

# Exploring Dark Mode's Impact on User Interface/Experience

## Introduction

The project focuses on understanding the increasing preference for dark mode in apps and websites, a feature that allows users to customize their technological experience to reduce eye strain and enhance visual appeal. Despite its growing popularity, the factors influencing the adaptation and preference for dark mode among different user groups remain underexplored. Our research aims to investigate these preferences, particularly among college students, and identify the key factors that influence their choice of dark mode over light mode. By examining existing literature, research, and dark mode usage in the real world we can understand the benefits of dark mode in reducing visual fatigue and improving readability. We aim to provide insights into how companies can better implement dark mode in their applications and interfaces to enhance user satisfaction and usability.

### Research Question / Design Goal

Dark mode is becoming more of a prominent feature in apps and websites, giving users another avenue to tailor their experience with technology to their individual needs. Research by ACM Digital Library indicated that dark mode can significantly reduce visual fatigue and improve screen readability, particularly in low-light environments. DiVA adds to this by concluding that dark mode allows for increased levels of comfort, and that many people wish to see dark mode implemented in other operating systems. Its aesthetic not only presents visual alternatives for users but is more energy-efficient and allows us to use our devices and applications for longer periods. The current research discussed in this paper will examine how the adaptation of dark mode varies amongst different groups of people and what factors influence those preferences. This project will also suggest how companies can adjust how dark mode is implemented in applications and interfaces that already exist based on results from data collection.

## Background

Research on dark mode has demonstrated significant benefits in reducing eye strain and improving readability, especially in low-light environments. Dark mode has been associated with enhanced aesthetic appeal and user satisfaction, particularly among heavy technology users and those in computer-related fields. Previous work in this area has primarily focused on the general benefits of dark mode, but there is limited research on the specific preferences and usage patterns among different user demographics.

The technology we are examining includes the implementation of dark mode in various applications and websites, particularly in social media and mobile interfaces. Dark mode offers a lower contrast between text and background making it easier for users to see. Our project involves designing surveys and interviews to gather information that will help us better understand why people prefer dark mode over the traditional light mode, and dark mode's overall

usage in design and technology. Throughout the project, we've utilized technologies like Google Forms, Sheets, and Docs to articulate our findings and data. By analyzing this data, we hope to provide recommendations for developers on how to better integrate dark mode features to enhance user experience and user interfaces but to also push the research and limitations in this field and to have a better understanding of dark mode's impact.

## Methods

This research project uses both a survey and an interview protocol to gather qualitative information about people's preferences related to dark mode implementation. The below sections will give further information about how data was collected, how participants were selected, and any procedures that were carried out if applicable to the data collection method.

### Participants

Around 30 participants across survey responses and interviews took part in this study. A majority of the participants from the survey are undergraduate students at the University of California, Santa Cruz participating in the study as a part of their game design course, but many of the other participants were friends outside of the class and our families. The participants were not randomly selected and voluntarily responded to the survey as it was posted on online forums on the class Discord, and was directly sent out to close friends and family members.

## Data Collection

### Survey

The first form of data collection utilized in this project was a survey about dark mode implementation. Through this survey, participants were asked about what devices they would use dark mode on and if any particular applications made dark mode more favorable compared to light mode. Additionally, the survey inquired about satisfaction with dark mode and allowed participants to openly talk about what they liked or disliked about dark mode either in general or for specific applications. The end of the survey asked respondents to compare implementations of dark mode for the same app or website and talk about which one they prefer and why. All responses were recorded on a spreadsheet for further analysis.

[Dark Mode Survey](#)

[Dark Mode Usage Survey \(Responses\)](#)

### Interviews

The second form of data collection we conducted was through interviews. We created a set of interview questions and ensured that the people we picked, to the best of our knowledge,

had varying experiences with technology. We interviewed 5 UCSC college students, all majoring in STEM-adjacent fields. Through our interviews, we wanted to observe if/how people's unique interactions with technology affected how they viewed and utilized dark mode. We asked questions about career choice/major, technologies owned, screen time, etc., to grasp enough information about the interviewee. We then asked questions specifically about dark mode, or rather, what the interviewees thought of it and how much they used it. We then linked the interviewees' responses together to see if there was a noticeable correlation between technology usage and dark mode preference.

### Interview Responses.

### **Data Analysis.**

Using a spreadsheet as well as transcripts from the interviews, each response was carefully analyzed. The main goal of data analysis was to find commonalities for both motives of using dark mode and overall satisfaction. Once most commonalities were established, the stronger commonalities were identified and presented in more detail in this paper. Stronger commonalities for this study are defined as a grouping that had more participants associated with them, implying that more participants agreed with each other for that question or prompt.

In our case, commonalities were found regarding screen time and fields of study. For example, one of our interviewees, a computer engineering major, stated that they tend to spend more time interacting with technology compared to another one of our interviewees, who is a biology major and spends more time in labs than on a computer. The computer engineering major greatly favored the usage of dark mode compared to the biology major, who seemed to find it preferable only on certain occasions. While we are dealing with limited sample size, when analyzing how our interviewees responded to our questions, a case can be made that the more time you spend interacting with technology, the more you think about the appearance of the screen you are staring at, and thus, the more you think about the usage of dark mode.

Now in regards to the survey data, it reveals that most users favor dark mode, particularly for its ability to reduce eye strain (cited by 14 respondents), its aesthetic appeal (cited by 13 respondents), and improved readability in low-light environments (cited by 12 respondents). Dark mode is frequently used on smartphones (15 respondents) and laptops/desktops (14 respondents), with many also utilizing it on tablets (7 respondents). Users primarily apply dark mode across social media, messaging apps, reading apps, and productivity tools, with high satisfaction levels, as evidenced by 12 respondents rating their satisfaction as "very satisfied." Despite these positive responses, some participants noted challenges such as difficulty reading text and the lack of a battery-saving benefit. The data suggests that while dark mode is generally well-received for its comfort and visual appeal, certain usability issues still need addressing.

## **Limitations.**

Despite possible conclusions drawn from this study, it is unlikely that such inferences can be made for other populations of people. Since all participants were undergraduate students at the same school and most were of the same major, there is still a question of whether or not the age of the participant or other background information can inform their decisions about dark mode and whether or not they choose to use it.

## **Ethical Considerations.**

This project heavily considered the privacy of the participants and didn't want respondents to the survey or the interview to feel like they had to disclose possible personal information about themselves. Our survey and interview protocol didn't inquire about the participant's name, age, major, ethnicity, or socioeconomic status. All responses were kept anonymous and only the responses to the questions themselves were considered in the data analysis process.

## **Findings**

The study on user preferences for dark mode in technology highlights that many users prefer dark mode for its aesthetic appeal and reduced eye strain, particularly among those who spend significant time on devices. Dark mode is favored for providing a visually pleasing experience with lower contrast, making it especially popular among computer-related majors and heavy technology users seeking variety. Additionally, dark mode is widely used for social media due to its less visual impact and alignment with device colors, enhancing app satisfaction and comfort during longer periods of use. Overall, dark mode's ability to ease eye discomfort and its aesthetic preference make it popular among college students, particularly in social media contexts.

### **Aesthetic Preference**

A lot of our participants indicated that they used dark mode because of the different aesthetic that it offers compared to light mode. For a lot of smartphone apps and websites, dark mode can offer a more pleasing experience visually because of the lower contrast between present colors. As mentioned in our interviews, users who have to or choose to spend more time interacting with technology will naturally think more about how they prefer to view said technology. For example, interviewee #1, a computer engineering major, spends more time on his laptop and therefore has had more time to think about and get sick of light mode, whereas interviewee #2, a human bio major, spends more time in labs and only uses his laptop when he needs to. Because of this, interviewee #2 has stated that dark mode is "overrated and isn't as necessary as most people say it is". Even both of the CS majors had very similar thoughts to say in terms of the idea they both used to code; which has a dark aesthetic. Users, like all people, like to experience change, especially when they become self-aware of this lack of change. Viewing a screen in the same way every single day may motivate some users to switch things up and try a

different appearance. However, if technology is only used on a limited basis, users may not care to think about how their screen looks when they are interacting with it.

### **Eye Strain**

Participants also tended to prefer dark mode because of its reduced stress on the eyes. As stated before, since a lot of respondents used dark mode for smartphones, long browsing periods can result in extended eye strain, especially with light mode as the screen becomes brighter. Dark mode can reduce eye strain especially when the environment surrounding the user is dark as well. Additionally, many participants were reasonably satisfied with dark mode and the features that it offers. With many people using smartphones for social media, dark mode not only presents a new visual experience (see above), but also allows users to continue browsing with less of a chance of experiencing fatigue, headache, or any other symptoms that are commonly associated with eye strain. Although they may encourage prolonged device use which may not be advised, dark mode can be a short-term solution to the consequences of being reliant on technology for entertainment and communication.

When referencing our interviews, there is yet another correlation between total usage and preference regarding eye strain. Interviewee #1 spends more time on his laptop and therefore may feel increased effects of eye strain compared to interviewee #2, who does not use his laptop as often.

### **Dark Mode and Social Media**

Building on the above findings, many participants indicated that they used dark mode for social media. Since apps like Discord, Instagram, and Reddit have a large presence in the online world, many people may use dark mode because it is something that differs from light mode (which many are accustomed to using). When asked about why dark mode is preferable, some participants who used dark mode for social media or web browsing mentioned how dark mode was less abrasive visually, even bringing up how the dark mode colors matched with the colors of their device. Overall, the consensus was that dark mode promoted higher satisfaction with the app as a whole, which allowed people to continue using it. Additionally, given the population that was sampled, social media plays a large part in the lives of college students with many using those platforms every day, and finding that most used dark mode allowed the conclusion to be made that dark mode could be used for different purposes and applications, but was overwhelmingly used for social media because it's softer on the eyes, and was noted as more pleasing to look at compared to light mode.

### **Design / Research Implications**

The results of the study imply that technology users can have a rather wide variety of reasons for using dark mode. Given that the survey in particular was posted on an online forum

and the fact that all answers were kept anonymous, some people feel quite strongly about the use of dark mode in apps regardless of whether such feedback is positive or negative.

## **Summary and Conclusion**

The project highlighted the widespread preference for dark mode among college students due to its aesthetic appeal and ability to reduce eye strain. Dark mode's popularity is particularly pronounced in social media contexts, where users spend extended periods interacting with their screens. The preference for dark mode in these scenarios suggests a demand for more visually comforting and less straining interface designs. From a practical standpoint, these findings indicate that developers and designers should prioritize dark mode options in their applications, ensuring that these settings are easily accessible and customizable. Effectively incorporating dark mode can lead to higher user satisfaction and prolonged engagement with the app, as users find it less straining on their eyes and more visually appealing.

Additionally, this research highlights the importance of considering user demographics and technology usage patterns when designing interface options. While this study focused on college students, the insights gained can be a valuable starting point for further exploration into how different age groups, professions, and usage habits influence interface preferences. Future research could expand the participant pool to include a more diverse range of users, helping to identify whether these findings hold across different demographics. Additionally, studies could examine whether preferences for dark mode evolve with changes in technology usage habits.

In conclusion, the study reveals that dark mode is not merely a trend but a significant feature that enhances user experience by reducing eye strain and offering a more aesthetically pleasing interface. By acknowledging and addressing these user preferences, developers can create more user-friendly and engaging applications, ultimately leading to greater user satisfaction and loyalty.

## **Acknowledgments**

Thank you to everyone who participated in the study, whether it was responding through the survey or participating in the interview process. The data they provided allowed our group to compare findings and draw possible conclusions about the use of dark mode in technology, user interface, user experience, and design.

## References

1. Andrew, S., Bishop, C., & Tigwell, G. W. (2024). Light and Dark Mode: A Comparison Between Android and iOS App UI Modes and Interviews with App Designers and Developers. *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies*, 8(1), 1–23. <https://doi.org/10.1145/3643539>
2. Erickson, A., Kim, K., Lambert, A., Bruder, G., Browne, M. P., & Welch, G. F. (2021). An extended analysis on the benefits of dark mode user interfaces in optical SEE-through head-mounted displays. *ACM Transactions on Applied Perception*, 18(3), 1–22. <https://doi.org/10.1145/3456874>
3. Henriette, E., & Felix, K. (2020, August 23). The Rise of Dark Mode: A qualitative study of an emerging user interface design trend. *Digitala Vetenskapliga Arkivet*. <https://www.diva-portal.org/smash/record.jsf?pid=diva2:1693756&dswid=8637>
4. Skogh, P. (2020). Personality and the preference for light or dark mode in image-sharing social media platforms. In U. Söderström, O. Norberg, T. Nordström, & L. Freidovich (Eds.), *Proceedings of the Nineteenth Student Conference in Interaction Technology and Design* (pp. 3-10). Umeå: Interaction and Media Technology Report Series.
5. Villacorta Burgos, D. (2020). The dark side of social media: an analysis of the effects of automatic playback. In U. Söderström, O. Norberg, T. Nordström, & L. Freidovich (Eds.), *Proceedings of the Nineteenth Student Conference in Interaction Technology and Design* (pp. 11-16). Umeå: Interaction and Media Technology Report Series.