



The Change in Prescription Requirement Using Piggyback Lenses

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Purpose

There are some patients that have irregular corneas that need specialty contact lenses to see and function. One such method is using a small, gas permeable (GP) contact lens on top of a soft contact lens (also known as a piggyback system). The benefit of a piggyback system is to improve comfort and/or centration of the GP lens. The use of a soft contact lens may change the prescription requirement of the GP lens. Few research exists on this, but a previous publication shows that the addition of a soft lens should result in little to no change in the GP power as a soft lens contributes only about 20% of its power when used in a piggyback system.^{1,2} This study was intended to verify this percentage.

Methods

This IRB-approved, prospective study included 63 third year optometry students enrolled in OPTOD 1750 Contact Lens III course at Midwestern University Chicago College of Optometry. This study was conducted on participants with regular corneal profiles and involved spherical soft lenses of two different powers. As part of the study, students evaluated the fit of a diagnostic GP lens on its own. Once an adequate fit was achieved (defined as centered on the cornea) and over-refraction was completed, they introduced a plus-powered soft contact lens (traditional hydrogel, daily disposable lens, between +2.00 and +3.00 DS) underneath the GP lens. The over-refraction was repeated, and the percent change in prescription due to its addition was calculated. This was then repeated with a minus-powered soft contact lens (traditional hydrogel, daily disposable lens, between -2.00 and -3.00 DS) underneath the GP lens. Each student had their data verified by a lab instructor to ensure proper calculations were done, and their data was collected anonymously without indicating any HPI (if they elected to share their data).

Figures



Figure 1: Contact lenses utilized for study (note: image does not depict the exact prescriptions used)

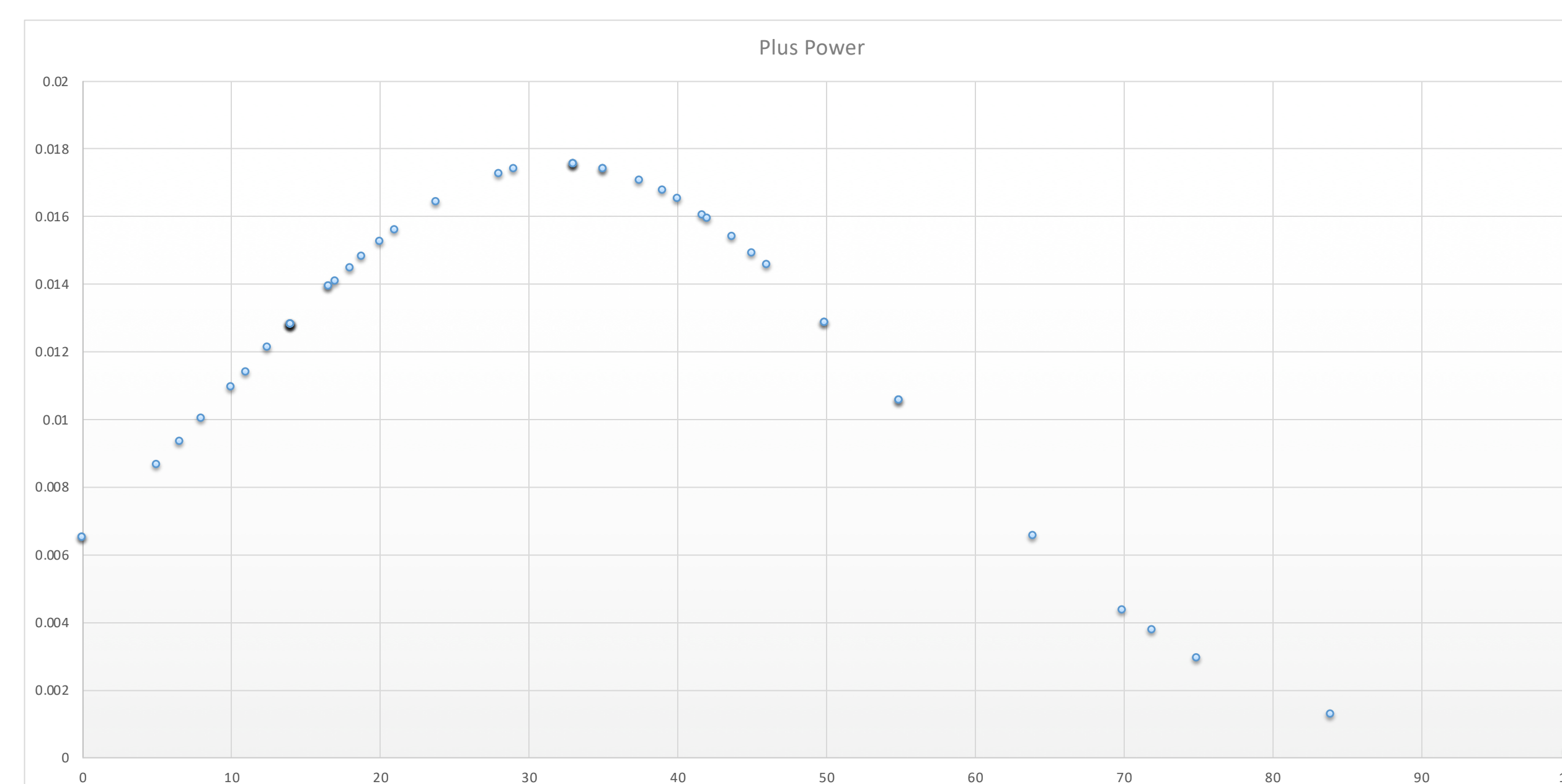


Figure 2: Plus Soft Contact Lens (x-axis: percentage, y-axis: distribution)

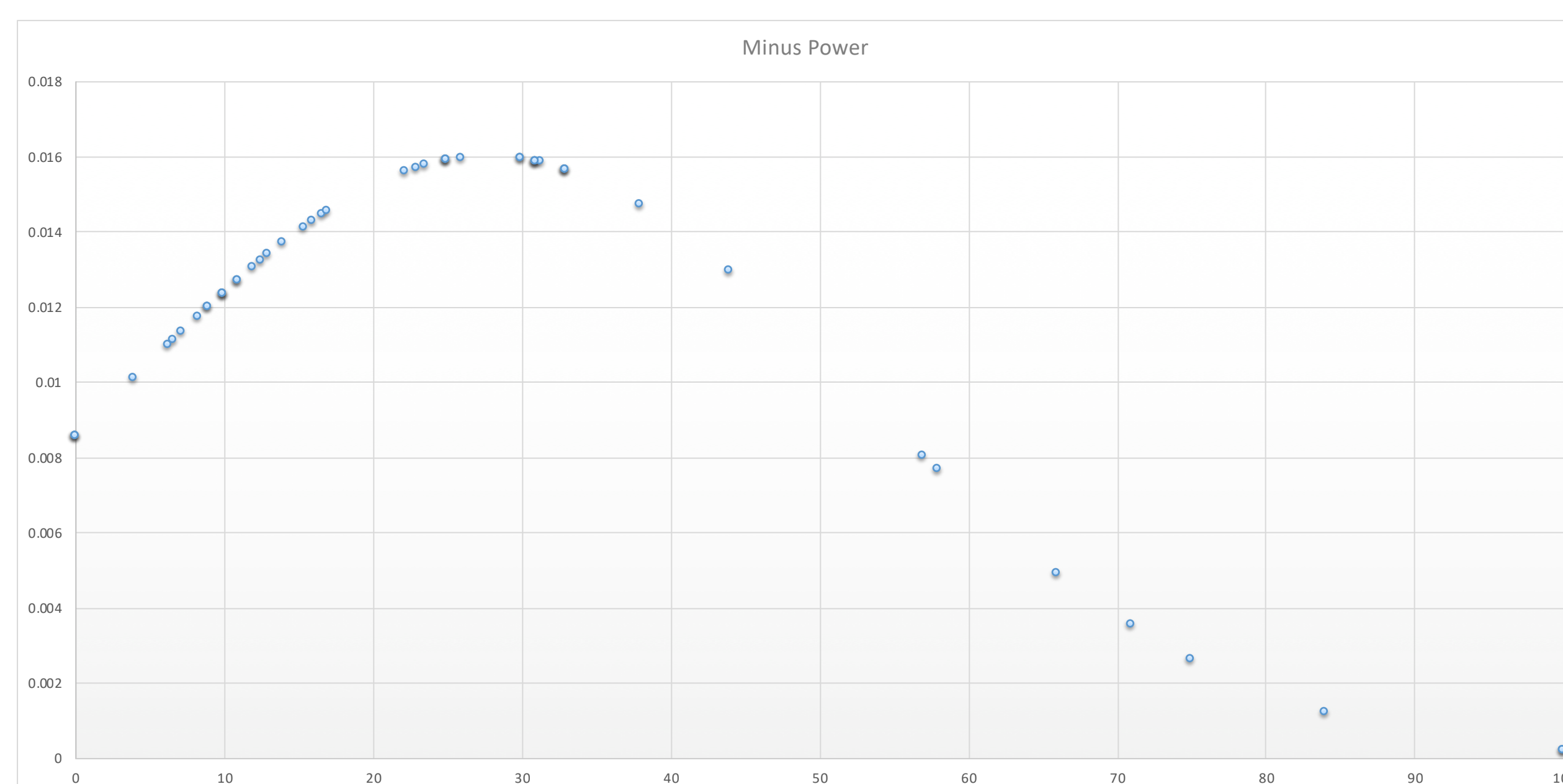


Figure 3: Minus Soft Contact Lens (x-axis: percentage, y-axis: distribution)

Results

Out of the 63 potential students, 49 reported their data anonymously. With the plus soft contact lenses (Figure 2), the average percentage of power manifesting in the overall prescription was 32.08% (range: 0-100, standard deviation: 22.74%, coefficient of variation: 70.89%). With the minus soft contact lenses (Figure 3), the average percentage of power manifesting in the overall prescription was 27.85% (range: 0-100, standard deviation: 24.90%, coefficient of variation: 89.40%). When considering all powers of soft contact lenses studied, the average percentage of power manifesting in the overall prescription was 29.97% (range: 0-100, standard deviation: 23.81%, coefficient of variation: 79.45%).

Conclusion

A soft contact lens contributes about 30% of its power when used in a piggyback system. When comparing plus and minus soft contact lens (SCL) carriers, minus SCLs showed more variation, relative to its mean. Unlike plus SCLs, minus SCLs do not have a thicker center, so there is a greater chance of decentration (with subsequent potential in variation). Typically, a very low power (<0.50 DS) silicone hydrogel soft lens is used as a carrier for its higher oxygen transmission, and so that little or no change is required in the GP lens power. A plus-powered soft lens is also preferred for its more convex central shape to promote centration of the corneal GP lens.

References

1. Gas Permeable Lens Institute. Contact lens clinical pearls pocket guide. www.gpli.info/fitting-guide/. Accessed September 1, 2019.
2. Michaud L, Brazeau D, Corbeil ME, et al. Contribution of soft lenses of various powers to the optics of a piggy-back system on regular corneas. Cont Lens Anterior Eye. 2013;36:318-23.

