

Performance of Essilor's Anti-Fatigue Lens in a Pre-Presbyopic Patient Population

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## ABSTRACT

*Background:* Essilor's Anti-Fatigue lens has been marketed to reduce near symptoms in non-presbyopic patients aged 18-40. This study investigated the lens' effectiveness in reducing near symptoms in a college-aged population that is engaged in rigorous near work. The visual performance at near tasks of optometry graduate students were evaluated by symptom surveys both with and without the use of the Anti-Fatigue lens. In doing so, we demonstrated the effectiveness of prescribing this lens for non-presbyopic patients with an increased near visual demand. *Methods:* Near task visual symptom surveys were given to optometry students to evaluate their performance at near without the use of the Anti-Fatigue Lens. The students were then fit in Essilor's Anti-fatigue lens and asked to use the lens. After two weeks of lens use, the same symptom survey was given to the students along with an additional survey to determine their opinions about the lens. *Results:* Statistical analysis revealed a significant improvement in visual fatigue symptoms with the use of the Anti-Fatigue lens. *Conclusions:* Prescribing the Anti-Fatigue lens for pre-presbyopic patients with symptoms of visual fatigue is a viable treatment option. While the Anti-Fatigue lens is not a cure for all types of visual fatigue, many patients will benefit from its use.

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## INTRODUCTION

Visual fatigue is most often encountered in practice with presbyopic patients. However, with growing near work demands in school and the work force visual fatigue is becoming a more and more common symptom of the pre-presbyopic population. The increasing use of computers and other visual display units is also contributing to the increase of asthenopia in non-presbyopes. Studies have shown that the unnatural characteristics of the images produced by computers increase the symptoms of visual fatigue.<sup>1</sup> Other studies have identified factors causing visual fatigue in professions such as radiology<sup>2</sup> and dental offices.<sup>3</sup> This study identifies symptoms of visual fatigue in graduate level students.

Once factors causing visual fatigue are identified, prevention and treatment of the fatigue must be addressed. While ergonomics<sup>3</sup> can help lower the demand put on the visual system, many patients may require additional help. For presbyopic patients, prescribing an addition or near prescription will relieve most symptoms.<sup>4</sup> Patients with normal, active accommodation prove to be more of a challenge, however. Adapting to an addition can be difficult for pre-presbyopes, and the stigma of wearing a 'bifocal' can confound the problem. If a pre-presbyopic patient can be convinced to try an addition, the practitioner has to determine how much plus power should be prescribed. Studies on accommodative insufficiency have recommended that the use of +1.00 D is favorable to a +2.00 D addition, because the lower addition exercises the accommodative system.<sup>5</sup> Since patients with accommodative insufficiency have similar symptoms to those with visual fatigue, the same principle can be applied when prescribing for visual fatigue patients.

Essilor has recently come out with a product entitled the Anti-Fatigue Lens. The lens is a low add progressive lens that provides +0.60 D of addition and is marketed to those younger than 40 who have significant near work demands.<sup>6</sup> Graduate school is an ideal demographic for studying the use of the Anti-Fatigue Lenses. This study was conducted at Ferris State University's Michigan College of Optometry. The student population spends several hours a day engaged in near tasks that could cause them to experience visual fatigue. Near work demands include taking notes during lecture, studying, reading, and using the computer. The Anti-Fatigue Lens is designed to reduce the accommodative demands of near work while still allowing the wearer to use their accommodation; and to improve and eliminate visual fatigue symptoms. This study will identify symptoms of visual fatigue in non-presbyopic graduate students and compare the graduate student's symptoms with and without the use of Essilor's Anti-Fatigue Lens.

## METHODS

First, second, and third year optometry student volunteers (n=30) between the ages of 21 and 25 were given a near work vision symptoms survey. The survey was based on the convergence insufficiency symptom survey used in the convergence insufficiency treatment trial<sup>7</sup> and can be found in Appendix A. The survey was modified to be specific to visual fatigue symptoms that may develop with activities that graduate students are engaged in. Common near fatigue symptoms were listed and the testing population was asked to rank the frequency of the symptoms they experienced over the past semester. The options given as choices were never, seldom, occasionally, frequently, or always.

Lenses and frames for this study were provided by Essilor. The students picked out a frame, which was then fit and sent to Harbor Optical for processing. The students were then asked to use the prescribed Anti-Fatigue lenses for two weeks as their primary near work lens aid. Another symptoms survey (Appendix B) was given to the testing population to evaluate their symptoms and experience with the use of the lenses themselves.

Symptom frequency was given a numerical value to aid in quantifying the results of the surveys. The frequencies of never, seldom, occasionally, frequently, and always were given the values 0, 1, 2, 3, and 4, respectively. Total frequency and average frequency of symptoms were calculated for each symptom and for symptoms with and without the anti-fatigue lens. Statistical analysis of student responses was calculated by using t-tests. The results were then analyzed to see if there was any change in symptoms with the use of the prescribed lenses.



## RESULTS

Average frequency of symptoms for each item on the symptoms survey for students not using the anti-fatigue lens can be seen in Appendix C. The most frequently experienced symptoms were: 1-keeping attention on reading, 2- uncomfortable vision with computer work, 3-falling asleep while reading, and 4-vision worsening at the end of the day. The average frequency of these four symptoms was 1.375. The least frequent symptom was misalignment of digits/columns of numbers followed by words running together, dizziness/nausea with near work, and double vision at near. The average frequency for these four symptoms was 0.342. The average total score of all 14 symptoms was 12.21, with the maximum score of 23, minimum of 4, median of 12.5, and standard deviation of 5.39.

After the trial of the Anti-Fatigue lenses the most frequent symptoms were the same with an average frequency of 0.55. The average total symptoms was 7.2, the median was 7, the minimum was 0, the maximum was 24, and the standard deviation was 5.96. Average frequency of each category can be seen in Appendix C. A paired t-test was used to contrast total symptoms with and without the use of the Anti-Fatigue lens as well as average symptoms of each item on the two questionnaires. A statistically significant improvement was found in the following symptoms with use of the Anti-Fatigue lens: blurry vision while looking at near, falling asleep while reading, seeing worse at the end of the day, difficulty copying from chalkboard, trouble keeping attention on reading, and uncomfortable reading with computer work. There was also a significant improvement in total and average symptoms.

The students were also asked what they liked and disliked about the trial lens. A summary of their responses can be found in Appendix F. Finally, the students were asked if they would consider purchasing an Anti-Fatigue lens instead of a single vision lens on their next glasses purchase. 50% replied that they would, 23% responded that it would depend on the price difference, and 27% responded that they would not purchase the lens.

## DISCUSSION

While the 14-question survey used in this study has not been proven to be able to differentiate symptomatic visual-fatigue from normal symptoms, it does give insight into the average visual symptoms of graduate-level students. If it is assumed that a score 1 standard deviation above the mean may be significant<sup>7</sup> for visual fatigue (17.6), five of the thirty volunteers are experiencing more visual fatigue than their cohorts. Only two of these subjects had a total symptoms score above 17.6 with the use of the Anti-Fatigue lens.

The period of two weeks using the anti-fatigue lens was chosen, because it is a common time period practitioners will tell patients to try new prescriptions. This will give a realistic insight into the effectiveness of prescribing Essilor's Anti-Fatigue lens for patients with symptoms of visual fatigue. It should be noted that all subjects in this study were given the Anti-Fatigue lens. A blind study was not conducted because the subjects, being optometry students, would be able to differentiate the test from the control, thus eliminating the benefit of a blind study.

The most frequently experienced symptoms: keeping attention on reading, uncomfortable vision with computer work, falling asleep while reading and vision worsening at the end of the day, may have multi-factorial causes such as ergonomics, general fatigue, and dry eye in addition to refractive and binocular status of the individual. The comparison of students wearing the anti-fatigue lens with those not wearing the lens in these categories is of interest. All four of these categories were significantly improved with the use of the Anti-Fatigue lens. In addition, the total visual fatigue symptoms experienced by wearers of the lens was significantly improved. The average fatigue symptoms were also significantly improved with use of the Anti-Fatigue lens.

The subjective responses to the lens were very positive. Many students commented on the ease of transition into their first addition. Overall, 50% of the subjects responded that they would consider purchasing the Anti-Fatigue lens in place of a single vision lens. Another 23% would also consider replacing the single vision lens with the Anti-Fatigue lens depending on the price difference. This favorable result indicates that in addition to alleviating symptoms of visual fatigue, the lens is well received by patients.

## CONCLUSION

One of the marketing advantages of the anti-fatigue lens is the absence of the term 'bifocal'. Many patients, presbyopes included, often suffer through symptoms of visual fatigue to avoid 'feeling old'. The lens could be used as a compromise to ease patients into the idea of an addition. This was seen in our post-lens survey with patients commenting that a larger addition would make the lens better.

Prescribing the Anti-Fatigue lens for pre-presbyopic patients with symptoms of visual fatigue is a viable and successful treatment option. A minority of subjects did not like the lens, however all treatment modalities will have patients that are unsuccessful with them. While the Anti-Fatigue lens is not a cure for all types of visual fatigue, many patients will benefit from its use.

TABLE 1

Near Work Vision Symptoms Survey  
Without Anti-Fatigue Lens

Please reflect on your performance with near tasks over the past semester and assess the following symptoms using this scale:

(a)Never (b) Seldom (c) Occasionally (d) Frequently (e) Always

1. Blurry vision when looking at near \_\_\_\_\_
2. Double vision \_\_\_\_\_
3. Headaches with near work \_\_\_\_\_
4. Words run together when reading \_\_\_\_\_
5. Fall asleep while reading \_\_\_\_\_
6. See worse at the end of the day \_\_\_\_\_
7. Skip/repeat lines while reading \_\_\_\_\_
8. Dizzy/nausea with near work \_\_\_\_\_
9. Head tilt/close one eye when reading \_\_\_\_\_
10. Difficulty copying from chalkboard \_\_\_\_\_
11. Misalign digits/columns of numbers \_\_\_\_\_
12. Reading comprehension down \_\_\_\_\_
13. Trouble keeping attention on reading \_\_\_\_\_
14. Uncomfortable vision with computer work \_\_\_\_\_

TABLE 2

Near Work Vision Symptoms Survey  
With Anti-Fatigue Lens

Please reflect on your performance with near tasks using the Anti-Fatigue Lens and assess the following symptoms using this scale:

(a)Never (b) Seldom (c) Occasionally (d) Frequently (e) Always

1. Blurry vision when looking at near \_\_\_\_\_
2. Double vision \_\_\_\_\_
3. Headaches with near work \_\_\_\_\_
4. Words run together when reading \_\_\_\_\_
5. Fall asleep while reading \_\_\_\_\_
6. See worse at the end of the day \_\_\_\_\_
7. Skip/repeat lines while reading \_\_\_\_\_
8. Dizzy/nausea with near work \_\_\_\_\_
9. Head tilt/close one eye when reading \_\_\_\_\_
10. Difficulty copying from chalkboard \_\_\_\_\_
11. Misalign digits/columns of numbers \_\_\_\_\_
12. Reading comprehension down \_\_\_\_\_
13. Trouble keeping attention on reading \_\_\_\_\_
14. Uncomfortable vision with computer work \_\_\_\_\_

What did you like about the lenses?

What didn't you like about the lenses?

Would you consider purchasing an anti-fatigue lens instead of a single vision lens the next time you purchase glasses?

TABLE 3

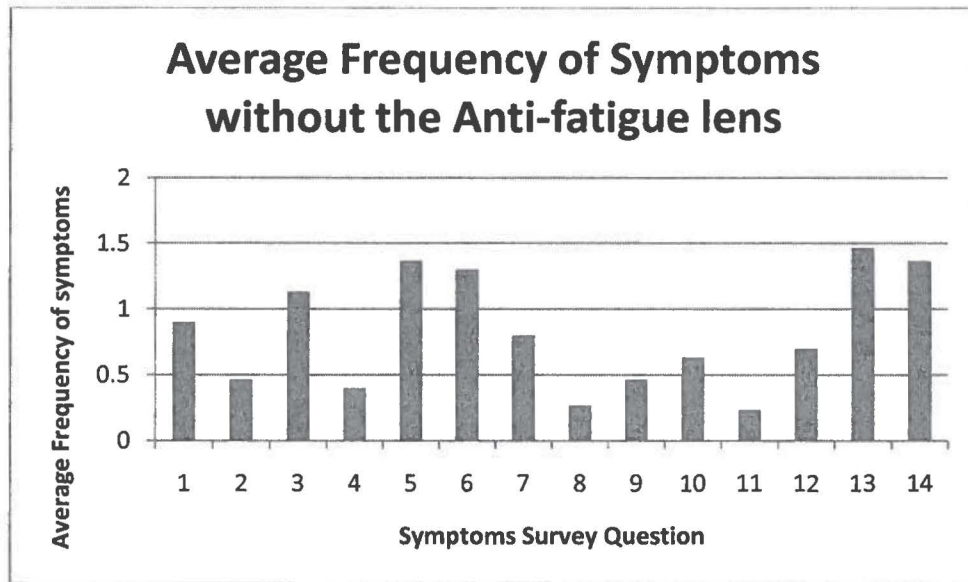


TABLE 4

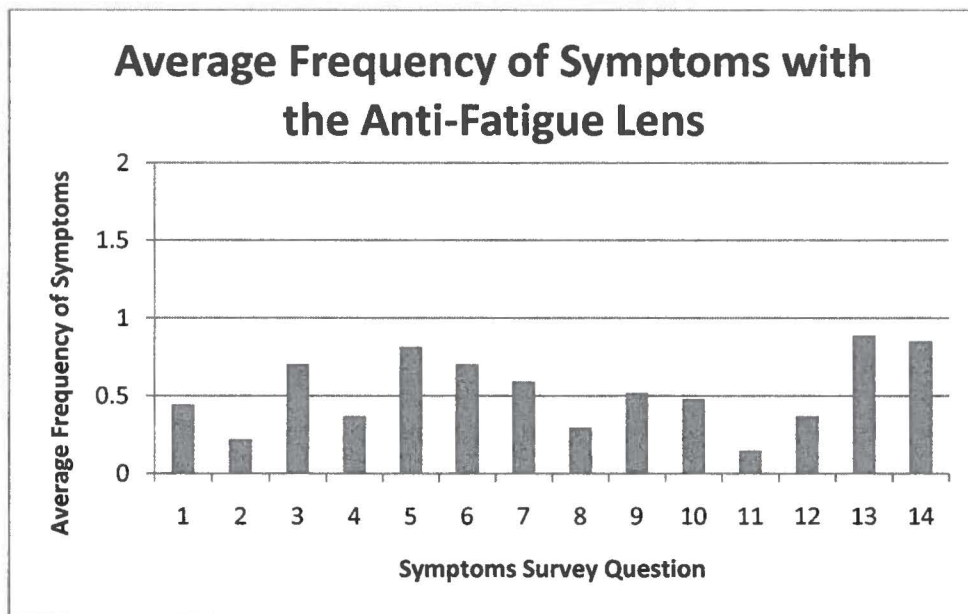


TABLE 5

## Paired Samples Test

		Paired Differences		t	df	Sig. (2-tailed)
		Mean	Std. Deviation			
Question 1	q1 - pq1	.500	1.075	2.548	29	<b>.016</b>
Question 2	q2 - pq2	.267	.828	1.765	29	.088
Question 3	q3 - pq3	.400	1.102	1.989	29	.056
Question 4	q4 - pq4	.100	.759	.722	29	.476
Question 5	q5 - pq5	.767	.898	4.678	29	<b>.000</b>
Question 6	q6 - pq6	.667	.922	3.959	29	<b>.000</b>
Question 7	q7 - pq7	.333	1.028	1.775	29	.086
Question 8	q8 - pq8	.000	1.050	.000	29	1.000
Question 9	q9 - pq9	.000	1.017	.000	29	1.000
Question 10	q10 - pq10	.233	1.194	1.070	29	.293
Question 11	q11 - pq11	.200	.664	1.649	29	.110
Question 12	q12 - pq12	.333	.547	3.340	29	<b>.002</b>
Question 13	q13 - pq13	.633	.718	4.829	29	<b>.000</b>
Question 14	q14 - pq14	.667	.922	3.959	29	<b>.000</b>
Total symptoms	Total - PTotal	5.100	6.008	4.650	29	<b>.000</b>
Average Symptoms	AVG Pre - AVG Post	.3642857	.4291253	4.650	29	<b>.000</b>

Bolded Sig. values are significant

Table 6

	Symptoms without Anti-Fatigue Lens	Symptoms with Anti-Fatigue Lens
Mean Total Score	12.21	7.2
Maximum Total Score	23	24
Minimum Total Score	4	0
Standard Deviation	5.39	5.96
Median	12.5	7



## WHAT DID YOU LIKE ABOUT THE ANTI-FATIGUE LENS?

Being the first pair of addition lenses I've ever worn, I was impressed that I didn't have much, if any, distortion while looking off to the peripheral zones of the lens. I also liked that they were AR coated

No line add

Very easy to adapt to and little distortion

I liked the anti-fatigue lenses for extended near work. In the past, I have had frequent headaches when working at near with my contacts, and occasionally with my glasses. With the anti-fatigue lenses, near work feels much more comfortable and easy to do for prolonged periods. I found the small add in the lenses to be easy to get used to

Very nice for near work, really enjoyed them for studying

The lens made studying for long periods of time less tiresome.

Made sustained near work more comfortable

I did not consciously notice the add

I could read a little longer at night and between study breaks before I got tired

Very Easy to adjust to, Can't even notice progressive distortion. AR is very nice.

I felt they were easy to adapt to. I assumed it would be more difficult to transition into them. They made it much easier to see at computer distance for extended periods.

AR coating, eyes seem less tired at the end of the day

The lenses performed excellently at near, and I feel like my reading endurance was improved when I needed to perform extended near work.

The extra plus power was beneficial at near

Clear vision, no distortion

Very Natural, felt good. Didn't notice much of a change from distance to near viewing, but my eyes were not as tired after long periods of reading, computer work, studying, etc.

I noticed that I had fewer headaches when reading/studying for long periods of time

I liked how it was a very discreet difference in the distance vs reading area

These lenses were clear and comfortable lenses to wear. They seemed like a good material w/ a nice A/R coat on them.

#### WHAT DIDN'T YOU LIKE ABOUT THE ANTI-FATIGUE LENS?

Swim on head movements, tough to avoid blur at distance

I think the seg height may have been high on my lenses, which made using the lens in class difficult

At a distance if I was looking through the lens incorrectly my vision was decreased

I would have maybe liked a slightly higher add in a larger eye wire size

I did not notice a difference in my near vision when wearing these lenses

Couldn't tell there was an add, hard to tell if I was using it.

Do notice a little distance blur if chin is too high.

I'm not sure the lenses really made a large impact on fatigue symptoms

Progressive was a little difficult to get used to.

I can't see as well at distance as with my SV lenses. I was surprised how much a subtle head or eye movement decreased my ability to see fine details.

I would have liked a little bit of a higher add.

I always got nauseous and got headaches. I kept trying to overcome the discomfort and I really liked the idea of "reading glasses" for the amount of reading I do. Unfortunately, it was too uncomfortable to continue wearing.

At first it took me a little while to get used to adjusting my head to get into the add of the lenses, but now it doesn't bother me.

There seemed to be a very small point on the lens for optimal viewing. When tilting my head back, I could definitely notice some plus power in the bottom of the lens. The very center was clear for distance, then the top of the lens seemed to defocus a little again. For near work, I noticed little to no change in my comfort of vision when compared to my single vision lenses.

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