

Performance of a Silicone Hydrogel Daily Disposable Contact Lens Among Heavy Digital Device Users

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Purpose

As digital device use continues to increase, excess screen time can present challenges to contact lens wear (CLW). With increased concentration time, blink rates decrease, the number of incomplete blinks and tear instability increase, and CLW experience can be impacted. This investigation evaluated the performance of the unique Kalifilcon A (KA) daily disposable silicone hydrogel (DDSH) lens containing moisturizers and osmoprotectants in a population of contact lens (CL) wearers with heavy digital device use (HDDU).

Methods

Subjects that spent ≥10 hours using digital devices on an average workday were assessed in this prospective 2-week, bilateral, open-label study at 36 investigative sites. Slit lamp examinations (SLE) were conducted at dispensing and 2-weeks. Frequency of rewetting drops use among habitual users was recorded at dispensing and 2-weeks.

Following 7 days of wear, subjects completed an internet survey to capture performance attribute ratings using a 6-point Likert scale. A two-sided exact binomial test was performed to test whether agreement was indicated for more than 50% of responses for the performance attributes.

Results

A total of 292 subjects (63%F, 37%M) participated in the evaluation. Table 1 provides a profile of the heavy digital device users that participated. On a typical day, 30%of users wore their lenses 16 or more hours, 15% were considered gamers, 42% were binge watchers, and 53% were physically active. While wearing their habitual lenses, 45% self-reported dry eyes, 21% tired eyes, 16% eye strain, 19% blurry/fluctuating vision, and 26% reported using rewetting drops.

There was no significant change in graded SLE between dispensing and 2-weeks(p>0.05). Frequency of rewetting drop use decreased significantly, when wearing KA lenses(p<0.001).

Subject agreement regarding performance attributes associated with focusing for a long time at digital devices and general wear experiences were statistically significantly greater than 50%(p<0.05). While focusing for long times at digital devices, the heavy device users agreed the lenses were comfortable (86.6%), provided clear vision (90.4%), and prevented blurriness (83.9%), Figure 1. For general wear experiences, subjects agreed the lenses provide comfortable vision throughout the day (87.7%), protect against irritation and discomfort (78.2%), reduce halos and glare in low light (87.8%), prevent eyes from feeling tired or fatigued (81.3%) and allow me to see and experience this visual world (95.4%), Figure 2.

Results

Table 1. Profile of the Heavy Digital Device Users

Gender (n, %)	
Female	164 (63%)
Male	98 (37%)
Age (Mean, SD)	30.5 ± 5.7
Hrs CL Wear (n, %)	
≤ 10 hours/day	44 (17%)
11 - 15 hours/day	140 (53%)
16 - 20 hours/day	57 (22%)
> 20 hours/day	21 (8%)
Experiences (n, %)	
Gamer	38 (15%)
Binge Watcher	110 (42%)
Physically Active	138 (53%)
Dry Eyes	119 (45%)
Tired Eyes	55 (21%)
Eye Strain	43 (16%)
Blurry/Fluctuating Vision	49 (19%)
Used Rewetting Drops	67 (26%)

Figure 1. Percent Agreement When Focusing for Long Times at Digital Devices

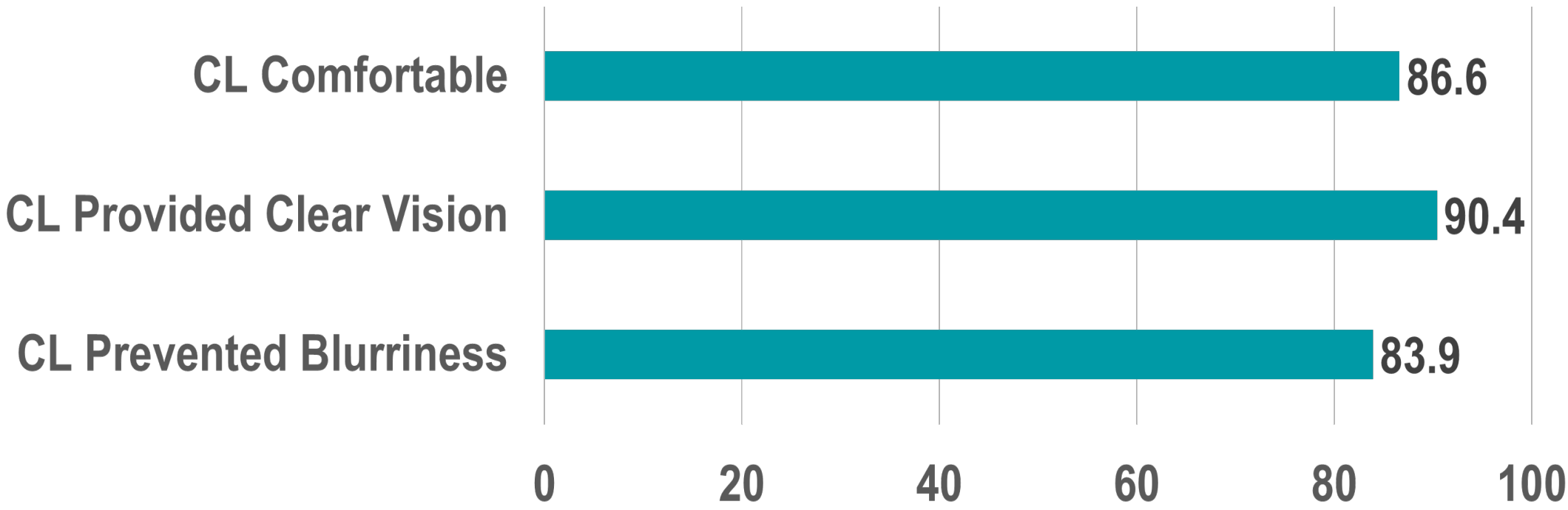
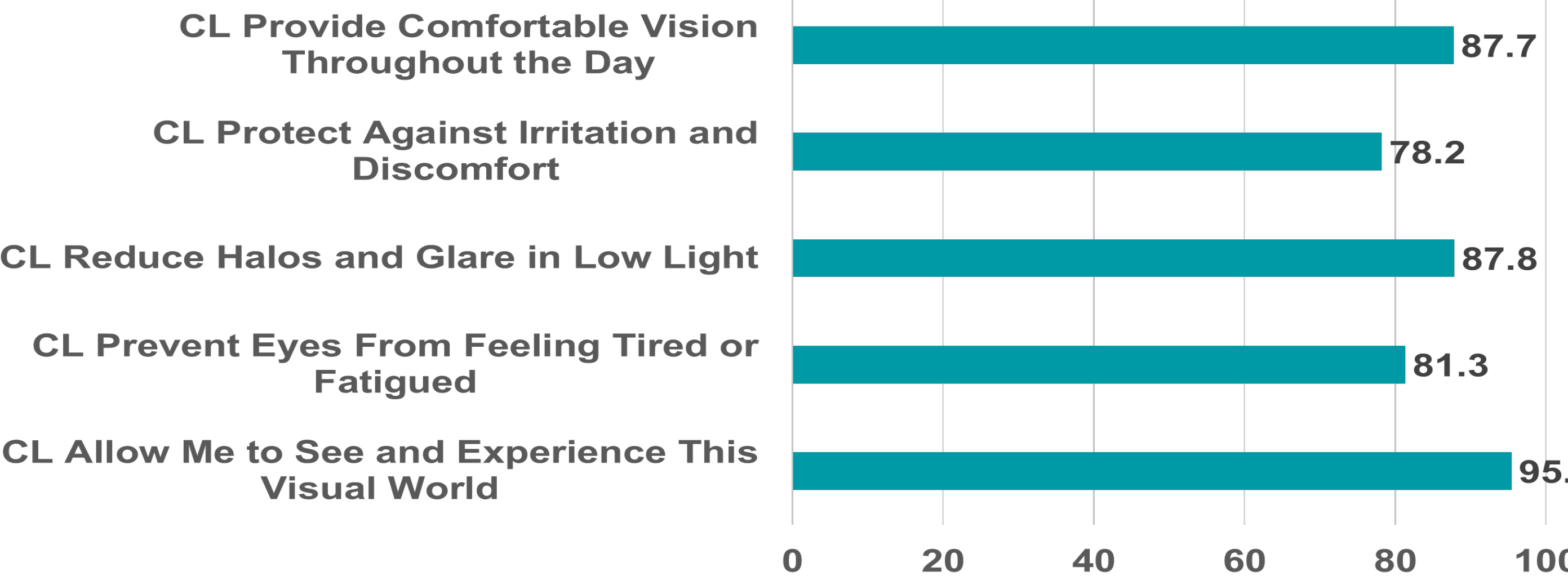


Figure 2. Percent Agreement For General Wear Experiences



Discussion

Product development of silicone hydrogel lenses has led to advancements that include increased oxygen permeability, a rise in water content, and reductions in modulus.^{1,2} A 2019 survey of silicone hydrogel users revealed that contact lens related dryness was the most common symptom.³ In this evaluation, contact lens related dryness was also the most common symptom reported by the HDDU subjects while wearing their habitual silicone hydrogel lenses.

Dry eye is a multifactorial condition characterized by a loss of homeostasis of the tear film where tear film instability and hyperosmolarity play a role.⁴ Lifestyle activities such as digital device use and physical activity can have important implications for ocular surface homeostasis, as both can result in increased tear osmolarity.^{5,6} Contact lens wear can also induce biophysical changes to the tear film through tear film instability, increased tear evaporation, and increased tear osmolarity.⁷

The KA DDSH lens includes a proprietary combination of ingredients infused into the lens material and released to help maintain ocular surface homeostasis for comfortable lens wear. The combination of ingredients, inspired by the Tear Film and Ocular Surface Society's DEWS II report,⁸ includes osmoprotectants (erythritol, glycerin), electrolytes (potassium), and moisturizers (poloxamine 1107, poloxamer 181).

Among HDDU subjects, the KA DDSH lens provided comfortable wear and clear vision when focusing a long time at their digital devices. For general wear experiences, the lens provided comfortable vision throughout the day. Subjects that used rewetting drops prior to KA use reduced the frequency of use when wearing KA DDSH lenses.

Conclusion

HDDU can create challenges when wearing CLs. The unique KA DDSH containing moisturizers and osmoprotectants provided a favorable comfort and vision wear experience among heavy digital device users.

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