between aesthetics, perceived normality, and treatment adherence. Stigma around visible medical devices can create barriers to treatment, often resulting in poorer health outcomes and heightened anxiety about managing symptoms in social settings ([Asthma Australia, 2022](#)).

This highlights a significant opportunity for design innovation in this space. By addressing this gap by reimagining the appearance and feel of spacers to reduce stigma, adolescents can be supported in managing their asthma more confidently, while still meeting the needs of a broader user base.



02

Benchmarking



Benchmarking

To improve the experience of asthma management and reduce stigma, few devices exist that specifically address the social and emotional challenges associated with inhaler use. While inhalers remain the most common form of treatment, spacers play a critical role in ensuring effective medication delivery. To understand what currently exists on the market, benchmarking was conducted. The most common spacers include; **AeroChamber Plus Flow-Vu**, **Phillips OptiChamber Diamond**, **Able Collapsible Spacer**, **Volumatic**, **Funhaler**, and **Breath-A-Tech Spacer**, each varying in size, material, and design intent.

It is important to note that no single manufacturer dominates the spacer market. Instead, they are widely produced and distributed through pharmacies, hospitals, and online retailers, often with different designs targeted at children, adults, and clinical use. While most focus on functionality and meeting medical requirements, there is less emphasis on discretion, portability, and reducing stigma for long-term users.

The aforementioned devices are evaluated against five criteria:

1. **Quality and Durability**

- a. Spacers must be reliable, safe, and built from durable, medical-grade materials that withstand repeated use and cleaning.

2. **Accessibility and Affordability**

- a. Spacers should be reasonably priced, widely available through pharmacies, hospitals, and community health providers, and ideally reusable to reduce long-term costs for individuals and families.

3. **Design and Aesthetics**

- a. Design should balance function with aesthetics to encourage consistent use. For children, fun and engaging designs support confidence, while adolescents and adults benefit from discreet, less clinical forms that reduce stigma and social discomfort.

4. **Functionality and Features**

- a. Covers compatibility with different inhaler types, portability, detachable or modular parts, and ease of cleaning for hygiene and maintenance.

5. **Ergonomics and Comfort**

- a. Comfort in handling, ease of forming a seal, mask or mouthpiece fit, and suitability across age groups and physical abilities.



Breath-A-Tech

A widely used basic spacer that improves medication delivery by reducing particle loss. It is easy to clean, fits most puffers, and can be paired with masks for different age groups.

Philips OptiChamber Diamond

A compact, anti-static spacer with low-resistance valves and a stepped mouthpiece. Portable, easy to clean, and compatible with most puffers, it balances usability with clinical reliability.



Able Collapsible Spacer

A foldable, pocket-sized spacer with a 210 ml chamber that reduces drug loss. Anti-static, BPA-free materials and visible valves support hygiene, portability, and ease of use.

The Volumatic

A large holding chamber that improves lung delivery and reduces throat deposition. Though less portable, it is clinically reliable, especially for corticosteroids.



The Funhaler

A child-focussed spacer that uses toy-like incentives to improve adherence. Maintains effective drug delivery while encouraging engagement.

AeroChamber Plus Flow-Vu

An anti-static spacer with a Flow-Vu indicator providing inhalation feedback. Durable, compatible with most inhalers, and trusted across age groups.



Product Benchmarking Radar Graph

This graph visualises the criteria evaluation of key market competitor products.

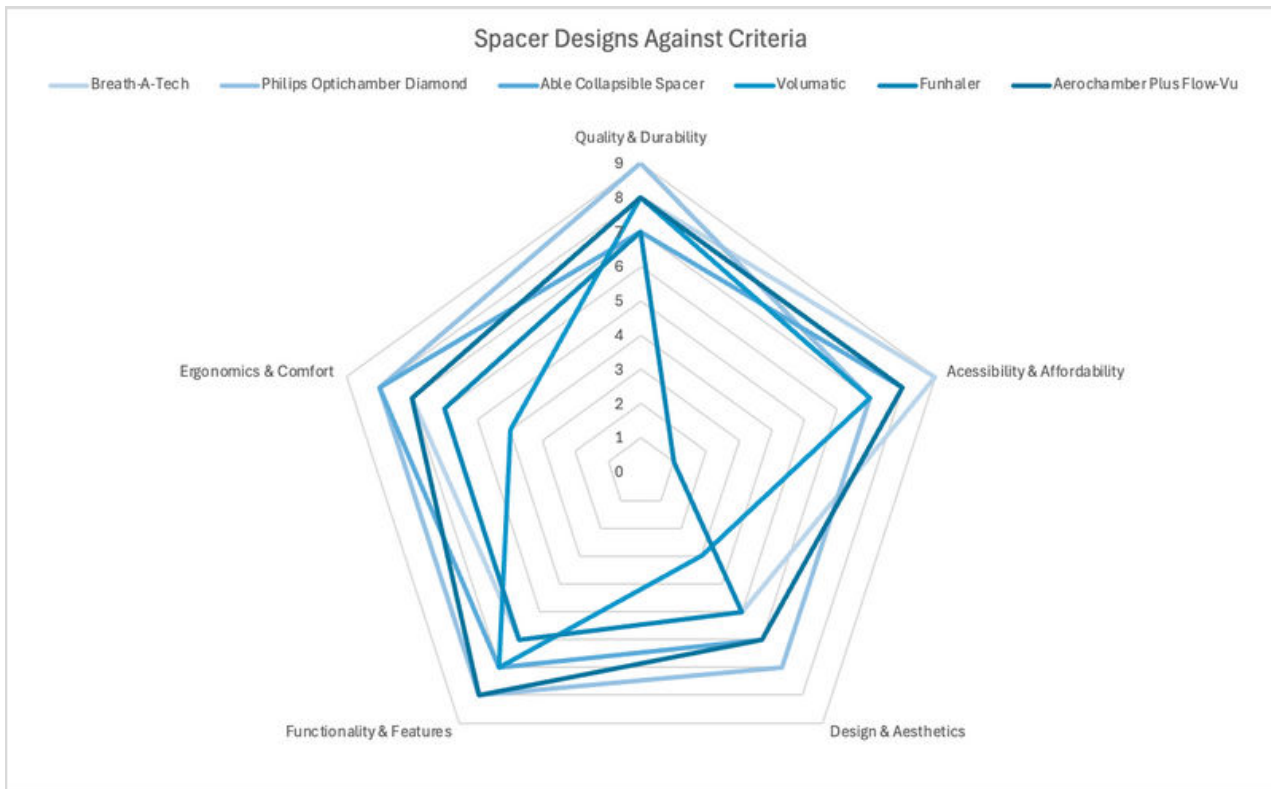


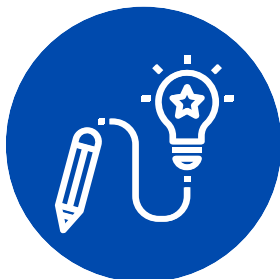
Figure 1: Radar Graph Evaluating Key Competitors

As visualised in the radar graph above, the identified spacer competitors are compared across the established evaluation criteria, with each axis representing a specific category and the connecting lines indicating each spacer's performance.

The **Philips OptiChamber Diamond** demonstrates the strongest overall performance across the criteria, followed by the **AeroChamber Plus Flow-Vu** and the **Able Collapsible Spacer**. The **Breath-A-Tech** spacer performs particularly well in the Accessibility and Affordability category, while the **Funhaler** ranks lowest overall, as it was developed for a research study and is not commercially available. The **Volumatic** achieves the lowest score in Design and Aesthetics due to its bulky, clinical appearance.

While several spacers excel in specific criteria, most devices are limited by their clinical appearance, which negatively impacts Design and Aesthetics. Furthermore, many remain suboptimal in Ergonomics and Comfort and Functionality and Features, highlighting a clear opportunity in the market for a spacer that integrates usability, discreet design, and user-centred features more effectively.

Product Opportunities



STIGMA REDUCING DESIGN

Opportunity to create a spacer with a discreet, contemporary aesthetic that reduces embarrassment and promotes confident public use.



CUSTOMISATION AND PORTABILITY

Development of a compact, collapsible, or modular spacer with options for personalisation to suit adolescent lifestyles.



ERGONOMICS AND USABILITY

Designing for improved comfort, secure fit, and ease of cleaning to enhance adherence and long-term satisfaction.

Addressing these gaps highlights the opportunity to develop a spacer that maintains clinical effectiveness while enhancing portability, comfort, and aesthetic appeal. By prioritising these features, future designs can reduce stigma, encourage adherence, and ultimately support more consistent and confident asthma management among adolescents.



03

Research and Analysis



Research

Research for this project was carried out using a combination of anonymous surveys and observational studies with participants who currently have asthma or experienced it during their childhood or adolescence. This approach was chosen to gain detailed insights into how the design of asthma spacers affects user confidence, social comfort, and adherence, as well as to understand the emotional and practical challenges associated with their use.

Methodology

A combination of surveys and observations was employed to provide a comprehensive understanding of the research topic, using both quantitative and qualitative approaches. Observations offered qualitative, in-depth insights into personal experiences and behaviours that could not be captured through surveys alone. Meanwhile, surveys provided a quantitative perspective, allowing for data collection from a larger and more diverse group of participants to identify common experiences, perceptions, and challenges associated with the use of asthma spacers.

Survey



The survey consisted of 21 questions and was designed using Google Forms. A link to the survey was distributed online via Instagram, a university group chat, and private messages to colleagues and friends; receiving 17 responses. Participants were informed that consent was implied by proceeding with the survey. The survey (see Appendix 1) included multiple-choice, Likert scale, and short/long answer questions for retrospective sampling. Examples of questions include:

- “Did you ever avoid using your spacer in social settings (school, with friends, in public) because of how it looked or how others might react?”
- “Can you describe a time when you chose not to use your spacer around others? What influenced that decision?”
- “If you could change something about the spacer design or your experience using it, what would it be?”

This combination of question types was selected to balance efficiency with depth of insight. Multiple-choice and Likert scale questions allowed participants to respond quickly and facilitated comparison across responses, while short and long answer questions enabled participants to provide more detailed, qualitative insights. The structured survey format supported the identification of patterns and trends in adolescents' experiences, perceptions, and challenges related to spacer use.

Observation

Towards the end of the survey, participants were asked:

“Would you be comfortable taking part in a short observation session where you use your spacer and inhaler? If yes, please provide your email below so we can send you more details and the consent form. If no, simply leave this blank and proceed.”



This process enabled the recruitment of participants for the observation phase. To gain in-depth insights into the experiences of individuals currently using, or who have previously used, an asthma spacer, a semi-structured ‘Think-Aloud Protocol’ was employed. Two observations were conducted, involving one male and one female participant of different ages. Participants were asked questions such as:

- *“Would you be happy carrying this around or using it in public?”*
- *“What do you think about the overall design? Does it feel approachable or clinical?”*
- *“How confident do you feel that you used it correctly?”*

The flexible nature of this protocol allowed participants to verbalise their thoughts in real time while interacting with the device, enabling a more personal and detailed exploration of their experiences. Observations focused on the design, features, usability, and emotional responses to the spacer, and sessions lasted approximately 15–20 minutes each.

The qualitative nature of the observation was paramount in providing detailed insights into participants' experiences, allowing for a deeper understanding of the design implications of the asthma spacer and shaping more meaningful research outcomes.

Limitations and Improvements

While the mixed-methods approach provided valuable insights, the small sample size of both the survey and observations limits the accuracy and generalisability of the results. Smaller samples can increase variability and reduce the reliability of conclusions ([Simmons, 2018](#)). In qualitative research, sample size is often guided by data saturation, but limited responses may not fully capture the diversity of adolescent experiences, making it harder to draw robust conclusions ([Vasileiou et al., 2018](#)).

Future research with a larger, more diverse sample would strengthen validity and allow findings to be more broadly applicable. Increasing the number of observations and surveys would also provide deeper analysis and clearer insights into how design factors influence spacer use and associated stigma.

Ethical Considerations

Ethical considerations extend beyond obtaining informed consent, ensuring participants are aware they can withdraw at any time. Without proper consent, participants may agree to take part without fully understanding the study's purpose, their involvement, or how their data will be used and protected ([Fisher, 2020](#)). Clear information about confidentiality, anonymity, and withdrawal rights is essential to maintain trust and prevent discomfort or early withdrawal ([Haynes, 2021](#)). Participants who withdrew during observations had their data removed. For the quantitative research using Google Forms, participants could remain anonymous by not requiring emails ([Demarest, 2021](#)). In qualitative research, pseudonyms were used, and participants could redact statements at any point to protect their identity ([Salmons, 2024](#)).



Analysis

This section presents key insights from both the survey and observation data, highlighting recurring themes and challenges in asthma spacer use. Particular attention is given to how aesthetics and social factors shape adherence, especially among adolescents who are more vulnerable to stigma.



Qualitative and quantitative data was collected using two methods;

- First, observational research employed a ‘Think-Aloud Protocol,’ where participants verbalised their thoughts while interacting with the spacer device. They described their actions, emotional responses, and evaluations of its design, with conversational prompts used to encourage a natural flow of dialogue.
 - Recordings were transcribed with Otter AI and analysed thematically by clustering them into broader themes, identifying recurring patterns, and coding statements. These were refined to ensure they accurately represented participant experiences, with particular focus on how design influenced both adherence and perceptions of stigma.
- Second, a survey was conducted consisting of both closed and open-ended questions on spacer use, design perceptions, frequency of use, and the extent to which peer and social contexts shaped comfort in public. This generated both numerical data and personal reflections.
 - The quantitative data were summarised statistically, while the qualitative responses were systematically coded into themes. Findings were then visualised in charts and tables to highlight key patterns, support comparisons, and guide further analysis.

Finally, results from both methods were compared, allowing consistencies, differences, and key insights to be identified across data sources. This process strengthened the overall validity of the findings and offered a more comprehensive understanding of the research topic.

Analysis

Survey Findings

The survey results revealed that 58.8% of participants often used their inhaler on its own rather than with the spacer, citing reasons such as feelings of embarrassment, the greater convenience of the inhaler's smaller size, or a general discomfort with using the spacer because of its clinical appearance.

Additionally, 76.5% (see Fig 3) of participants reported that the spacer felt too large, overly medical in appearance, and uncomfortable to use. Reflecting these concerns, 64.7% indicated that they would prefer to rely on the inhaler alone, even though they were aware that using the spacer provides more effective delivery of medication (see Fig 4).

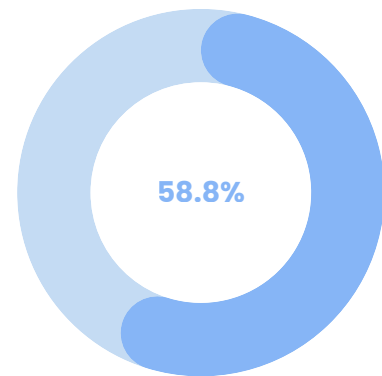


Fig 2: percentage of participants using the inhaler on its own

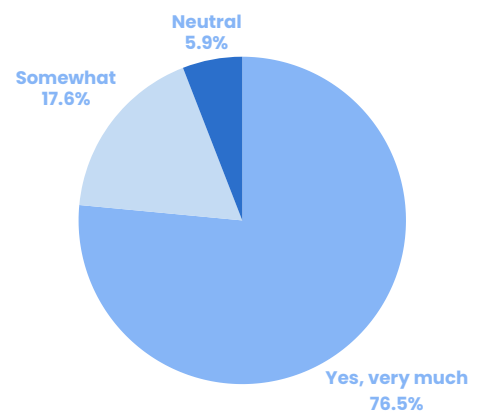


Fig 3: pie chart representing participants outlook on the spacer design

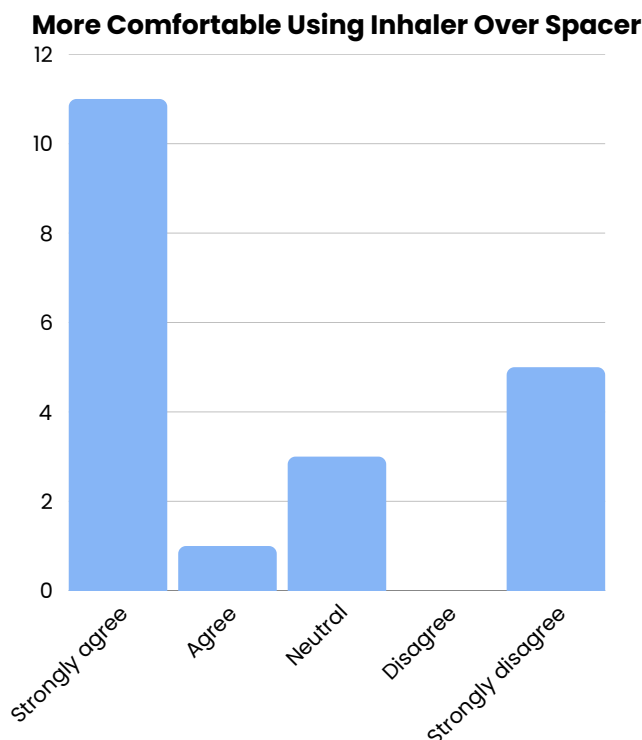


Fig 4: Inhaler use despite knowledge of effectiveness of spacer

The spacer's **bulky, clinical appearance** and **lack of comfort** contribute to many users **preferring the inhaler alone, despite** being **aware** of its **reduced effectiveness.**

Analysis

Participants' descriptions revealed that social context strongly influenced decisions to avoid using a spacer, particularly during school, sports, or in public settings. Many expressed concerns about being judged, appearing weak, or drawing unwanted attention, with the spacer's large and clinical appearance adding to this discomfort. As a result, some relied solely on their inhaler or limited spacer use to private settings.

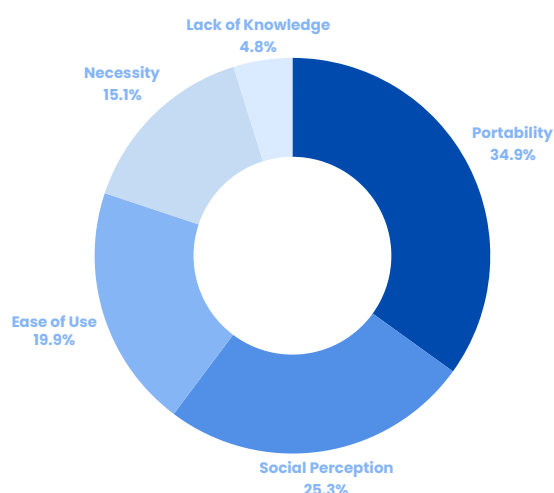


Fig 5: Survey question asking about why participants prefer inhaler only.

The preference for inhaler-only use (see Fig. 5) was largely linked to portability, with spacers often described as bulky and inconvenient to carry. Feelings of embarrassment when using a spacer in public further reinforced this choice, highlighting the need for designs that are smaller, more discreet, and easier to use.

The survey responses indicate that exercise and sports are the most common triggers for inhaler use, often combined with seasonal changes, illness, or allergies (see Fig 6). Exercise and sports were mentioned by nearly two-thirds of respondents (65%), while seasonal or weather changes were noted by over half (59%). Illness (29%) and environmental allergens such as dust, smoke, or pollen (24%) were reported less frequently, though still notable. Emotional triggers such as stress, nervousness, or laughter were mentioned by a smaller portion (18%), showing that while less common, these still impact some individuals' inhaler use. This highlights that while physical activity and environmental factors dominate, there is a wide range of situations that influence inhaler reliance.

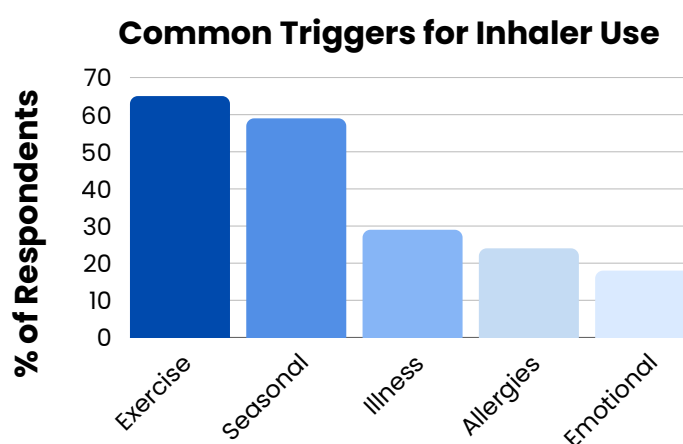


Fig 6: Survey question, "What usually triggers you to use your inhaler?" Note: Some responses fit multiple themes, so percentages reflect number of responses mentioning the theme.

Analysis

This graph showcases the variety of changes respondents desired for the asthma spacer's current design.

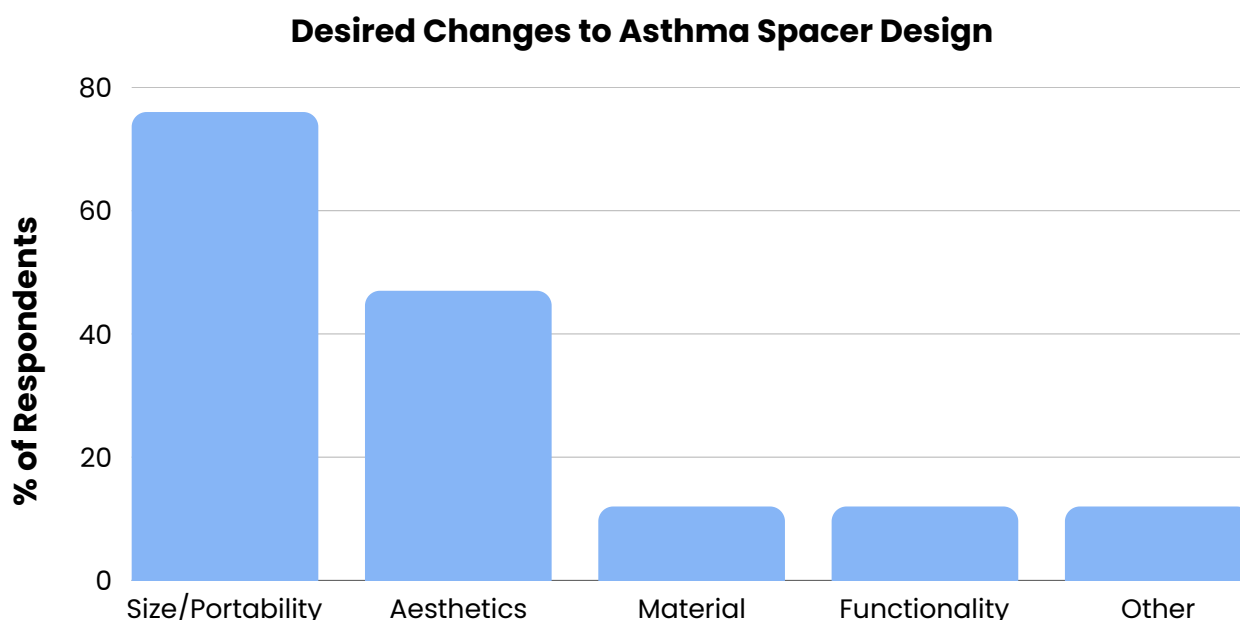


Fig 7: Survey question, "If you could change something about the spacer design or your experience using it, what would it be?" Note: Some responses fit multiple themes, so percentages reflect number of responses mentioning the theme.

Survey responses highlighted several challenges with the current asthma spacer design, which may explain why it is less commonly used. The most frequent concern was size and portability (see Fig. 7), with 76% of participants preferring a smaller, more manageable device. Aesthetics were also important, with 47% commenting on the clinical appearance and desire for a more discreet design. Fewer responses suggested changes to materials or functional features, such as foldability or protection from dirt. If the spacer were redesigned to look less medical, smaller and more customisable, 82.3% of respondents agreed that they would be more comfortable to use them (see Fig. 8). Overall, these findings indicate that the spacer's bulkiness, appearance, and limited adaptability may discourage regular use, as stigma and fear of embarrassment deter users in public. This points to opportunities for improvements in both form and user experience.

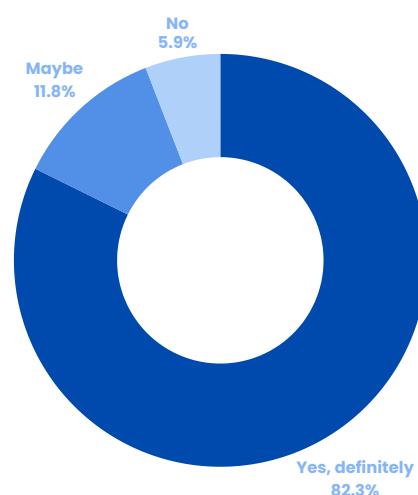


Fig. 8: Survey question, "If spacers were redesigned to look smaller, less medical, or more customisable, would that make you feel more comfortable using them?"

Observation Findings

The observations provided valuable qualitative insights into participants' perceptions of the spacer's design and how these perceptions shaped their comfort and willingness to use the device in public settings.

The treemap (see Fig. 9) visually represents the recurring codes identified from each observation. The most prominent concerns related to the overall design of the spacer and the social factors associated with its use in public. Portability and functionality also emerged as frequently discussed issues, reflecting participants' practical considerations when choosing whether to use the device.

These codes were subsequently grouped into broader themes with direct quotes from the transcription, as outlined in Table 1.

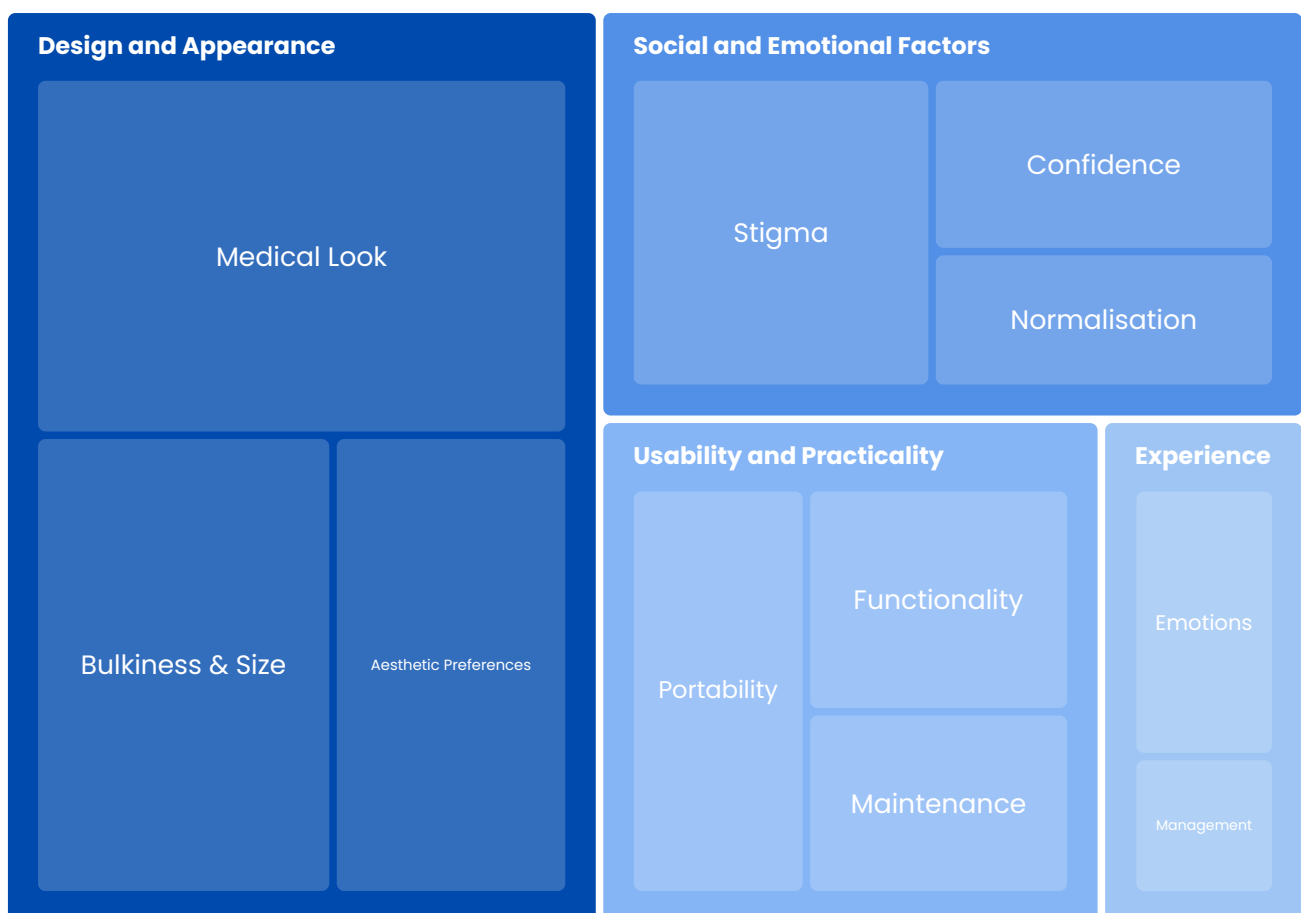


Fig 9: Treemap of thematic coding, sub themes grouped into main themes. Created using [Canva](#)

Analysis

This table shows the main and sub themes found within the observation transcripts and identifies relevant quotes mentioned by participants.

Main Theme	Subtheme	Transcript Example
Design & Appearance	Bulkiness & Size	"I guess the size of it, it's really big and long and hard to carry." "The mouthpiece feels weirdly big and awkward but the mask provided feels comfortable."
	Clinical / Medical Looks	"Yeah, I feel like that [clear mask] just looks more obvious, because it looks like a clinical thing. It looks like something you find in a hospital." "It's just a bit awkward looking, if that makes sense. I think the blue and the clear definitely gives it that medical looking vibe."
	Aesthetic Preferences	"Colour wise, even just the black... is pretty solid, right? I think white is still too clinical... so you can see marks if it's white... so maybe just plain, solid colours... or even canteen bandanas... they're fun." "You know, it's just really not pretty looking."
Social & Emotional Factors	Embarrassment & Stigma	"It looks... daunting and super obvious, I'm like, I can't breathe.... oh she can't breathe... oh, she needs help." "I find it a bit awkward to use, especially if I'm in public. I don't want, you know, people seeing me opening my mouth wide and then putting on this big mask."
	Confidence & Self-Consciousness	"I find it really uncomfortable to use." "Maybe if it was soft, I would be more comfortable just using that."
	Normalisation & Acceptance	"Like, you'd rather it be like, customisable, super obvious... an accessory instead of a clinical looking device." "I guess, I've gotten used to using it wrong sometimes with just the inhaler.... rather than a big tube sometimes"
Usability & Practicality	Convenience & Portability	"Something collapsible... something smaller... one handed... compact... travels well." "It's just really big to bring in my bag."
	Functionality & Effort	"It definitely delivers the ventolin more effectively, like I find that I breathe better when I use the mask over the mouthpiece." "I'm pretty aware of how it works and what gets pointed out when it doesn't. Like, if I taste it... it's probably hasn't hit the back of my throat."
	Maintenance & Hygiene	"Okay, so there's little bits to think about. You can't lose anything if you if there are a lot of bits and you lose something instantly, it won't work." "It gets dirty in my bag... there was lint all over it."

Table 1: Observation, 'Think-Aloud Protocol' findings

Analysis

Theme Analysis



Theme One: Design and Appearance

The design and appearance of the spacer were consistently raised during the observations. Participants expressed dissatisfaction with its clinical aesthetic, particularly the colours and materials, with one noting, "It's just a bit awkward looking... the blue and the clear definitely gives it that medical looking vibe." Beyond appearance, the physical design contributed to discomfort, as participants described the mouthpiece and the long tube as awkward and unpleasant to use.

Theme Two: Social and Emotional Factors

Social stigma and embarrassment strongly influenced participants' willingness to use the spacer in public. One participant shared, "It's not coming with me, and I would just wait till I get home... to use it [the spacer], yeah, says a lot about society." These feelings were closely tied to the device's bulky and medical appearance, leading participants to forgo the spacer in public and instead rely solely on the inhaler, even when recognising this could compromise effective medication delivery.



Theme Three: Usability and Practicality

Participants identified significant issues with the spacer's size, portability, and hygiene. The device was considered inconvenient to carry, with one participant commenting, "it gets dirty in my bag." Its bulk and exposed components raised concerns about cleanliness and practicality for daily use. Although participants acknowledged the spacer's effectiveness in delivering medication, these functional drawbacks, combined with the associated stigma, often outweighed its benefits, prompting users to favour the inhaler alone.



04

Discussion and Design Implications



Discussion

Through benchmarking, primary research, and secondary analysis, a significant gap emerges for the re-design of the asthma spacer. Despite minor variations across products, the device largely remains unchanged and is consistently perceived as clinical and embarrassing to use in public. Survey findings show that 76.5% (see Fig. 4) of respondents found the spacer too big, medical-looking, and uncomfortable, while 70.3% (see Fig. 10) reported avoiding its use in social settings due to its appearance. This aligns with the aesthetics of assistive technology having a significant influence on device abandonment and user stigma ([Chu et al., 2024](#), [Kent, 2021](#)). To prevent compromised adherence the spacer must be redesigned to address modern aesthetic and social needs, reducing stigma and promoting consistent asthma management. Rather than forcing individuals to risk correct delivery of their medication ([Asthma+Lung UK, 2024](#)).

Combined Percentage of Avoided Use of a Spacer in Public

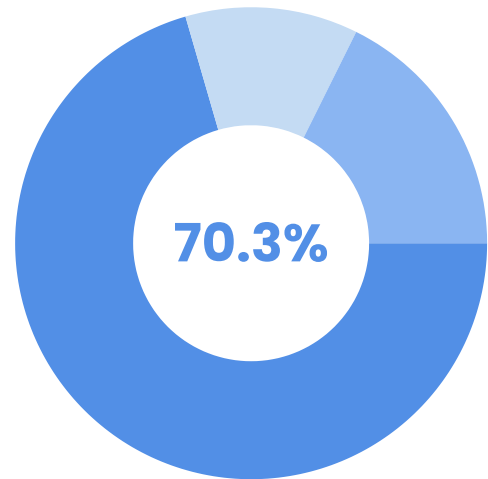


Fig. 10: Survey question, "Did you ever avoid using your spacer in social settings (school, with friends, in public) because of how it looked or how others might react?"

Findings suggest the re-design should prioritise ergonomics, focussing on portability, ease of use, durability, and maintenance. Integrating aesthetic design elements can foster emotional comfort, trust and long term user acceptance ([David, 2024](#)). Complementary to these factors, the inclusion of customisable and adaptable aesthetics supports the user's connection to the device and strengthening adherence over time. These changes represent an untapped opportunity for creative and innovative solutions that better align with user needs.

There is a clear correlation between the identified gap of the spacer's design discouraging public and private use. Many participants shared their limited use of the spacer is due to its clinical appearance and associated embarrassment. This demonstrates how stigma, shaped by poor design, deters use and affects individuals access to correctly administered medication. These results demonstrate how aesthetics, usability, and social factors intersect, highlighting the need for design innovation to support long-term asthma management.

Design Implications

Overall, the research indicates a clear design opportunity to create an improved asthma spacer that supports a wide range of users, extending beyond the targeted adolescent demographic. Although the current market offers low cost, readily available spacers, most designs share the same clinical appearance, limited adaptability and bulky size. Not only do these shortcomings discourage consistent use but also contribute to stigma, leading many individuals to avoid the device altogether. This gap poses as an opportunity for a redesigned spacer which addresses function and emotional needs, combining effective delivery of medication with improved ergonomics, aesthetics and eventually user acceptance.

A key critical problem found is the asthma spacers are often too bulky and visually clinical. An adaptable, size reducing, and visually appealing re-design of the asthma spacer would assist in encouraging consistent adherence. Participants shared that the size and awkward handling make it difficult to carry, especially on the move. As discovered in the qualitative research, participants shared that the spacers clinical appearance drew attention and caused embarrassment, leaving one participant to remark “I feel like people are staring at the long tube protruding from my face.” This strengthens the opportunity for a compact, portable and discreet, spacer that can be used by individuals confidently in public.

As per the quantitative analysis, a vast majority of respondents agreed that if spacers were redesigned with a less medical-looking appearance, be more customisable, and smaller, they would feel more comfortable in using one (refer to Appendix 1). Findings also highlighted that participants would rather risk their health and, “...not be able to breathe right or have a wheeze than to use it in public,” as they felt self conscious drawing more attention to themselves with the use of a spacer. A combination of insights from both quantitative and qualitative research, a strong design opportunity presents itself in the form of a re-designed spacer that reduces stigma and encourages use through improved aesthetics, portability, and user friendly design.

Conclusion

This research underscores the impact that design can have on individuals, particularly adolescents, when managing health conditions like asthma. Commonly, inhalers are used to deliver essential medication but spacers are offered to help improve delivery effectiveness. However, the design of current spacers are often bulky, visually unappealing (clinical looking), and difficult to carry or use, discouraging consistent adherence of the device and reinforcing social stigma. For individuals to improve their quality of life, spacers are beneficial, but despite knowing the benefits, their health is being compromised because of these design limitations.

These insights highlight an opportunity in the current market for an aesthetically appealing, compact, and portable redesigned spacer that addresses both functional and emotional user needs. By providing an individual with this device, they could gain to improve management of asthma symptoms, encourage regular adherence, ease of use, and reduce self-consciousness. Ergonomic handling, and adaptable features would further support users with different asthma severities and experience levels,

A well-designed spacer has the potential to improve medical effectiveness, whilst promoting confidence and support in asthma management. By normalising usage in daily life, reducing stigma, and supporting not only their physical health but their emotional wellbeing, this device could make a meaningful difference to the users' quality of life.



05

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Image References

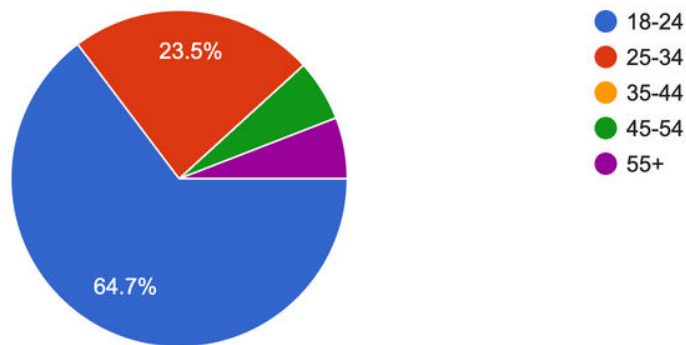
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Appendix

Appendix 1: Surveys

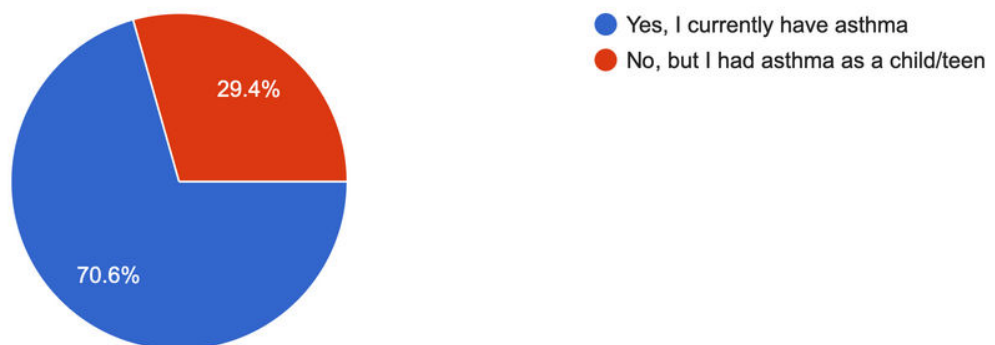
1. What is your age?

17 responses



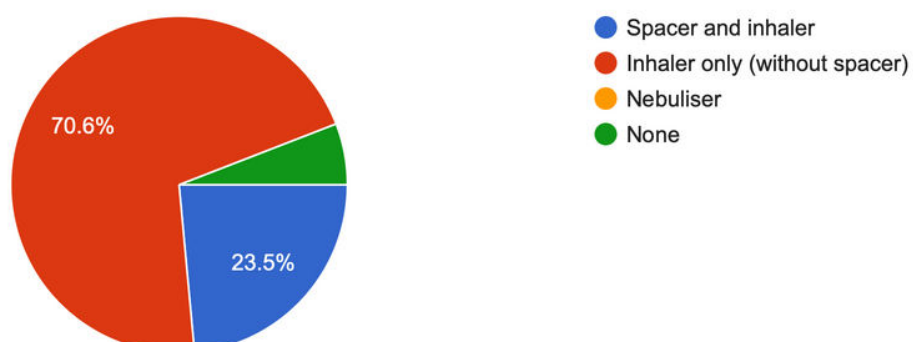
2. Do you currently have asthma?

17 responses



3. Do you currently use a spacer, inhaler only, or nebuliser?

17 responses



Appendix 1: Surveys (Cont.)

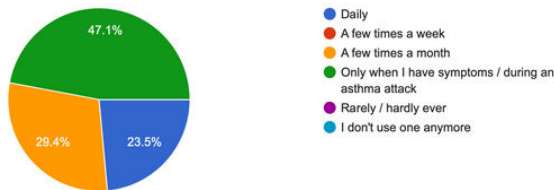
4. If you selected 'none' or 'inhaler only' for the previous question, please describe why?

12 responses

- i find that the spacer takes up too much space for me to carry it around everywhere like to work, uni or even going out
- I tend to keep an inhaler in a sports bag as a precaution when exercising. I found spacers take up too much space and draw attention. It is important to me that it is discreet, as I've found people may doubt my ability to participate in sport if they discover that I'm experiencing asthmatic symptoms.
- Easier to use and carry on its own once I got the hang of it.
- It's easier as I don't have to carry a spacer around with me
- I used to use a spacer with the inhaler as a kid but only at home (i do not remember the exact reason why it was only at home, maybe parents were afraid i would loose it or break it when in was in my bag?). And only an inhaler now for multiple reasons. Firstly, for convenience. I find that also carrying a spacer around just takes up unnecessary room, is clunky and large in my bag. Additionally I find myself unconsciously thinking why do I need a spacer if the inhaler by itself works just fine (lack of knowledge on a spacers purpose? potentially). Also, having to take out a long tube, attach it to the inhaler and then use it is kind of awkward and "attention grabbing," where I feel as if people are staring at the long tube protruding from my face, making me a little self conscious, so just using the inhaler was quick and easy. BOOM BAM BACK IN BAG DONE.
- Inhaler is too bulky to travel with but also embarrassing use in public
- Just ease of use, much easier to carry just an inhaler around then a massive spacer too
- Asthma not that severe
- I grew up only using a spacer and never knew the need for it
- The Spacer is too much to carry around in my sports bag. Plus it looks a bit goofy
- Since I no longer have asthma I no longer use one. But I used a spacer as a child.
- My asthma is relatively mild

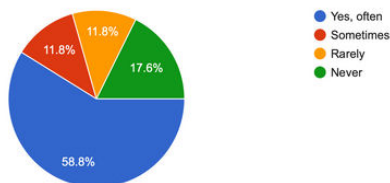
5. How often do you use your inhaler?

17 responses



8. Did you ever avoid using your spacer in social settings (school, with friends, in public) because of how it looked or how others might react?

17 responses



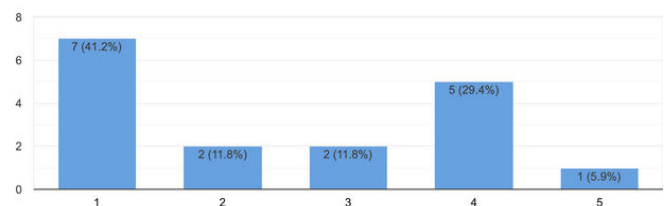
6. What usually triggers you to use your inhaler (e.g. during sports, only when sick, change of season, etc.)?

17 responses

- mostly when sick which tends to be a drastic change of weather. or if i am exercising and push myself too hard and find myself wheezing i take it as well
- Exercising is now my only trigger. Almost exclusively during the winter and/or when exercising in the wind or in air conditioning.
- Usually excessive laughter.
- Change of season, pollen in the air, dust
- During sports if I over do it and do excessive running
- Over the recent years, I have only found myself using it in dusty or smoky areas. For example if i was to be constantly inhaling second hand smoke from cigarette it flares up pretty badly. And sometimes, very rarely pollen in spring.
- During sports, when sick, change of season and laughing too much (lol)
- Seasonal changes, sports, when I am anxious or scared or nervous.
- change of season
- Change of season
- Certain sports can trigger my asthma especially swimming. Being sick can also trigger my asthma.
- During sports mixed with allergies
- Sports, Exercise and Cold Weather Conditions
- My asthma only acts up during extensive exercise or when I have flare ups during periods of illness.
- Mostly when I would be doing lots of exercise and going beyond my usual exercise or sport
- Change of Season/Sports
- seasonal , sickness , tight chested - no exercise

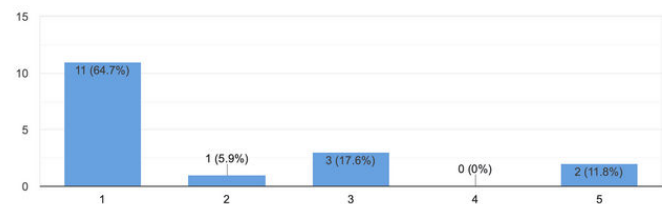
7. When you were younger, did you ever feel embarrassed or uncomfortable using a spacer around others?

17 responses



9. I felt more comfortable using my inhaler without the spacer, even though I knew it worked better with one.

17 responses



Appendix 1: Surveys (Cont.)

10. Can you describe a time when you chose not to use your spacer around others? What influenced that decision?

17 responses

when i was in primary school. i was afraid that the kids around me would judge me for having asthma, especially since i wouldn't see anyone else using one

When I would be playing sport, I'd make the choice to leave my bag with my inhaler in a private area. So that during the game I could leave and access it without my team members noticing. I did this out of fear that my coach or teammates would identify that I was having asthmatic symptoms, and I'd be forced to stop participating. Or that they'd 'baby' me because of my condition.

I've never considered using a spacer as something to be embarrassed about, and I'm not up-to-date on the science behind its effectiveness. I stopped using the spacer because I found it slightly too cumbersome to have to carry around everywhere.

At the airport. Too many people around

It was after a sports carnival in school, I did one of the running events and needed ventolin but didn't use a spacer cause I thought it would be embarrassing to use around others

One time, I didn't use my spacer on the bus because I felt awkward pulling it out in front of everyone and making it seem like a 'oh look at me' situation. So instead, I just whipped out my inhaler turned to the window in the corner and used it quickly.

During sports at school, people may see me as nerdy or disabled. It's also very obvious when you're using it

When I was around my relatives, they will judge and consider me as weaker person and will give unnecessary advice and sympathy.

i keep a spacer at home for bad asthma attacks but that is about it just due to how considerable the size is

Not wanting to get it out

I didn't use a spacer because I didn't own one and didn't think it changed anything so I got into a habit of using it without one

I kind of thought of the Spacer as training wheels for the puffer when I started primary school. Once I got older and more used to it, it was just easier to carry the puffer

When I was at athletics training, I got an asthma attack which was already embarrassing enough as it was, with a group of 20 people my age I didn't want to cause a scene. We were running and I didn't want to seem un fit either, so I grabbed my inhaler and went somewhere else to use it.

i have never owned a spacer

At a sports carnival in school, I was doing some running event and after it ended I was wheezing a lot and need Ventolin. I was afraid to get my spacer from my bag so my peers wouldn't see me as I was afraid of what they would think

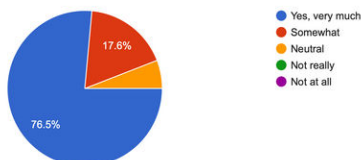
The spacer is too bulky to carry around so I just take the inhaler out when I'm feeling tight chested

Surrounded by Immature people who often would refer to the spacer as a penis pump

13.

Did you feel the spacer was too big, too medical-looking, or otherwise uncomfortable to use?

17 responses



11. What did you like about using a spacer (if anything)?

17 responses

i liked that it would help administer the ventolin correctly, as sometimes i would find that if i used the inhaler only the medication would come out from the top of it as i guess when i would breathe it would push it back out?

It was easier to use and more effective, especially when I am physically tired from exercising and out of breath.

It was simple to use.

Knowing I'm taking in most or all of the ventolin

It was efficient and delivered the Ventolin correctly

HMM to be honest nothing really? As a kid maybe I liked the fact that I could see the air I was breathing in from the clear tube? If that makes sense? Like see the white puff on the plastic from the inhaler and then me breathing it in? Was fun to watch.

Ease of breathing or having to really suck in the Ventolin once sprayed, tasting the stray at the back of your throat and not having to do extra puffs because most of it evaporates if you don't use a spacer and I need to repuff

I don't use one.

how effectively it mitigates symptoms

Nothing

It did seem to have more of an effect of the inhaler

Seeing the vapour appear in the tube

It was easy to fit the inhaler into, quick and efficient when you can't breath properly.

N/A

I liked how well it delivered the medication and help to breathe it in better

It gives me better inhalation of the puffer and goes deeper into my lungs

it is effective even though it is poorly designed

12. What did you dislike about using a spacer?

17 responses

i disliked how big it was and that it wasn't very discreet. sometimes i found the rubber mouth piece that would go over my nose and mouth would be uncomfortable as well so i would end up just not using it

Too large and would often draw attention. The size also made it difficult to store in my everyday bag.

Having to carry it around everywhere.

It's bulky

It was big and would get dirty easily, especially if I would take it with me or keep it in my backpack

Large. Obnoxious. Ugly. Hard to carry around. Easy to loose. Flimsy.

It's bulky looking and a plastic monstrosity, hard to travel with (I have a folding out one that collapses on itself but still 'solid' because of its material, kind of sound like Darth Vader when using it kind of feels like how it feels to open a pad packaging in the bathrooms on your period and the sound is a little too loudly obvious lol, it also feels extra nerdy to use one thanks to asthma's depreciation in movies too!

It's embarrassing.

the size of the actual device, it's about 7 times the size of the inhaler

Difficult to carry around

It was big and required an extra step to use the inhaler

How bulky it was

It was big, obvious to others around me and when kept in my bag it got dirty easily.

N/A

How big and medical looking it was. It would get dirty easily and made me not want to use it

I have to keep cleaning it every week

everything , its poorly designed, who said it has to resemble the male anatomy ?

Appendix 1: Surveys (Cont.)

14.

If you could change something about the spacer design or your experience using it, what would it be?

17 responses

definitely the size and how it looks. made me feel like a medical patient when all i needed was it to help me breathe better. otherwise the experience was fine as it always helped me a lot more than the inhaler

Smaller and more discreet.

I would make it smaller, though I recognise that may impact the effectiveness of it.

The size

It's looks and size. Looks very clinical and feels bigger than it is when I bring it out to use it

Defs the colour. Less bulky so it was easier to take with me to places. Fun design.

Making it out of silicon or a soft material that's squishy or can almost fold up (like a period cup?), definitely something more discrete and smaller in size, not see-through!!! I know my life might depend on it but it's so loudly saying 'I can't breath' like getting oxygen in a hospital but in public.

I would change its size if I can.

reduce size and make it more inconspicuous without removing too much effectiveness

Smaller?

Make it smaller and if possible attached to the design of the inhaler

Somehow make it more compact or expandable.

Designing for a more discrete and smaller in size would reduce attention brought to you when having an asthma attack. I think if it could close as well, to prevent sand and dust from getting in that would make it so much easier to keep it clean and ready to use.

The size and look of it, maybe something that's more customisable or better looking than a clinical looking tube?

Maybe the length of the spacer if thats able to change

Mmmm - Think seashell design or large snail, the neck of the snail is the Ventolin connecting to the body of the shell, the Ventolin is dragged through the cyclonic chamber

15.

Did the appearance of the spacer ever affect how you felt about having asthma?

17 responses

Yes

No

yeah it did, felt like an outcast sometimes? like i was different than other people and in a bad way cause i needed a spacer to help me breathe better when others didn't

Yes. Especially as a child, I felt in stigmatised my condition. It would draw attention from other people, and I would feel alienated from my peers. As it limited my ability to participate.

No.

Some what

I felt somewhat ashamed that I had to use it, like everyone would be looking at me if I would take it out to use it

No, more towards me actually having to use it. I did not mind having asthma.

Yes, I felt like a stereotypical nerd from a movie or something, I honestly wouldn't use it around people unless I was in dire need or could get to a bathroom cubical.

yeah it does

It was very big and bulky. I think that was the main thing that I found, I think it was more about how other people perceived it, I didn't want to cause a scene, but when I was already wheezing loudly and then the pacer is brought out I felt like everyone was looking at me.

N/A

Yeah it did, I felt embarrassed that I had asthma sometimes when I needed to use it

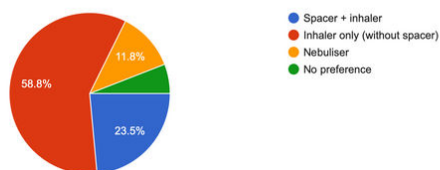
No not really mostly about taking it into public settings

Yes, its quite large , and not really travel worthy if you like to pack lite

16.

Which device do/did you prefer using?

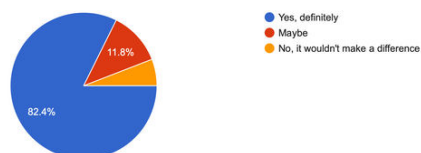
17 responses



18.

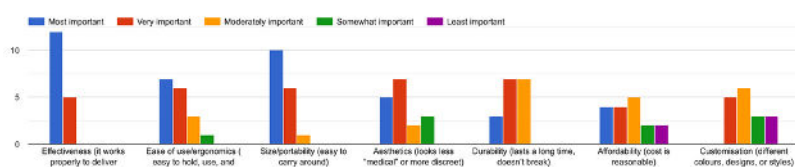
If spacers were redesigned to look smaller, less medical, or more customisable, would that make you feel more comfortable using them?

17 responses



19.

When using (or imagining using) a spacer, what aspects are most important to you?



17.

Why did you prefer that device?

17 responses

i definitely liked the spacer and inhaler as it helped a lot, i wish i used it more but i haven't bought one since primary school.

When dealing with asthma symptoms, it can be difficult to calm myself enough to effectively administer with an inhaler alone. Spacers reduced this problem and allowed me to administer far more effectively.

I only use the inhaler on its own out of convenience.

Because you can use it in the privacy of your own home

Was smaller and just easy to use

Weirdly it felt more effective? Like closer to mouth = stronger in my eyes. Additionally, close to the mouth, hand hides it, quick and easy to pull in and out of bag.

Because it actually works better but hard to have handy unless I'm at home and it's stored away. In public I find it hard to travel with still

So I don't have a carry an another piece with me. Only inhaler fits perfectly in my pocket.

portability

No spacer

Using an inhaler without a spacer made it a lot more portable a lot more accessible if needed

Easier to carry around and quicker to use. I could just run to my bag, have some water and a quick puff and keep playing.

It was quicker, and not as obvious to people around me.

it's easy, and the inhalers i buy don't come with them anyway.

It doesn't look as bad as having a medical tube near my face for people to look at

For a long time I just used the inhaler and didn't make a difference until I spoke with my GP who said to use the inhaler to make it more effective

Beurer has marketed a very small compact rechargeable unit like a vape pump

Appendix 1: Surveys (Cont.)

20.

Any other comments about your experience using asthma spacers as a child/teen that you would like to share?

17 responses

No

N/A

maybe that it was just weird to bring out a big tube to put some medicine in to help me feel better was strange. idk maybe it could just look better so i don't feel so embarrassed to bring it out, even now that im over 18

When I had to use a spacer, I was well past being self-conscious about medical requirements.

Not really, besides that I would feel embarrassed to use it since it was so big and medical looking, which would make me use the inhaler

Weirdly I did not mind using it at a kid but now as an adult and throughout my teenage years I became more self conscious about it. I also noticed lots of other kids around who also did not use spacers (primary school and high school) and would just quickly pull the inhaler out of their bag take two puffs and then shove it back in. On a very rare occasion would someone not mind at all and use the spacer.

It felt extra, nerdy, obvious, lame, embarrassing and I would have rather not been able to breathe right or have a wheeze than to use it in public

I honestly don't like using spacer.

i only have used spacers when having severe asthma attacks, just because of how impractical it is to carry around

Nil

It felt kind of cool as a kid to have this magical puffer I could use when breathing became difficult. I didnt really consciously stop using the Spacer, I kind of just went "i can probably do this without like a big boy" and never looked back.

I would definitely say the most important aspect is the size of the device, as I always felt that was what drew most attention from my peers and made the asthma attack more obvious.

-

Not really, besides that I sometimes would feel alienated and really embarrassed to use it. One time in primary school I remember getting bullied about it cause they said it wasn't 'cool' which I guess is where this embarrassment of the spacer began

21.

Would you be comfortable taking part in a short observation session where you use your spacer and inhaler? If yes, please provide your email below so we can send you more details and the consent form. If no, simply leave this blank and proceed.

7 responses

REDACTED

Appendix 2: Consent Forms

PARTICIPANT INFORMATION FOR CAPSTONE RESEARCH PROJECT – Observation –
Redesigning Asthma Spacers to Reduce Stigma and Promote Confident User

Research team		
Principal Researcher:	Alexandra Nomikos	Industrial Design Student
Unit Coordinator:	Rafael Gomez	Unit Coordinator
	Marianella Chamorro-Koc	Unit Co-Coordinator
School of Design/Faculty of Creative Industries, Education and Social Justice Queensland University of Technology (QUT)		

Why is the study being conducted?

This research project is being undertaken as part of an Industrial Design Capstone project for Alexandra Nomikos.

The purpose of this project is to investigate the social stigma surrounding the use of asthma spacers in adolescents. While spacers are a recommended tool that improves the delivery of medication like Ventolin, many users choose not to use them due to embarrassment, fear of being judged, or bullied. It focusses on the connection between health-related stigma and product appearance, and how current spacer designs often feel clinical, outdated or childish, making users feel even more alienated.

You are invited to participate in this research project because you have felt embarrassed to use a space and your prior experiences are valuable in understanding how young people perceive and interact with these medical devices.

What does participation involve?

Your participation will involve an audio recorded observation at (QUT) or other agreed location that will take approximately 30 minutes of your time.

Your participation in this research project is entirely voluntary. If you do agree to participate you can withdraw from the research project without comment or penalty. You can withdraw anytime during the observation. Your decision to participate or not participate will in no way impact upon your current or future relationship with QUT or myself.

You will be able to review the video of your observation after the exercise.

What are the possible benefits for me if I take part?

It is expected that this research project will not benefit you directly. The outcomes of the research, however, may benefit xxx. You can request a brief summary of the outcomes of the study by [indicate how, e.g. checking a box on the consent form, providing an email address].

Appendix 2: Consent Forms

What are the possible risks for me if I take part?

QUT provides for limited free psychology, family therapy or counselling services for research participants of QUT research projects who may experience discomfort or distress as a result of their participation in the research. Should you wish to access this service please call the Clinic Receptionist on **07 3138 0999** (Monday–Friday only 9am–5pm), QUT Psychology and Counselling Clinic, 44 Musk Avenue, Kelvin Grove, and indicate that you are a research participant. Alternatively, Lifeline provides access to online, phone or face-to-face support, call **13 11 14** for 24 hour telephone crisis support. If you are aged up to 25, you can also call the Kids Helpline on **1800 551 800**.

What about privacy and confidentiality?

All comments and responses are coded i.e. it be possible to re-identify you. A re-identifying code stored separately to personal information (e.g. name, email address) will only be accessible to the research team, and the code plus identifying information will be destroyed after the completion of this assessment.

Any personal information that could potentially identify you will be removed or changed before the summary of results are disseminated or these data are shared with other researchers. The information that will be removed includes names and email addresses.

Any data collected as part of this research project will be stored securely on personal computers or password protected cloud storage systems (not on public storage systems). Data will be deleted once the project is complete at the end of the semester.

As the research project involves an audio recording:

- You will not have the opportunity to verify your comments and responses prior to final inclusion.
- The recording will not be used for any other purpose.
- Only the named researchers will have access to the recording.
- It is not possible to participate in the research project without being recorded.

Every effort will be made to ensure that the data you provide cannot be traced back to you in reports, publications and other forms of presentation. For example, we will only include the relevant part of a quote, we will not use any names, or names will be changed, and/or details such as dates and specific circumstances will be excluded.

How do I give my consent to participate?

We would like to ask you to sign a written consent form (enclosed) to confirm your agreement to participate.

What if I have questions about the research project?

If you have any questions or require further information, please contact one of the listed researchers: Alexandra Nomikos Alexandra.nomikos@connect.qut.edu.au 0491158966

What if I have a concern or complaint regarding the conduct of the research project?

The researcher is committed to research integrity and the ethical conduct of research projects. If you wish to discuss the study with someone not directly involved, particularly in relation to matters concerning policies, information or complaints about the conduct of the study or your rights as a participant, you may contact the Unit Coordinator on email (Rafael Gomez) r.gomez@qut.edu.au or (Tim Williams) tim.williams@qut.edu.au

Thank you for helping with this research project. Please keep this sheet for your information.

Appendix 3: Transcript Summary - Otterbox AI

Transcript 1

https://otter.ai/u/KvHRES_3HJOFHrLvQdpDZjc57wo?view=summary

The conversation revolves around the usability and design of a spacer for inhalers, specifically the Ventolin. Speaker 1 and others discuss the discomfort and awkwardness of using the spacer without a mouthpiece, noting its clinical appearance and the difficulty of holding it with one hand. They suggest improvements such as a more ergonomic design, a collapsible feature, and the option for different colors to make it less conspicuous. The group also emphasizes the importance of hygiene and the potential for the device to get dirty. They conclude that while the device is functional, it could benefit from a more user-friendly and aesthetically pleasing design.

Action Items

- [] Explore design options for a more compact, discreet, and user-friendly spacer device.
- [] Investigate ways to improve the hygiene and ease of cleaning the spacer device.
- [] Consider incorporating customizable color options or designs to make the spacer more visually appealing.

Outline

Discussion on Using a Spacer with Ventolin

- Speaker 1 and Unknown Speaker discuss the use of a spacer with Ventolin, emphasizing the importance of comfort and ease of use.
- Speaker 1 mentions that the spacer looks clinical and daunting, which can be intimidating and cause anxiety.
- Speaker 2 suggests demonstrating how to use the Ventolin with and without the spacer.
- Speaker 1 prefers using the mask over the spacer, as it is more comfortable and doesn't require precise positioning in the mouth.

Challenges with the Current Design

- Speaker 1 and Unknown Speaker discuss the physical awkwardness of using the spacer, which requires two hands and can be cumbersome.
- The spacer is described as bulky and difficult to store, especially when compared to a soft lunch box.
- Speaker 1 suggests that the spacer should be more ergonomic and easier to hold with one hand.
- The conversation touches on the potential for the spacer to get dirty, especially if it is not stored properly.

Preference for a More Compact Design

- Speaker 1 and Unknown Speaker discuss the idea of a collapsible or more compact design for the spacer.
- The current design is described as hard to deconstruct and store, making it less practical for daily use.
- Speaker 1 suggests that a soft, squishy design would be easier to fit into a bag and less likely to get damaged.
- The conversation highlights the need for a design that is both hygienic and easy to clean.

Considerations for Public Use

- Speaker 1 and Unknown Speaker discuss the practicality of using the spacer in public, noting that it can be awkward and noticeable.
- The spacer is described as bulky and not suitable for travel, especially when carrying other items like bags or poles.
- Speaker 1 mentions that they would prefer to wait until they get home to use the spacer, rather than carrying it around in public.
- The conversation touches on the importance of the spacer being discreet and not drawing attention in public settings.

Design Improvements and Personal Preferences

- Speaker 1 and Unknown Speaker discuss potential design improvements, such as making the spacer more compact and easier to hold with one hand.
- The conversation highlights the importance of the spacer being hygienic and easy to clean, especially if it is used daily.
- Speaker 1 suggests that the spacer should be available in different colors to make it more appealing and less clinical-looking.
- The idea of commissioning artists to design custom spacers is mentioned, with the potential for more colorful and visually appealing designs.

Final Thoughts and Recommendations

- Speaker 1 and Unknown Speaker summarize the key points discussed, emphasizing the need for a more ergonomic and user-friendly design.
- The conversation concludes with a focus on the importance of the spacer being both practical and aesthetically pleasing.
- Speaker 1 suggests that a more compact and colorful design would make the spacer more appealing and easier to use for daily needs.
- The overall discussion highlights the potential for design improvements to enhance the user experience and practicality of the spacer.

Appendix 3: Transcript Summary - Otterbox AI

Transcript 2

<https://otter.ai/u/9aFEKMFYO7nOdpGsaokzCwdwKUs?view=summary>

Speaker 1 discusses their experience with an asthma spacer, highlighting its large size, discomfort, and awkward appearance as main issues. They find the mouthpiece hard and unsuitable for public use, and the mask, while more effective, is also cumbersome. The spacer attracts dirt and lint, and cleaning it is challenging. Despite these drawbacks, the spacer effectively delivers medication, which is better than using an inhaler alone. Speaker 1 suggests improvements to the design, particularly the mouthpiece and overall size, for a more comfortable and discreet user experience.

Action Items

- [] Explore design improvements to the asthma spacer, focusing on the mouthpiece and overall size/appearance.
- [] Investigate options for a more compact and discreet asthma spacer design.
- [] Provide feedback on the current spacer design to the manufacturer or relevant healthcare provider.

Outline

Experience with Asthma Spacer

- Speaker 1 asks the participant to describe their experience with the asthma spacer, including feelings, thoughts, and reasons for using it.
- Speaker 1 notes the participant's long-term use of the spacer and requests detailed feedback.
- Speaker 1 emphasizes the importance of understanding the participant's comfort and effectiveness of the spacer.

Size and Comfort of the Spacer

- Speaker 1 mentions the spacer's large size, which they find uncomfortable to use, especially in public.
- The participant describes the difficulty of inserting Ventolin into the spacer with one hand and the awkwardness of the mouthpiece.
- The participant prefers the spacer for its ability to hold Ventolin but finds it hard and awkward to use, especially in public.

Appearance and Practicality of the Spacer

- The participant dislikes the spacer's medical appearance, describing it as plasticky and unattractive.
- The blue and clear colors of the spacer contribute to its medical look, which the participant finds awkward.
- The participant appreciates the ability to see the Ventolin inside the spacer but finds the overall design unappealing.

Use of the Mask

- The participant rarely uses the mask, finding it too big and cumbersome.
- Despite its size, the mask delivers Ventolin more effectively and is more comfortable than the mouthpiece.
- The participant finds the process of using the spacer and mask in public to be a significant inconvenience.

Maintenance and Cleaning

- The participant notes that the spacer gets dirty easily, especially when carried in a bag, due to lint and other debris.
- The mask's material, described as a silicone rubber, attracts lint, making it difficult to keep clean.
- The participant finds the cleaning process similar to cleaning a baby bottle or water bottle but acknowledges the challenge.

Design and Functionality

- The participant suggests that the spacer's design, particularly the mouthpiece, needs improvement.
- The participant appreciates the spacer's effectiveness in delivering medication but finds the overall design and size problematic.
- The participant suggests that a softer mouthpiece and a more compact design would improve the user experience.

Effectiveness and Alternatives

- The participant acknowledges that the spacer does its job effectively but expresses a desire for a more comfortable and aesthetically pleasing design.
- The participant finds the inhaler alone difficult to use correctly, often seeing medication come out improperly.
- The participant suggests that a softer mouthpiece and a more compact design would make the spacer more user-friendly.

Overall Feedback and Suggestions

- The participant reiterates the need for a more comfortable and aesthetically pleasing design, particularly for the mouthpiece.
- The participant appreciates the spacer's effectiveness but finds the overall design and size problematic.
- The participant suggests that a softer mouthpiece and a more compact design would improve the user experience.

Final Thoughts and Participation

- Speaker 1 thanks the participant for their feedback and participation in the discussion.
- The participant expresses gratitude for the opportunity to provide their input.
- The conversation concludes with mutual thanks and appreciation for the discussion.

Appendix 4: Analysis Tables

	Quality & Durability	Accessibility & Affordability	Design & Aesthetics	Functionality & Features	Ergonomics & Comfort
Breath-A-Tech	8	9	5	6	7
Philips Optichamber Diamond	9	7	7	8	8
Able Collapsible Spacer	7	8	6	7	8
Volumatic	8	7	3	7	4
Funhaler	7	1	5	6	6
Aerochamber Plus Flow-Vu	8	8	6	8	7

Benchmarking Scoring Table

Main Theme	Sub-Themes	Examples / Descriptions from Transcript
Comfort & Usability	Mouthpiece vs. Mask	Mask feels "comfier," easier to use, more ergonomic; mouthpiece touches tongue, causes taste issues, requires awkward mouth positioning.
	Grip & Handling	Spacer feels long and cylindrical, unclear how to hold ("Do I double hand it?"); requires two hands, awkward in public or when carrying bags.
	Size & Bulkiness	Spacer described as "too long," "bulky," and "hard to travel with"; compared to a hard lunchbox that doesn't fit well in bags.
	One-Handed Use	Difficulty using while holding other items (e.g., bus pole, bags); user suggests thumb-operated inhaler design for easier handling.
	Cleaning & Hygiene	Concerns about bacteria buildup (compared to water bottles), inability to clean thoroughly, device picking up dirt when loose in a bag.
	Weight	Spacer felt light overall, but inhaler adds heaviness; not a major issue compared to size/bulk.
Design & Aesthetics	Clinical Appearance	Described as "clinical," "daunting," and like "something you'd find in a hospital"; clear plastic seen as making it "more obvious" rather than discreet.
	Colors & Customisation	Preference for black or solid colors over clear/white; comparisons to accessories like bandanas; suggestion that artists could design patterns to make them expressive.
	Durability & Portability	Clear parts turn "cloudy and nasty" over time; collapsible versions suggested for easier storage; pouch for hygiene mentioned.
	Comparisons to Other Products	Compared to baby bottles (too many parts that can be lost), lunchboxes (hard vs soft), water bottles (cleaning challenges).
Stigma & Social Use	Public Use	User wouldn't carry or use it in public due to bulkiness and appearance; would wait until home to use spacer.
	Embarrassment / Social Perception	Concern that others would think "she can't breathe, she needs help"; described as "super obvious" and "a big contraption."
	Desire for Normalisation	Suggestion that if it looked more like an accessory (colorful, customised), it could feel less medical and more acceptable in social settings.
Functionality	Effectiveness	Knows spacer improves delivery but avoids it due to convenience and design; prefers inhaler alone when rushing.
	Ease of Use	Spacer requires timing and coordination ("two hand job"); feels less practical in urgent or outdoor situations.
	Confidence in Use	Confident in correct use as an adult, but recalls needing guidance as a child; relies on sensory cues (taste, smell) to know if used incorrectly.

Analysis from Transcript 1

Appendix 4: Analysis Tables (Cont.)

Analysis from Transcript 2

Main Theme	Sub-Theme	Description from Transcript
Comfort & Ergonomics	Mouthpiece fit	Found the mouthpiece "a bit awkward on the teeth" and preferred when it sat higher in the mouth.
	Handling & grip	Struggled to keep a steady hold while pressing the inhaler: "I've got bigger hands but it still feels fiddly."
	Mask option	Mentioned that a soft mask would be easier on days when breathing feels "tight" and avoids awkward lip positioning.
Usability & Practicality	Portability	Said the spacer "doesn't fit in a pocket" and usually leaves it at home, relying on just the inhaler when outside.
	One-handed use	Noted it was "tricky on the go" since both hands are needed, especially when carrying shopping bags or opening doors.
	Cleaning & maintenance	Frustrated by cleaning process: "You've gotta take it apart properly, otherwise it smells plasticky."
Design & Aesthetics	Appearance	Felt the spacer looked "medical and clunky," compared it to "something you'd expect in hospital."
	Size & bulk	Commented on how "big and obvious" it looked when carried in public, preferring something flatter or foldable.
	Colour/design appeal	Suggested darker colours would make it "blend in better" compared to the current transparent plastic.
User Behaviour & Adaptation	Reliance on inhaler alone	Admitted he "mostly just uses the puffer" when out, despite knowing the spacer gives better results.
	Long-term habits	Explained he has "gotten used to doing it wrong sometimes" because the spacer feels inconvenient.
	Experience & confidence	Confident in his technique after decades of use but still noticed errors like tasting the medicine when rushing.