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Purpose. To investigate the mediating role of coping self-efficacy (CSE) between two types of illness cognitions (i.e., acceptance and helplessness) and depressive symptoms in persons with low vision.

Methods. This was a single-group, cross-sectional study. Patients with visual acuity < 6/12 in the better eye and at least minimal depressive symptoms (≥ 5 on the Patient Health Questionnaire-9 [PHQ-9]) were recruited from vision rehabilitation services and participated in telephone-administered structured interviews at one time point. Measures were the PHQ-9, CSE Scale, and Illness Cognition Questionnaire. Structural equation modeling (SEM) devised the causal flow of illness cognitions and their observed indirect effects on depressive symptoms via the CSE mediators: problem focused, emotion focused, and social support.

Results. The study comprised 163 patients (mean age 62 years; 61% female), most with age-related macular degeneration (26%) and moderate vision impairment (44%, <6/18–6/60). Structural equation modeling indices indicated a perfect fit ($\chi^2 < 0.001$, $P = 1.00$), accounting for 55% of the variance in depressive symptoms. Lower levels of acceptance and higher levels of helplessness illness cognitions were associated with lower self-efficacy in problem-focused coping ($\beta = 0.38$, $P < 0.001$, $\beta = -0.28$, $P < 0.01$, respectively), which in turn was associated with greater depressive symptom severity ($\beta = -0.54$, $P < 0.001$).

Conclusions. Lack of acceptance and greater helplessness relating to low vision led to a lack of perceived capability to engage in problem-focused coping, which in turn promoted depressive symptoms. Third-wave cognitive–behavioral treatments that focus on acceptance may be efficacious in this population.

Keywords: illness cognitions, coping self-efficacy, low vision, depression, acceptance

Low vision (visual acuity unable to be corrected to better than 6/12 in the better eye[1]) can lead to significant vision-specific and/or psychological distress.[2–4] For example, research suggests that more than 30% of individuals with low vision have subthreshold depressive symptoms[4,5] and that, for older people with low vision, the prevalence of depression is at least double that of matched samples of those without low vision.[4,6] However, the impact of low vision on emotional well-being varies greatly from person to person, even among those with comparable eye diagnoses.[7] Furthermore, severity of vision impairment incompletely explains the detrimental effect of ophthalmologic disease on emotional well-being and functioning.[8,9] Thus, the psychological outcomes of low vision are most likely, at least in part, determined by intrapersonal factors.[3,10,11] Two such factors are illness cognitions and coping self-efficacy (CSE).

Illness cognitions occur in response to chronic disease/disability when an individual has evaluated how much his or her condition could impede daily and goal-directed actions.[10,12,13] The two overarching types of illness cognitions are helplessness and acceptance. Helplessness illness cogni-tions involve preoccupation with the adverse effects of low vision, its permanence, and unmanageability with regard to day-to-day functioning.[13,14] In contrast, acceptance illness cogni-tions entail acknowledgement of low vision and confidence in living with and adapting to the limitations.[13] Previous research has shown that illness cognitions play an important role in protecting against or promoting depressive symptoms in the context of chronic conditions other than low vision.[7] Evidence suggests that greater acceptance of vision impairment is associated with improved psychological adjustment[3,7,11,15] and, in other chronic health conditions, poorer psychological outcomes have been related to increased helplessness.[7,13,14]

Coping self-efficacy, one's perceived capability to use coping strategies to deal with health-related disturbances,[16] may also account for variability in the impact of low vision on psychological outcomes. Maladaptive coping, particularly avoidant coping, has been found to reduce vision-related quality of life over time,[9] while adaptive coping, specifically instrumental coping, social support, and use of assistive aids, predicts better adjustment to vision impairment.[11] While

studies have explored actual coping behavior among people with low vision, CSE is yet to be investigated in this population.

As a whole, part of the variation in psychological outcomes for individuals with low vision may arise both from illness cognitions and perceived capability for adaptive coping. Because CSE and actual coping occur after a problem is identified (i.e., low vision) and considered, we propose that the relationship between illness cognitions and depression will be mediated by CSE. For example, greater acceptance may lead to greater adaptive CSE in making a plan of action to improve mobility, engaging in meditation, and/or obtaining assistance from others, which then serve to protect against depressive symptoms. Henceforth, our aim was to test the assertion that illness cognitions contribute to depressive symptoms via CSE in a low vision population. We hypothesized that greater helplessness and lower acceptance would be associated with increasing depressive symptoms, and that adaptive CSE (i.e., problem-focused coping, emotion- and cognitive-focused coping, and/or seeking social support) would mediate the relationship between illness cognitions and depressive symptoms.

MATERIALS AND METHODS

Participants and Recruitment

Participants were recruited across Australia from Vision Australia, a low vision rehabilitation service provider. Participants who met screening criteria for age ($\geq$18 years) and scored $\geq$3 on the Patient Health Questionnaire-2 (PHQ-2)[17] were identified by Vision Australia staff. Eligible participants (N = 529) were then contacted by researchers to assess additional eligibility criteria and invited to complete the telephone-administered structured interview with a trained research assistant/PhD level student. At this juncture, participants required a score of $\geq$5 on the PHQ-9 (PHQ-9),[18,19] best-corrected visual acuity <6/12 in the better eye, the ability to converse in English, adequate hearing using a hearing aid if necessary, no active treatment for a mental health condition, independent living in the community, and no cognitive impairment as determined by the 6-item Cognitive Impairment Test (CIT6).[20]

Informed written consent was obtained from all participants via mail. Ethical approval was provided by Human Research and Ethics Committees of the Royal Victoria Eye and Ear Hospital (12/1061H) and Deakin University (2012-139). This research adhered to the tenets of the Declaration of Helsinki.

Design

A single-group, cross-sectional design was used. Our study reports on baseline data collected between the years 2012 and 2015 from 163 patients with low vision and depressive symptomatology who were enrolled in a two-arm randomized controlled trial (RCT) that aimed to explore the effectiveness of problem-solving therapy for primary care (PST-PC) in reducing depressive symptoms. Details of the RCT are described elsewhere[21] (ACTRN12612000318886).

Demographics

Participants' data on age, eye diseases, self-reported general health, and marital, educational, and residential statuses were collected. Vision Australia records provided most recent Snellen assessed visual acuity, categorized into mild, <6/12 to 6/18; moderate, <6/18 to 6/60; and severe, <6/60 vision impairment.

Depressive Symptom Severity

The PHQ-9[18,19] assesses the frequency with which participants experienced nine symptoms over the past 2 weeks. They were asked, for example, "Over the last 2 weeks, how often have you been bothered by . . . feeling down, depressed, or hopeless"? Responses were rated on a four-point Likert scale ranging from "not at all" = 0 to "nearly every day" = 3, with a summed score range of 0 to 27. Higher scores indicate increasing depressive symptoms, and a score of $\geq$10 is the threshold for clinical levels of depression, with a sensitivity and specificity of 88% in detecting major depressive disorder.[18] The PHQ-9 has been validated for use with patients with vision impairment[22] and administration over the telephone.[23]

Intrapersonal Psychological Factors

The Illness Cognition Questionnaire (ICQ)[13] is chiefly used with patients with multiple sclerosis, chronic pain, or rheumatoid arthritis, but can be adapted to the specific condition in question. The ICQ is made up of 18 items, measuring three ways people assign meaning to their chronic disease: (1) "Acceptance" (six items), reflecting acknowledgement of one's low vision and perceived ability to positively manage its negative consequences—for example, "I have learned to live with my vision impairment"; (2) "Helplessness" (six items) focusing on the negative consequences of low vision and overgeneralizing these to functioning in daily life—for example, "My vision impairment limits me in everything that is important to me"; and (3) "Perceived benefits" (six items) exploring any benefits a person may experience as a result of their vision impairment—for example, "My vision impairment has taught me to enjoy the moment more." The latter scale was not included in our study as we did not form any specific hypotheses about the impact of perceived benefits of low vision on depressive symptoms; this was based on the lack of theoretical and empirical standing of this variable with regard to the variables of interest and in our specified population. The four-point Likert scale ranges from "not at all" = 1 to "completely agree" = 4. Summed increasing scale scores indicate that acceptance and helplessness with regard to low vision are held to a larger degree by the respondent. The ICQ has demonstrated strong internal reliability, as well as good construct and predictive validity across chronic conditions,[13] and has previously been used over the telephone in a low vision population.[24]

The Coping Self-Efficacy Scale (CSE)[25] consists of 26 items assessing confidence in one's ability to cope effectively with life challenges. The three subscales are: (1) "Problem-Focused"—for example, "Make a plan of action and follow it when confronted with a problem" (12 items); (2) "Stop Unpleasant Emotions/Thoughts"—for example, "Look for something good in a negative situation" (9 items); and (3) "Support from Friends/Family"—for example, "Get emotional support from friends and family" (5 items). The preceding statement for each item was "When things aren't going well for you, or when you're having problems, how confident or certain are you that you can do the following . . . ?" On an 11-point anchored scale for each item, participants indicated the extent to which they could perform in accordance with the coping statement. Anchor points were "cannot do at all" = 0 to "moderately certain can do" = 5 and "certainly can do" = 10, with a higher score indicating greater CSE. The CSE has demonstrated excellent internal reliability and concurrent and predictive validity,[25] and has been successfully used in auditory format.[26]

TABLE 1. Differences Between Participants in the Study and Those Who Declined to Participate

Characteristics	Participants in the Study, $N = 163$	People Who Declined to Participate, $N = 200$	P Value
Age, y, mean (SD)	62.4 (16.9)	78.3 (17.4)	**<0.001**
Sex, male, n (%)	64 (39.3)	62 (31.0)	0.100
Vision impairment, n (%)			
Mild VI	48 (29.4)	48 (24.0)	0.344
Moderate VI	72 (44.2)	103 (51.5)	
Severe	43 (26.4)	49 (24.5)	
VI/blindness			
Comorbid eye diseases (yes)	29 (17.8)	24 (12.6)	0.170

Bold number indicates significant *P* values. VI, vision impairment.

Psychometric Assessment of the Measures

Rasch analysis was used to assess the psychometric properties of all scales and to derive interval measures for analysis. The Andrich rating scale model[27] was used with Winsteps software (version 3.75; Chicago, IL, USA).[28] Rasch analysis is a form of item response theory in which the ordinal ratings of the questionnaire are transformed to estimates of interval measures (expressed in log of the odd units, or logits). Rasch analysis provides significant insight into the psychometric properties of the scale, including appropriate use of response categories, measurement precision, how well items fit the underlying trait, unidimensionality, targeting of item difficulty to patients' ability, and differential item functioning (DIF). Rasch analysis is important for studies using rating scales, as loss of measurement quality due to participants' poor understanding of questions or underutilization of response categories can reduce the value of clinical research.[29-31]

The PHQ-9 demonstrated acceptable fit to Rasch model parameters, although precision fell just below acceptable levels, suggesting that there was a lack of variance across the spectrum of depression in the sample. The ICQ Acceptance and Helplessness subscales demonstrated excellent fit to the Rasch model, with good precision and targeting, and no evidence of multidimensionality or item misfit. The Problem-Focused subscale of the CSE had disordered thresholds that were resolved by collapsing response categories from 10 to 6. Item 9, "Talk positively to yourself," displayed substantial misfit and was therefore removed. The Stop Unpleasant Emotions/Thoughts subscale of the CSE also required categories to be collapsed from 10 to 7 to resolve disordered thresholds. There was some evidence of multidimensionality and minor item misfit. Finally, the Support from Family/Friends subscale required categories to be collapsed from 10 to 6 to resolve disordered thresholds, and item 2, "Get emotional support from friends and family," displayed minor misfit. For all measures, the derived logit scores were transformed to a 0 to 10 scale to assist in interpretation. A higher score indicates that a person possesses a high level of the assessed latent trait (e.g., helplessness, acceptance, depressive symptoms, and CSE).

Statistical Analysis

Descriptive analyses were performed on all variables. Continuous variables are presented as mean and standard deviation (SD) for the normally distributed data, whereas categorical variables are presented as absolute (n) and relative frequencies (%). Pearson's correlation analyses were used to establish associations between the variables of interest, followed by mediation analysis[32] to evaluate the hypothesis that CSE mediates the relationship between illness cognitions and depressive symptoms. To interpret the mediational results, a structural equation model (SEM) was devised to encapsulate the causal flow of illness cognitions and their observed indirect effects on depressive symptoms via the multiple CSE mediating variables: problem focused, emotion focused, and social support. Structural equation modeling permits exploration of total, direct, and indirect effects among the variables of interest. Bootstrapping analysis with 5000 bootstraps was used; this is the current preferred method for testing indirect effects.[33] Bootstrapping is a nonparametric resampling method that generates an estimate of the indirect effect, and it does not require assumptions about the shape of the sampling distribution that underlie the Sobel test. The data met all of the assumptions for SEM, and shared variance and muticollinearity were not problematic in this sample. Age and self-reported health status were included as control variables, as these were the only covariates significant in the univariate regression analyses; severity of vision impairment was not adjusted in the model, as it was not associated with PHQ-9 depression scores ($P = 0.204$). To evaluate overall model fit, several fit indices were used: the χ^2 goodness-of-fit statistic, the Tucker-Lewis index (TLI), the Bentler comparative fit index (CFI), and the root mean square error of approximation (RMSEA). A model is considered to have good fit if the χ^2 statistic is nonsignificant, TLI and CFI are greater than 0.95,[34] and the RMSEA is below 0.05.[35] The data were analyzed through SEM with maximum likelihood estimation using Stata 14.1 (StataCorp, College Station, TX, USA). All statistical tests were 2-sided with a 0.05 level of significance.

RESULTS

Of the 529 persons who had a telephone assessment, 200 declined to participate (Table 1; people who declined were significantly older than those who participated in the study [$P < 0.001$]); 88 did not meet inclusion criteria (i.e., currently engaged in psychological treatment [$n = 26$], hearing was inadequate [$n = 17$], cognitively impaired [$n = 16$], not living independently [$n = 12$], PHQ-9 score of <5 [$n = 8$], and non-English speaking [$n = 9$]); 76 were unable to be contacted, and 2 were deceased. The final sample consisted of 163 participants.

Participant Characteristics

The sample (Table 2) of 163 participants included 99 women (mean age = 65.0 years, SD = 15.9 years) and 64 men (mean age = 58.4 years, SD = 17.6 years). Twenty-nine percent of participants had mild ($n = 48$; <6/12–6/18), 44% moderate ($n = 72$; <6/18–6/60), and 26% severe vision impairment ($n = 43$; <6/60). The mean duration of low vision was 15.6 years (SD = 18.5). Age-related macular degeneration was the most frequently diagnosed primary eye condition (26%, $n = 43$); 14% ($n = 23$) were diagnosed with diabetic retinopathy; 12% ($n = 20$) had optic nerve damage; and 48% ($n = 78$) had other vision conditions (e.g., nystagmus).

TABLE 2. Sociodemographic and Psychosocial Participant Characteristics at Baseline Participant Characteristics ($n = 163$)

Categorical variables	n (%)
Sex	
Female	99 (60.7)
Male	64 (39.3)
Marital status	
Single/widowed/never married	93 (57.1)
Married/de facto	70 (42.9)
Health status	
Excellent	12 (7.3)
Good	28 (17.1)
Very good	52 (31.7)
Fair	39 (23.8)
Poor	33 (20.1)
Education level	
None/primary school	12 (7.4)
Some secondary/technical	95 (58.3)
Secondary completed	17 (10.4)
Trade/apprenticeship/TAFE	12 (7.3)
University	27 (16.6)
Residing with someone	
No	54 (33.1)
Yes	109 (66.9)
Visual impairment	
Mild	48 (29.4)
Moderate	72 (44.2)
Severe/blindness	43 (26.4)
Comorbid eye diseases	
No	29 (17.8)
Yes	134 (82.2)
Continuous variables	Mean (SD)
Age, y	62.4 (16.9)
Rasched ICQ Helplessness	5.04 (2.28)
Rasched ICQ Acceptance	4.76 (2.44)
Rasched CSE Emotions/Thoughts	4.03 (1.82)
Rasched CSE Problem-Focused	4.71 (1.91)
Rasched CSE Social Support	5.51 (1.73)
Rasched PHQ-9 Depression	3.22 (1.91)

TAFE, technical and further education.

Univariate and Multivariate Analysis

Pearson correlation coefficients (Table 3) showed that depression scores were associated with the predictor variables as expected; a moderate positive relationship was observed between PHQ-9 Depression and ICQ Helplessness, and moderate negative relationships were found between PHQ-9 Depression and ICQ Acceptance and all of the CSE subscales. Illness Cognition Questionnaire Helplessness and Acceptance had a strong negative relationship with each other, and both were moderately correlated with the CSE subscales. Illness Cognition Questionnaire Helplessness was negatively associated with the CSE subscales, whereas ICQ Acceptance was positively associated with the CSE subscales.

Mediation analysis (Table 4) showed that the previous significant relationships between the ICQ subscales and PHQ-9 Depression became nonsignificant after the introduction of the mediators (i.e., CSE subscales). Only CSE Problem-Focused added a substantial amount of variance to the model and served as a mediator between the ICQ subscales and PHQ-9 (i.e., ICQ Acceptance and Helplessness had no significant effect on PHQ-9 Depression when CSE Problem-Focused was introduced).[32]

The standardized parameter estimates for the SEM analysis can be viewed in the Figure. The final model fit indices

TABLE 3. Correlations Between Illness Cognitions, CSE, and Depressive Symptoms ($n = 163$)

Variable	1	2	3	4	5	6
1. ICQ Helplessness	–	−0.75	−0.55	−0.59	−0.48	0.57
2. ICQ Acceptance		–	0.59	0.60	0.50	−0.55
3. CSE Emotions/Thoughts			–	0.77	0.58	−0.60
4. CSE Problem-Focused				–	0.64	−0.71
5. CSE Social Support					–	−0.48
6. PHQ-9 Depression						–

Higher subscale scores indicate a greater degree of illness cognitions and CSE.

All values are $P < 0.001$.

indicated a perfect fit, and the data accounted for 55% of the variance in PHQ-9 Depression. χ^2 was <0.001, $P = 1.00$; CFI was 1.00; TLI was 1.0; standardized root mean squared residual (SRMR) was <0.001; standardized root mean residual was <0.001; RMSEA was <0.001, with a 90% confidence level of 0.000 to 0.000 (all of the statistics were well within range). As displayed in the Figure, a negative direct effect was found, such that lower CSE Problem-Focused was associated with increasing PHQ-9 Depression scores ($\beta = -0.54$, $P < 0.001$). As shown in Table 5, a negative indirect effect was found between ICQ Acceptance and PHQ-9 Depression scores via CSE Problem-Focused ($\beta = -0.16$, SE = 0.05, $P = 0.001$). A positive indirect effect was found between ICQ Helplessness and PHQ-9 Depression scores via CSE Problem-Focused ($\beta = 0.13$, SE = 0.05, $P = 0.009$). Thus, lower levels of acceptance predict greater depressive symptoms via lower levels of problem-focused CSE, while higher levels of helplessness predict greater depressive symptoms via lower levels of problem-focused CSE. The total effects of ICQ Acceptance and Helplessness on PHQ-9 Depression scores were -0.25 (SE $= 0.08$, $P = 0.001$) and 0.24 (SE $= 0.09$, $P = 0.010$), respectively. Direct effects were also found for ICQ Helplessness and CSE Social Support ($\beta = -0.27$, SE $= 0.11$, $P = 0.011$), ICQ Acceptance and CSE Emotions/Thoughts ($\beta = 0.42$, SE $= 0.09$, $P < 0.001$), and ICQ Acceptance and CSE Social Support ($\beta = 0.27$, SE $= 0.11$, $P = 0.011$).

DISCUSSION

Our novel study provides evidence for the role of illness cognitions and problem-focused CSE in depressive symptoms among persons with low vision. Independent of age and self-reported health status, how one thinks about one's low vision and one's perceived ability to use problem-focused coping accounted for a considerable proportion of the variance in depressive symptoms. Specifically, greater levels of depressive symptoms were predicted by lower levels of problem-focused CSE, which, in turn, was determined by lower levels of acceptance and greater levels of helplessness.

The findings support the view that illness cognitions are an important factor linking disease to psychological well-being generally[12,13,36] and vision impairment specifically. In support of our hypotheses, both acceptance and helplessness illness cognitions were associated with depression in the manner predicted. This is consistent with previous studies linking improved psychological adjustment to acceptance of vision impairment,[3,7,11,15] and poorer psychological outcomes in chronic health conditions to increased helplessness.[7,13,14]

When the role of CSE was investigated, only partial support for our mediational hypothesis was obtained; problem-focused CSE mediated the relationships between the illness cognitions and depression. However, in the path model, helplessness illness cognitions predicted both lower social support and

TABLE 4. Univariate and Multivariate Linear Regression Models for the Mediational Effect of CSE Between Illness Cognitions and Depressive Symptoms

Variable	Univariate Linear Regression β (95% CI)	Multivariate Linear Regression* β (95% CI)
1. ICQ Helplessness	0.48 (0.36, 0.61)†	0.11 (−0.05, 0.27)
2. ICQ Acceptance	−0.41 (−0.50, −0.32)†	−0.09 (−0.22, 0.03)
3. CSE Emotions/Thoughts	−0.63 (−0.77, −0.50)†	−0.03 (−0.20, 0.14)
4. CSE Problem-Focused	−0.68 (−0.80, −0.56)†	−0.53 (−0.73, −0.34)†
5. CSE Social Support	−0.51 (−0.64, −0.39)†	0.01 (−0.16, 0.18)

CI, confidence interval.
* Model included the variables significant in the univariate regression analyses: age and self-reported health status.
† $P < 0.001$.

problem-focused CSE, while acceptance illness cognitions predicted higher CSE for all domains. This demonstrates that helplessness and acceptance impact various aspects of CSE; yet CSE in social support and stopping unpleasant emotions and thoughts did not serve as significant mediators of depression. The findings suggest that acceptance illness cognitions may be a necessary prerequisite for all domains of CSE that were explored. Adaptive emotion regulation, strategies to deal with unhelpful thoughts, and seeking appropriate social support are well-known protective factors for mental health, and the findings reflect the significant impact of illness cognitions on these domains. In contrast, helplessness illness cognitions are associated with withdrawal from others and not seeking appropriate support out of fear, shame, or embarrassment regarding vision loss. Thus, intervening with how one interprets one's illness and manages unhelpful cognitions or uncomfortable emotions is the first step to build CSE to protect against or treat depression in persons with low vision.

Importantly, how people think about chronic illness and how they evaluate their ability to cope with it are modifiable. Illness cognitions and problem-focused CSE provide concrete starting points for designing targeted interventions to modify or neutralize unhelpful cognitions. Cognitive–behavioral treatments, problem-solving treatment (PST), or acceptance and commitment therapy (ACT) is likely to be efficacious in protecting against and reducing depressive symptoms among individuals with low vision. However, PST may be most effective for those individuals who have greater levels of acceptance in relation to their vision impairment.[9] Acceptance and commitment therapy, on the other hand, focuses on building acceptance by helping people to create a "rich, full, and meaningful life while accepting the pain that life inevitably brings" (p. 2).[37] Through neutralizing or defusing helplessness-related cognitions, building acceptance, and designing values-driven goal-directed behavior acting to increase problem-

focused CSE, the client is gradually activated in a behavioral sense and begins to achieve personal goals. While there is vast evidence for the efficacy of ACT in the treatment of depression, ACT in low vision has not yet been tested.

Our study is the first to explore a mediational path model elucidating the effect of illness cognitions on CSE and depressive symptoms in low vision. Strengths of the study include the use of Rasch analysis to validate outcome measures and transform ordinal scores to interval-level measurement, and sophisticated SEM provides assurance regarding the robustness of our model. However, there are also a number of shortcomings. First, as the sample was engaged with low vision rehabilitation services and agreed to take part in an RCT for depression management and thus was treatment seeking, the findings may not be extrapolated to the broader population of low vision patients who do not seek support. As a result, the findings may be understated as patients were engaged in rehabilitation programs that promote well-being. Second, while there was a proportion of patients (37.8%) who declined to participate in our study, the refusal rate is not unlike what is seen in other studies conducting health research, with refusal rates reported as high as 53%.[38] In fact, across all epidemiologic study designs, there has been an observed decrease in participation due to nonresponse and refusal over time.[39] Nonetheless, the nonparticipation rate observed in our study may impact the generalizability of the findings and may have resulted in reduced statistical power suggesting that our findings could further be understated. Third, we observed that persons who declined to participate in the study were significantly older than those who agreed to participate. Our findings suggest that willingness to engage in health research decreases with increasing age. This finding is not consistent with other research exploring factors that affect willingness to participate in studies,[38] but could be indicative of a range of factors including the positive relationship between increasing depressive symptoms and age found in patients with vision impairment.[4,40] In other words, patient refusal may be related to low motivation, fatigue, and other symptoms of depression that are also further intensified by increasing age. While we did not gather data on depressive symptoms in nonparticipants, this finding could again indicate that our results are understated and may impact the findings' generalizability. Fourth, additional psychosocial influences that could predispose people to unhelpful cognitions, such as a biological vulnerability to depression or personality traits (e.g., neuroticism), were not explored. It could also be argued that exploring illness cognitions in a sample of individuals who have an increased prevalence of depressive symptoms may be problematic because mood state may impact cognitions, implying reverse causality.[41] Finally, the issues with fit to the Rasch model for some measures mean that the results must be interpreted with some caution.
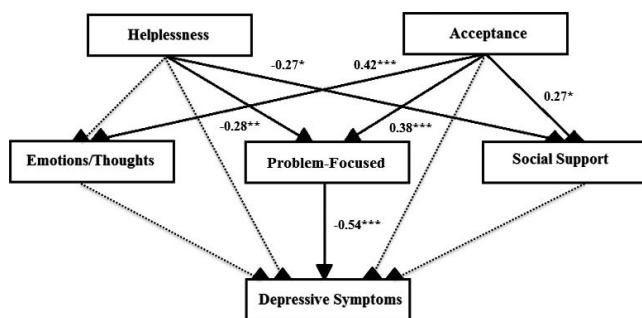

FIGURE. Path diagram of the model tested to evaluate the impact of illness cognitions and CSE on depressive symptoms. Higher scores indicate a greater degree of illness cognitions and CSE. *$P < 0.05$, **$P < 0.01$, ***$P < 0.001$.

TABLE 5. Standardized Results for the Structural Equation Model of the Effect of CSE between Illness Cognitions and Depressive Symptoms*

Variable	Direct Effects		Indirect Effects		Total Effects	
	Effect Size (SE)	P	Effect Size (SE)	P	Effect Size (SE)	P
ICQ Helplessness	0.11 (0.01)	0.176	0.13 (0.05)	0.009	0.24 (0.09)	0.010
ICQ Acceptance	−0.09 (0.06)	0.162	−0.16 (0.05)	0.001	−0.25 (0.08)	0.001
CSE Emotions/Thoughts	−0.03 (0.09)	0.757	–	–	−0.03 (0.09)	0.757
CSE Problem-Focused	−0.54 (0.10)	<0.001	–	–	−0.54 (0.10)	<0.001
CSE Social Support	0.01 (0.09)	0.910	–	–	0.01 (0.09)	0.910

* Model included the variables significant in the univariate regression analyses: age and self-reported health status.

Future research could confirm our findings using a longitudinal design, as the factors explored in this study are dynamic (i.e., cognitive factors, visual acuity, depressive symptoms). Other studies could explore, using a three-armed RCT, the effectiveness of PST versus ACT versus control in a low vision population to enhance positive intrapersonal factors and improve mental health outcomes; this would help to determine the mechanisms of change in the tested psychological interventions. Researchers may also want to trial depression treatment interventions before providing vision rehabilitation services to examine if the uptake and outcomes of those rehabilitation services improve. Additional studies could explore whether the model tested in this study fits with other mental health problems (e.g., anxiety) in low vision and assess for predisposing biopsychosocial factors. Studies may also include participants with vision impairment from the general population who are not actively engaged in vision rehabilitation programs.

In conclusion, our novel findings suggest that problem-focused CSE mediates the relationship between helplessness and acceptance illness cognitions on the one hand and depressive symptoms on the other. Psychological interventions that promote adaptive and reduce maladaptive illness cognitions and increase problem-focused CSE may be successful in reducing depressive symptoms in people with low vision.

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