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## The Effect of Cataract Surgery on Depression and Vision-Related Quality of Life in an Elderly Population

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THE EFFECT OF CATARACT SURGERY ON DEPRESSION AND VISION-  
RELATED QUALITY OF LIFE IN AN ELDERLY POPULATION

by

Paige B. Martin

A Thesis Submitted in Partial Fulfillment  
of the Requirements for a Degree with Honors  
(Psychology)

The Honors College

University of Maine

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## Abstract

Cataracts due to age affect the ability to perform daily visual activities, thereby reducing independence, which can leave a person feeling depressed. This project is designed to study the relationships between cataract surgery and depression and vision-related quality of life in an elderly population. Two groups were studied: Participants undergoing cataract surgery and a wait-list control group. Levels of depression and vision-related quality of life were assessed at baseline and at one-month post-surgery/baseline point. Changes in depressive symptoms did not differ between the two groups; however, vision-related quality of life and visual acuity are significantly increased with cataract removal surgery. Examining the effects of cataract surgery on depression and quality of life will help better understand the full risks and benefits of cataract surgery.

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## **The Aging Population**

Today about 40 million people in the United States are ages 65 or older, but this number will more than double to 89 million by 2050 (Jacobsen et al., 2011). The majority of this growth in the elderly population will occur between 2010 and 2030, when the “baby boom” generation enters what is considered as the older population (Vincent & Velkoff, 2010). During these years, the elderly population will grow by an average of 2.8% annually (U.S. Census Bureau). In some countries such as Germany, Italy, and France, the percentage of the population ages 65 and older could be around 30% by 2040 (Jacobsen et al., 2011). With the increase in this population there will be many economic, demographic, and healthcare consequences. This cohort is likely to stay in the work force longer than prior generations, projected to make up 25% of the American work-force by 2019 (Lee & Mather, 2008). Not only will they stay in the work force longer, but also have an increase in geriatric specific health concerns. With an increase in geriatric specific health concerns, elderly people could become a larger portion of the patients in hospitals and clinics in America and around the world. One specific concern related to the elderly population will be an increase in cataracts and surgeries to treat them.

## **Eyesight and Cataracts**

Eyesight is one of the most fundamental senses that we have. We depend on it to do most of our daily activities. As a person gets older, they may not only lose their mobility and independence but also lose their eyesight, limiting what they can and cannot do for entertainment and social life. Vision-related quality of life (VRQOL) refers to the

effects of vision on everyday activities (e.g. cooking, seeing steps/curbs, driving).

Decreased visual function has been found to be associated with diminished VRQOL and general living activities, particularly vision-dependent activities (Kundston et.al., 2005).

Cataracts are one of the main causes of a decrease in visual acuity in elderly patients and thereby a decrease in VRQOL (Dana et al., 1990). A cataract is the clouding of a lens, which is generally clear and helps to focus light on the retina (Kalina, 1997). An aggregation of the proteins within the lens due to aging is one of the main causes of a cataract (Kalina, 1997). As a consequence, the light is dispersed and the images are blurry because they cannot easily be transmitted through the lens onto the retina. There are numerous symptoms of cataracts some of which include cloudy or blurry vision, difficulty with night vision, halos around lights, yellowing of colors, and double vision. Cataracts can be graded by the average color and opalescence, on a scale from grade 1 (mild/early) to grade 4+ (severe/advanced, milky or brownish) (Murrill et.al., 1995). Furthermore, these grades indicate the percentage of intra-pupillary space the cataract opacity occupies: from grade 1 obscuring 10% of the intra-pupillary space to grade 4+ obscuring more than 90% of the intra-pupillary space. There are three types of cataracts (Murrill et.al.,1995). A cataract which occurs by natural processes (i.e., aging) is called a senile cataract. In contrast, an acquired cataract is caused by an injury, whereas a congenital cataract is present at birth. In this study, we will be focusing only on senile cataracts, and the term cataract will refer to a senile cataract.

The number of people afflicted by a senile cataract in either eye is growing at a rapid rate. An estimated 20.5 million people over the age of 40 in America have a cataract in either eye and is estimated to rise to 30.1 million by 2020 (The Eye Diseases

Prevalence Research Group, 2004). Cataract induced vision impairment and blindness can lead to a decrease in quality of life for elderly people, difficulties in daily activities, and loss of independence and self-esteem (Hall, McGwin & Owsley, 2005). Cataract induced visual impairment can have a number of negative side effects, particularly in the independence of an older individual. Cataracts can affect a person's independence by affecting their driving abilities, which can be remarkably improved by bilateral cataract surgery (Wood & Carberry, 2006). In addition to driving performance, a person's confidence in driving can be affected by the visual effects of cataracts. Elderly individuals with cataracts were approximately twice as likely to report a reduction in the number of days they have driven and the number of destinations per week, with an increase in preferring someone else to drive compared to their peers without cataracts (Owsley, Stalvey, & Wells, 1999).

Cataract surgery is performed when the cataract significantly interferes with a patient's visual acuity and can no longer be corrected by prescription glasses. Cataract removal is now one of the most commonly performed ambulatory surgical procedures with more than three million such surgeries performed each year (Cullen et al., 2009). This surgery consists of phacoemulsification, or a breaking up of the natural lens, which houses the cataract. Then an intraocular artificial lens (IOL) is implanted. This IOL is clear and has a certain amount of corrective power, which is calculated for each patient. This surgery can generally be done in an out-patient setting. Over 85% of patients report an improvement in function and satisfaction with their vision after undergoing cataract surgery (Steinberg, et al., 1994). There are other benefits of cataract surgery besides visual satisfaction. For example, impairment of vision by cataracts can cause a

significant decrease in employment opportunities, and cataract surgery can contribute to poverty alleviation by increasing a person's ability to work (Kuper et al, 2010).

### **Depression in Elderly**

The presence of medical problems (e.g., diabetes, pulmonary disease, heart disease, and arthritis) is associated with an increased comorbidity with depression (Katon, Lin, & Kroenke, 2007). An Agency for Healthcare Research and Quality systematic review reported that up to 20% of coronary heart disease patients meet criteria for a major depressive disorder (MDD), and up to 47% have significant patient-reported depressive symptoms, these diagnoses/symptoms remain long after discharge (Bush et al., 2005). Another large study of coronary heart disease patients found that depression was again an important correlate of diminished quality of life, while two traditional measures of cardiac function, ejection fraction and ischemia, were not (Ruo et al., 2003).

MDD is a condition with certain symptoms that last for at least 2 weeks. In addition to persistent feelings of sadness and/or anhedonia, other symptoms of MDD include significant weight loss or gain, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, diminished concentration or indecisiveness, and recurrent thoughts of suicide or death (DSM-IV, 1994). A mild form of depression has few, if any, of the listed symptoms and only has a minor impairment in occupational or social functioning. A moderate form of depression has some of the symptoms listed and mild to moderate impairments to social and occupations. In contrast, the severe form of



depression consists of several of the symptoms in excess and a marked interference with occupational and/or social functioning (DSM-IV, 1994).

More than 6.5 million of the 35 million Americans aged 65 or older are affected by symptoms of depression (Duckworth, 2009). Depression can often go untreated in the elderly group, due to beliefs that depression in elderly is a normal part of aging in response to chronic illness, loss, and social transition. Similar to decreases in visual acuity, late-life depression can cause a decrease in quality of life for an individual (Unützer et al., 2000). Late-life depression can affect quality of life in numerous ways. This late-life depression can increase risk for other medical illnesses (Duckworth, 2009). For example, depression can affect health and healing following a stroke or myocardial infarction (Frasure-Smith, et.al., 1993). Furthermore, late-life depression is associated with increased fatality by both suicide and non-suicide (Duckworth, 2009). That is, individuals with depression have a higher death rate than those without depression, and late-life depression is associated with increased suicidal ideation, which in turn may lead to mortality by suicide (Henriksson et. al, 1995)

### **Relation Between a Decreased Acuity of the Senses and Depression**

Senses are crucial to one's well-being and functionality. As people age, their senses start to decrease in acuity, causing them to have more difficulties with vision and hearing. This can make it difficult for them to enjoy activities they once may have enjoyed, like having a conversation, playing card games, or watching TV. However, few studies have examined the relation between cataracts and depression specifically. One study showed that there are higher levels of depressive symptoms and a higher

prevalence of MDD in low-vision elderly patients (Rovner & Shmueli-Dulitzki, 1997). This study utilized the Geriatric Depression Scale (GDS), a 30 item self-rated questionnaire to look at depression in elderly and a community disability scale to measure function in daily activities. Participants were recruited from a low-vision clinic afflicted with various eye diseases (e.g. macular degeneration, glaucoma), but participants' visual acuity was not examined for the study. This study found that the depressive symptoms were common among visually impaired elderly.

Another big study (Owsley et al., 2007) aimed to look at the effect of treating uncorrected refractive error on vision-targeted health-related quality of life and depression in nursing home residents. Participants completed the VF-14, a visual functioning questionnaire aimed at measuring vision-related quality of life (VRQOL) and the GDS at baseline and at the 2-month follow-up. In this study, an immediate correction group was given updated lenses after the baseline questionnaires, and a delayed correction group received updated corrective lenses after the 2 month follow up. The delayed correction group served as the control group. The immediate correction group exhibited increased vision-targeted health-related quality of life (QoL) and fewer depressive symptoms, when comparing baseline to follow-up data, and compared to the control group. Thus, increasing the quality of vision through updated glasses, decreased the levels of depressive symptoms and increased VRQOL.

Just like vision, hearing is a fundamental sense, and reactions to such life-changing losses in vision and hearing could be similar. Therefore, reviewing the relation between depression and other similar senses, like hearing, in the elderly population can help us understand the relation between depression and vision. A study on depression

comorbid with hearing loss demonstrated that there was a significant decrease in depressive symptoms with the use of hearing aids (Boi et al, 2012). More specifically, at 6 months after the use of the programmable hearing device, levels of depressive symptoms decreased significantly, while hearing ability and quality of life increased. Likewise, another study showed strong correlations among hearing impairment, depressive symptoms, and quality of life (Ishine, et al., 2007). This study compared elderly with hearing impairments and elderly without hearing impairments in their depressive symptoms and quality of life using the GDS, Subjective Quality of Life (QOL), and Activities of Daily Living (ADL). Those with hearing impairments had significantly lower QOL and ADL scores and higher depression scores than their peers without hearing impairments. The researchers suggested that other sensory functions (i.e. vision) might also be related to depression, the ADL, and the QOL in the elderly population.

Few studies have been conducted in order to examine the relation between cataract related vision loss and depression, but the relation is expected to be similar to that of hearing and depression. A recent study (McGwin, Li, McNeal & Owsley, 2003) on the relationship between cataracts and depression did not support the hypothesis. In this study, three groups of elderly were recruited: one group of patients undergoing cataract surgery, a group of patients who choose to forego surgery, and individuals who had no cataract. All three groups of participants completed the following questionnaires: a cognitive health questionnaire was used to assess the cognitive function of the elderly participants; the 20 item Center of Epidemiological Studies Depression Scale (CES-D) was used to assess depressive symptoms; and a general health questionnaire to assess

presence and absence of symptoms of 17 types of diseases (e.g. heart disease, cancer, diabetes). In addition, a visual acuity test and contrast sensitivity test were administered at baseline and 6 and 12 month marks. There were no significant differences between the baseline and follow up depression scores in patients who underwent cataract corrective surgery compared to the patients forewent the surgery.

A recent study (Ishii, Kabata, & Oshika, 2008) examined cognitive impairment, depression, and VRQOL in individuals who were about to undergo cataract surgery for bilateral cataracts. Participants completed the visual functioning questionnaire (NEI VFQ-25) to measure VRQOL, the Mini-Mental State Examination (MMSE) to measure cognitive impairment, and the Beck Depression Inventory (BDI) to measure depressive symptoms, at a baseline, before surgery, and two months after the surgery. The study found that VRQOL, cognitive impairment, and depressive mental status are strongly related with one another. The improvement to the VRQOL via cataract surgery led to improved cognitive functioning and decreased depressive symptoms. While depressive symptoms decreased at post-operation, the changes were not statistically significant. Only the improvement in VRQOL and cognitive impairment at post-operation were statistically significant. In addition, there was a strong correlation between the change in the NEI VFQ-25 and the BDI, showing the relationship between VRQOL and depressive symptoms. It is important to note that there was no control group, while the other study (McGwin et al., 2003) did utilize a control group.

Another study (Fagerström, 1994) examined the association between depression and vision. One hundred participants were observed for the first eye cataract removal operation. The participants completed questionnaires regarding socio-demographic

background, diagnosed diseases, a Snellen eye-chart for visual acuity, the BDI, and a personality test, the 71 item Mini-Mult Minnesota Multiphasic Personality Inventory (MMPI). These questionnaires were presented orally one day before the operation and 3 months after the operation. The study found that visual acuity significantly improved and depressive symptoms significantly decreased. Before cataract operation, nearly blind participants were more depressed than those who had binocular vision, but the association was not statistically significant. However, depression and visual acuity were significantly correlated after the operation. Depression following the cataract operation could be partly explained by the presence of other somatic diseases (e.g. cardiovascular disease, asthma, cerebrovascular disease). It is important to note that this study also did not have a control group of participants who did not undergo the surgery.

The studies discussed above show different results. One study (Ishii et al., 2008) indicated that there was a correlation between VRQOL and depression after cataract surgery. Similarly, Fagerström (1994) showed that there was a significant decrease in depressive symptoms and that is correlated with visual acuity post-surgery. In contrast, McGwin et al. (2003) demonstrated that there was no significant improvement in depression after cataract surgery compared to a control group. These inconsistencies may be due to the fact that the studies used different measures to assess depressive symptoms: McGwin et al. (2003) used the CES-D, whereas Ishii et al., (2008) used the BDI and Fagerström (1994) utilized mainly the BDI, the Mini-Mult MMPI and the Snellen eye chart.

Because these studies that examined the relation between cataract-related vision loss and depression and quality of life yielded inconsistent findings, the effects of cataract

surgery on depressive symptoms and VRQOL still remains equivocal. More studies in this area must be conducted in order to better understand the relation. This is important because with the increase in age of America and the world will come the increase in cataracts and the need for surgery. Awareness of the psychological aspects of cataract related vision loss is important for health care providers to understand, which may help patients make informed decision regarding cataracts that can be detrimental if left untreated.

### **Hypotheses**

The hypotheses of the current research are as follows. First, levels of depressive symptoms will decrease in those who undergo the cataract surgery, while those who do not undergo cataract surgery (i.e., a wait-list control group) will demonstrate no change in depressive symptoms. Second, visual acuity and vision-related quality of life will increase in those who undergo the cataract surgery compared with the wait-list control group.

## **Method**

### **Participants**

Two groups of participants were recruited from Family Eyecare in Dover-Foxcroft, Maine. The two groups are: (A) participants who had a cataract that is at removal stage but are not yet undergoing intraocular lens replacement (i.e., a wait-list control group) and (B) participants who have a cataract and have an upcoming intraocular

lens replacement (i.e., a surgery group). All participants have a cataract at a stage of 1+ NS or higher without other significant ocular concerns (eg. Macular degeneration, severe glaucoma), which was determined by Dr. David P. Frasz.

### **Recruitment**

Individuals were eligible for the current study if they had a cataract at a stage of 1+ NS or greater and had no previous cataract surgeries. These eligible patients were approached by the investigator using the following script: “Hi Mr. /Ms. Blank, my name is Paige Martin. I am one of Dr. Frasz’s assistants as well as a student at the University of Maine. I am interested in researching cataract surgery and the quality of life. I was wondering if this is something you would be interested in participating in. This is completely voluntary and will have no effect on your care if you decide not to participate.” If the patient agreed to participate, an informed consent form and a medical records release form were given to participants. Each participant read and signed the forms. By signing the medical records release form, patients gave the investigator permission to take the visual acuity, age, and gender information from their medical records.

### **Questionnaires**

Both groups of participants were given two questionnaires to complete at two different time points, approximately one month apart from each other. These questionnaires were: the Center of Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977), a widely used measure to assess depressive symptoms and the Visual

Functioning Quality of Life (VF-14 QOL; Weisinger, 2009), a measure assessing visual functioning and its effects on a person's daily life. The surgery group was given these questionnaires at the pre-operative appointment about 2 to 4 days prior to surgery, which served as a baseline. The surgery group then underwent the intraocular lens replacement surgery performed by Dr. David P. Frasz at Mayo Regional Hospital. Follow-up questionnaires, which again were the CES-D and the VF-14 QOL, were given at one month following the surgery.

The wait-list control group was given the same questionnaires (i.e., the CES-D and the VF-14 QOL) after one of their appointments. Participants in the wait-list control group did not have a follow-up appointment within the month. Therefore, follow-up questionnaires were mailed a month after they initially completed the measures, with a pre-stamped envelope to return the measures. Participants were instructed to fill out the one month follow up questionnaires and return them in the provided envelope.

### **Visual Acuity Measure**

Participants from both groups had an assessment of their visual acuity with the Snellen eye chart (Snellen, 1862). The Snellen Eye Chart measures visual acuity based on letters set at certain ratios, and the 20/20 line is considered normal visual acuity. Both groups were assessed for best corrected vision at their initial appointment. Participants in the surgery group were assessed again at their one month post-operative appointment. Participants in the wait-list control group were not assessed at a follow-up point; it was assumed that their vision had not changed from their initial appointment.

## **Results**



## Demographic Characteristics

The present study consisted of two groups of participants. A cataract surgery group (n=26) and a wait-list control group (n=20). Two participants from the surgery group were excluded from the analysis, because they did not have follow-up information. Thus, data from 24 participants in the surgery group were included in the analyses. At baseline, the two groups had similar distributions of demographic characteristics (Table 1). The surgery and the wait-list control groups did not differ in their sex composition ( $\chi^2(1)=.642, p=.432$ ) and age ( $t(42)=.009, p=.321$ ).

**Table 1. Baseline Demographic Characteristics**

Variable	Surgery Group (n=24)	Control Group (n=20)	P Value
Sex, No (%)			
Female	14 (58.3)	14 (70)	0.432
Male	10 (41.7)	6 (30)	
Age, mean (SD)	69.4 (7.7)	69.37 (10.1)	0.321

## Visual Acuity

Table 2 presents visual acuity at baseline and at follow-up. The visual acuity is in logMAR form, taking the Snellen eye chart assessment and putting it into a logarithmic scale so that analysis could be performed. The formula for calculating Snellen into logMAR is:  $\log\text{MAR visual acuity} = -\log_{10}(\text{Snellen ratio})$ . Snellen ratio of 20/20 equals to logMAR of 0, and Snellen ratio of 20/200 equals to logMAR of 1. Best corrected vision of the affected eye was taken at baseline and follow-up. At baseline, the surgery group had overall a higher mean of logMAR visual acuity (mean = .669, SD=.303),

indicating a lower overall visual acuity than the control group (mean= .310, SD=.194), with a significant difference between the two groups at baseline ( $F(1,42)=16.397$ ,  $p<.001$ ). The change in visual acuity from baseline to follow-up for the surgery group improved significantly ( $t(23)=8.00$ ,  $p<.001$ ). It was assumed that the control group had no change in vision from baseline to follow-up.

**Table 2. Visual Acuity for surgery and control at baseline and follow-up**

	Baseline Mean (SD)	Follow-up Mean (SD)	P Value
Surgery Group (n=24)			
Best Corrected Vision, logMAR	.669 (.303)	.156 (.230)	<0.001
Control Group (n=19)			
Best Corrected Vision, logMAR	0.310 (.194)	.310 (.194)	

### **Vision-Related Quality of Life and Depression**

Table 3 displays the baseline and follow-up VRQOL and levels of depressive symptoms for both the surgery and control groups. First, group x time repeated measures ANOVA was conducted with the scores on the VF-14 as a dependent measure to assess changes in VRQOL. There was a significant main effect of time,  $F(1, 42)=18.75$ ,  $p<.001$ , which was qualified by a significant group x time interaction,  $F(1,42)=7.405$ ,  $p=.009$ , suggesting that the change in VRQOL from the baseline to follow-up points in the control group were significantly different from the change in the surgery group. Follow-up within-group analyses revealed that VRQOL improved significantly from baseline to

follow-up in both the surgery group ( $t(23) = -4.078, p < .001$ ) and the wait-list control group ( $t(19) = -2.322, p = 0.031$ ). Follow-up between group analyses demonstrated that the two groups significantly differed in their VRQOL at baseline ( $t(42) = 2.727, p = .031$ ), with the surgery group reporting significantly lower VRQOL. A between group analysis demonstrated that at the follow-up point the two groups did not significantly differ in their VRQOL ( $t(42) = .251, p = .227$ ).

Next, group x time repeated measures ANOVA was conducted with the scores from the CES-D to examine changes in symptoms of depression. Although none of the effects were significant (all  $ps < .09$ ), t-tests were conducted to further examine the pattern. The CES-D scores for surgery group significantly decreased ( $t(23) = 2.099, p = 0.047$ ), while the control group's CES-D scores did not significantly change from baseline to follow-up ( $t(19) = .444, p = .662$ ). Both at baseline ( $t(42) = -1.083, p = .723$ ) and at follow-up ( $t(42) = -.474, p = .546$ ), the control and surgery groups did not significantly differ in their levels of depressive symptoms.

**Table 3 Outcome: Vision-related quality of life and depression**

Variable	Cataract surgery group (n=24)		Control wait-list group (n=20)	
	Baseline	Follow-up	Baseline	Follow-up
VF-14, mean (SD)	70.5 (19.64)	87.21 (14.20)	84.37 (12.51)	88.18(10.97)
CES-D, mean (SD)	10.88 (7.71)	8.79 (8.43)	8.20 (8.65)	7.7 (6.46)

## Discussion

This study aimed to examine the impact of cataract surgery on depressive symptoms and VRQOL in cataract patients undergoing surgery (i.e., the surgery group) and cataract patients not yet undergoing surgery (i.e., wait-list control group). It was hypothesized that individuals in the surgery group will exhibit a greater decrease in depressive symptoms and greater increases in VRQOL and visual acuity than individuals in the wait-list control group. Inconsistent with the hypotheses, cataract corrective surgery did not significantly reduce depressive symptoms in elderly patients compared to patients who have not received the surgery. However, VRQOL significantly improved following cataract corrective surgery.

Few studies have examined cataract surgery's effect on depression and VRQOL in regards to a control and surgery groups. Furthermore, results from the previous studies are inconsistent. One study (McGwin, Li, McNeal & Owsley, 2003) found that depressive symptoms did not change significantly difference from the baseline to follow-up in those who underwent surgery and those who did not. In contrast, another study (Ishii, Kabata, & Oshika, 2008) examined depression and VRQOL and found that VRQOL had improved significantly post operation and that depressive symptoms had a near statistically significant decrease post-operatively. However, it is important to point out that Ishii et al. (2008) did not have a control group to compare the findings to. Earlier, Fagerström (1994) found that visual acuity significantly increased and depression significantly decreased following the surgery. It was also found that the visual acuity and depression were significantly correlated: The better the outcome of the visual acuity after surgery, the better the relief of depressive symptoms. It is important to note that this study had no control group. The current findings are consistent with some of these

previous studies demonstrating an increase in both visual acuity and VRQOL and no significant change in depressive symptoms following the surgery.

As expected (Fagerström, 1994 & McGwin et al., 2003), visual acuity did indeed increase significantly with cataract corrective surgery in the current study. Vision is one of the most depended upon senses, on which many everyday activities like cooking, driving, reading, and watching TV rely. By decreasing vision and decreasing the ability to which glasses can correct the vision, cataracts lead to difficulty performing many of these enjoyable and/or necessary activities. As a result, many people become dependent upon someone else to help them read medicine bottles, cook, and enjoy TV. Due to decrease in their independence, elderly people may be more likely to become depressed. If an elderly person could regain their independence, depressive symptoms might be eliminated. Indeed, updating uncorrected refractive error in nursing home residents significantly improved quality of life and decreased symptoms of depression (Owsley et al., 2007). The residents who received updated prescription glasses experienced less psychological distress, including less depressive symptoms and increase in social interaction. Like an updated prescription, cataract surgery also increases visual acuity; therefore the same benefits can be expected due to the increase of visual acuity.

In the current study, VRQOL significantly improved from baseline to follow-up in the surgery group, and the degree of change in VRQOL in the surgery group was significantly different from the control group. These findings are consistent with other studies examining cataract surgery and other vision debilitating problems (Ishii et al., 2008; Boisjoly et al., 1999). Scores on the VF-14 correlated with an overall health related quality of life, suggesting that improvements in one aspect of health quality of life

may increase the overall health quality of life (Desai et al., 1996). Therefore, Gains in VRQOL due to improved visual acuity from cataract corrective surgery will likely be translated into gains in overall health related quality of life.

Previous research demonstrated correlations between depression and many physical and psychological diseases, like heart disease or dementia (Nöel et al., 2004). For example, depression was an important correlate of diminished quality of life among patients with coronary heart disease, while two traditional measures of cardiac function, ejection fraction and ischemia, were not (Ruo et al., 2003). It has also been shown that late-life depression increases physical disability and reduces the patient's ability to care for themselves (Unützer et al., 2000). Therefore, reducing the depressive symptoms and increasing VRQOL in an elderly person can have numerous implications, leading to an overall healthier life, more independence, and longevity of life.

In the current study, decreases in depressive symptoms in the surgery group were not significantly different from the wait-list control group. It is possible that cataract surgery does not necessarily affect levels of depressive symptoms. However, the lack of group differences in depressive symptoms might be due to floor effects. That is, most participants in this study exhibited minimal depressive symptoms. A score of 16 or greater on the CES-D identifies participants who are at risk for clinical depression, and the average scores for both groups at baseline were less than 16 to begin with. Very few participants at baseline exhibited CES-D scores of 16 or above (n=9). Future studies could examine the effects of cataract surgery on depression among elderly patients who exhibit more depressive symptoms than the participants in the present study.

The environment in which participants in the control group were questioned could have also masked any group differences. At baseline, both the surgery and the wait-list control groups were presented with the questionnaires at the physician's office, along with the other preliminary paperwork for the study. The surgery group completed follow-up paperwork at a one month post-operative appointment in the office. The control group, however, completed the follow-up measures at home and returned in a provided pre-stamped envelope. It may be that participants were more stressed and thinking on their health issues while at the physician's office. It is well known that many people react negatively to doctor's visits known as the "white coat effect" (Spruill, et al., 2007). The "white coat effect" is an anxiety which is associated with the presence of a health care provider, particularly seen in blood pressure level which is higher than a pressure taken at home (Verdecchia, et al., 2002). One study found that the "white coat effect" may not only be limited to the time that a patient sees the physician, but also extend to the whole clinical experience (Gerin et al., 2006). That is, presenting higher blood pressures in the office, than found out of the office, even if the physician was not present during the measurement. The same phenomena may be at play for the participants in the present study. Completing the VF-14 and the CES-D at home at follow-up might have led the participants in the control group feel more comfortable, which might have inadvertently affected their responses. Therefore, different settings for follow-up tests could have reduced any group differences in changes in their depressive symptoms.

There are other limitations in the present study. First, the timing of the follow-up may have not been ideal to detect changes in depressive symptoms. It is possible that one

month was too short of a period to reveal any changes in depressive symptoms. At the one month point most participants have had time to adjust to their new vision, have been prescribed updated glasses if needed, and have stopped all needed prescription eye drops. However, the participants may still be concerned about their vision and the post-operative attention that they need. Future studies could include more than one post-baseline mark such as at 1, 3, and 6 months and 1 year. Having multiple follow-up tests over a longer period of time will allow researchers to investigate the progression. In turn, it will allow a better understanding of the long term benefits of cataract surgery and increased visual acuity.

Second, participants were not randomly placed into the control or surgery groups. Random assignment could ensure that any differences between the groups are not because of any pre-existing group differences in other variables. In the current study, the wait-list control group was significantly different from the surgery group in baseline visual acuity. The wait-list participants may not have a sense of urgency for the surgery (being asked to move up in the waitlist), because their vision is still at a level which they consider functional.

Lastly, participants in the current study were fairly homogenous. Having conducted the present study in central Maine, all participants were Caucasian, most of who grew up in the area with similar values and similar levels of educations. In a heterogeneous sample, for example, some people may be very open about depression, while other people may be very private and their responses might be affected by their desire to not show weakness or need for help. Although homogeneity of the sample limits generalizability of the current findings, it can be assumed that the two groups (i.e.,



surgery and the wait-list control groups) are similar in other variables that we did not measure. Therefore, our finding that the surgery significantly improved VRQOL is less likely to be due to other third variables.

The population that is affected by cataracts is growing rapidly with an estimated 30.1 million people over 40 with a cataract in either eye by the year 2020 (The Eye Diseases Prevalence Research Group, 2004). Understanding not only the visual benefits, but also the mental and long term benefits will help both physicians and patients to make informed decisions regarding cataract surgery. The current study demonstrated that cataract surgery not only increases visual acuity as it is aimed to do so, but also VRQOL, which in turn should increase the overall quality of life of a patient. However, the current findings show that cataract surgery does not pose significant benefit regarding decreasing depressive symptoms particularly in patients with minimal depressive symptoms. Therefore, it may not be advantageous yet to consider lowering of depressive symptoms as a benefit of cataract surgery. Further research could expand on all of the risks and benefits both psychologically and physically of an increasingly performed surgery.

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Appendix: A

**Vision and Quality of Life Study**

**Informed Consent Form**

You are invited to participate in a research project being conducted by Paige Martin, an undergraduate student in the Department of Psychology at the University of Maine (Faculty Advisor: Lira Yoon). The purpose of the research is to investigate mood and quality of life in patients who choose to have or not to have cataract surgery.

**What Will You Be Asked to Do?**

If you decide to participate, you will be asked to complete two questionnaires, now and at a one month follow up appointment. The questionnaires will take less than 30 minutes to complete. In addition to these questionnaires, information on your visual acuity, age, and gender will be obtained from your medical records for the purpose of this research. If you do not have a return appointment within about a month from now, the follow up questionnaires can be sent to you and filled out at home and returned to me with a self-addressed and stamped envelope that I will provide you.

**Risks**

There is a possibility that you may be uncomfortable answering some of the questions (e.g., “I thought my life had been a failure”, “Because of my vision I had a hard time driving at night”). You have the right to skip questions you don’t wish to answer. If

your responses on these questionnaires seem to be concerning, it will be reported to Dr. Yoon, a Psychologist and the faculty sponsor of this project, and appropriate follow-up actions will be taken.

### **Benefits**

While there are no direct benefits to you from participating, we hope this study will help us to better understand the relation between vision and quality of life in older adults.

### **Confidentiality**

Data will be kept confidential. Except the consent form, which will be kept separate from the data, your name will not be on any forms. A code number will protect your identity. All study files will be labeled with this ID number in place of a name and will be maintained in a locked office. Electronic files will be kept with password protection. Your name and other identifying information will not be reported in any publications. The key linking your name to the data will be destroyed after data analysis is complete (approximately in one year), but the investigator will keep the data, which only contains an ID number instead of your name, indefinitely. The key and data files will be stored on separate computers.

### **Voluntary**

Participation is completely voluntary. You are free to refuse to participate in the study or withdraw consent at any time during the study without giving reason. You may skip any questions you do not want to answer. Refusal in participating in this study or

withdrawal during the study, will **in no way** affect the quality of your treatment or relationship with Dr. Frasz or this office.

### **Contact Information**

If you have any questions about this research, please contact Paige Martin (email: [paige.miles@maine.edu](mailto:paige.miles@maine.edu)). You may also reach the faculty advisor on this study, Dr. Lira Yoon at [lira.k.yoon@umit.maine.edu](mailto:lira.k.yoon@umit.maine.edu). If you have any questions about your rights as a research participant, please contact Gayle Jones, Assistant of the University of Maine's Protection of Human Subjects Review Board at 581-1498 or email: [gayle.jones@umit.maine.edu](mailto:gayle.jones@umit.maine.edu).

**Your signature below indicates that you have read and understand the above information. You will receive a copy of this form.**

\_\_\_\_\_

Signature of Participant

\_\_\_\_\_

Date

**Address for follow-up paperwork to be sent to:**

Street: \_\_\_\_\_

City: \_\_\_\_\_ State \_\_\_\_\_

Zip \_\_\_\_\_

## Appendix: B

ID: \_\_\_\_\_ DATE: \_\_\_\_\_

## CES-D

Instructions: Below is a list of ways people sometimes feel or behave. For each item, please think and indicate how often or how consistently you have felt or behaved this way during THE PAST TWO WEEKS by circling the appropriate response number.

---

During the past two weeks:

0 = RARELY (less than 3 days over the past two weeks)

1 = SOMETIMES (a total of 3 days spread out over the past two weeks)

2 = OFTEN (a total of 4-7 days over the past two weeks)

3 = MOST OF THE TIME (more than 7 days)

---

- |  |   |   |   |   |
|--|---|---|---|---|
| 1. I was bothered by things that usually don't bother me                                 | 0 | 1 | 2 | 3 |
| 2. I did not feel like eating; my appetite was poor.                                     | 0 | 1 | 2 | 3 |
| 3. I felt that I could not shake off the blues even with help from my family or friends. | 0 | 1 | 2 | 3 |
| 4. I felt that I was just as good as other people.                                       | 0 | 1 | 2 | 3 |

5. I had trouble keeping focused.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future.	0	1	2	3
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	0	1	2	3
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3
16. I enjoyed life.	0	1	2	3
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not get “going”.	0	1	2	3

## Appendix: C

VF- 14 QOL Questionnaire

**Because of your vision**, how much difficulty do you have with the following activities?

Check off the box which best describes how much difficulty you have, even with glasses.

<b>Activity</b>	<b>None</b>	<b>A Little</b>	<b>Moderate</b>	<b>A Great Deal</b>	<b>Unable To Do</b>
1. Reading small print, such as medicine bottle labels, a telephone book or food labels					
2. Reading a newspaper or a book					
3. Reading a large-print book or large print newspapers or numbers on telephone					
4. Recognizing people when they are close to you					
5. Seeing steps, stairs or curbs					
6. Reading traffic signs, street signs or store signs					
7. Writing checks or filling out forms					
8. Playing games such as bingo, dominos, or card games					
9. Taking part in sports like bowling, handball, tennis, golf					
10. Cooking					
11. Watching television					
12. Doing fine handwork like sewing, knitting crocheting, carpentry					
13. Driving during the day					
14. Driving at night					

Appendix: D

**Family Eyecare**

**David P. Frasz, M.D.**

**AUTHORIZATION for the Use and/or Disclosure  
of HEALTH INFORMATION**

Name: \_\_\_\_\_ Address: \_\_\_\_\_

Telephone: \_\_\_\_\_ DOB: \_\_\_\_\_

**Instructions: Please complete all of the sections of this form. Please note incomplete or inaccurately completed forms will not be honored.**

I hereby authorize Family Eyecare to use and/or disclosure of my health information as described below:

Visual Acuity, Age and Gender from (pre-op date) to (1 month post-op date)

I understand that my specific consent is required to use and/or disclose information pertaining to treatment and/or diagnosis of mental health conditions, substance abuse and/or HIV status. Please fill out all of the sections even if one or more of them are not applicable to you. Any of the following sections not completed will be presumed to be a refusal to authorize use and/or disclosure of such information. (The information below will not be FAXED even if disclosure is authorized.)

(A) HIV status information. I DO/DO NOT (Circle one) authorize use and/or disclosure



of health information related to testing, diagnosis or treatment of HIV, ARC or AIDS.

(B) Substance Abuse Treatment Information. I DO/DO NOT (Circle one) authorize use and/or disclosure of health information related to treatment, testing or diagnosis of alcohol or substance abuse. Substance abuse treatment information may not be re-disclosed without the Individual's express written authorization or as otherwise permitted by law. Unless otherwise revoked, this SPECIFIC authorization will expire on \_\_\_\_\_, 20\_\_ or 6 months from the date of signing whichever comes first.

(C) Mental Health Treatment Information. I DO/DO NOT (Circle one) authorize use and/or disclosure of health information related to mental health treatment, not including Psychotherapy Notes which cannot be disclosed pursuant to this Authorization.

(D) Sexually Transmitted Disease Information. I DO/DO NOT (Circle one) authorize use and/or disclosure of health information related to Sexually Transmitted Diseases.

The Purpose of Use and/or Disclosure is: for a research study entitled, "Effect of Cataract Surgery on Depression in Older Adults"

Release Information to: (Name of Individual or Facility): Paige Martin

Address: University of Maine, Psychology Department, 301 Little Hall, Orono, ME 04469

Subsequent Disclosures: I DO /DO NOT (Circle one) authorize subsequent disclosures to be made of the health information identified above. This does not apply to re-disclosure of alcohol or substance abuse treatment information disclosed under section (B) above.

\* I understand I have the right to revoke this authorization at any time by sending a written revocation to Paige Martin. I understand the revocation will not apply to information that has already been released in response to this authorization and may be the basis for the denial of health benefits or other insurance coverage or benefits.

\* Unless otherwise revoked, this authorization will expire on \_\_\_\_\_, 20\_\_, or 30

months from the date of signing whichever comes first.

\* I understand that authorizing the use or disclosure of this health information is voluntary.

\* Partial or incomplete disclosures, as compared to the information requested to be disclosed, will be labeled as such.

\* I can refuse to sign this authorization. I need not sign this form in order to assure treatment, payment, enrollment in a health plan or eligibility for benefits (if applicable), except (a) if my treatment is related to research, then an authorization may be required; or (b) if the purpose of the health care is solely to create health information to be provided to a third party, then an authorization may be required.

\* I may refuse to disclose all or some health information, but that refusal may result in improper diagnosis or treatment, denial of coverage or claim for health benefits or other insurance or other adverse consequences.

\* I understand that I have a right to a copy of this authorization.

\* I understand any disclosure of information carries with it the potential for unauthorized re-disclosure and the information may not be protected by federal or state confidentiality rules anymore.

\* If I have questions about use or disclosure of my health information, I may contact Paige Martin, 207/902-2780

Signature: \_\_\_\_\_

Date:

\_\_\_\_\_

Parent/Guardian:

Date: \_\_\_\_\_

(if under 18 years of age)

Personal Representative:

Date: \_\_\_\_\_

**IF NOT SIGNED BY THE INDIVIDUAL, PLEASE PROVIDE THE FOLLOWING INFORMATION:**

Relationship to the

Individual: \_\_\_\_\_

Describe Authority to Act for Individual:

\_\_\_\_\_

**RE-DISCLOSURE OF MEDICAL RECORD INFORMATION IS STRICTLY FORBIDDEN BY RECIPIENTS UNLESS DULY AUTHORIZED BY THE PATIENT.**

**ADDITIONAL NOTICE TO RECIPIENTS OF SUBSTANCE ABUSE**

**TREATMENT INFORMATION:** This information has been disclosed to you from records protected by federal confidentiality rules (42 CFR Part 2). The federal rules prohibit you from making any further disclosure of this information unless further disclosure is expressly permitted by the written consent of the person to whom it pertains or as otherwise permitted by 42 CFR Part 2. A general authorization for the release of medical or other information is NOT sufficient for this purpose. The federal rules restrict any use of the information to criminally investigate or prosecute any alcohol or drug abuse patient.



## Appendix: E

Office of the Vice President for  
Research  
*Protection of Human Subjects Review  
Board*



5703 Alumni Hall, Room 114  
Orono, Maine 04469-5703  
Tel: 207-581-1498  
Fax: 207-581-1300  
www.umaine.edu

## MEMORANDUM

TO: Paige Martin

FROM: Gayle Jones  
Assistant to the Institutional Review Board for the Protection of Human Subjects  
(IRB)

SUBJECT: "Effect of Cataract Surgery on Depression in Older Adults," #2012-06-08

DATE: July 18, 2012

The above referenced project was approved by the University of Maine's Institutional Review Board for the Protection of Human Subjects (IRB) in a full Board review. The approval period is 6/20/2012 through 6/19/2013 (revisions accepted for final approval on 7/18/2012). A continuing review of this project must be conducted by the IRB before the end of the approval period. Although you will receive a request for this information approximately 6-8 weeks before that date, it is your responsibility to submit the information in sufficient time to allow for review before the approval period expires.

Enclosed is an approved, stamped copy of the consent document for this project. The approval for this consent expires on 6/19/2013. **This approved, stamped copy must be duplicated and used when enrolling subjects during the approval period.** In addition, the form, Authorization for the Use and/or Disclosure of Health Information, must be used to comply with HIPAA regulations.

Please remember that each subject must be given a copy of the consent document. Any unanticipated problems or harm to the subject must be reported to the IRB immediately. Any proposed changes to the research must be approved by the IRB **prior** to implementation. Any significant new findings must be reported to the subject.

If you have questions, please contact me at 1-1498. Thank you.

pc: Lira Yoon

### Author's Biography

Paige Martin was born in Bangor, Maine on April 2<sup>nd</sup>, 1992. She graduated with High Honors from Foxcroft Academy in Dover-Foxcroft, ME, and enrolled in the Honors College at the University of Maine in 2010. Pursuing degrees for both psychology and biology, Paige also has a minor in neuroscience and has completed the pre-medical course requirements. Paige has been active in research while at the university receiving a College of Language Arts Fellowship, Carolyn E. Reed Pre-Medical Honor's Thesis Fellowship, and the Maine INBRE Summer Fellowship.

Next school year Paige plans to finish her fourth year, continuing her work on her psychology and biology degrees at the University of Maine. Upon graduation, Paige plans to apply to medical schools and pursue a career in the medical field focusing on neurology.