

The Impact of Dark Mode on Programmers' Productivity in Mogadishu, Somalia

Abdimalik Muse Rage and Abdullahi Mohamud Sharif
Baacil Institute for Research and Development, Mogadishu, Somalia
<https://baacil.com>

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Abstract

Dark mode is now a default in most programming environments, yet its influence on the productivity and visual comfort of developers in the Horn of Africa remains empirically unexamined. This study provides the first empirical examination of dark mode and programmers' productivity in Mogadishu, Somalia. A cross-sectional descriptive survey was conducted between January and April 2026 among 401 programmers using a structured, self-administered 25-item questionnaire distributed electronically, and data were analysed in Python (pandas, scipy) using descriptive statistics and Pearson's chi-square (χ^2) test of independence. Dark mode was the preferred and most comfortable display option for 56.1% ($n = 225$) of respondents, and 54.6% ($n = 219$) judged it easier to read and more conducive to better performance. Majorities felt that dark mode improved their focus while coding (65.3%, $n = 262$) and reduced their eye strain (59.4%, $n = 238$), while 41.1% ($n = 165$) perceived their coding speed to be faster in dark mode than in light mode. Reduced eye strain was the most frequently cited benefit (42.6%, $n = 171$).

Display-mode preference was significantly associated with sex ($\chi^2 = 12.57$, $p = 0.002$) and with years of programming experience ($\chi^2 = 44.06$, $p < 0.001$), and the perceived effect on focus was strongly associated with frequency of dark-mode use ($\chi^2 = 34.62$, $p < 0.001$). Somali programmers thus experience dark mode as a meaningful aid to comfort and self-reported productivity, particularly in low light, and its adoption is patterned by demographic and experiential factors. Software firms, training institutions and policymakers should treat configurable display polarity as a component of digital workplace wellbeing rather than a matter of aesthetic preference.

Keywords: dark mode; display polarity; programmer productivity; eye strain; software developers; Somalia

Introduction

The visual interface through which programmers read and write code has undergone a quiet but consequential transformation over the past decade. Where the earliest text editors and integrated development environments (IDEs) presented dark characters on a light background,

the contemporary software-development landscape is dominated by “dark mode” — light, often syntax-coloured text rendered against a dark background. Once a niche customisation, dark mode is now a default option in virtually every major code editor, operating system and mobile platform, and is widely assumed by developers to reduce eye strain and improve concentration during long coding sessions.

This assumption rests upon a deeper body of human-factors research on display polarity. A long tradition of vision science has documented a “positive polarity advantage,” in which dark text on a light background yields smaller pupil sizes and superior proofreading and legibility outcomes under typical lighting (Piepenbrock et al., 2013, 2014). At the same time, more recent work emphasises that the relative merits of dark and light modes are strongly context-dependent, with dark mode offering measurable benefits for visual comfort and fatigue in low-light environments (Sengsoon & Intaruk, 2025; Atsani et al., 2025). The scientific consensus, in short, remains unsettled, and the gap between objective performance metrics and subjective user preference is wide.

For software developers this tension is particularly salient. Programmers spend prolonged, uninterrupted hours engaged with high-density text under variable ambient lighting, a pattern associated with a high prevalence of digital eye strain among knowledge workers (Bin Maneea et al., 2024). Within the developer

community, dark themes are valued not only for comfort but for the way syntax highlighting appears more vivid against a dark canvas, a feature practitioners link to faster error-spotting and code navigation. Yet almost all of this evidence is anecdotal, drawn from blog posts and informal polls rather than systematic measurement.

Somalia presents an especially under-researched setting. The country's software-development sector is young, rapidly expanding and overwhelmingly self-taught, and its programmers frequently work in environments where ambient lighting is inconsistent and where electricity and device quality vary. Whether the productivity and comfort benefits attributed to dark mode in Western and East Asian studies extend to Somali programmers — and how those benefits vary by sex, experience and developer status — has never been examined empirically. Establishing this evidence base is a precondition for any locally grounded guidance on developer wellbeing and digital workplace ergonomics.

Against this background, the present study surveyed 401 programmers in Mogadishu to document their display-mode habits, preferences and self-reported productivity and comfort outcomes, and to test whether these outcomes are associated with key demographic and experiential characteristics.

Accordingly, the study pursues the following aims:

- (i) to describe the sociodemographic and professional profile of programmers in Mogadishu, including sex, age, years of programming experience and developer status;
- (ii) to establish the prevalence and frequency of dark-mode use among these programmers, and the contexts in which it is used;
- (iii) to determine respondents' preferred and most comfortable display mode and the mode they perceive as easier to read;
- (iv) to assess the self-reported impact of dark mode on focus, coding speed, eye strain and fatigue during prolonged coding;
- (v) to examine whether display-mode preference and perceived productivity outcomes are statistically associated with sex, age, experience and developer status; and
- (vi) to derive evidence-based recommendations for software firms, training institutions and policymakers on display ergonomics for developers.

Literature Review

The literature relevant to this study spans four broad strands: the psychophysics of display polarity and legibility; the effects of dark versus light mode on visual fatigue and comfort; the ergonomics of screen use, blue light and digital eye strain; and the emerging, largely practitioner-led discourse on theme choice and developer productivity. Each is reviewed in turn, followed by a statement of the research gap.

Display Polarity, Legibility and the Positive-Polarity Advantage

A substantial body of vision-science research has established that, under ordinary indoor illumination, dark text on a light background (positive polarity) is more legible than light text on a dark background (negative polarity). Piepenbrock et al. (2013) demonstrated that positive display polarity is advantageous for both younger and older adults, and in a follow-up study showed that this benefit is particularly pronounced for small character sizes (Piepenbrock et al., 2014). The proposed mechanism is optical: brighter backgrounds induce pupillary constriction, which reduces optical aberrations and sharpens the retinal image (Piepenbrock et al., 2014). Dobres et al. (2017) extended this work, finding that legibility thresholds under glance-like reading were worst for negative-polarity text in dark ambient conditions, underscoring the interaction between polarity and environmental lighting. More recent evidence complicates the picture: Muhamad and Mokhtar (2024) reported that, among young adults, reading speed was actually higher under negative than positive polarity, even though reading errors did not differ significantly, suggesting that the polarity advantage is task- and metric-specific rather than absolute.

Dark versus Light Mode, Visual Fatigue and Comfort

A second strand focuses directly on the dark-mode/light-mode distinction as implemented in

contemporary devices. Sengsoon and Intaruk (2025) measured the immediate effects of light and dark modes on visual fatigue in tablet users and found no overall difference in subjective fatigue, but significant differences in critical flicker frequency and dry-eye symptoms, indicating subtle physiological effects. Kim et al. (2019) found, in optical see-through head-mounted displays, that dark mode conferred significant benefits for visual acuity, fatigue and usability, with user preference contingent on the brightness of the physical environment. Shrestha et al. (2024), in a human-computer interface analysis of university students, similarly reported context-dependent benefits of dark mode. Synthesising this literature, the systematic review of Atsani et al. (2025) examined 25 studies published between 2020 and 2025 and concluded that light mode is superior for readability and high-illumination tasks, whereas dark mode offers better visual comfort and reduced eye fatigue in low-light conditions — a finding that frames display mode as a fundamentally situational choice.

Screen Ergonomics, Blue Light and Digital Eye Strain

A third strand situates display mode within the broader ergonomics of prolonged screen use. Digital eye strain, or computer vision syndrome, is highly prevalent among intensive screen users; Bin Maneea et al. (2024) documented its substantial prevalence, associated factors and quality-of-life effects among digital-device users.

Blue-light exposure is one implicated factor, and Akagun (2025) found that long-term use of blue-light-filtering glasses improved at least one symptom of digital eye strain in 85% of users, with dryness and fatigue most often relieved — evidence that reducing the intensity and spectral content of emitted light, as dark interfaces partly do, can mitigate ocular discomfort. This literature provides the physiological rationale for why programmers might experience dark mode as protective during long, late coding sessions.

Theme Choice, Syntax Highlighting and Developer Productivity

A fourth and more applied strand concerns programmers specifically. Practitioner discourse consistently links dark IDE themes to more vivid syntax highlighting, faster recognition of code structure and subjective relief from fatigue, while acknowledging that a minority of developers prefer light themes for clarity in bright environments. Empirical performance studies, however, caution against over-claiming: an eye-tracking investigation reported that dark themes improved accuracy and confidence on medium-complexity tasks but increased pupil dilation across all tasks, signalling higher cognitive workload (Ettling et al., 2025). This mirrors the broader finding that subjective comfort and objective performance do not always move together (Atsani et al., 2025).

Research Gap

Taken together, the literature establishes that display polarity has measurable optical and ergonomic effects, that those effects are strongly moderated by ambient lighting and task type, and that subjective preference frequently diverges from objective performance. Three gaps are evident. First, almost all existing evidence derives from controlled laboratory tasks with general or student populations rather than from working programmers in their natural setting. Second, the literature is geographically concentrated in high-income and East Asian contexts, with no published evidence from Somalia or the wider Horn of Africa, where lighting, device and infrastructural conditions differ markedly. Third, few studies examine how display-mode preference and perceived productivity vary by sex, experience and professional status within a developer community. The present study addresses all three gaps by surveying a sizeable sample of Mogadishu programmers and testing the demographic correlates of their dark-mode experience.

Methodology

Research Design

A cross-sectional descriptive survey design was employed. This design is appropriate for collecting data at a single point in time and for systematically describing patterns in the attitudes, behaviours, and perceptions of a defined population (Creswell, 2014).

Setting and Study Period

The study was conducted in Mogadishu, Somalia, among programmers and software developers active in the city's technology, education and freelance sectors. Data were collected online between January and April 2026.

Study Population and Sampling

A total of 401 programmers were recruited using a systematic sampling approach, based on availability and willingness to participate. Respondents ranged from students and self-taught beginners to professional developers working in companies and as freelancers.

Data Collection Instrument

Data were gathered through a structured, self-administered questionnaire comprising 25 items distributed electronically via Google Forms. The instrument was offered in both English and Somali to ensure comprehension, and was reviewed for clarity and cultural appropriateness prior to distribution. The questionnaire covered five domains: (i) sociodemographic and professional characteristics; (ii) coding tools, devices and screen type; (iii) coding intensity and dark-mode usage habits; (iv) preferences regarding readability, comfort and display mode; and (v) self-reported effects of dark mode on focus, eye strain, coding speed and fatigue.

Data Analysis

Data were analysed using Python (pandas, scipy). Descriptive statistics — frequencies and

percentages — were computed for all variables. Multi-select and free-text items were disaggregated and normalised using binary indicator coding. Bivariate associations between categorical variables were assessed using Pearson's chi-square (χ^2) test of independence, with $p < 0.05$ as the threshold for significance. Cross-tabulations were produced for display-mode preference by sex, by experience level, by years of experience and by developer status, and for perceived focus by frequency of dark-mode use. Where expected cell counts fell below five (the 8+ years, 50+ age and "Other" status cells), results were interpreted with appropriate caution.

Ethical Considerations

The study was conducted under the Baacil Institute research programme [OWNER: confirm whether reviewed/approved by the Somalia Researchers Association (SRA) or an institutional ethics committee]. All participation was voluntary. Informed consent was obtained prior to data collection, and respondents were assured of the confidentiality and anonymity of their responses. Data were used solely for research purposes.

Results

Sociodemographic and Professional Profile of Respondents

Table 1 presents the sociodemographic and professional characteristics of the 401 programmers surveyed. The sample was

predominantly male (63.1%, $n = 253$), with females comprising 36.9% ($n = 148$). Respondents were largely young: the 18–25 age band was dominant (67.3%, $n = 270$), followed by the 26–35 band (14.0%, $n = 56$). In terms of experience, the largest groups reported 42.1% ($n = 169$) with 3–5 years and 38.7% ($n = 155$) with 0–2 years of programming. Most identified as intermediate developers (60.1%, $n = 241$), and the single largest occupational group were students (58.4%, $n = 234$). The profile is therefore that of a young, male-skewed and predominantly student-and-early-career developer community, consistent with Somalia's nascent and self-taught software sector.

Table 1. Sociodemographic Characteristics of Respondents (N = 401)

Characteristic	n (%)
Sex	
Male	253 (63.1%)
Female	148 (36.9%)
Age group	
Under 18	29 (7.2%)
18–25	270 (67.3%)
26–35	56 (14.0%)
36–50	32 (8.0%)
50+	14 (3.5%)
Years of programming experience	
0–2	155 (38.7%)
3–5	169 (42.1%)
6–8	62 (15.5%)
8+	15 (3.7%)
Developer experience level	
Beginner	105 (26.2%)
Intermediate	241 (60.1%)
Professional	55 (13.7%)
Current status	
Student	234 (58.4%)
Freelance programmer	86 (21.4%)
Company employee	75 (18.7%)
Other	6 (1.5%)

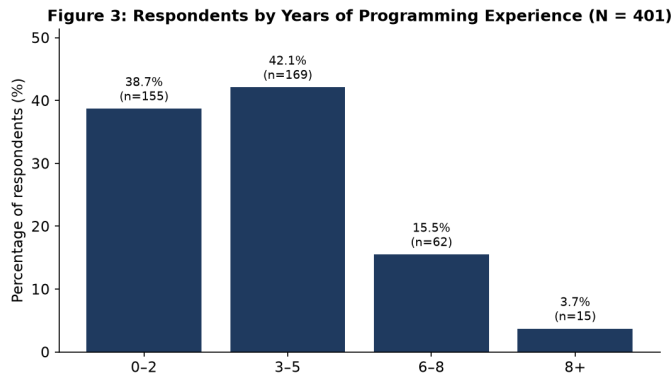


Figure 3: Respondents by Years of Programming Experience (N = 401).

Coding Tools, Devices and Coding Intensity

Table 2 presents respondents' coding tools, devices and coding intensity. Visual Studio Code was by far the most widely used editor (58.4%, n = 234), reflecting its global dominance among developers. The laptop was the primary device for the majority (63.1%, n = 253), and LCD was the most common reported screen type (54.6%, n = 219), although a notable 23.4% (n = 94) were unsure of their screen technology. Coding intensity was moderate: the most common daily coding load was 1–2 hours (36.2%, n = 145), and the most common weekly pattern was 3–4 days (36.9%, n = 148). This profile of frequent but not continuous screen exposure is precisely the context in which display-mode comfort effects accumulate.

Table 2. Coding Tools, Devices and Coding Intensity (N = 401)

Characteristic	n (%)
Primary code editor / IDE	
VS Code	234 (58.4%)
PyCharm	39 (9.7%)
Microsoft Visual Studio	32 (8.0%)
IntelliJ IDEA	32 (8.0%)
Terminal	25 (6.2%)
Sublime Text	18 (4.5%)
Android Studio	17 (4.2%)
nvim	1 (0.2%)
Code pen	1 (0.2%)
Cursor	1 (0.2%)
Matlab	1 (0.2%)
Primary device	
Laptop	253 (63.1%)
Both (laptop & desktop)	74 (18.5%)
Desktop pc	74 (18.5%)
Screen type	
LCD	219 (54.6%)
OLED	88 (21.9%)
Unsure	94 (23.4%)
Hours coding per day	
less than a hour	92 (22.9%)
1-2hour	145 (36.2%)
3-4hours	76 (19.0%)
5-6hours	59 (14.7%)
6 +	29 (7.2%)
Days coding per week	
1–2 days	114 (28.4%)
3–4 days	148 (36.9%)
5–6 days	89 (22.2%)
Everyday	50 (12.5%)

Dark-Mode Usage, Preference and Readability

Table 3 presents dark-mode usage and preference. Dark-mode use was habitual for most respondents: 34.9% (n = 140) reported always using it, with a further 15.0% (n = 60) using it often, while only 7.0% (n = 28) never did. Night was the most common context for dark-mode use, whether exclusively at night (37.7%, n = 151) or in both day and night (48.4%, n = 194). Crucially, dark mode was the preferred and most comfortable option for a clear majority (56.1%, n = 225), well ahead of light mode (27.9%, n = 112), and was likewise judged easier to read and

more performance-enhancing by 54.6% (n = 219). Tool availability was rarely a barrier, with 50.1% (n = 201) reporting dark mode available in all the tools they use. These figures closely echo the 64% dark-mode preference reported in recent systematic-review evidence (Atsani et al., 2025).

Table 3. Dark-Mode Usage, Preference and Readability (N = 401)

Characteristic	n (%)
Frequency of dark-mode use	
Always	140 (34.9%)
Often	60 (15.0%)
Sometimes	113 (28.2%)
Rarely	60 (15.0%)
Never	28 (7.0%)
When dark mode is used most	
Night	151 (37.7%)
Day	56 (14.0%)
Both	194 (48.4%)
Preferred / most comfortable mode	
Dark mode	225 (56.1%)
Light mode	112 (27.9%)
No difference	64 (16.0%)
Mode easier to read / better performance	
Dark mode	219 (54.6%)
Light mode	120 (29.9%)
No difference	62 (15.5%)
Switches mode by time/lighting	
Often	64 (16.0%)
Sometimes	205 (51.1%)
Never	132 (32.9%)
Dark-mode availability in tools	
Available in all tools I use	201 (50.1%)
Available in some tools only	113 (28.2%)
Not available in most tools	38 (9.5%)
Not sure	49 (12.2%)

Perceived Productivity, Focus and Visual Comfort

Table 4 presents the self-reported impact of dark mode on focus, eye strain, coding speed and fatigue. A clear majority felt that dark mode improved their focus while coding (65.3%, n = 262), and a comparable majority reported that it reduced their eye strain (59.4%, n = 238). On a 1–10 eye-strain scale, respondents reported a moderate mean of 5.16 (SD = 2.64), with 37.9% (n = 152) in the moderate band and 31.4% (n = 126) in the high band, confirming that eye strain is a real concern in this population. In terms of productivity, 41.1% (n = 165) perceived their coding speed as faster in dark mode, against only 20.4% (n = 82) who felt it was slower. After long coding sessions in dark mode, more respondents felt less tired (42.1%, n = 169) than more tired (33.7%, n = 135). Reduced eye strain was the single most cited perceived benefit (42.6%, n = 171), followed by better focus (24.7%, n = 99) and better appearance (20.7%, n = 83), while 12.0% (n = 48) perceived no benefit. These patterns are consistent with the comfort-in-low-light advantage of dark mode documented by Sengsoon and Intaruk (2025) and Kim et al. (2019).

Figure 1: Preferred and Most Comfortable Display Mode (N = 401)

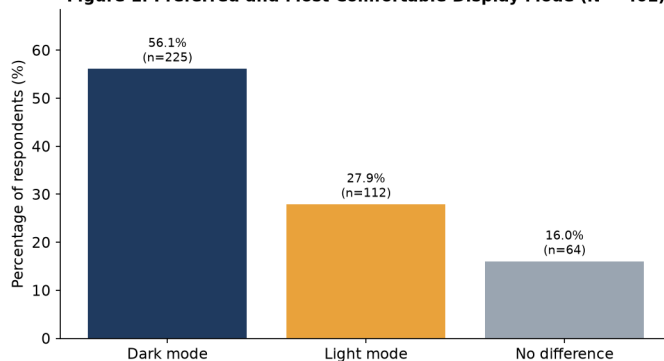


Figure 1: Preferred and Most Comfortable Display Mode.

Table 4. Perceived Productivity, Focus and Visual Comfort (N = 401)

Characteristic	n (%)
Dark mode improves focus	
Yes	262 (65.3%)
No	78 (19.5%)
No noticeable difference	61 (15.2%)
Dark mode reduced eye strain	
Yes	238 (59.4%)
No	91 (22.7%)
No noticeable difference	72 (18.0%)
Eye-strain intensity (1–10, banded)	
Low (1–3)	123 (30.7%)
Moderate (4–6)	152 (37.9%)
High (7–10)	126 (31.4%)
Coding speed in dark vs light mode	
Faster	165 (41.1%)
No difference	106 (26.4%)
Slower	82 (20.4%)
Not sure	48 (12.0%)
Fatigue after long dark-mode sessions	
Less tired	169 (42.1%)
No difference	97 (24.2%)
More tired	135 (33.7%)
Most perceived benefit of dark mode	
Reduced eye strain	171 (42.6%)
Better focus	99 (24.7%)
Better appearance	83 (20.7%)
None	48 (12.0%)

Figure 4: Self-Reported Reduction in Eye Strain with Dark Mode (N = 401)

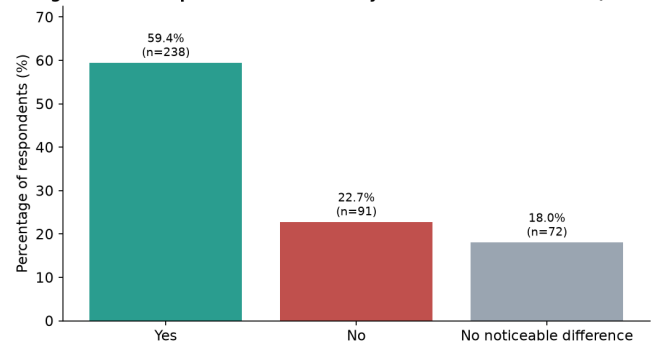


Figure 4: Self-Reported Reduction in Eye Strain with Dark Mode (N = 401).

Figure 5: Perceived Coding Speed in Dark Mode versus Light Mode (N = 401)

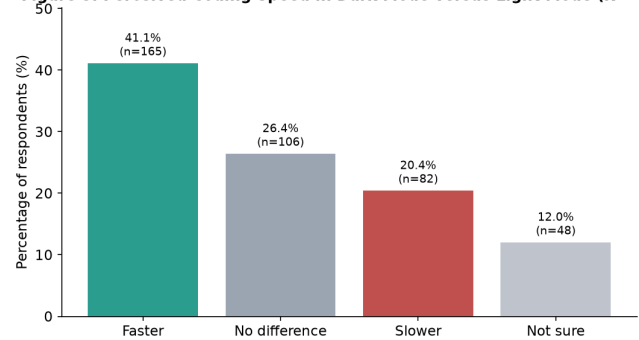


Figure 5: Perceived Coding Speed in Dark Mode versus Light Mode (N = 401).

Figure 2: Perceived Effect of Dark Mode on Coding Focus (N = 401)

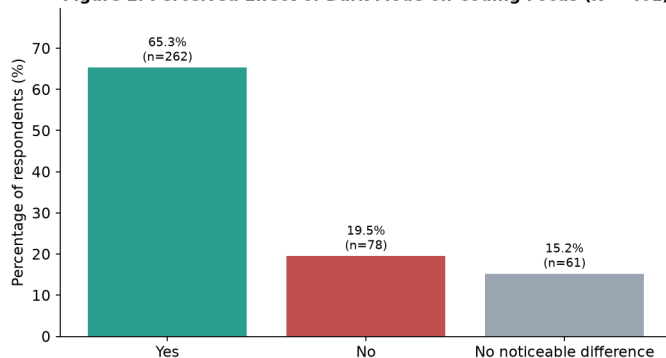


Figure 2: Perceived Effect of Dark Mode on Coding Focus (N = 401).

Contextual Attitudes Toward Dark Mode

Table 5 presents respondents' level of agreement with three contextual statements. Agreement that dark mode is better than light mode in low-light (night) environments was strong, with 64.1% (n = 257) agreeing or strongly agreeing. Agreement that dark mode is better in bright (daylight) environments was markedly weaker at 48.6% (n = 195), with the largest single response being neutral (27.7%, n = 111). This day–night asymmetry is the clearest signal in the data that respondents experience dark mode as a context-dependent rather than universal benefit, directly

corroborating the lighting-contingent findings of Dobres et al. (2017) and Atsani et al. (2025). Agreement that dark mode helps sustain focus over long periods was also high (61.8%, $n = 248$).

Table 5. Contextual Attitudes Toward Dark Mode (Likert) (N = 401)

Characteristic	n (%)
Dark mode better in low light (night)	
Strongly agree	153 (38.2%)
Agree	104 (25.9%)
Neutral	72 (18.0%)
Disagree	47 (11.7%)
Strongly disagree	25 (6.2%)
Dark mode better in bright light (daylight)	
Strongly agree	94 (23.4%)
Agree	101 (25.2%)
Neutral	111 (27.7%)
Disagree	72 (18.0%)
Strongly disagree	23 (5.7%)
Dark mode helps sustain long focus	
Strongly agree	103 (25.7%)
Agree	145 (36.2%)
Neutral	92 (22.9%)
Disagree	44 (11.0%)
Strongly disagree	17 (4.2%)

Bivariate Associations: Display-Mode Preference by Demographics

Tables 6 and 7 present chi-square cross-tabulations of display-mode preference. Table 6 reports preference by sex. The association was statistically significant ($\chi^2 = 12.57$, $df = 2$, $p =$

Table 6. Display-Mode Preference by Sex (N = 401)

Predictor	Dark mode n (%)	Light mode n (%)	No difference n (%)
Overall	225 (56.1%)	112 (27.9%)	64 (16.0%)
Female	68 (45.9%)	56 (37.8%)	24 (16.2%)
Male	157 (62.1%)	56 (22.1%)	40 (15.8%)

Table 7. Display-Mode Preference by Developer Experience Level (N = 401)

Predictor	Dark mode n (%)	Light mode n (%)	No difference n (%)
Overall	225 (56.1%)	112 (27.9%)	64 (16.0%)
Beginner	53 (50.5%)	33 (31.4%)	19 (18.1%)
Intermediate	147 (61.0%)	62 (25.7%)	32 (13.3%)
Professional	25 (45.5%)	17 (30.9%)	13 (23.6%)

0.002), indicating that men and women in the sample differed in their display-mode preferences. Table 7 reports preference by developer experience level; although professionals and intermediates leaned toward dark mode, this association did not reach significance ($\chi^2 = 7.2$, $df = 4$, $p = 0.126$). The strongest demographic predictor was years of programming experience: preference varied highly significantly across experience bands ($\chi^2 = 44.06$, $df = 6$, $p < 0.001$), as did preference by developer status ($\chi^2 = 20.59$, $df = 6$, $p = 0.002$); both of these tests include cells with expected counts below five (8+ years, $n = 15$; "Other" status, $n = 6$) and should be read as indicative. Finally, the perceived effect of dark mode on focus was very strongly associated with how frequently respondents used it ($\chi^2 = 34.62$, $df = 8$, $p < 0.001$), suggesting that habitual users are also those who most perceive a focus benefit. These associations indicate that dark-mode experience is patterned by experience and habituation rather than uniform across the developer population.

Discussion

A Pronounced but Context-Bound Preference for Dark Mode

The headline finding — that 56.1% of Mogadishu programmers prefer dark mode and 54.6% find it easier to read — aligns closely with the 64% dark-mode preference reported in the systematic review of Atsani et al. (2025). Importantly, the preference in this study was strongly context-bound: agreement that dark mode is superior was high at night (64.1%) but fell sharply in daylight (48.6%). This day–night asymmetry is precisely what the polarity literature predicts, since the positive-polarity (light-mode) advantage is rooted in pupillary constriction under bright conditions (Piepenbrock et al., 2013, 2014) while dark mode's comfort advantage emerges in dim environments (Dobres et al., 2017). The practical implication is that adaptive, time-and-lighting-aware theming — not a single fixed default — best serves developer comfort.

Self-Reported Productivity, Focus and Eye Strain

A majority of respondents linked dark mode to improved focus (65.3%), reduced eye strain (59.4%) and faster perceived coding speed (41.1%). These subjective gains are consistent with the visual-comfort benefits of dark mode in low light documented by Sengsoon and Intaruk (2025) and Kim et al. (2019), and with the ocular-relief mechanism implied by Akagun's (2025) blue-light findings. They must, however,

be read against the broader evidence that subjective comfort and objective performance can diverge: eye-tracking work has shown dark themes raising cognitive workload even where accuracy improves (Ettling et al., 2025), and Muhamad and Mokhtar (2024) found faster reading under negative polarity. The present data therefore demonstrate a strong perceived productivity benefit, which future objective task-based studies should test directly.

Eye Strain as a Real and Prevalent Concern

With a mean eye-strain rating of 5.16 on a 1–10 scale and 31.4% of respondents in the high-strain band, digital eye strain is clearly a live issue for Somali programmers, echoing the high prevalence of computer vision syndrome among knowledge workers reported by Bin Maneea et al. (2024). That reduced eye strain was the most frequently cited benefit of dark mode (42.6%) suggests developers are already using display mode as a self-directed coping strategy, reinforcing the case for ergonomics guidance that treats it as such.

Demographic and Experiential Patterning

Display-mode preference was significantly associated with sex ($\chi^2 = 12.57$, $p = 0.002$) and very strongly with years of experience ($\chi^2 = 44.06$, $p < 0.001$) and developer status ($\chi^2 = 20.59$, $p = 0.002$). The strong association between frequency of use and perceived focus benefit ($\chi^2 = 34.62$, $p < 0.001$) is consistent with a habituation effect, whereby sustained exposure both reflects

and reinforces perceived benefit. These patterns caution against one-size-fits-all display defaults and support user-configurable interfaces (Atsani et al., 2025).

Implications for the Somali Software Sector

For Somalia's young, largely self-taught developer community, these findings carry concrete weight. Most respondents already have dark mode available in their tools and use it habitually, particularly at night when ambient lighting is low and electricity may be intermittent. Embedding awareness of display-polarity ergonomics into coding curricula, and configuring institutional and workplace tooling for adaptive theming, represents a low-cost intervention with plausible benefits for both comfort and sustained productivity in this setting.

Limitations and Future Research

Several limitations should be borne in mind when interpreting these findings. First, the study was confined to Mogadishu and respondents were recruited on the basis of availability and willingness to participate; the sample is skewed towards men (63.1%), students (58.4%) and the 18–25 age band (67.3%), so the results should not be generalised to all Somali programmers or to other regions without caution. Second, all measures are self-reported single items; productivity, coding speed and eye strain were not measured objectively, no validated visual-fatigue scale was used, and instrument reliability was not estimated. Third, the design is cross-

sectional, so the associations reported describe co-occurrence rather than causation; in particular, the link between frequency of dark-mode use and perceived focus may reflect self-selection by those who already find dark mode comfortable. Fourth, several cells were small (8+ years of experience $n = 15$, 50+ years of age $n = 14$, "Other" status $n = 6$), so expected counts below five occurred in the experience-band and developer-status chi-square tests and those results should be read as indicative. Fifth, ambient lighting, screen brightness and device quality were not measured, although the literature identifies them as key moderators of display-polarity effects.

Future research should combine self-report with objective task-based measures (for example, timed coding or proofreading tasks, error rates and eye-tracking or ocular-fatigue measures) under controlled and naturalistic lighting, draw multi-city and multi-country samples across the Horn of Africa, and use longitudinal or within-subject designs to test whether adaptive, lighting-aware theming improves developer comfort and productivity over time.

Conclusion

This study provides the first empirical examination of the impact of dark mode on programmers' productivity and visual comfort in Mogadishu, Somalia. Drawing on a survey of 401 programmers, it documents a pronounced preference for dark mode (56.1%, $n = 225$), with majorities reporting that it improves focus (65.3%), reduces eye strain (59.4%) and accelerates perceived coding speed (41.1%).

At the same time, the study shows that these benefits are not unconditional. Agreement that dark mode is superior was strong at night (64.1%) but weak in daylight (48.6%), and preference varied significantly by sex and very strongly by experience and developer status. Eye strain was confirmed as a real concern, with a mean rating of 5.16 on a 1–10 scale.

Taken together, the evidence positions configurable display polarity as a genuine component of developer wellbeing and self-reported productivity, rather than a matter of mere taste. Universities, software firms, the Ministry of Education, the NCHE and regional partners across the East African Community and IGAD should accordingly treat display ergonomics as part of a wider agenda for healthy, productive and sustainable software development in Somalia and the Horn of Africa.

Recommendations

For universities and training institutions:

Integrate display-polarity ergonomics and screen-comfort practices into programming and computer-science curricula. Configure institutional labs and devices to offer adaptive, lighting-aware theming, and teach students the 20-20-20 rule and other evidence-based habits for reducing digital eye strain during long coding sessions.

For software firms and employers:

Provide developers with adjustable, dark-capable tooling and well-controlled ambient lighting rather than mandating a single display default. Recognise eye strain as an occupational-health issue, support breaks during prolonged coding, and allow individuals to configure display mode to their environment and preference.

For the government:

Incorporate digital workplace ergonomics, including display-polarity guidance, into national standards for higher education and the technology workforce. Commission follow-up research that combines self-report with objective performance and ocular measures to build a locally grounded evidence base for developer wellbeing.

For regional and international partners:

Through the East African Community, IGAD and the Arab League, support comparative research and the sharing of display-ergonomics and

digital-wellbeing guidance across member states, ensuring that emerging software sectors in the Horn of Africa benefit from evidence tailored to local lighting, device and infrastructural conditions.

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