

Research Report

Promoting Medical Adherence for Patients with Dry-Eye and Glaucoma through Treatment Management and Product Assistance

Sophie Montgomery



DropAssist

Executive Summary

This project aims to investigate strategies to improve patient adherence to optical treatments, specifically glaucoma and dry eye, thus targeting users with neurodivergence, physical limitations and elderly demographics. Further, this report will research and analyse the underlying barriers to medical adherence, thus specifying gaps and opportunities for future design innovation projects in this space.

Here, the objective is to promote active and voluntary participation by patients in the management of their health through improved treatment adherence and administration.

The conducted qualitative and quantitative research will consider a range of factors contributing to human behaviours and reasoning for why non-adherence to patient posology occurs. Therefore, the following factors will be considered: practical, behavioural, psychological, physical and emotional barriers to adherence and administration to treatment plans.

Ultimately, this report will consider what and how opportunities can be further explored in the scope of design, thus improving treatment adherence through interactive and self-participation design. These mainly include effective reminding systems, educational systems and supportive functions that aim to foster collaborative and consistent engagement between patients, medical professionals, and their therapeutic plans.

Authencity and AI Use Statement

AI Use Statement

I have utilised Generative AI in this report (including ChatGPT) to assist in various ways. The way I have used AI includes synthesising data information from my findings and from the literature. AI has been used throughout this project for each section to ensure the information provided is accurate and to reduce word count.

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Date: 5/09/2025

Authencity 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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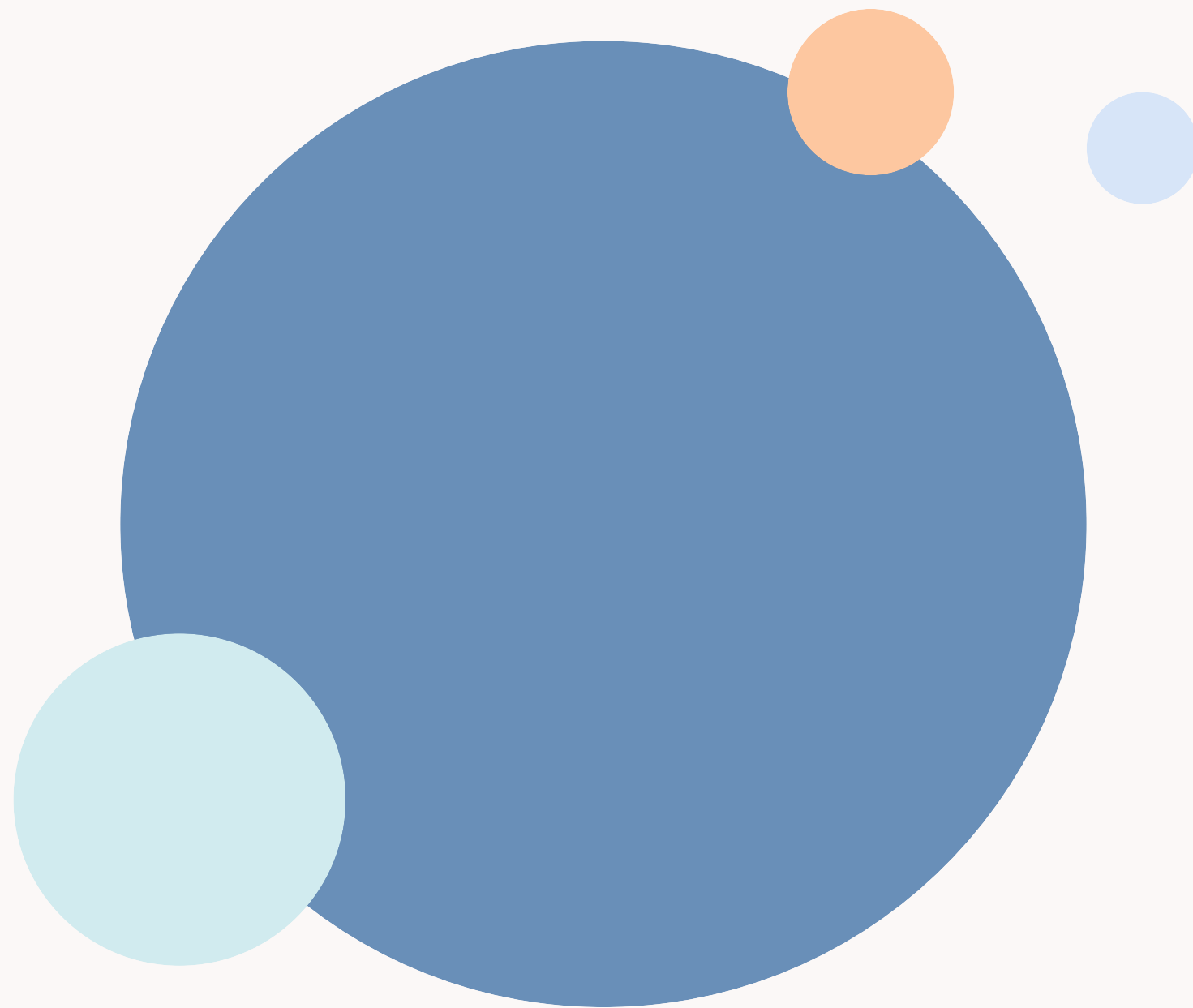
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1.0 Introduction



Introduction
Aim
Research Question
Project Structure
Background
Benchmarking
Opportunities and Gaps

1.0 Introduction

This project aims to explore design opportunities to support voluntary and active participation in managing prescribed optical treatment adherence. The two optical conditions considered here are glaucoma and dry eye disease, as both conditions have similar treatment regimens, including the timed administration of eye drop regimes (Optometry Australia., 2020). The primary patient demographics that will be focused on include elderly adults, neurodivergent individuals, and physically impaired users. Specifically, those with parkinson's disease, arthritis, and low upper mobility, dexterity, strength and grip.

This report will research, examine, and explore the underlying themes and barriers behind patient adherence and non-adherence to prescribed optical treatment plans. Thus informing design implications, gaps and opportunities for future product innovation. Human behaviours related to medical non-adherence will be explored by specifically considering physical, practical, emotional, behavioural and psychological barriers of adherence and administration.

Section 1 will review several academeic literature journals considering the challenges of medical adherence, emotional and physical barriers to adherence concerning glaucoma and dry eye treatment. Additionally, it will benchmark pre-existing design innovations and products concerning the assistance of optical treatment adherence, thus analysing gaps and designing opportunities for future innovation. Section 2 aims to synthesise findings from survey and interview responses from industry expert optometrists to inform and support common keywords regarding barriers to treatment adherence. Based on these findings, Section 3 will then identify themes and design implications to inform future design innovation and solutions to enhance optical treatment adherence.



Aim

This project aims to investigate strategies to improve patient adherence to optical treatments, specifically glaucoma and dry eye, thus targeting users with neurodivergent, physical limitations and elderly demographics.

Research Question

How can patients with physical and mental limitations and barriers (including elderly adults, parkinsons disease, arthritis, and low upper arm dexterity) improve their treatment adherence, be supported and encouraged to actively and consistently adhere to their prescribed optical treatment plans?

Figure 1: Outline of Report Aim and Research Question

Project Structure



Figure 2: Report Project Structure

1.1 Background

Medical Adherence

According to Optometry Australia (2024), the term “medical adherence” refers to ‘whether patients follow their prescribed treatment plan, including taking medicines at the correct dose and frequency with the correct administration.’ In the context of optical health, treatment adherence is crucial to the quality use of medicines, as it supports the success of medication regimens and overall patient health. Especially for patients with glaucoma and dry eye disease. (Gast et al., 2019) Intentional and non-intentional adherence are factors that result from inadequate instillation techniques, such as physical and/ or cognitive limitations that prevent patients from improving their optical health condition. (Hovanesiana., 2023)

Glaucoma

Glaucoma is “a chronic eye disease which progressively damages the optic nerve, usually from elevated pressure inside the eye, ...leading to irreversible blindness (if untreated).’ (Optometry Australia, 2020).

The issue regarding patients with glaucoma who do not adhere to treatment plans is becoming increasingly prevalent globally and especially in Australia. Non-adherence to glaucoma treatment is primarily due to ‘not noticing the benefits of the medication.’ (Sayner., 2015) Therefore, the effectiveness of glaucoma medication depends on the adherence to treatment from the patient, which typically includes instilling multiple eye drops and medications several times daily. (Erras et al., 2023)

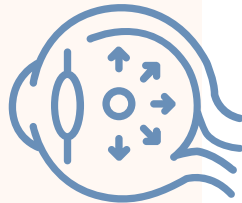
Ultimately, several academic studies suggest that patients with glaucoma need innovative support and development of robust methods of measuring adherence. For instance, areas of innovation include confirming eyedrop medication usage in real time, thus not relying optical health-care professionals for this information. (Newman- Casey., 2017)

Dry Eye

Dry Eye disease (DED) is one of the most common clinically observed diseases globally, which is principally treated by eye drops. (Stapleton et al., 2017) ‘Dry eye is a multifunctional disease of the ocular surface characterised by a loss of homeostasis of the tear film. ’ (Optometry Australia, 2019; Craig et al., 2017)

Ocular symptoms of dry eye are mainly characterised by hindering a patient’s quality of life due to abnormal discomfort, stinging, burning and itchiness, which affect daily living. (Gomes., 2018) This may lead to a corneal infection and, in serious cases, may lead to permanent vision loss. (Schaumburg et al., 2001).

Optical Conditions



300,000

of Australians have Glaucoma

Figure 3 : Glaucoma Australia (2019)



72%

of Australians have Dry Eye (2017)

Figure 4: Optometry Australia (2019)

1.1.1 Mental vs Physical Adherence

There are numerous intentional and non-intentional factors that contribute to the non-adherence of optical treatment plans, specifically for patients with glaucoma and dry eye. These mainly include mental barriers concerning emotional, psychological, behavioural and educational challenges. Additionally, physical limitations, including upper-mobility dexterity, age and difficulty with administering eye drops, are all factors that contribute to impacting treatment adherence.

Mental Adherence

‘Locus of Control’

The psychological theory, ‘locus of control’, will be considered to gain a better understanding of how a patient may perceive their own behaviour. This suggests that if a patient improves their treatment through voluntary participation, then this will improve treatment adherence. (Rotter., 1966). Ultimately, this concept is important to consider in the scope of the healthcare system in general and in the optical space, as patients are likely to respond better to treatment adherence when engaging in self-determination and self-efficacy toward their own health outcomes. (Náfrádi et al., 2017)

Patient Empowerment & Trust

Moreover, the emotional pain points when administering eye drops are important to consider and avoid when designing for an innovative patient experience to better adhere to treatment regimes. Therefore, not reinforcing a patient’s lived presumptions and feelings regarding their past experiences with treatment adherence, such as shame, embarrassment and hopelessness.(Náfrádi et al., 2017)

Forgetfulness, Education & Neuro-divergence

Additionally, mental barriers to treatment adherence mostly include a lack of adherence to remembering when to comply with treatment regimes. Further, an educated understanding of the consequences when not adhering to treatment. Both barriers will be considered in the scope of patients with neurodivergence and age-related limitations.

Physical Adherence

Eye Drop Application Complications

The main challenges with administering eye drops are due to the following physical limitations;

Parkinsons, Arthristis, Upper-Arm Strenght and Dexterity

Patients with Parkinson's disease and arthritis are found to have great difficulty with self-administering and instilling eye drops into their own eyes due to shaking hands and missing drop doses. (Virani et al , 2015) This further includes patients with limited upper arm mobility, strength, dexterity and grip whereby treatment requirements such as squeezing the eye drop bottles are a major barrier to treatment adherence.

Aiming / Confirmation

A main limitation that most patients face includes not being able to accurately measure and aim where the eye drop meets the eye. (Uchino et al., 2022)

1.2 Benchmarking

As stated in section 1.1.1, the main challenges with optical treatment adherence concern patients with low upper arm dexterity and strength, thus find it challenging and avoid administering aid drops due to it's lack of usability and innovation.

Ultimately, the main emotional and physical factors that contribute to improving optical treatment adherence include its usability, education, accuracy, dignity and trust. Here, these terms are extrapolated per Newman-Casey et al (2015) depiction of *The Most Common Barriers to Glaucoma Medication Adherence* (Appendix 1). Figure 5 stipulates keywords drawn from Section 1's academic research, highlighting a narrower scope of needs and wants for design innovation for the future of optical adherence. Figure 5 is categorised into themes as per its colour code; therefore, multiple circles with the same colour follow the same themes and keywords. Ultimately, the circle positions have been intentionally designed to suggest that the key themes are interconnected and relate to one another in the context of treatment adherence.

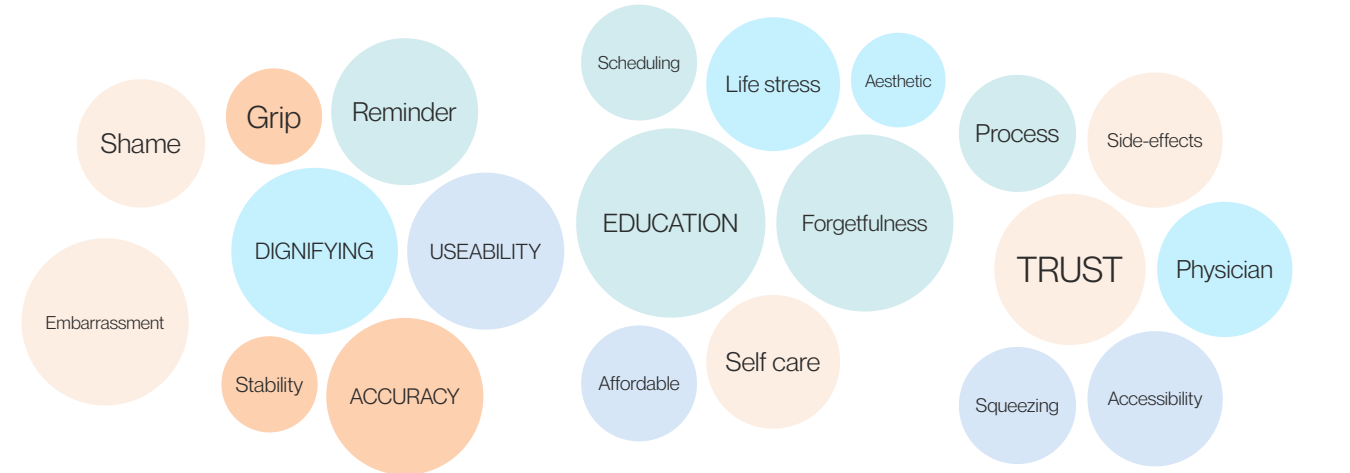


Figure 5 : Key Word for Benchmarking Optical Adherence Products

Research Key Words and Optical Adherence Products

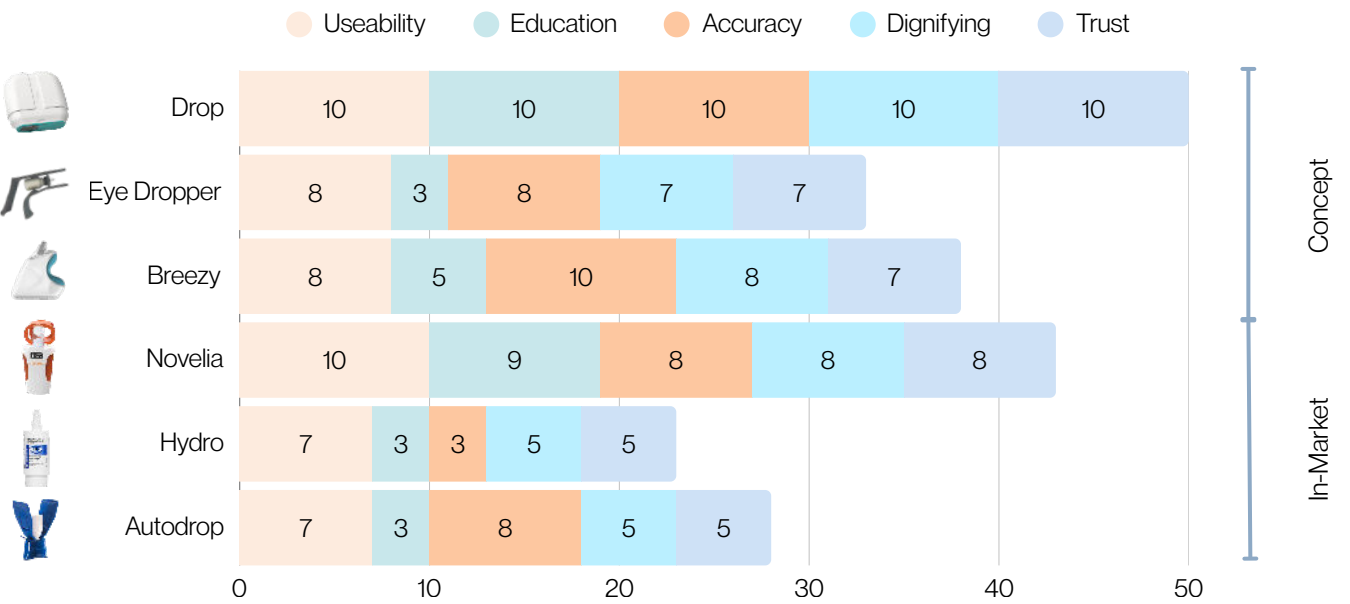


Figure 6 : Key Word for Benchmarking Optical Adherence Products

Figure 6 's benchmarking criteria is based on what was understood in research and judged against the listed features concerning the X-axis of the bar graph. This figure illustrates that most in-market and product concepts that assist the emotional and physical adherence of optical treatment are mostly considered usable and accurate. Therefore, identifying a gap for improving physical adherence needs, as opposed to unprioritised emotional needs. Here, most products have a higher usability rating, which relates to the physical adherence of the products, whereas education and dignity, which are emotional adherence words, are ranked lower. Therefore, this suggests that the current design innovations for optical adherence products do not prioritise emotional features and factors.

In-Market VS Concepts Products for Eye-Drop Stabilisation

Figure 7 aims to illustrate different product concepts and in-market products that exist in the scope of assisting with barriers to optical treatment adherence concerning glaucoma and dry eye disease. These products are compared based on their innovative design choices and human-centred design features. Here, the word 'innovation' is to encapsulate the key words as stated in Figure 5. The comparison of in-market and product concepts reflects the current lack of 'high innovative' optical assistive aids in the market and through design concepts.



Figure 7: Product Matrix of Design Concepts and In-Market Products

Nonetheless, the lack of innovative in-market products also suggests a lack of accessibility to these products. Figure 6 shows that the *drop* product is the most innovative, therefore suggesting there is a gap in accessibility to the 'most' innovative product, not in the market.

Figure 7's product names and further explanation of how these products accommodate both emotional and physical needs are listed per Figure 10's numbering system of products.

1.3 Opportunities and Gaps

Identifying Gaps and Opportunities for Future Design Innovation

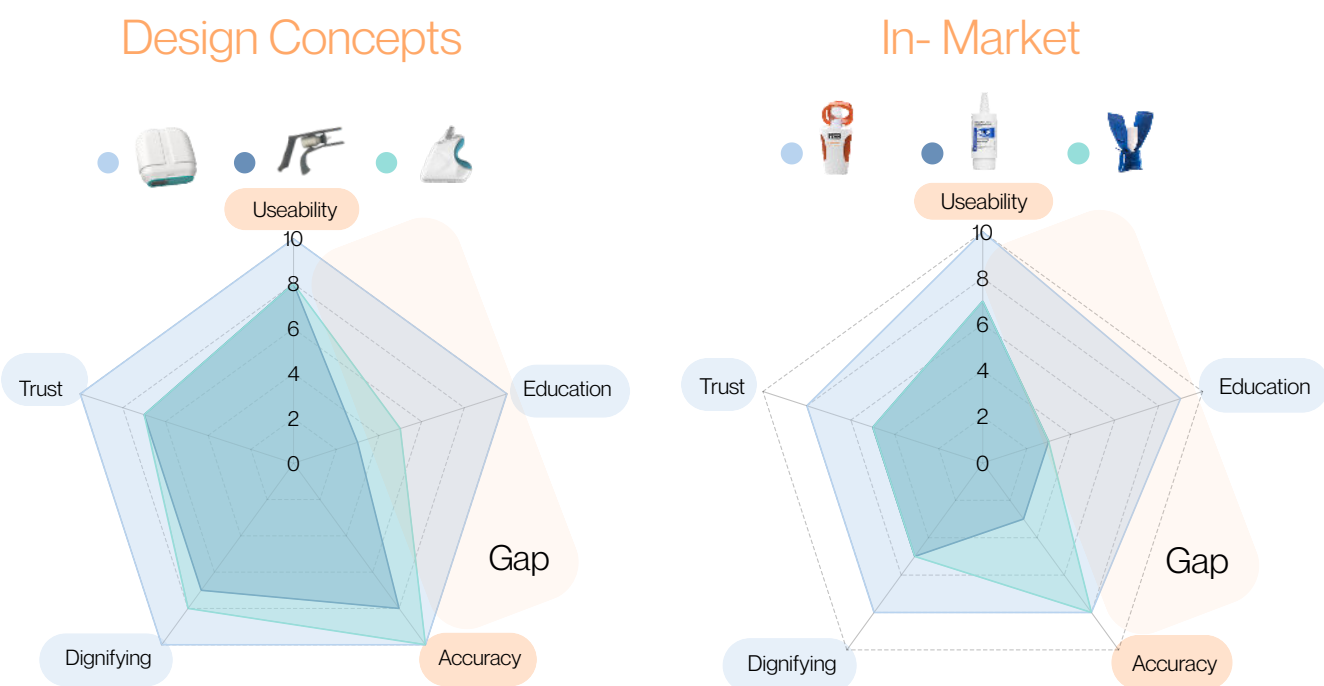
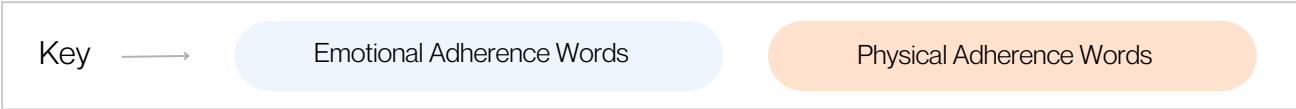


Figure 8: Design Concept Products Radar Graph

Figure 9 : In-Market Product Radar Graph



Gap

The main gaps identified from Figures 6 - 9 mainly address that current in-market and design concept designs of optical assistive devices do not address the emotional adherence needs of patients.

Figures 8 and 9 represent a majority gap with products not addressing the educational needs of patients, therefore suggesting a design opportunity to educate patients on their treatment regimes. In this case, educational factors consider reminding users when to administer eye drops at the correct dosage and frequency. Additionally, to encourage users to adhere to treatment regimes, but understanding the consequences of not adhering to prescribed treatment plans, which mainly result in worsening their condition or blindness.

Opportunity

From this, the main opportunities for encouraging emotional and physical treatment adherence includes targeting the emotional needs of patients. By doing so, the physical barriers of patients must be considered and designed innovatively to influence the emotional factors of the patient. For example, by increasing the usability and accuracy of an optical assistive aid, this will influence users to feel less ashamed and embarrassed when they are not able to administer their drops accurately.

Summary

Summary of In-Market vs Concept products Adherence

Product	In-market or Concept	Emotional Adherence	Physical adherence
1.	Concept/ High	Dignifying, moderately accurate, aesthetic,	Stability, gripability, automatic squeezing, easy to aim
2.	Concept/ Low	Non-aesthetic, in-expensive materials	Squeezing mechanism is difficult especially with low grip strenght
3.	Concept/ Low	Aesthetic design, but lack of usability hinders emotional durability	Hard to stabilise on nose and head. Difficult squeezing mechanism
4.	In-Market/ High	Reliance to ensure eye drop instills into the eye	Difficult to squeeze around the sides of the product
5.	In-Market/ Low	Not aesthetic, or easy to understand	Not trustworthy squeezing bottle to ensure eye drops instills in eye
6.	In-Market/ Low	Low dignifying features of aesthetic and form	Difficultly gripping and squeezing device whilst aiming

Figure 10 : Summary of Design Concepts and In-Market Products

Summary of Key Words and Benchmarking Products

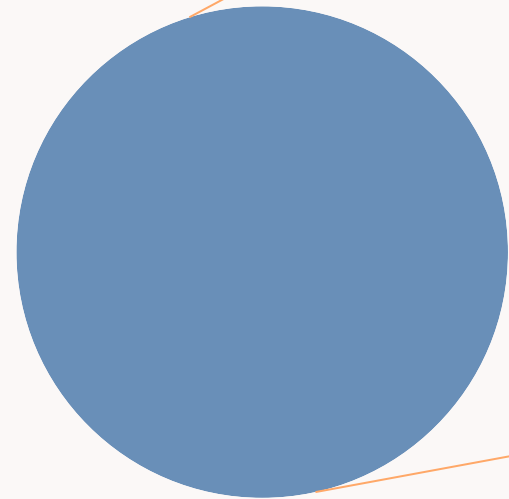
	Drop	Eye Dropper	Hydro	Novelia
Useability	✓	✓	✓	✓
Education	✓	✓	✓	✓
Accuracy	✓	✓	✓	✓
Dignifying	✓	✓	✓	✓
Trust	✓	✓	✓	✓

Figure 11: Summary of Key Words and Four Innovative In-market and Design Conduct Projects

Figure 11 demonstrates that design concept products consider the emotional adherence needs of the patient, as opposed to in-market products. Ultimately, the benchmarking figures suggest there are current gaps and opportunities for future design innovation in the space for enhancing optical treatment adherence.

Appendix 2 should be referred to understand a deeper analysis of keywords as per Figure 6. Thus, providing context as to how to address the gaps in-market and through concept design, therefore, presents opportunities for innovation regarding features of the device.

Research
Research Scope
Methodology
Limitations
Future Improvements
Analysis and Findings
Survey
Interview



2.0 Research

2.0 Research

As stated in section 1.2, the main gaps and opportunities identified amongst in-market and design concept products concern the emotional and physical aspects of treatment adherence. Therefore, suggesting a greater need for product innovation relating to the following innovative factors: usability, education, accuracy, dignity and trust. (Figure 5)

The main challenges here are understanding these gaps and verifying whether they address the needs and concerns of optical industry experts who understand the lived barriers and limitations of patient adherence.

1. Survey 2.1 Research Scope

Purpose of Survey	To seek a wide range of expertise regarding the priority of the six main themes. For instance, questions related to design interventions informed whether optical experts believed there is a gap, need and opportunity for optical product innovation. The results are to suggest design priorities, requirements and feasibility of ideas as potential interventions.
Survey Participants	A total of 11 survey participants who all completed or are completing their Master's of Optometry Degree at QUT. These include six practising optometrists and five Master's of Optometry Students at QUT.
Data Type	The quantitative data concerns 22 questions with a 1-5 scale (1 being strongly disagree, 3 being neutral, and 5 being strongly agree), which prioritise and address the main matters and themes of patients in this scope. The qualitative data addresses an elaboration on particular topics, including open-ended responses. These responses are then coded into themes per Figure 18.
Limitations	Participants are optometrists/ students, therefore are not the end patient/ user with lived experience. Voluntary participants of the responses link to selection bias regarding all participants receiving their Master's education at Brisbane, QUT.

2. Methodology

Recruitment	The qualitative data set was collected by emailing optometrists/ students from QUT Optometry Clinic and OPSM. The participation in the survey was voluntary and anonymous.
Collection of Data	Google forms Refer to the 'data type' in the previous table. Refer to Appendix 3 for all Google Forms questions. These responses are then coded into 'data type' themes
Data Type	These questions mostly regarded: demographic considerations including patients with dementia, parkinsons disease, arthritis, upper mobility dexterity and strenght and neurodivergence, education and health literacy of patients, eye drop dosage, and frequency, reminding challenges and aids, gap in the market for assitive eye-drop aids and interventions. Refer to Appendix 4 for coding of data into common themes.
Limitations	Limitations of the data pool concern a lack of a survey aimed at the end primary patients with glaucoma or dry eye disease, or an upper arm mobility disability. There is a notable limitation of data regarding accessing a larger data pool, mostly due to a lack of participant responses and voluntary participation.

Informed from Survey

The Human-Centred Design (HCD) methodology will be adopted here by using convergent mixed-methods and design thinking, in order to understand emotional and physical limitations of treatment adherence.

3. Interview Research Scope

Purpose of Survey	The purpose of the semi-structured / written interviews is to gain expert insights into the challenges that patients with glaucoma and dry eye disease face from the perspective of the optical health care provider.
Survey Participants	- The following participants include five optical expert interviewees. - One final year Master's of Optometry student at QUT - Clinical Optometrist/ HDR Student - Optometrist, Optical Super Store and QUT clinician - Senior Lecturer in Optometry & Vision Science - Optometrist, Glaucoma Australia Board Member
Data Type	Qualitative data will be deconstructed with noting key words linking to section 1.1 and 1.2.
Limitations	Similarly to Section 2.1 Limitations.

4. Methodology

Recuitment	Refer to Interview methodology
Collection of Data	The shared Google Doc included 10 written semi-structured interview questions for expert optometrists to type out. The qualitative analysis in Excel includes qualitative coding (content analysis). Refer to Appendix 5.
Data Type	The questionnaire consisted of the following topics with approx two questions per theme: general experience, perspectives of patients with non-adherence to glaucoma and dry eye disease treatment, understanding health and literacy, patient demographics, emotions of the patient, challenges in treatment adherence, and device and future intervention.
Limitations	- Future improvements for collecting data include outreaching to different nationalities, regional groups and inter-state paitents with glaucoma for a more spread data collection. - The data collected is also limited to the Australian population, specifically Brisbane, all experts received their education from the QUT Optometry Clinics. (This does not consider that a few optometrists have experience overseas regarding their expertise, more so that their patients are mostly from Australia and are Australian certified Optometrists).

2.2 Analysis & Findings

As per Section 2.0, this analysis will depend on expert quantitative and qualitative data regarding the advice of Optometrists and a Master's of Optometry student. The following survey results will reflect the mean, median and mode for each survey theme/ graph, to best determine the common consensus of each topic. The themes are based on the findings in each section and sub-section of the report, and in the survey. The x-axis is the question theme, and the y-axis is the 1-5 scale.

2.2.1 Survey Results

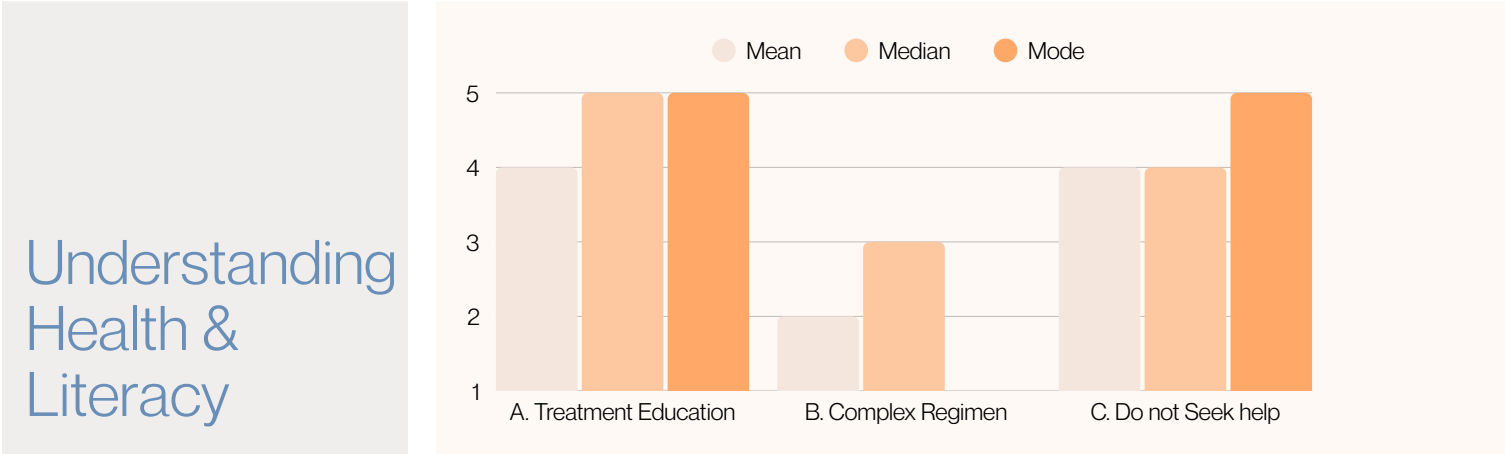


Figure 12: Understanding Health & Literacy Survey Results

Refer to Appendix 6.1, the mean for A. is 4.72, B. is 2.6, and C. is 3.63, overall median of 3.66. Figure 12 shows that ‘complex regimes’ do not necessarily mean there will be poor compliance by the patient. Nonetheless, ‘treatment education’ is strongly agreed to be a main factor in encouraging voluntary participation in treatment care.

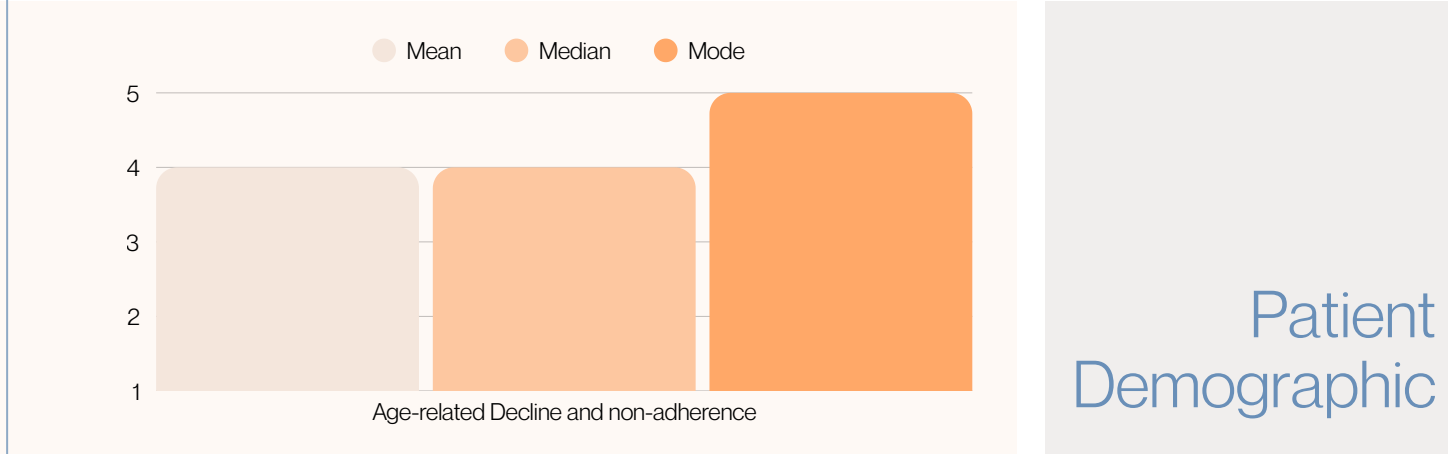


Figure 14 : Patient Demographic Survey Results

Refer to Appendix 6.3, the overall mean is 4.36. Therefore, there is a strong correlation between older patients and an increase in non-adherence to treatment. Thus addressing pain points elderly patients usually experience, including higher prevalence of Parkinson’s disease, arthritis, limited grip strength and forgetting treatment regimen and health consequences to not adhering to treatment.

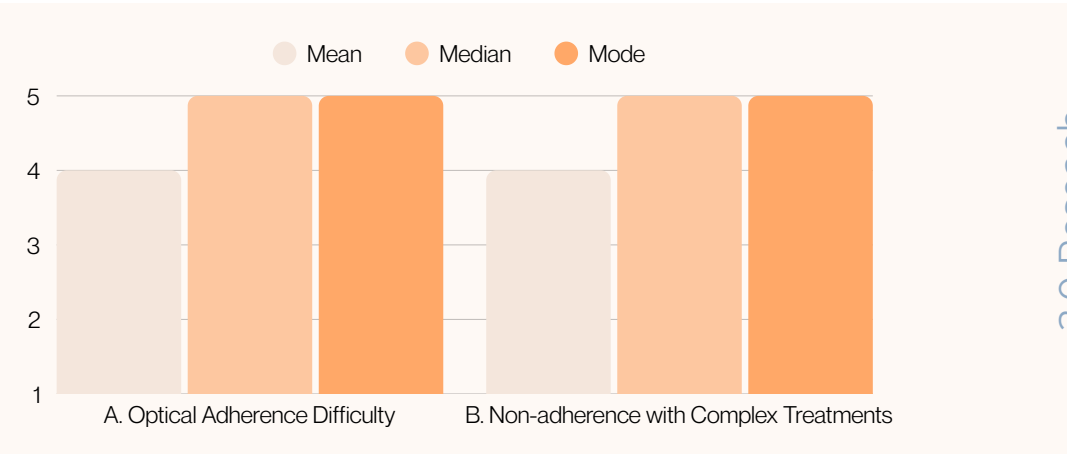


Figure 13: Mental Limitations of Patient Survey Results

Refer to Appendix 6.2, the mean for A. is 4.18 and B. is 4.63 with an overall mean of 4.4. Figure 13 shows that complex treatments are strongly agreed to be more difficult to adhere to if the patient has mental barriers. Therefore, it suggests an opportunity for designing a reminder for patients to administer eye drops at their prescribed regimen.

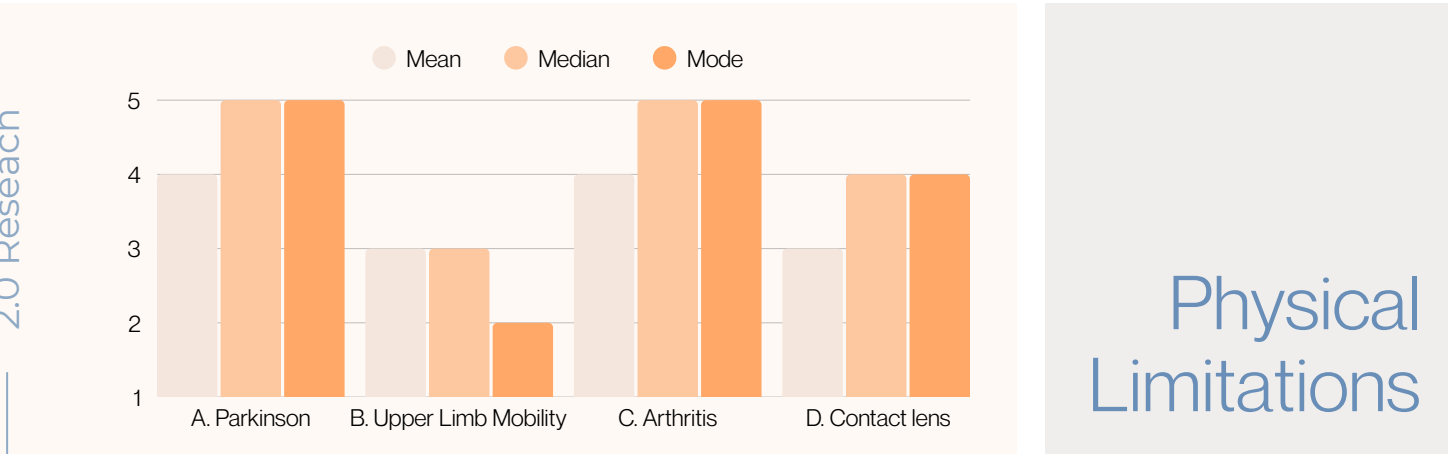


Figure 15: Physical Patient Limitations Survey Results

Refer to Appendix 6.4, the mean for A. is 4.54, B. is 3, C. is 4.18, and D is 3.72, with an overall mean of 3.86. Opportunities for designing for better stabilising a patients arm/ hand for better accuracy of eye drop administration,

Treatment Adherence Challenges

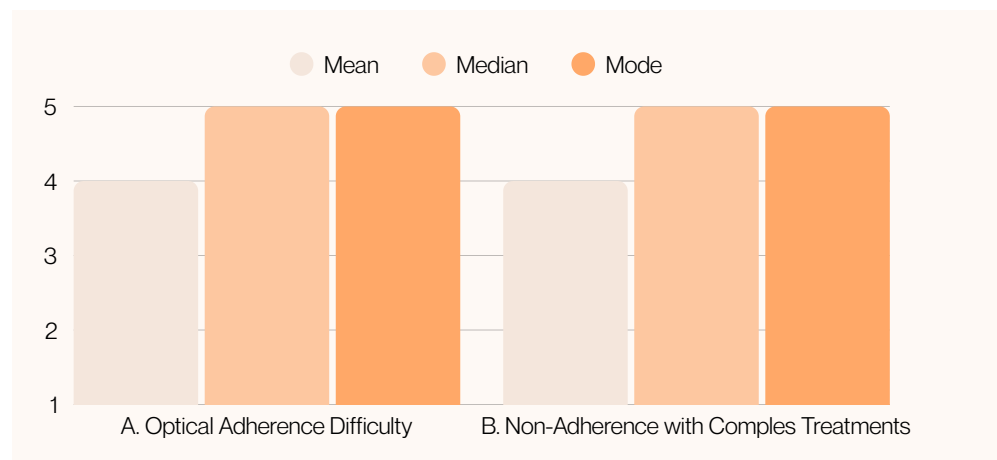


Figure 16 : Challenges with Treatment Adherence Survey Results

Refer to Appendix 6.5, the mean for A. is 4 and B. is 4.18 with an overall mean of 4.09. This graph shows that the more complex the treatment regime is for a patient with glaucoma and dry eye disease, the more non-adherence there is with their treatment plan. Therefore, there is a need for treatment plans to be easily understandable and adhered to.

Devices & Intervention

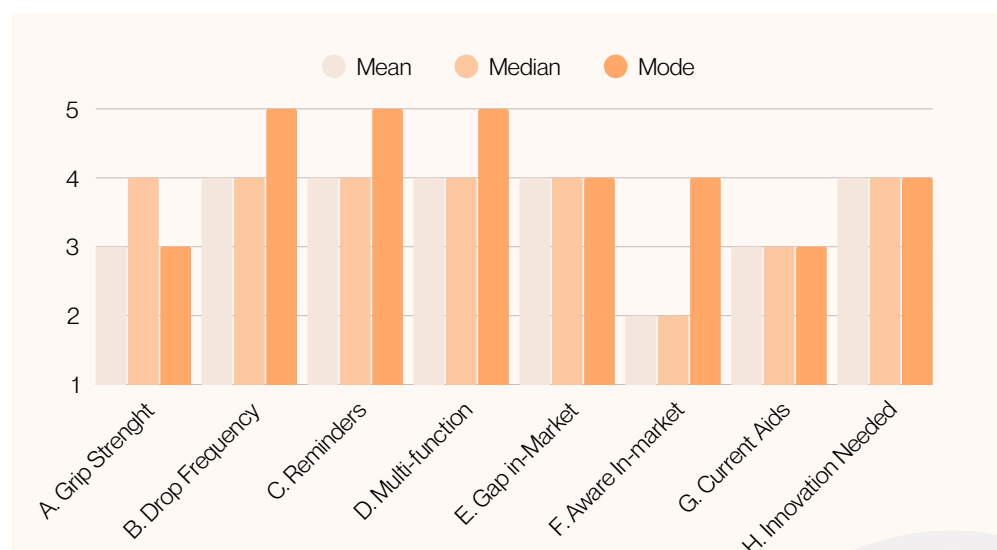


Figure 17 : Gaps and Opportunities for Future Device Intervention Survey Results

Refer to Appendix 6.6, the mean for A. is 3.72, B. is 4.27, C. 4.09, D. 4.09, E. 4.18, F. 2.63, G. 2.90 and H. is 3.81 with an overall mean of 3.71.

Due to having a large range of questions, the overall 3.7 mean average is assumed not to be a true reflection of whether device intervention is strongly agreed to be an opportunity for innovation. Nonetheless, reminders, drop frequency and multi-functional devices are the highest opportunity for innovation.

Question 23. What would you like to see in future product interventions regarding assistive eye drop devices, reminder products or general eye health products?

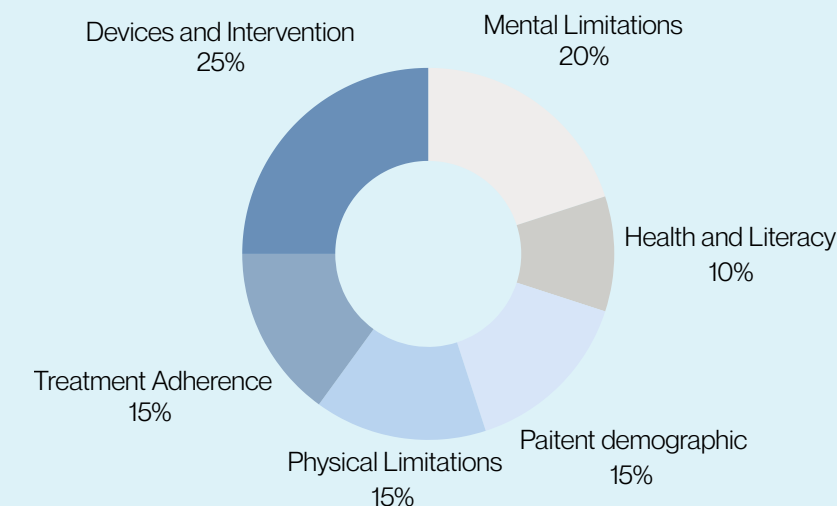


Figure 18: Future Product Intervention & Gaps Qualitative Survey Results



Figure 19: Summary of Quantitative Survey Data

Refer to Appendix 4 for data coding, and other qualitative data results including Question 22, what that means for design implications. Here, the data is somewhat even distribution for the need and importance of each theme. The themes with a higher percentage rate are 'strongly agree' responses from the survey. This is supported by the summary pie chart diagram as per Figure 19, which provides also provides examples of factors relating to the main themes of treatment adherence.

Future Product Intervention & Gaps

Summary of Survey Data

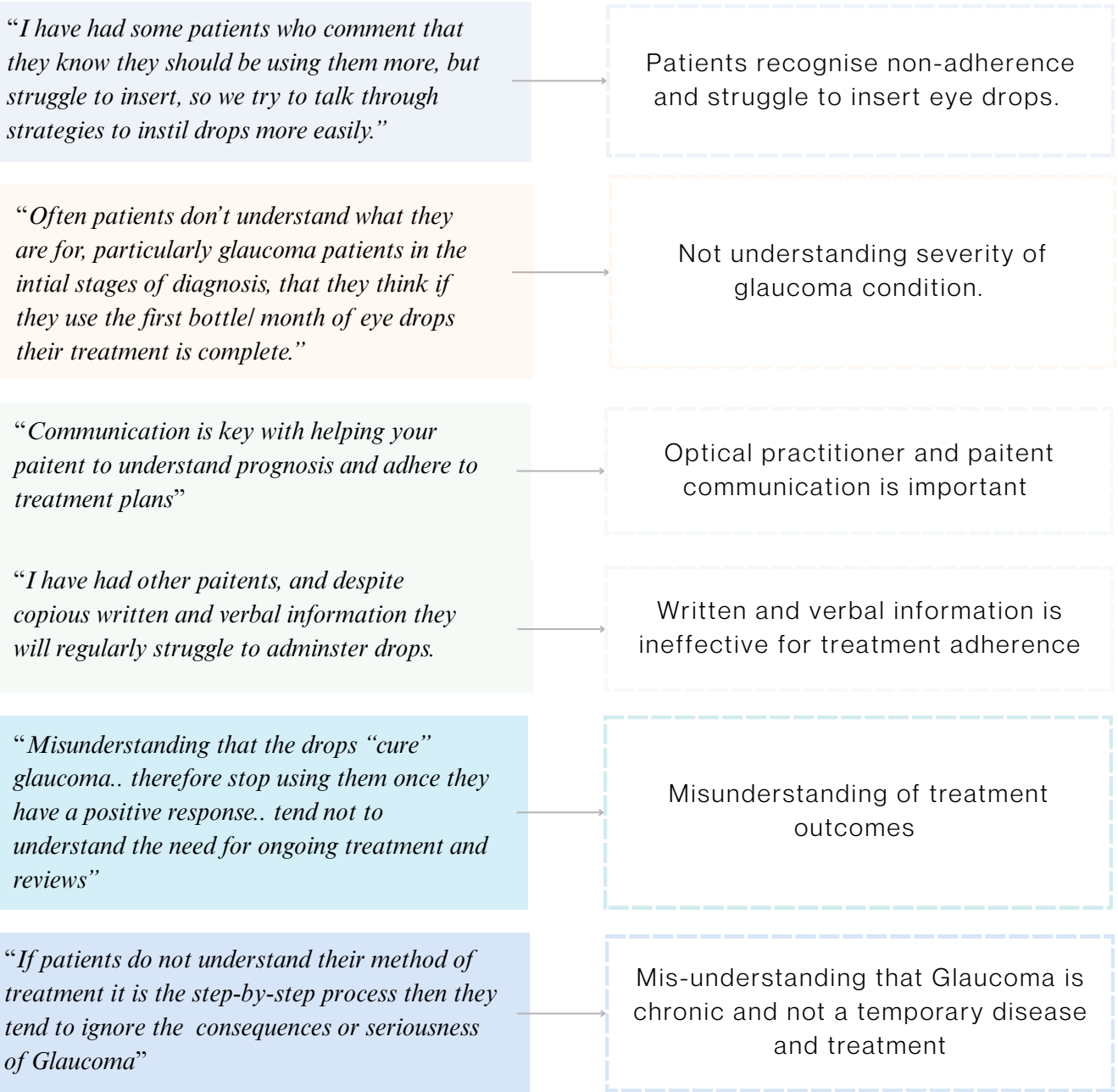
2.2.2 Interview

The interview findings are to better understand what optical experts observe in practice. These responses are purposely not analysed in depth, keywords and phrases will be drawn out to show the main themes. Quotes are categorised into participant responses and as per Section 2.2.1's themes, refer to Appendix 7.

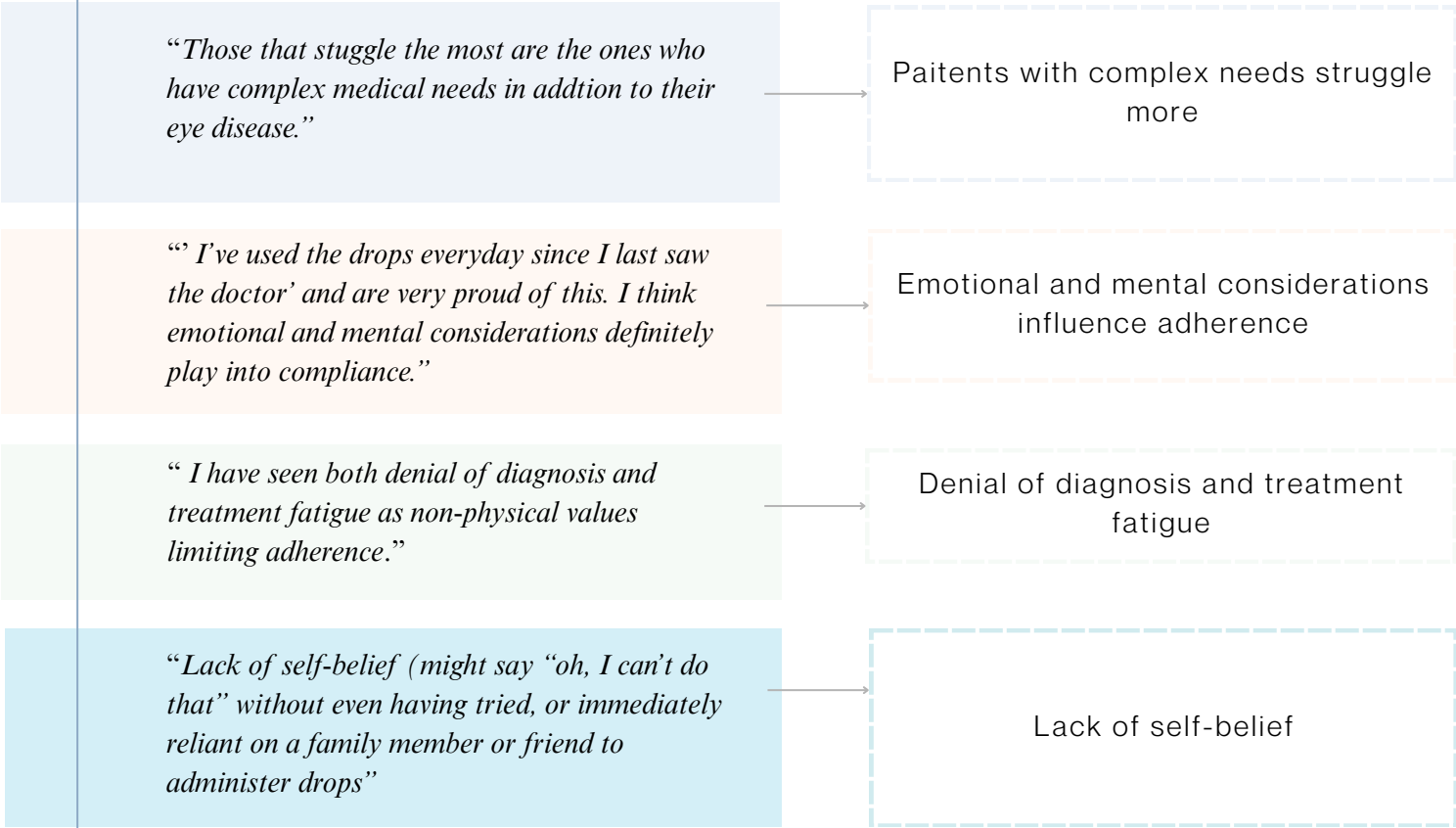


Figure 20 : Optometrist Participants in Interviews

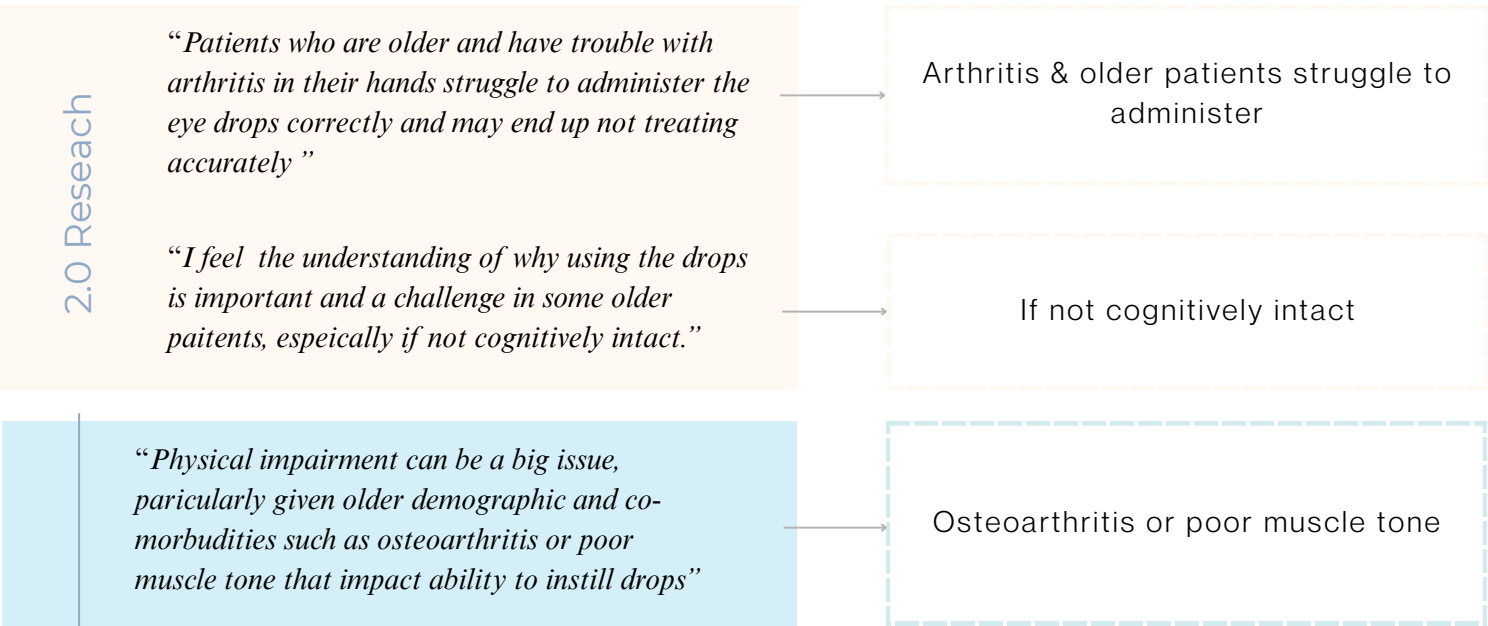
Understanding Health and Literacy



Mental Limitations



Patient Demographic



Physical Limitations

"Difficulty squeezing bottle and lining up the drop in their eye."

Squeezing and lining up bottle

"I've had patients say to me they're not interested in using drops because they know they will not be able to use them."

Know and not interested with using bottle

"Patients generally don't like being called out for poor compliance due to their physical incapacities stopping drop use."

Don't like being shamed or embarrassed about physical incapacities

Emotional Limitations

"I definitely see a lot of emotional barriers to treatment compliance. For conditions like dry eye, treatment fatigue is common, with patients often needing to instill drops four times a day or more on an ongoing basis indefinitely."

Treatment fatigue

"Dry eye drops are generally just to minimise symptoms, rather than be curative, and patients often don't understand that or get frustrated by this. As I mentioned in a previous answer, I think patients with a low mood due to other health concerns are less likely to comply with treatment due to an overall feeling of helplessness, and/or being overwhelmed from all the other treatments/medications they take for life threatening conditions."

Chronic diseases are not curable, which is frustrating, helpless, overwhelming and not understood

"I think any tool that empowers a patient to 'take charge' of their condition is worthwhile - sometimes, it can be the seemingly lack of control a patient has on their condition that can be detrimental to accepting diagnosis."

Patients need feeling of control in their treatment

Challenge in Treatment Adherence

"Some patients make the decision they will go blind from glaucoma, rather than struggle with daily eye drops."

Go blind rather than struggle with drops

"The fact that they sting and the patient can't notice any benefit from using the drops make it harder for patient to comply if they are also struggling to get the drops in."

Not noticing benefits of treatment contributes to non-adherence

Devices and Intervention

"Reminders would be important, but also something that registers their compliance might be more useful, so that doctors can monitor their actual compliance."

Registering compliance to optical professional

"A reminder system, patient education, system that helps stabilise eye drops, something to confirm to the user they eye drop got in the eye, contact lense insertion, grip stability are great ideas"

Reminder system, patient education, stabiliser and confirmation

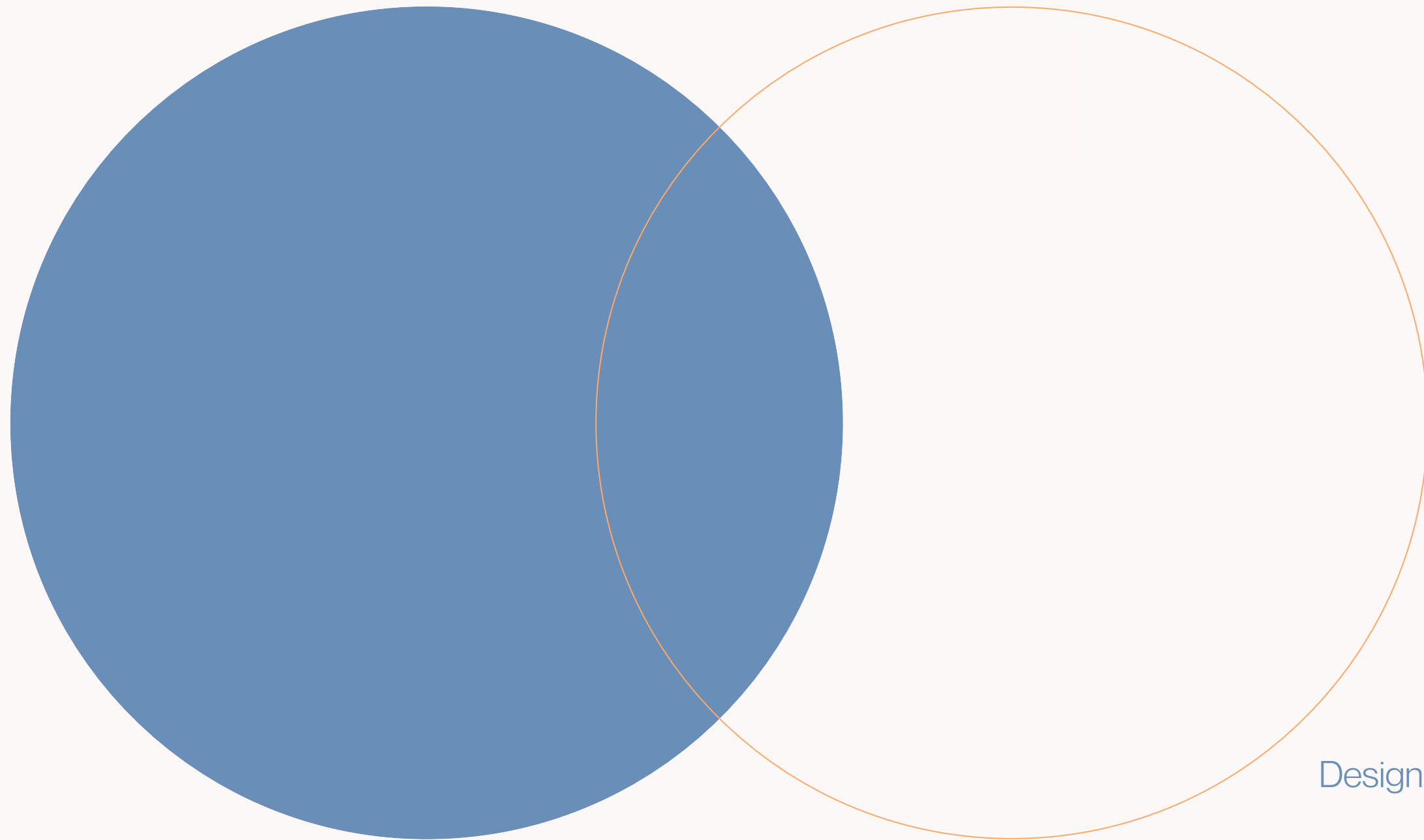
"I think if a tool could support a patient in ensuring good adherence to (reminders to instill drops and feedback of successful drop instillation), and at the same time provide a reliable source of written information to re-inforce why they have to be on treatment, this could be very beneficial."

Reminder and feedback of successful drop instillation and re-reinforcement for treatment checklist

Summary

Overall, there is a clear issue with patients with glaucoma, dry eye disease and adherence from the expert opinions and optometrists in Brisbane, Australia. Note, the number of quotes for each theme does not reflect their level of importance to this topic.

3.0 Discussion



Discussion
Design Implications
Conclusion

3.0 Discussion

Literature and Academic Journals

Section 1.1 provides an initial understanding of medical adherence in the scope of glaucoma and dry eye disease. This outcome suggests that without voluntary participation and adherence to eye drop administration regimes, blindness or severely impacted quality of life can result. Further, section 1.1.1 emphasises the main emotional and physical barriers patients face that contribute to non-adherence to treatment. Therefore, these barriers are gaps in future design innovation concepts, which highlights an opportunity to design for improving the quality of life for patients with glaucoma and dry eye disease.

Benchmarking Products

Section 1.2 identified, analysed and categorised five key words/ themes, including usability, education, accuracy, dignity and trust from Casey et al (Appendix 1). From these keywords, in-market and design concepts were compared against each other depending on whether they suited the keywords. It was determined that there is a gap for design innovation for both in-market and design concept products. Whereby, there is a clear opportunity for both markets to innovate products that combine physical assistance and lower emotional barriers to better adhere to treatment plans.

Survey & Interviews

Section 2.2.1 analysed a survey including 11 optical professionals with experience addressing patients with emotional and mental barriers to treatment adherence. There was a clear correlation that all optical industry professions agree that adherence to treatment does exist with education, remembering, and the accuracy of drop administration are all gaps and opportunities for design innovation.

Section 2.2.1 reiterates from five independent interviews by highly educated optical professionals with four optometrists, agreeing that a patient’s need to understand their treatment regimen is very important for influencing better treatment adherence. Additionally, the emotional and physical barriers to administering eye drops are extremely important. Whereby some patients are unable to adhere to their treatment due to physical limitations, for example, the inability to squeeze an eye drop bottle independently and feeling embarrassed. Ultimately, this clearly links to the ‘locus of control’ theory as stated in Section 1.1.1 and is supported by Inez Hsing agreeing there is an opportunity for innovation in this space, “I think any tool that empowers a patient to ‘take charge’ of their condition is worthwhile - sometimes, it can be the seemingly lack of control a patient has on their condition that can be detrimental to accepting diagnosis.”

Identified Themes & Gaps

Based on my previous findings, this re-inforces that there is an opportunity for marketable, affordable and accessible devices that limit the emotional and physical barriers of treatment adherence specifically designed for glaucoma and dry eye patients. Thus, innovating a product experience to address a clear gap for accessible eye drop assistive devices that educate, remind and provide accurate eye drops.

Identified Themes

Figure 21 addresses the key findings and themes identified from Sections 1.0 and 2.0 in the scope of treatment adherence. From this, seven design opportunities for future design implications have been identified.

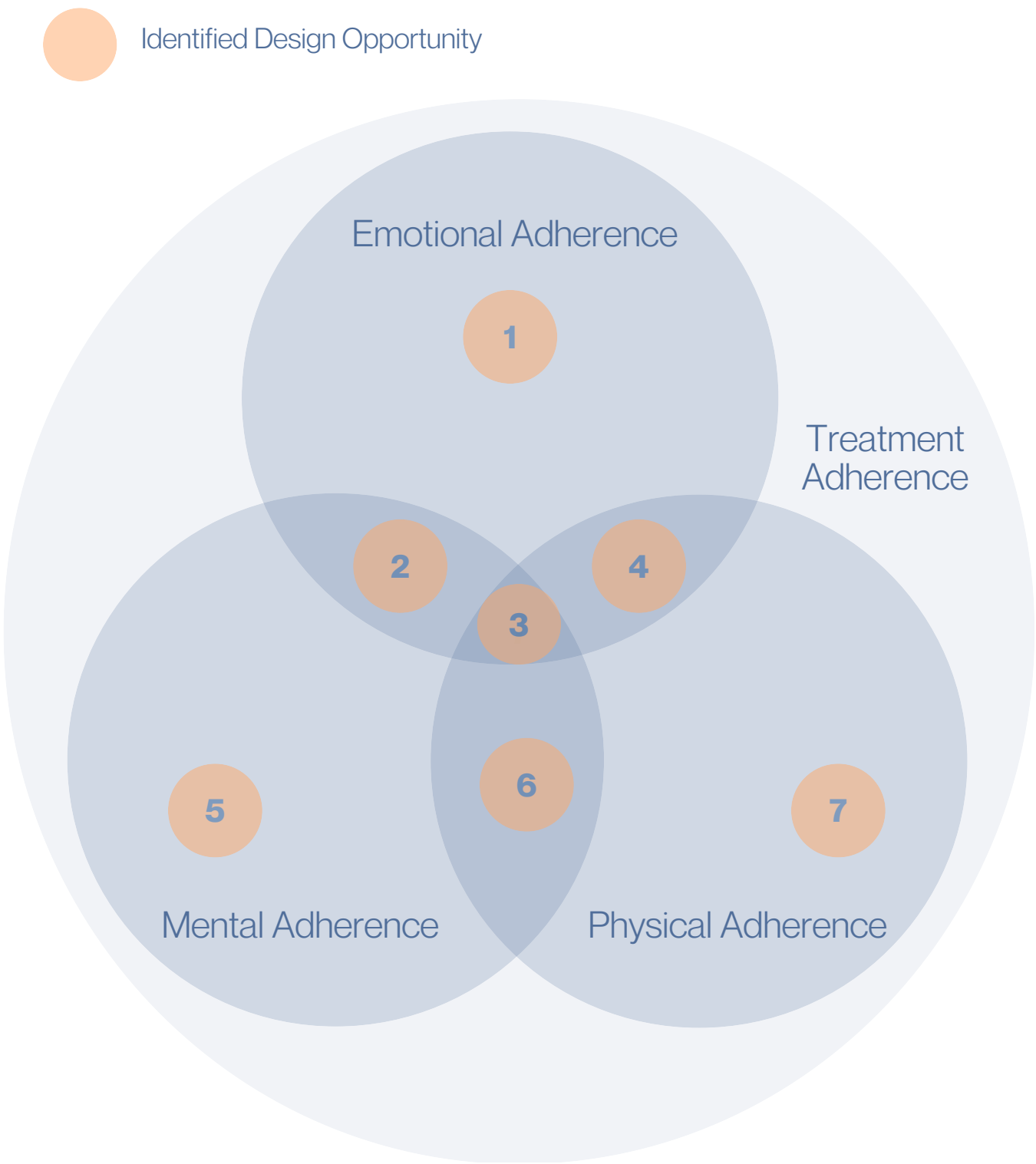


Figure 21: Identified Themes for Design Implications and Opportunities

3.1 Design Implications

The following headings are design implications to be addressed in future innovation projects per Section 3.0 of this report. These design implications aim to address the gap in design innovation, addressing emotional, mental and physical barriers to optical treatment adherence.

Treatment Adherence

The issue of optical treatment adherence is the overarching criterion that is advised to be included in the design direction I take toward the concept and prototyping phases. The main opportunities presented concern emotional, mental and physical adherence as directed by expert optical feedback, which encompasses and considers tertiary barriers as well. For instance, emotional barriers relate to psychological barriers.

Overall, based on the identified themes and gaps from sections 1 and 2 of the report, seven identified design opportunities are identified as per Figure 21. This suggests that patients may only have one themed barrier towards their optical treatment adherence, whereas another participant may have two or three. For example, a patient may have emotional and mental barriers to adherence due to their neurodivergence, therefore feel guilty and ashamed when forgetting to administer their eye drops at the correct frequency.

Goal

Emotional Adherence

Emotional adherence includes psychological, cognitive and motivational barriers. These specifically include feelings like dignity, shame, trust, reliability, embarrassment, frustration and low confidence.

From this, the design implications with designing emotionally conscious considerations indirectly, would allow an opportunity for patients to feel dignified, and self-empowered when engaging in independent participation in treatment adherence.

1, 2, 3 & 4

Mental Adherence

Mental Adherence concerns neurodivergent individuals, dementia, regular memory issues, depression and anxiety. Therefore, addressing barriers to forgetfulness, medical education and literacy, and other mental challenges. Considering this, the gap to address here would be preventing patients from forgetting to administer eye drops frequently at the correct dosage. The design implications include reminding patient and re-inforcing emotional feelings of encouragement towards their treatment progression.

2, 3, 4, & 6

Physical Adherence

Physical adherence addresses patients who live with physical barriers, where they are unable to administer their own treatment independently. This includes patients with parkinsons, arthritis and upper arm mobility and strength issues. The main gap here is allowing independent and accurate administration of eye drops. The opportunity presented includes allowing the patient to feel empowered, dignified and not ashamed whilst avoiding taking part in their treatment.

3, 4, 6, & 7

4.0 Conclusion

In conclusion, this report highlights a clear opportunity for design innovation regarding optical assistive devices that support accurate and dignified eye drop administration for patients with mental, emotional and physical limitations. Treatment adherence is the key overarching criterion, with glaucoma and dry eye disease as prevalent diseases that affect the lives and daily living of hundreds of thousands of Australians each year. (Optometry Australia, 2020) Treatment adherence to these conditions has been identified as a real and lived challenge for patients with mental, emotional and physical limitations to adherence.

Moreover, Section 1 examined condition-specific barriers to treatment adherence, thus introducing the psychological theory of the 'locus of control', to explain how a patient may perceive their own behaviour and reward with improved treatment adherence. (Rotter, 1966). Ultimately, this concept aims to be used to encourage an individual's perception of control over their health and treatment, thus better adhering to treatment regimes.

Secondly, based on Section 1 findings, Section 2 built on the literature research thus revealing gaps in usability, accuracy, education, trust and dignity of product innovation.

Lastly, Section 3 formulated a conclusion based on the report findings and explored strategies to promote medical adherence through interactive, trustworthy and voluntary participation. Such as effective reminding, educational systems and supportive handles that foster a collaborative and supportive journey for patients, medical professionals and their therapeutic plans. (Kowing et al., 2010) Ultimately, optical treatment adherence is a lived issue and market with great need for design innovation to best treat the health and symptoms of glaucoma and dry eye.



4.0 References

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