UNIVERSITY OF CALIFORNIA

Los Angeles

Promoting Adjustment in Uveal Melanoma Survivorship:

A Randomized Trial Targeting Illness Perceptions

A dissertation submitted in partial satisfaction of the

requirements for the degree Doctor of Philosophy

in Psychology

by

Megan Michelle Hoch

2024

ABSTRACT OF THE DISSERTATION

Promoting Adjustment in Uveal Melanoma Survivorship:

A Randomized Trial Targeting Illness Perceptions

by

Megan Michelle Hoch

Doctor of Philosophy in Psychology

University of California, Los Angeles, 2024

Professor Annette Louise Stanton, Chair

Introduction: This dissertation project was a randomized controlled trial of a brief psychoeducational intervention targeting three illness perceptions (chronicity, control, coherence) in a sample of uveal melanoma (UM) survivors at UCLA (N = 101). Illness perceptions have been shown to be associated with psychological and disease-related adjustment in the context of chronic illnesses at large (e.g., Hagger et al., 2017), and within UM patient populations specifically (e.g., Hoch et al., 2023). More positive (i.e., less threatening) illness perceptions have been shown to be associated with better mental health outcomes in the context of chronic illness. **Method**: The intervention consisted of two psychoeducational videos in which participants' ocular oncologist discussed considerations for promoting mental, physical, and visual adjustment across the course of UM survivorship. The control group received an enhanced

treatment as usual manipulation comprised of a mental health resource information sheet. Participants completed four study visits via online surveys, including a baseline visit (T0) during which they completed assessments and were randomized to the intervention (n = 53) or control (n = 48) condition and received their respective study manipulations. Assessments were repeated one (T1) and two (T2) weeks later, with a final assessment (T3) administered four weeks after the third study visit. I hypothesized that participants randomized to the treatment condition would evidence less threatening illness perceptions over the course of the study than would participants in the control condition. **Results**: Multilevel models tested interactions between study condition and time to evaluate treatment effects on illness perception and psychological distress outcomes. Number of years since UM diagnosis and pre-randomization levels of approach- and avoidance-oriented coping were included in separate models as moderators. No interactions between study condition and time were statistically significant (with or without additional moderator variables). Participants' feedback suggested that both the psychoeducational and control interventions were rated as informative, acceptable, and credible. Participants reported that both interventions would have been particularly helpful at the time of UM diagnosis. **Conclusion**: We recommend that future trials test the psychoeducational intervention at more specific and relevant clinical milestones to optimize desired changes in illness perceptions (e.g., following UM diagnosis).

The dissertation of Megan Michelle Hoch is approved.

Thomas Bradbury

Jennifer A Sumner

Han Du

Annette Louise Stanton, Committee Chair

University of California, Los Angeles

2024

Dedication

This dissertation project is dedicated to my mentors in clinical health psychology who work tirelessly to promote mental and physical adjustment outcomes for individuals diagnosed with chronic diseases. This project is also dedicated to people with ocular melanoma who have been incredibly generous in sharing their lived experiences through participating in both medical and psychosocial research initiatives. I would also like to dedicate this dissertation to my parents and to my partner for their tireless support throughout graduate school and the completion of this project and my degree.

TABLE OF CONTENTS

I. Introduction 1
- i. Rare Cancers 1
- ii. Uveal Melanoma 1
  - 1. Psychological Predictors of Mental Health Outcomes 3
- iii. Common Sense Model (CSM) 4
- iv. Illness Perception Domains 6
  - 1. Control Appraisals 6
  - 2. Chronicity Appraisals 7
  - 3. Coherence Appraisals 8
  - 4. Other Illness Perception Domains 9
  - 5. Directionality of Effects 10
- v. Goodness-of-Fit Models (GOF) 11
- vi. Coping Interventions 14
- vii. Illness Perception Interventions 16
  - 1. Illness Perception Stability 16
  - 2. Intervention Literature 17
- viii. Psychoeducation and Illness Perceptions 19
- ix. Unmet Needs in UM Survivors 22
- x. Anxiety and Depressive Symptoms in Cancer 24
- xi. Current Dissertation Project 25

II. Study Aims and Hypotheses 27
- i. Aim 1: Target Engagement of Illness Perceptions 27
- ii. Aim 2: Change in Depressive Symptoms and Anxiety 28
- iii. Aim 3: Intervention Efficacy Moderated by Time Since Diagnosis 28
- iv. Aim 4: Intervention Efficacy Moderated by Coping Processes 28
- v. Aim 5: Illness Perceptions as Mediators of Change in Depressive Symptoms and Anxiety 29

III. Methods 30
- i. Participants, Recruitment, and Enrollment 30
  - 1. Inclusion Criteria 31
  - 2. Exclusion Criteria 32
- ii. Study Conditions 32
  - 1. Treatment Condition 32
  - 2. Control Condition 34
  - 3. Manipulation Checks 35
  - 4. Experimenter Blinding 37

TABLE OF CONTENTS (continued)

iii. Procedure 38
1. Baseline Visit (T0), Randomization, and Treatment Manipulation 38
2. Second Assessment Point (T1) and Administration of Video #2 39
3. Third Assessment Point (T2) 40
4. Fourth Assessment Point (T3) 40
iv. Measures 40
1. Demographic and Medical Variables 40
2. Brief Illness Perception Questionnaire (Broadbent et al., 2006) 41
3. Center for Epidemiological Studies Depression Scale (Radloff, 1977) 41
4. Generalized Anxiety Disorder Scale (Spitzer et al., 2006) 42
5. Coping Processes 42
6. Exit Surveys 43
IV. Analytic Plan 44
i. Descriptive Statistics 44
ii. Composite Psychological Distress Variable 45
iii. Moderation Analyses 45
1. Omnibus Models 47
a. Model 1. 48
b. Model 2. 48
c. Model 3. 48
d. Model 4. 48
iv. Blimp Software 48
v. Mediation Analysis 49
vi. Qualitative Analysis 50
V. Results 50
i. CONSORT Diagram 50
ii. Sample Characteristics 51
iii. Descriptive Statistics 52
1. Descriptive Statistics Across Study Conditions 53
iv. Missing Data 55
v. Manipulation Check for Treatment Condition 55
vi. Model 1 56
vii. Model 2 57
viii. Model 3 58
ix. Model 4 61
x. Mediation Model 63
xi. Intervention Feedback 63
1. Quantitative Feedback 63
2. Qualitative Feedback 65
a. Video 1. 65
b. Video 2. 66
c. Mental Health Resource Information Sheet. 67

TABLE OF CONTENTS (continued)

VI. Discussion 68
- i. Interpretation of Study Findings 68
  1. Moderation Models 68
  2. Mediation Model 74
  3. Intervention Feedback 75
- ii. Failed Target Engagement 75
  1. Sample Considerations 76
  2. Intervention Considerations 77
  3. Methodological Considerations 79
- iii. Study Strengths and Limitations 82
- iv. Future Directions 84
- v. Conclusion 87

VII. Appendix A – Copies of Measures 89

VIII. Appendix B – Video Transcripts and Mental Health Resource Information Sheet 96

IX. Appendix C – Blimp Syntax for Moderation Analyses 110

X. Appendix D – Figures 113

XI. Appendix E – Tables 121

XII. References 144

List of Figures

Figure 1 - *Schematic of Study Procedure and Assessments*

Figure 2 – *Model 1 Equation*

Figure 3 – *Model 2 Equation*

Figure 4 – *Model 3 Equation*

Figure 5 – *Model 4 Equation*

Figure 6 – *Mediation Model*

Figure 7 – *CONSORT Diagram*

Figure 8 – *Model 1 Predicting Chronicity Perceptions*

Figure 9 – *Model 1 Predicting Control Perceptions*

Figure 10 – *Model 1 Predicting Coherences Perceptions*

Figure 11 - *Model 1 Predicting Psychological Distress (Z-Scores)*

Figure 12 - *Model 3 Predicting Control Perceptions*

List of Tables

Table 1 – *Characteristics of Participants at Study Entry (T0; n = 99 – 101)*

Table 2 – *Descriptive Statistics – Psychological Variables*

Table 3a – *Independent Samples t-Test of Participants Randomized to the Treatment (n = 53) and Control (n = 48) Conditions (Equal Variances Assumed) on Variables at T0*

Table 3b – *Pearson Chi-square Comparison of Participants Randomized to the Treatment (n = 53) and Control (n = 48) Conditions on Variables at T0*

Table 4a – *Independent Samples t-Test of Participants with Incomplete (n = 20) and Complete (n = 81) Data (Equal Variances Assumed) on Variables at T0*

Table 4b – *Pearson Chi-square Comparison of Participants with Complete (n = 20) and Complete (n = 81) Data on Variables at T0*

Table 5 – *Omnibus Model 1: Interaction Between Time and Study Condition on Illness Perception and Psychological Distress Outcomes (N = 101)*

Table 6 – *Omnibus Model 2: Interaction Between Time, Study Condition and Years Since UM Diagnosis (T0) on Illness Perception and Psychological Distress Outcomes (N = 101)*

Table 7 – *Omnibus Model 3: Interaction Between Time, Study Condition and Approach-Oriented Coping (T0) on Illness Perception and Psychological Distress Outcomes (N = 101)*

Table 8a – *Simple Interactions Between Time and Study Condition on Control Perceptions at Probed Values of Approach-Oriented Coping (T0) (N = 101)*

Table 8b – *Simple Simple Effects of Time within Study Conditions When Approach-Oriented Coping (T0) is Probed at a Value of 1 (N = 101)*

Table 9 – *Omnibus Model 4: Interaction Between Time, Study Condition and Avoidance-Oriented Coping (T0) on Illness Perception and Psychological Distress Outcomes (N = 101)*

Table 10 – *Mediation Model Testing Indirect Effect of Study Condition on Psychological Distress via Illness Perceptions (N = 69)*

Table 11a – *Descriptive Statistics of Item Responses to the Exit Survey for Video 1*

List of Tables (continued)

Table 11b – *Descriptive Statistics of Item Responses to the Exit Survey for Video 2*

Table 11c – *Descriptive Statistics of Item Responses to the Exit Survey for the Mental Health Resource Information Sheet*

Table 12a – *Independent Samples t-test of Participants' Exit Survey Responses at T0 in the Treatment (N = 49 – 53) and Control (N=44 – 45) Conditions*

Table 12b – *Independent Samples t-test of Participants' Exit Survey Responses at T1 (Treatment Condition, N = 49) and T0 (Control Condition, N = 44 – 45)*

Table 12c – *Paired Samples t-test of Treatment Condition Participants' Exit Survey Responses to Videos 1 and 2 (Equal Variances Assumed) (N = 44 – 53)*

List of Supplementary Materials

Spreadsheets:

Table A – *Pearson Bivariate and Point-Biserial Correlations Between Psychological Variables at All Assessment Points (T0 – T4) (N = 92 – 101)*

Table B – *Pearson Bivariate and Point-Biserial Correlations Between Demographic and Medical Variables at T0 with Psychological Variables at T0 (N = 92 – 101)*

List of Acronyms

BIPQ – Brief Illness Perception Questionnaire

CES-D Center for Epidemiologic Studies Depression Scale

CSM - Common Sense Model

GAD-7 – Generalized Anxiety Disorder Scale-7

GOF – Goodness of Fit

IPQ – Illness Perception Questionnaire

IPQ-R – Illness Perception Questionnaire - Revised

IRB – Institutional Review Board

ITT – Intent to Treat

N – Number of participants

PSR – Potential scale reduction

T0 – Study visit 0/ Baseline visit / Assessment Point 0

T1 – Study visit 1 / Assessment Point 1

T2 – Study visit 2 / Assessment Point 2

T3 – Study visit 3 / Assessment Point 3

UCLA – University of California, Los Angeles

UM – Uveal Melanoma

Acknowledgments

The introduction section is informed by two co-authored publications that are listed below:

Hoch, M. M., MacDonald, J. J., Jorge-Miller, A., McCannel, T. A., Beran, T. M., & Stanton, A. L. (2023). Depression in uveal melanoma survivorship: Examining psychological predictors of adjustment in the first year following diagnosis. *Annals of Behavioral Medicine, 57*(12*),* 1081–1096. https://doi.org/10.1093/abm/kaad057

Co-author J. J. MacDonald contributed to data management and interpretation of study findings. Co-author A. Jorge-Miller contributed to data collection. Co-author T. A. McCannel was a co-principal investigator and contributed to study design, data collection, and interpretation of study findings. Co-author T. M. Beran contributed to study design, data collection, and interpretation of findings. Co-author A. L. Stanton was the lead principal investigator and contributed to study design, data analysis, interpretation of study findings, and manuscript writing.

Stanton, A. L., & Hoch, M. M. (2024). Cognition, coping, and adjustment in chronic disease. In T. W. Smith & N. B. Anderson (Eds.), *APA Handbook of Health Psychology* (Vol. 1: Foundations and Context of Health Psychology, pp. 485-508). American Psychological Association.

Co-author A. L. Stanton contributed to manuscript conceptualization and writing.

MEGAN M. HOCH, M.A., C. PHIL.
Curriculum Vitae

EDUCATION

University of California, Los Angeles, Los Angeles, CA 2018 – 2024
Ph.D. Candidate in Clinical Psychology, Minor in Quantitative Psychology
GPA: 4.00

University of California, Los Angeles, Los Angeles, CA December 2019
M.A. in Clinical Psychology

New York University, New York, NY 2011 – 2015
Bachelor of Arts, 2015; *summa cum laude*, GPA: 3.96
Major: Psychology; Minors: Child & Adolescent Mental Health Studies; Political

HONORS AND AWARDS

2020	National Science Foundation (NSF) *Honorable Mention* Graduate Research Fellowship Program
2019 - 2020	UCLA Graduate Research Mentorship Award ($21,000)
2019	UCLA Graduate Summer Research Mentorship Award ($6,000)
2018 - 2019	UCLA Department of Psychology Fellowship ($21,000)
2015	Phi Beta Kappa Honors Society
2015	New York University Doris Aaronson Award for Outstanding Departmental Research ($500)
2015	New York University Coons/Leibowitz Award for Outstanding Undergraduate Teaching ($500)
2015	New York University Dean's Undergraduate Research Fund Award ($500)
2014	Psi Chi Psychology Honors Society
2011 - 2015	New York University Dean's Lists

PUBLICATIONS

Stanton, A. L. & **Hoch, M. M.** (2024). Cognition, coping, and adjustment in chronic disease. In T. W. Smith & N. B. Anderson (Eds.), *APA Handbook of Health Psychology Volume 1: Foundations and Context of Health Psychology* (Chapter 24).

Hoyt, M.A., Llave, K., Wang, A.W., Darabos, K., Diaz-Yanez, K., **Hoch, M. M.**, MacDonald, J. J., & Stanton, A. L. (*In Press, Health Psychology)*. Coping through emotional approach for mental and physical health: A metanalysis.

Hoch, M. M., MacDonald, J. J., Jorge-Miller, A., McCannel, T. A., Beran, T. M., & Stanton, A. L. (2023). Depression in uveal melanoma survivorship: examining psychological predictors of adjustment in the first year following diagnosis. *Annals of Behavioral Medicine : A Publication of the Society of Behavioral Medicine*, kaad057. Advance online publication. https://doi.org/10.1093/abm/kaad057

Costi, S., Morris, L. S., Kirkwood, K. A., **Hoch, M.,** Corniquel, M., Vo-Le, B., … & Murrough, J. W. (2021). Impact of the KCNQ2/3 channel opener Ezogabine on reward circuit activity and clinical symptoms in depression: results from a randomized controlled trial. *The American Journal of Psychiatry*, *178(5)*, 437–446.

Hoch, M. M., Doucet, G. E., Moser, D. A., Hee Lee, W., Collins, K. A., Huryk, K. M., DeWilde, K. E., Fleysher, L., Iosifescu, D. V., Murrough, J. W., Charney, D. S., Frangou, S., & Iacoviello, B. M. (2019). Initial evidence for brain plasticity following a digital therapeutic intervention for depression. *Chronic Stress*, *3*, 1-10.

Costi, S., Soleimani, L., Glasgow, A., Brallier, J., Spivack, J., Schwartz, J., Levitch, C. F., Richards, S., **Hoch, M.**.. & Murrough, J. W. (2019). Lithium continuation therapy following ketamine in patients with treatment resistant unipolar depression: a randomized controlled trial. *Neuropsychopharmacology*, *44(10)*, 1812-1819.

Nikolin, S., Chand, N., Loo, C., Iacoviello, B., **Hoch, M.**, Martin, D. (2019). Clinical effects of transcranial direct current stimulation combined with cognitive emotional training in patients with treatment resistant depression. Brain Stimulation, 12(2), 482.

Iacoviello, B. M., Murrough, J. W., **Hoch, M. M.,** Huryk, K. M., Collins, K. A., Cutter, G. R., Iosifescu, D. V., Charney, D. S. (2018) A randomized, controlled pilot trial of the Emotional Faces Memory Task: a digital therapeutic for depression. *npj Digital Medicine, 1*.

Martin, D. M., Teng, J. Z., Lo, T. Y., Alonzo, A., Goh, T., Iacoviello, B. M., **Hoch, M. M.,** Loo, C. K. (2018). Clinical pilot study of transcranial direct current stimulation combined with cognitive emotional training for medication resistant depression. *Journal of Affective Disorders, 232*, 89–95.

PRESENTATIONS

Poster Presentations

Hoch, M. M., Figueroa*, M., Jorge-Miller, A., Arch, J. J., Wiley, J. F., Weihs, K. L., & Stanton, A. L. (2023, March 15-18). *Breast cancer survivorship in the COVID-19 pandemic: associations between cancer-related post-traumatic growth and pandemic-related adjustment* [Poster presentation]. Annual meeting of the American Psychosocial Oncology Society, Portland, Oregon, United States of America. *Presenting author

Hoch, M. M., Owoyemi, P*., Jorge-Miller, A., Weihs, K. L., & Stanton, A. L. (2023, March 8-11). *"Goodness of Fit" models of psychological adjustment in breast cancer survivorship: examining illness perceptions of current and anticipated illness* [Poster presentation]. Annual Meeting of the American Psychosomatic Society, San Juan, Puerto Rico. *Presenting author

Hoch, M. M., MacDonald, J. J., Jorge-Miller, A., McCannel, T. A., Beran, T. M., & Stanton, A. L. (April, 2020; Conference Canceled). *Coping, illness perceptions, and depression in uveal melanoma: An examination of Common Sense and Coping Resource models.* Poster accepted to the 41st annual meeting of the Society of Behavioral Medicine, San Francisco, CA. *Conference canceled due to COVID-19 Pandemic (April, 2020).

Hoch, M. M., Doucet, G., Moser, D., Collins, K. A., Murrough, J. W., Iosifescu, D. V., Charney, D. S., Iacoviello, B. M., & Frangou, S. (May, 2018) *Neural connectivity changes associated with a cognitive-emotional training intervention for depression.* Poster presented at the 73rd annual meeting of the Society of Biological Psychiatry, New York, NY.

Hoch, M., Murrough, J. W., Iosifescu, D. V., Collins, K. A., Charney, D. S., & Iacoviello, B. M. (May, 2017). *Evaluating the efficacy of a cognitive-emotional training intervention for depression.* Poster presented at the 72nd annual meeting of the Society of Biological Psychiatry, San Diego, CA.

Professional Presentations

Hoch, M. M. (2023, April). *Ocular Melanoma and Mental Health: Research and Clinical Practice at UCLA Jules Stein Eye Institute.* [Invited Talk]. Simms/Mann Center for Integrative Oncology. Los Angeles, CA (delivered live online via Zoom).

Hoch, M. M. (2023, February). *Coping with Ocular Melanoma: Considerations for Disease Adjustment.* UCLA Jules Stein Eye Institute's Ophthalmology Ground Rounds. Los Angeles, CA.

Hoch, M. M. & McCannel, T. A. (2022, October). *Ocular Melanoma Survivorship.* [Invited Talk]. The Ocular Melanoma Foundation's 2022 "Cure Ocular Melanoma: Global Science Meeting". Edinburgh, Scotland.

McCannel, T. A. & **Hoch, M. M.** (2021, November). *Mental Health in Ocular Melanoma.* [Invited Talk]. The Ocular Melanoma Foundation's 2021 "A Cure in Sight" lecture series. Los Angeles, CA.

Introduction

Rare Cancers

The National Cancer Institute (NCI) launched its Rare Tumors Initiative in 2013 to encourage research efforts regarding rare cancers, including elucidation of the unique experiences of survivors of rare cancers (NCI, 2015). The NCI defines rare cancers as those with fewer than 15 new cases diagnosed per 100,000 people annually (Greenlee et al., 2010). While research efforts dedicated to the development of disease models and treatments for rare cancers burgeon, predictors of survivors' psychological health trajectories and outcomes associated with rare cancers remain relatively understudied (Horick et al., 2018; IRCI, 2017), as do relevant psychosocial interventions. Additional research is crucial as individuals diagnosed with rare cancers evidence higher rates of depression, anxiety, and poor quality of life outcomes than individuals with more commonly diagnosed cancers, such as cancers of the breast and prostate (Bergerot et al., 2018; Zabora, et al., 2001). This dissertation project tested outcomes of a randomized trial of a brief psychoeducational intervention designed to promote psychological adjustment in survivors of uveal melanoma (UM), a rare, intraocular cancer.

Uveal Melanoma

UM has an incidence rate of 5.2 new cases per one million adults each year (Aronow et al., 2018). In keeping with the rare cancer literature, high rates of psychological sequalae in UM populations have been observed, with evidence to suggest these rates can remain elevated in the years following diagnosis and successful treatment (Brown, 2018). Studies examining psychological distress in people with UM have demonstrated rates of clinically significant symptoms of depression and anxiety ranging from 9 – 25% and 19 – 35%, respectively (e.g., Amaro et al., 2010; Brandberg et al., 2000; Chabert et al.,2004; Schuermeyer et al., 2016).

To date, research exploring contributors to mental health outcomes in UM survivors largely has examined disease-related characteristics, such as risk level for metastatic disease. One distinctive and important feature of UM is that despite successful treatment of the original tumor within 1-2 months following diagnosis, approximately 50% of individuals go on to be diagnosed with metastatic disease in which the cancer spreads to other parts of the body, chiefly the liver (Bedikian, 2006). Metastatic UM is associated with very poor prognosis, in that it commonly occurs within five years of diagnosis, rarely responds to systemic treatment, and exhibits a high (~50%) mortality rate within the first year following initial detection (Cerbone et al., 2014; Gragoudas et al., 1991; Kath et al., 1993; Khoja et al., 2019; Kujala et al., 2003; Rantala et al., 2019). For individuals with UM, metastatic illness is highly associated with specific genetic markers present in cells of the original tumor. In particular, the loss of one copy of chromosome 3, referred to as "monosomy 3", is found in approximately 50% of individuals with UM and is indicative of a high risk for metastatic disease. Risk estimates for the development of metastatic UM in individuals with monosomy 3 vary across the literature, but largely fall within a range 60% to 100% estimated lifetime risk (Damato et al., 2007; Onken et al., 2010). Alternatively, individuals who have preservation of both copies of chromosome 3, referred to as "disomy 3", are at a substantially lower risk for metastasis. Lifetime risk estimates for metastatic disease in these individuals typically fall within a range of 0 to 5% (Damato et al., 2007; Onken et al., 2010).

An individual's monosomy/disomy 3 status and corresponding risk of metastatic disease are determined through cytogenetic testing, a process that involves the genomic sequencing of a biopsied tissue extracted from the melanoma tumor at the time of surgical or radiation treatment. For the past two decades, it has been standard clinical practice for UM patients to receive

cytogenetic testing and obtain feedback regarding their estimated risk level for metastatic illness (Melia, 2006).

Given the differential prognoses for individuals with high versus low metastatic risk, a growing body of research has explored whether individuals with UM differ in their psychological morbidity as a result of learning their cytogenetic test result. A systematic review (Miniati et al., 2018) revealed no consistent effect of metastatic risk on anxiety, depression, or quality of life outcomes for adults with UM who were informed of their genetic testing result. Furthermore, a recent study examining longitudinal mental health outcomes in a sample of UM patients treated at the University of California, Los Angeles (UCLA) also did not find a significant effect of metastatic risk level on depressive symptoms in the year following diagnosis (Hoch et al., 2023). Thus, research efforts to identify predictors of psychological adjustment to UM has increasingly mirrored that of other and more commonly occurring forms of cancer, and has turned towards psychological predictors of adjustment proposed by theoretical frameworks in health psychology.

Psychological Predictors of Mental Health Outcomes

Although much of the existing literature examines the effects of disease-specific factors (e.g., metastatic risk) on mental health outcomes in samples of UM survivors, recent investigations examine the role of psychological factors in predicting patients' mental and physical well-being across the disease course. For example, MacDonald et al. (2021) found that subjective, but not objective, visual impairment predicted depressive symptoms in a sample of UM patients (with low trait optimism) over the course of one year following initial diagnosis. These findings lend support to psychological frameworks of chronic disease which theorize that psychological factors, such as one's *appraisals* of their illness, are stronger predictors of mental

health outcomes than are clinical features of the disease per se. Below is a summary of psychological frameworks that have informed this dissertation project and suggest important targets for intervention to promote psychological adjustment for individuals with UM and other chronic illnesses.

Common Sense Model (CSM)

The common sense model of self-regulation of health and illness (CSM) is one such psychological framework of chronic illness that emphasizes the role of appraisal in predicting adjustment outcomes (Leventhal et al., 1980). The CSM posits that 1) individuals appraise their illness in a number of domains, 2) these "illness perceptions" then inform the individual's downstream emotional responses and coping efforts, 3) which ultimately predict their mental and physical adjustment in response to their illness. Leventhal et al. (1980) specified distinct domains of appraisals on which individuals may evaluate their illness, including: 1) the degree of control they believe they have over their illness (control), 2) the perceived chronicity of their disease (chronicity), 3) the degree to which they experience symptom burden specific to their disease (identity), 4) how much they understand their disease (coherence), 5) the perceived cause(s) of their disease (cause), 6) the perceived impact of their illness on their life (consequences), and 7) their emotional responses to their illness (emotional).

The CSM proposes a mediational relationship amongst these constructs, with illness perceptions predicting adjustment outcomes indirectly through their effects on coping processes. Leventhal et al. (1980) theorized that negative or threatening appraisals of one's illness (e.g., less control, longer chronicity) and positive appraisals (e.g., greater coherence, lower identity) would lead individuals to adopt corresponding coping efforts to manage the illness, in keeping with the level of perceived threat. Specifically, more threatening illness appraisals were theorized to

inspire maladaptive coping efforts (i.e., avoidance-oriented coping), while less threatening appraisals were theorized to promote more adaptive forms of coping (i.e., approach-oriented coping). Accordingly, said coping processes were hypothesized to differentially predict mental, physical, and disease-related adjustment outcomes over time, with maladaptive coping resulting in worse outcomes and adaptive coping promoting better adjustment. The CSM therefore holds a central causal assumption that illness perceptions directly influence subsequently selected coping efforts, which in turn predict different courses of adjustment.

To date, the health psychology literature has largely supported the associations between coping processes, illness appraisals, and adjustment outcomes proposed by the CSM. A comprehensive meta-analysis by Hagger and Orbell (2003) examined results from 45 studies that tested the CSM in populations facing various forms of chronic disease. Results lent support to the CSM, as illness perception domains were correlated with adjustment outcomes in expected directions. The authors found that positive perceptions (e.g., of higher control and coherences) were associated with better adjustment, while more negative perceptions (e.g., of higher identity and chronicity) were associated with indicators of worse mental and physical adjustment. Findings also revealed that illness appraisal domains were associated with coping processes: threatening illness appraisals (e.g., prolonged chronicity, high identity) were most highly correlated with avoidance-oriented coping strategies, while positive appraisals (e.g., higher control) were strongly associated with approach-oriented strategies, such as problem-focused coping and cognitive reappraisal.

These findings have been widely replicated in recent decades across patient samples diagnosed with various forms of disease. For example, a meta-analysis of 54 studies examining coping processes, illness perceptions, and adjustment outcomes in adults with various cancers

found relationships of small to moderate effect sizes between illness perceptions and coping processes, and of moderate to large effect sizes between illness perceptions and adjustment outcomes. These relationships were again found in expected directions, with more positive perceptions associated with approach-oriented coping and more optimal adjustment, while more threatening perceptions were most strongly associated with avoidance-oriented coping and poorer adjustment outcomes (Richardson et al., 2017).

Illness Perception Domains

Over the past several decades a notable body of literature has generated support for the CSM in predicting adjustment across various chronically ill populations. This work has evolved over time to interrogate associations between specific domains of illness perceptions and a range of adjustment outcomes, including psychological functioning. Below is a summary of the theoretical influence of each domain of illness perceptions on the course of adjustment to chronic illness, including evidence of said influence on adjustment outcomes, specifically in the context of cancer survivorship.

Control Appraisals

Perceptions of control over one's illness is one of the most widely examined constructs in the field of health psychology and research on adjustment to chronic disease. A greater sense of perceived control over one's disease has been associated with more optimal psychological and disease-related adjustment outcomes across various chronically ill populations. In the context of chronic disease, "personal control" perceptions (e.g., Hagger & Orbell, 2003; Hagger & Orbell, 2021), concern the degree to which people believe they themselves have control over their disease and its course. In theory, greater personal control perceptions offer benefits for adjustment in the context of chronic illness, as control appraisals may serve to reduce the degree

of threat that is experienced by the individual. In turn, greater perceived control may serve to reduce the iatrogenic effects of stress on the individual's mental health, physical functioning, and quality of life throughout the disease course.

These theoretical implications of personal control appraisals in the context of chronic disease are well-supported in the health psychology literature. For example, Toscano and colleagues (2020) observed that perceptions of personal control were associated with multiple indicators of positive adjustment in a sample of individuals with skin melanoma. Specifically, they found that control perceptions were positively associated with emotional functioning and global self-rated health, as well as higher levels of role and social functioning over time. Further, in a prospective study of older adult cancer survivors, maintenance of personal control perceptions over time was associated with lower levels of psychological distress, both six and 12 months after diagnosis (Ranchor et al., 2010).

Chronicity Appraisals

Chronicity perceptions, sometimes referred to as "timeline" appraisals in the literature (Hagger & Orbell, 2021), reflect how long an individual believes their illness will continue into the future. While this construct has been less extensively studied than control perceptions, it has nonetheless been shown to demonstrate its own unique impact on adjustment to chronic illness. Specifically, prolonged chronicity perceptions have been shown to be associated with worse psychological adjustment across various chronically ill populations, while shorter chronicity perceptions have been shown to be associated with better outcomes (e.g., Dempster et al., 2015; Hagger & Orbell, 2021, Richardson et al., 2017). Chronicity perceptions may impact adjustment through influencing one's expectations of the duration for which they will need to exert coping efforts against the disease. Expectations of a prolonged illness timeline could understandably

exacerbate an individual's anticipation of sequelae associated with the illness, and in turn increase their experiences of stress and hinder adjustment over time.

Empirical support exists for the negative impact of prolonged chronicity perceptions on adjustment outcomes for individuals diagnosed with cancer. For example, prolonged chronicity appraisals were shown to be positively associated with depressive symptoms in patients with thyroid (Husson et al., 2020) and head and neck cancers (Llewellyn, 2007). Greater chronicity perceptions have also been shown to be associated with poor psychological adjustment after the diagnostic and oncologic treatment phases, including a greater degree of fear of recurrence in a sample of breast cancer survivors one year following treatment (Freeman-Gib et al., 2017).

Coherence Appraisals

Coherence perceptions reflect the degree to which individuals believe they understand their own illness. In theory, perceptions of low coherence may place an individual with chronic illness at risk for poor adjustment, as having less information or knowledge about one's illness may inherently confer a greater degree of uncertainty surrounding several aspects of disease survivorship (Leventhal et al., 1980). For example, low coherence perceptions could reflect poor understanding of an individual's own prognosis for treatment response or survival, as well as uncertainty surrounding how to best manage symptoms and cope with other sequelae. In turn, low coherence may predict worse adjustment outcomes such as higher levels of distress and lower levels of disease-related functioning or self-efficacy.

Evidence lends support to the aforementioned implications of coherence appraisals on adjustment in the context of cancer. For example, in a study of patients with non-muscle-invasive bladder cancer, lower coherence appraisals were associated with elevated depressive and anxiety symptoms over the course of a three-month period (Zhang, et al., 2020). Similarly, in a study of

men treated for localized prostate cancer, low coherence appraisals were associated with worse emotional well-being assessed 18 months after treatment (Traeger et al., 2009).

Other Illness Perception Domains

Of note, this dissertation will not focus on the other four illness perception domains postulated by Leventhal et al. (1980): identity, consequences, emotional representations, and causal attributions. Identity appraisals, emotional representations, and consequence perceptions have been shown to be strongly associated with many adjustment outcomes in the context of chronic diseases, with greater perceived symptom burden (i.e., identity perceptions), more negative emotional responses, and more negative consequences of one's own disease demonstrating associations with worse mental health, medical, and quality of life outcomes (Dempster et al., 2015, Richardson et al., 2017). However, there is reason to believe these associations may be artificially inflated due to both theoretical and operational overlap that exists between identity, consequence, and emotional appraisals and the indices of adjustment they are hypothesized to predict. Higher degrees of identity appraisals have been examined across the literature as both an independent predictor of poor adjustment outcomes, as well as an indicator of poor adjustment in and of itself (i.e., physical sequelae). Regarding consequence appraisals, when an individual considers the impact their illness has had on their life, they are inherently also considering their adjustment to the illness. Similarly, when reflecting on their emotional responses to their illness, individuals are also inherently reflecting on their emotional adjustment to said illness. Thus, it is challenging to extricate illness appraisals of identity, consequences, and emotional responses from adjustment outcomes. Accordingly, associations between these variables should be interpreted with caution and with acknowledgment of the aforementioned theoretical and operational overlap (e.g., Stanton & Hoch, 2024).

Regarding causal attributions, exploration of this domain of illness appraisal was omitted for a number of reasons. First, although there is a sizeable body of literature suggesting that internal, unstable, and controllable causal attributions of disease are associated with worse adjustment outcomes, it appears that all three of these attributions may need to be present concurrently in order to produce robust downstream effects on adjustment (Roesch & Weiner, 2001). As noted in their meta-analysis, Roesch & Weiner (2001) reported that causal attributions appear to exert their influence on adjustment outcomes indirectly through mental (e.g., emotion-focused), but not behavioral (e.g., problem-focused) coping processes, suggesting a further layer of complexity in associations between causal perceptions and adjustment in chronically ill populations. Finally, these specific effects of causal attributions on adjustment appear to be quite small, explaining relatively little of the variance in adjustment outcomes (Roesch & Weiner, 2001). Thus, the effect of causal attributions on adjustment is complex and specific to certain combinations of appraisals and subsequent coping processes, and for these reasons the current study did not explore this illness perception domain.

Directionality of Effects

While a sizeable literature provides support to tenets of the CSM framework, limitations exist within this evidence base that warrant consideration. First, a clear majority of studies testing the CSM framework are cross-sectional in design, which substantially limits the support they can provide for the causal and directional model assumptions in predicting longitudinal adjustment (Hagger et al., 2017; Hagger & Orbell, 2021). In the absence of established temporal precedence between illness perceptions, coping, and indices of adjustment, confirmation of the theorized causal and mediated relationships within the CSM is unfortunately impossible. Cross-sectional findings that appear to support the CSM can also be interpreted in the opposite

direction with statistical equivalence, such that illness perceptions could in fact mediate associations between coping processes and adjustment outcomes. Similarly, adjustment outcomes could actually serve to "predict" the development of subsequent illness perceptions and/or influence adopted coping processes. In the absence of longitudinal research, support of the CSM framework is inherently limited, as both the positioning and direction of effects among illness perceptions, coping processes, and adjustment outcomes cannot be properly determined when they are measured at a single time point.

Prospective studies testing causal and directional assumptions of the CSM are limited, but on the rise in recent years. Dempster and colleagues (2015) conducted a meta-analysis of 31 studies testing relationships among illness perceptions, coping, and psychological adjustment in the context of chronic disease. Thirteen of those studies interrogated the indirect effect of illness perceptions on adjustment outcomes, as mediated by coping processes. Of said studies, only three detected significant mediation models; however, all three had cross-sectional designs. Five longitudinal studies conducted mediation analyses, but none yielded significant indirect effects of illness perceptions on adjustment via coping. Thus, although general associations among illness appraisals, coping, and adjustment were again supported, temporal precedence was not established among these variables as specified under the CSM framework (see Hagger & Orbell, 2021 for an informative and detailed overview of the CSM and proposed theoretical revisions). In order to make more definitive causal inferences regarding CSM hypotheses, experimental research is needed in which manipulation of and/or change in illness perceptions are shown to predict subsequent changes in coping processes and adjustment outcomes.

"Goodness-of-Fit" Models (GOF)

The CSM proposes a mediational pathway between illness perceptions, coping and adjustment in response to chronic illness, while other frameworks hypothesize *moderated* relationships among these constructs. One such framework is the "Goodness of Fit" (GOF) hypothesis proposed by Lazarus and Folkman (1984, 1987). The GOF proposes that control perceptions moderate the relationship between coping and adjustment in the context of a given stressor. Lazarus and Folkman theorized that adjustment is optimized when an appropriate "fit" exists between the selected coping method and the degree to which the stressor at hand is perceived as controllable. Specifically, they believed problem-focused coping processes would offer the most benefit for adjustment when people appraised a stressor as highly controllable, while emotion-focused coping would confer most benefit for adjustment when perceptions of stressor controllability were low.

A recent systematic review examined 15 studies that tested GOF models in the context of chronic illness, where interactions between control perceptions and coping domains on psychological and disease-related adjustment outcomes were interrogated (Finkelstein-Fox & Park, 2019). Mixed evidence emerged in support of GOF models. The authors found support for GOF models in the context of problem-focused coping, as this coping domain was associated with more optimal adjustment to illness-specific stressors that were perceived as more controllable, and worse adjustment in response to illness-specific stressors appraised as less controllable. On the other hand, the authors found more inconsistent findings across studies regarding interactions between control appraisals and emotion-focused coping and their implications for adjustment. Specifically, support for GOF models seemed somewhat contingent on the method used for defining and measuring emotion-focused coping across the 15 studies. Some studies conceptualized emotion-focused coping as an active process, including approach-

oriented practices such as emotional processing and expression. However other studies defined and measured emotion-focused coping as a passive practice, including avoidance-oriented processes such as withdrawal and denial. When studies adopted the more passive definition, emotion-focused coping was associated with notably poorer adjustment, no matter the degree to which stressors were viewed as controllable. Accordingly, this pattern of findings fails to demonstrate any moderation effects between emotion-focused coping and control perceptions on adjustment outcomes. While some support emerged for GOF models, said findings should be interpreted with caution as many of the studies included in the review were cross-sectional in nature, preventing true examination of causal or directional effects.

A recent study explored the utility of GOF models in predicting longitudinal adjustment outcomes in the context of UM (Hoch et al., 2023). In a sample of UM survivors, the authors examined separate interactions between control perceptions and approach- and avoidance-oriented coping processes, respectively, in predicting depressive symptoms one year following diagnosis. Interactions between control perceptions and coping processes were examined at multiple assessment points throughout the study, both at one week and three months following diagnosis. No significant interactions emerged between control perceptions and coping processes at any assessment point in predicting subsequent depressive symptoms.

Although these results did not lend support to the original GOF hypotheses, interesting findings supported a potential extension of the GOF framework beyond the domain of control perceptions. In this study, analyses were also conducted to examine interactions between *chronicity* perceptions and coping processes, and a series of significant findings emerged. First, a significant interaction between chronicity perceptions and avoidance-oriented coping at the time of UM diagnosis predicted depressive symptoms one year following diagnosis. Interrogation of

simple slopes revealed that the deleterious effect of avoidance-oriented coping on depressive symptom severity was significant only for UM patients who endorsed prolonged chronicity perceptions at the time of diagnosis. Chronicity perceptions and approach-oriented coping also interacted significantly at multiple time points to predict depressive symptoms one year following diagnosis. Specifically, the protective effect of approach-oriented coping against depressive symptoms was moderated by chronicity perceptions three months following diagnosis. Again, simple slopes demonstrated that this effect was significant only for individuals who reported prolonged chronicity perceptions. These results suggest a potential extension of the GOF theoretical framework, highlighting implications of chronicity perceptions for longitudinal mental health outcomes depending on type and degree of coping processes.

More research is needed to elucidate the positioning of, and directionality between, illness perceptions and coping processes in their impact on adjustment outcomes in the context of chronic disease. The current literature converges on the role of illness perceptions and their influence alongside coping processes in predicting mental health outcomes in the context of cancer. Illness perceptions can therefore serve as candidate targets for psychosocial intervention in the service of promoting psychosocial adjustment across the course of chronic disease and its survivorship. Effectively targeting and modifying illness appraisals through psychosocial intervention can also help to elucidate directionality of theorized effects between illness perceptions and coping processes in their joint role in predicting psychological and disease-related adjustment to chronic illness.

Coping Interventions

Despite the promise of illness perceptions as targets for psychosocial intervention, a far greater body of literature explores the utility of coping interventions in promoting mental health

and other outcomes across chronic illness survivorship. These interventions are notably heterogeneous in the scope of covered content, the prescribed number and duration of sessions they contain, and the medium through which they are delivered. Coping interventions do however share in common the aim of teaching individuals to engage in more adaptive methods of navigating their illness and related mental and physical sequalae, such as approach-oriented coping processes, benefit-finding, and meaning-making. Further, said interventions typically caution individuals against over-utilizing less adaptive means of coping that have been shown to contribute to worse adjustment outcomes, such as rumination, denial and other avoidance-oriented strategies.

A recent study meta-analyzed 38 randomized, controlled trials of psychosocial interventions that sought to improve coping skills in samples of individuals diagnosed with cancer (Buffart et al., 2020). The authors found that the interventions overall conferred small but statistically significant decreases in symptoms of both anxiety and depression. Further, the study identified key factors that moderated the efficacy of the interventions, including clinician type, delivery medium, and targeted population. Specifically, interventions evidenced more successful coping outcomes when delivered in-person (vs. other mediums), by psychologists (vs. other training), and to patients who demonstrated higher levels of pre-intervention distress.

This latter finding is somewhat consistent with Hoch et al.'s (2023) moderation findings, in that the protective effects of approach-oriented coping and the deleterious effects of avoidance-oriented coping were present only for individuals with relatively prolonged chronicity perceptions. Thus, the effects of coping processes and/or coping skills interventions on adjustment may be most relevant for individuals with high levels of distress and/or threatening illness perceptions. These findings suggest that the provision of psychosocial resources such as

coping interventions, which are often costly and limited within oncology settings, may be optimally utilized when delivered to patients deemed "at risk" for poor psychological adjustment based on an initial screening of their psychological distress, coping efforts, or illness perceptions.

Illness Perception Interventions

A less well-studied possibility for an efficient and effective means of promoting adjustment to chronic disease might be interventions to alter illness perceptions. Such interventions not only would direct resources towards "at risk" individuals with heightened degrees of threatening illness perceptions, but also would specifically target illness perceptions as a mechanism of intervention and a means of promoting subsequent adjustment. Below is a summary of the literature regarding the stability of illness perceptions over time, a review of the existing illness perception intervention literature, and an exploration of the theoretical advantage of leveraging illness perception interventions to promote mental health outcomes in the context of UM survivorship.

Illness Perception Stability

Do illness perceptions change over time? Both longitudinal and intervention research have examined the stability and mutability of illness perceptions. The illness perception literature consistently reveals a high degree of stability in illness perceptions across the course of disease and survivorship (Dempster et al., 2015). Generally, specific domains of illness perceptions appear to remain stable in the absence of disease-related events or milestones (e.g., treatment, rehabilitation programs) or targeted intervention. These trends are consistent with the CSM, in which illness perceptions are theorized to change only in response to active attempts at adjustment or through perceived changes in threat posed by one's illness (Leventhal et al., 1980). For example, several longitudinal studies have failed to find significant changes in illness

perceptions, including a study of breast cancer survivors from diagnosis until six months later (McCorry et al, 2013) and a study of young adult cancer survivors over a one-year period (de Castro et al., 2012).

As previously mentioned, however, illness perceptions have been shown to change in response to significant milestones related to one's disease. For example, changes in illness appraisals have been observed in patients with cardiovascular disease following important clinical milestones such as cardiac rehabilitation (Goodman et al., 2013; Janssen et al., 2013), angiography (Devcich et al., 2012), and cardiac valve replacement (Crawshaw et al., 2015). Illness appraisals have also been shown to change following the start of hemodialysis treatment in patients diagnosed with chronic kidney disease (Jansen et al., 2013). These results highlight the potential mutability of illness appraisals over time, especially in response to meaningful clinical junctures across the course of disease and survivorship.

Intervention Literature

Interventions have increasingly been developed to both target and modify illness perceptions in order to promote psychosocial functioning in patient populations facing chronic disease. Similar to coping skills interventions, there is vast heterogeneity across illness perception interventions regarding the targeted populations, presented content, and delivery mediums. What these interventions have in common is the goal of targeting select (or all) domains of appraisals in order to reduce threatening illness perceptions and promote adjustment outcomes. The literature to date is varied in regards to efficacy, suggesting specific illness perception interventions are variable in their utility of successfully promoting adjustment. What is promising, however, is that notable evidence suggests these interventions can in fact successfully engage and exact desired modifications in illness perceptions. A meta-analysis by

Broadbent and colleagues (2015) found that all domains of illness perceptions were amenable to change in response to targeted interventions (compared to control groups) in 24 randomized controlled trials. Thus, in response to targeted intervention, it seems that illness appraisals can be successfully modified in desired directions, with growing evidence to suggest that said changes can in turn promote domains of psychosocial and disease-related adjustment.

There are many examples of illness perception interventions that have demonstrated success in targeting appraisals and promoting various domains of adjustment for patients diagnosed with cardiovascular disease. In a foundational study by Petrie and colleagues (2002), rehabilitation nurses administered a three-session inpatient illness perception intervention to patients who were hospitalized for a first-time myocardial infarction. The intervention sought to engage illness perceptions by 1) screening patients' illness perceptions using the Illness Perception Questionnaire (IPQ; Weinman et al., 1996), 2) engaging patients in discussion of their more threatening appraisals (e.g., low control, high chronicity), and 3) providing patients with information surrounding their disease/diagnosis in order to promote less threatening illness perceptions (e.g., lower chronicity, higher coherence). Compared to patients that received a control intervention, patients who received the illness perception intervention evidenced less threatening illness appraisals and more optimal adjustment outcomes, both at inpatient discharge and at a three-month follow-up assessment. Of note, patients in the intervention condition demonstrated pre- to post-intervention change in multiple domains of illness appraisals, including reduced chronicity perceptions, greater perceptions of personal control, and higher illness coherence. Not only were these changes observed in hypothesized directions, they were importantly *not* observed for patients in the control condition. In addition to modifications in illness perceptions, those in the treatment group demonstrated more optimal adjustment

outcomes than those in the control group, including greater self-reported readiness for hospital discharge, quicker rates of returning to work following discharge, and fewer angina symptoms three months after discharge.

Since the seminal Petrie et al. (2002) study, further work has demonstrated the utility of illness perception interventions in both engaging appraisals and contributing to improved psychological, functional and disease-specific adjustment outcomes for patients diagnosed with cardiovascular disease (e.g., Broadbent et al., 2009; Sararoudi et al., 2016; Yan et al., 2014), as well as other types of chronic disease such as diabetes (Alyami et al., 2020), chronic obstructive pulmonary disease (Weldam et al., 2017), hypertension (Pires et al., 2017), and chronic low back pain (Siemonsma et al., 2013). To date, the sizable illness perception intervention literature demonstrates that 1) illness appraisals are in fact malleable in response to targeted intervention and 2) modifications of these appraisals can promote more optimal psychological and physical adjustment outcomes over time. Although few investigations have specifically sought to target and modify illness perceptions as a means of promoting adjustment to cancer, the collective findings across various chronically ill populations indicate that illness perception interventions could be a promising means of promoting psychological, functional, and disease-related adjustment in the context of cancer survivorship.

Psychoeducation and Illness Perceptions

Many illness perception interventions involve the delivery of psychoeducation to patients about their illness as a means of reducing threatening illness appraisals and promoting more positive illness-related beliefs. Psychoeducation can be defined as “an intervention with systematic, structured, and didactic knowledge transfer for an illness and its treatment, integrating emotional and motivational aspects to enable patients to cope with the illness and to

improve its treatment adherence and efficacy" (Ekhtiari et al., 2017, p. 2). As per the definition, psychoeducation entails providing disease-related information to patients, addressing patient's questions about the illness, and providing patients with guidance and support towards resources, strategies, and approaches to coping with the medical, functional, and emotional consequences of the disease.

The efficacy of psychoeducational interventions in promoting adjustment to disease is well established across various chronically ill populations, with recent meta-analyses demonstrating promising intervention effects in the context of end-stage renal disease (Tao et al., 2020), coronary heart disease (Sua et al., 2020), and breast cancer (Setyowibowo et al., 2022). In the context of cancer survivorship, psychoeducational interventions have been found to promote a range of adjustment outcomes, including psychological (e.g., Lee et al., 2014; Weis et al., 2020) and disease-related (e.g., Chan et al., 2011; Ward et al., 2008) quality of life indicators. Furthermore, cancer survivors have evidenced greater benefit from psychoeducation than supportive intervention alone, suggesting important incremental utility in providing individuals with information related to their illness over and above social support (Edelman et al., 2000).

Psychoeducation-based interventions for patients with chronic illness offer logistical advantages that can help to promote the efficiency, delivery, and cost-effectiveness of psychosocial care. These interventions are frequently embedded within patients' medical care, often being available directly from patients' healthcare team and/or at their treating institutions. Psychoeducation can be delivered as both a stand-alone intervention, as well as incorporated into standard medical appointments, and it can be disseminated via face-to-face encounters with healthcare professionals, telehealth, or informational resources such as brochures, books, or videos. Recent work suggests that psychoeducation benefits may be optimized for patients when

delivered via online (Wang et al., 2020) and video (Tsai et al., 2020) formats, as opposed to written materials. Further, psychoeducation deemed by patients to be highly credible is associated with greater patient benefit (Alfonsson et al., 2017), especially in the context of resources delivered online (Beale et al., 2007).

Though seemingly straight-forward in practice, psychoeducation is rich with potential therapeutic mechanisms through which adaptive adjustment outcomes can be achieved, including the modification of illness perceptions. A growing body of evidence has demonstrated the ability of psychoeducation to successfully engage and modify multiple domains of illness perceptions across chronically ill populations, including in the context of cancer survivorship. Notably, these psychoeducational interventions have been shown to alter illness perceptions despite no specific or a priori intention to target or modify illness perceptions. For example, in a study of breast cancer survivors undergoing a group-based psychoeducational intervention, Fischer and colleagues (2013) found that changes in the illness perceptions of identity and chronicity across the course of the intervention were the most robust predictors of psychological distress both immediately following the intervention and one year later. Wiener and colleagues (2019) conducted a study of patients with thyroid cancer to examine associations between healthcare provider support and psychological adjustment in patients. Although patients received no formal intervention, the authors found that greater informational support (i.e., psychoeducation) from healthcare providers (as self-reported by patients) was associated with lower levels of psychological distress. The authors found that this effect was fully mediated by a composite "summary" score of illness perceptions, such that a greater degree of self-reported informational support was associated with less threatening illness perceptions (i.e., lower summary scores), and in turn less threatening illness perceptions were associated with lower levels of distress. These

findings not only highlight the utility of psychoeducation of promoting adjustment outcomes in cancer survivorship, but also underscore the possibility that engagement and modification of illness perceptions may be an important mechanism towards this end.

This notion is supported by intriguing research examining the utility of psychoeducation for promoting adjustment in the context of bipolar-spectrum disorders. Etain and colleagues (2018) examined the efficacy of a 20-hour psychoeducational intervention in promoting social functioning and self-esteem for individuals diagnosed with bipolar disorder. The intervention did in fact lead to an improvement in both outcomes; this effect was mediated by changes in illness perceptions (composite summary scores) and not by changes in knowledge about bipolar disorder or by changes in medication adherence. These results are striking in that they suggest that changes in illness appraisals, over and above illness-related information transfer and treatment adherence, may contribute significantly to improvements in psychosocial adjustment for chronically ill individuals. Thus, illness perception interventions that leverage psychoeducation appear to hold promise in targeting illness perceptions to reduce threatening appraisals of disease in the context of cancer and other illnesses. In turn, said modification of illness perceptions may serve to promote a range of adaptive outcomes across the course of disease and survivorship.

Unmet Needs in UM Survivors

The proposed research is concerned with promoting adjustment in the context of UM survivorship. In addition to the aforementioned rationale, psychoeducation-based illness perception interventions may be uniquely poised to facilitate adaptive outcomes for patients with UM. Recent work by Williamson and colleagues (2018) conducted in the same medical setting as the proposed research revealed that individuals with UM endorsed higher rates of unmet

supportive care needs than did individuals with more prevalent forms of cancer. On average, UM survivors exhibited high levels of unmet psychological and informational needs shortly after diagnosis, which remained high at a follow-up evaluation three months later. These findings suggest that UM survivors are in need of both information regarding their disease as well as psychological support, even in the months following successful treatment of the tumor.

Considering the fact that UM is a rare form of cancer with a relatively rapid course of treatment, the heightened unmet psychological and informational needs observed by Williamson et al. (2018) is quite understandable. It could be argued that unmet psychological and informational needs are likely to be elevated in UM populations due to the rarity of the cancer and the lack of access individuals may have to other survivors in their social networks to consult for both informational and emotional support. Furthermore, the course of treatment for UM typically begins and ends within 1-2 months of UM diagnosis and may leave survivors and their emotional needs less visible to their support network, resulting in less psychological support that may be afforded to survivors of cancers with more prolonged courses of treatment. Regarding informational needs, the rapid course of treatment beginning soon after diagnosis may cause UM patients to be inundated with information regarding their diagnosis, treatment, risk of metastasis, and considerations for their future visual functioning and survivorship, such that they find themselves feeling overwhelmed by the sheer volume of information conveyed in such a short, stressful period of time. The “information overload” that patients experience early on in the disease course may ultimately contribute to an elevated need for information, which remains high in UM populations even in the months after treatment has concluded.

Heightened emotional and informational needs in UM populations may be further underscored by the high degree of uncertainty that is characteristic of both the disease and of

survivorship. While UM tumors themselves tend to be highly treatable, patients have a high degree of uncertainty at the time of treatment and throughout early stages of recovery as to the degree of visual impairment and sequelae they will go on to experience in survivorship. In addition to potential visual impairment due to the cancer itself and its location in the eye, most patients are at risk for developing side effects of treatment (e.g., radiation retinopathy, cataracts) ranging from bothersome (e.g., blurred vision, pain) to significantly impairing (e.g., vision loss, glaucoma). For most patients, there are few ways to predict whether, to what degree, or when these side effects may emerge and/or resolve, leaving them to cope with a high degree of uncertainty as to the course of their visual functioning across survivorship. These factors, along with the risk for recurrence and/or metastasis, likely contribute to UM patients' heightened degree of unmet psychological and informational needs. As UM survivors face an uncertain and evolving course of potential sequelae, they may simultaneously possess an enduring need for illness-related information and emotional support. Illness perception interventions leveraging psychoeducation may therefore be particularly well-suited to 1) address psychological and informational needs in UM populations and 2) reduce threatening illness appraisals as a means of 3) promoting adjustment outcomes across the course of survivorship. Below, such an intervention is proposed for study.

Anxiety and Depressive Symptoms in Cancer

In addition to illness perceptions, anxiety and depressive symptoms were selected as primary outcomes for this study given their prevalence in patients with UM and other cancers (Aronow et al., 2018; Amaro et al., 2010; Brandberg et al., 2000; Chabert et al., 2004; Lu et al., 2016; Miniati et al., 2018; Schuermeyer et al., 2016;) and the implications they hold for psychological functioning and other important outcomes. Clinically significant anxiety and

depressive symptoms have a documented prevalence rate in cancer populations that is almost three times higher than rates observed within the general population at large (Linden et al., 2012). Within cancer populations, heightened depressive and anxiety symptoms are associated with various indices of poor adjustment, including lower medication adherence (Mausbach et al., 2015; Theofilou & Panagiotaki, 2012), higher functional impairment (Hegel et al., 2006), and worse health-related quality of life outcomes (Brown et al., 2010; Charalambous et al., 2017). Depressive and anxiety symptoms have also been shown to predict higher mortality rates in cancer populations, with even sub-threshold symptoms conferring elevated risk of cancer-related mortality (Linden et al., 2012; Pinquart & Duberstein, 2010; Satin et al., 2009).

Current Dissertation Project

This dissertation project tested the utility of a psychoeducational intervention in 1) modifying illness appraisals of control, chronicity, and coherence, and 2) promoting lower depressive and anxiety symptoms in a sample of UM survivors recruited from the UCLA Jules Stein Eye Institute, relative to a comparison group of UM survivors who were randomly assigned to an enhanced "treatment as usual" control condition. The psychoeducational intervention was delivered via two online videos in which participants' treating ocular oncologist, Dr. Tara McCannel, provided information regarding medical, disease-specific, and psychological considerations for UM survivorship. Video content was selected with the goal of promoting less threatening personal control, illness chronicity and illness coherence appraisals. In the control condition, participants were provided with and asked to review a "Mental Health Resource Information Sheet", which contained a list of survivorship resources for UM patients. Of note, this information sheet was also provided to participants who received the psychoeducational intervention. Thus, participants were randomized to either receive the psychoeducational

intervention + mental health resource information sheet (i.e., treatment condition), or the mental health resource information sheet alone (i.e., control condition). Participants provided self-reported data prior to randomization and receipt of the first study condition manipulation (T0), one week later (immediately before watching the second video for participants in the treatment condition) (T1), one week later (T2), and after an additional four-week follow-up period (T3). The study methodology is described in further detail below in the Methods section.

This dissertation project was informed by an experimental medicine approach (e.g., Riddle & Science of Behavior Change Working Group, 2015), in that it sought to test causal hypotheses regarding the mechanisms through which illness perception and psychoeducational interventions produce desired outcomes in adjustment to chronic disease. The four sequential steps of the experimental medicine approach include 1) identification of a putative target for intervention, 2) identification of measures that will allow for an examination of target engagement, 3) testing of target engagement by the experimental intervention, and 4) analyzing the extent to which successful target engagement facilitates the desired downstream psychological adjustment outcomes. Adopting an experimental medicine framework allowed this dissertation study not only to examine specific mental health outcomes in response to a novel psychoeducational intervention, but also allowed for the interrogation of specific change mechanisms that may have facilitated said outcomes. Identification of these mechanisms is crucial for elucidating how best to make sense of any promising outcomes that are observed, as well as understanding how to further apply these advances to other domains of adjustment in the context of UM and other chronic diseases. We hoped that the use of this approach would be fruitful in informing theoretical frameworks of adjustment, as well as clinical intervention efforts to promote psychological adjustment in the context of rare cancer survivorship.

Following an experimental medicine approach, this dissertation project has leveraged existing literature to identify 1) illness perceptions of control, chronicity, and coherence as putative targets for intervention, as well as 2) appropriate, well-validated measures to interrogate engagement of said targets (i.e., Brief Illness Perception Questionnaire; Broadbent et al., 2006). Analyses (see Analytic Plan section below) tested the degree of desired change in illness perceptions as a result of the psychoeducational intervention (i.e., target engagement). Further, additional models as outlined below investigated potential moderated relationships amongst illness perceptions and coping processes to examine whether GOF frameworks provide adequate models of adjustment outcomes in the collected data, as was previously found by Hoch and colleagues (2023). Finally, mediation models tested the indirect effect of study condition on subsequent anxiety and depressive symptoms through change in illness perceptions.

Study Aims and Hypotheses

Aim 1: Target Engagement of Illness Perceptions

The primary aim of this dissertation was to test whether an experimental psychoeducational intervention could successfully target and modify illness perceptions of personal control, illness chronicity, and illness coherence in the context of UM survivorship. Analyses examined whether UM survivors randomized to the treatment condition evidenced a greater degree of change in each domain of illness perception over time, compared to participants in the control condition. *Hypotheses*: I hypothesized that participants in the treatment condition would evidence a greater degree of change in illness perceptions over time compared to individuals in the control condition. Specifically, I hypothesized that participants in the treatment condition would exhibit significantly greater increases in personal control and illness

coherence perceptions and a greater decline in perceived illness chronicity, compared to individuals in the control condition.

Aim 2: Change in Depressive Symptoms and Anxiety

A second aim of this dissertation was to examine changes in mental health symptoms over the course of the intervention and follow-up period. Symptoms of depression and anxiety are elevated in UM survivors, even in the years following successful treatment of the original tumor (e.g., Brown et al., 2018), and I was interested in examining changes in these symptoms over time as a function of study condition. *Hypotheses:* I hypothesized that individuals in the treatment condition would evidence greater reductions in depressive and anxiety symptoms over the course of the study period relative to individuals in the control condition.

Aim 3: Intervention Efficacy Moderated by Time Since Diagnosis

In addition to the models specified in aims 1 and 2, I tested a third set of models examining the potential moderating role of time elapsed since UM diagnosis in order to understand which UM patients may have benefitted most from the psychoeducational intervention. This third set of models probed interactions between "number of years since UM diagnosis" and study condition in predicting illness perception outcomes, as well as depressive and anxiety symptoms. I offered no a priori hypotheses regarding the role of time since diagnosis in moderating the effect of study condition on illness perceptions or mental health symptoms over time, given the potential informational and psychological benefits psychoeducation may offer UM survivors across the course of survivorship.

Aim 4: Intervention Efficacy Moderated by Coping Processes

I also investigated whether the degree to which participants engaged in approach- and avoidance-oriented coping prior to randomization moderated the effect of study condition on

change in illness perceptions, as well as change in depressive and anxiety symptoms over time. I examined the moderating effects of approach- and avoidance-oriented coping in separate models. These moderation analyses were informed by Hoch and colleagues' (2023) findings that supported GoF models of adjustment. Specifically, the effect of prolonged chronicity perceptions on depressive symptoms was moderated by levels of both approach- and avoidance-coping in UM survivors, such that the effect of prolonged chronicity perceptions was significant only for individuals who engaged in low levels of approach-oriented coping or high levels of avoidance-oriented coping. *Hypotheses:* Consistent with Hoch et al. (2023), I predicted that the effect of study condition on illness perceptions (i.e., personal control, illness chronicity, illness coherence) and depressive and anxiety symptoms over time would be moderated by the level of approach- and avoidance-oriented coping at baseline. I hypothesized that the effect of the psychoeducational intervention on illness perceptions and mental health outcomes would be stronger for individuals with lower levels of approach- and higher levels of avoidance-oriented coping at baseline (T0) prior to randomization.

Aim 5: Illness Perceptions as Mediators of Change in Depressive Symptoms and Anxiety

Consistent with an experimental medicine approach, I examined whether successful engagement of theoretical targets produced subsequent change in adjustment outcomes. Specifically, I tested whether study condition would be associated with mental health outcomes (i.e., symptom change scores, T3 – T0), as mediated by change in illness perceptions. I adopted a multiple mediation approach, including illness perception change scores for control, coherence, and chronicity domains as simultaneous mediators. Changes in illness perceptions were measured via change scores between baseline (T0) and the first assessment timepoint following completion of the intervention (T2) (i.e., T2 – T0). I tested separate models for depressive and

anxiety symptom change-score outcomes. *Hypotheses:* Consistent with the illness perception and psychoeducational intervention literature, I predicted that increases in personal control and coherence perceptions, and a decline in perceived illness chronicity would at least partially mediate the effect of study condition on change in depressive and anxiety symptoms.

Methods

Participants, Recruitment, and Enrollment

Participants were UM survivors (N = 101) who had at least one scheduled appointment with Dr. Tara McCannel in the UCLA Stein Eye Center Retinal Division clinic over the course of a 24-month period (06/01/2022 – 06/01/2024). All study procedures were approved by the UCLA Institutional Review Board (IRB) (Project #23-000414). The study team was granted IRB authorization to pre-screen prospective participants using Dr. McCannel's clinic schedule in Care Connect, UCLA Health's electronic medical record system. I pre-screened prospective participants and contacted potentially eligible patients via email between 01/15/24 and 03/15/2024.

Participants who expressed interest in taking part in the study scheduled a Zoom appointment with me or research team member, A. Jorge. During this meeting, one of us conducted an IRB-approved eligibility screening. If participants were eligible for the study, they were then read oral consent language and were given ample opportunity to ask questions and make a decision as to whether or not they wanted to enroll in the study. During the consenting process, prospective participants were told that the purpose of the study was to obtain their feedback and reactions to one of two resources that were newly developed by the study team (including Dr. McCannel) and were designed to provide enhanced support to UM survivors at UCLA. Specifically, prospective participants were informed that they had a 50% chance of being

assigned to review a newly developed written resource, and a 50% chance of being assigned to review a newly developed video resource. Participants were unaware of the fact that the video resource specifically contained a psychoeducational intervention and that the written resource was considered an enhanced "treatment as usual" control condition. Participants were also unaware of A) the hypothesized changes in illness perceptions and mental health symptoms that B) were expected in response to the reviewing the video resource, but not the written resource. Thus, while participants were aware that they were assigned to a video resource vs. written resource study condition, they were unaware of their assignment to a psychoeducational intervention (i.e., treatment condition) vs. enhanced treatment as usual (i.e., control) condition.

All participants (and prospective participants) were screened and/or consented between 01/15/24 and 04/15/24. Participants who elected to take part in the study were asked to provide HIPAA authorization allowing the study team to access their UCLA medical charts for data extraction purposes. Once participants provided said authorization, I sent them a link to the first online study survey (via Qualtrics). For further information regarding procedures of each study visit (T0 – T4), please see the respective sub-sections below. Participants were compensated via $25 Amazon gift cards for each completed study visit, up to $100 in total compensation for each participant. If participants were lost-to-follow-up or chose to terminate their participation at any point in the study, the experimenter made attempts to ascertain the participants' reason(s) for discontinuing their involvement in the study.

Inclusion Criteria

Eligible participants were patients of ocular oncologist Dr. Tara McCannel at the UCLA Jules Stein Eye Institute Retinal Division clinic. They were adults (at least age 18 years) who had been diagnosed with UM as an original cancer diagnosis (i.e., not a result of metastatic spread

from another form of cancer), as confirmed by their UCLA medical records. Eligible participants were able to read, write, and converse in English. Participants also needed to have internet access and a personal email address in order to be eligible for the study.

Exclusion Criteria

Patients were excluded from participation if they failed to meet any of the above listed inclusion criteria. Patients were also excluded from participation if they evidenced significant cognitive impairment that would limit their ability to give informed consent, complete study questionnaires, or ask/answer questions to/from study personnel. Participants with visual impairment rendering it difficult or impossible to watch the intervention videos were not excluded from study participation unless they also experienced hearing impairment that would render it difficult to access, hear, and comprehend the study intervention videos. Similarly, visually-impaired participants were not excluded from study participation if they could identify a person (e.g., loved one, caregiver) who could help them complete the study questionnaires.

Study Conditions

Treatment Condition

Participants randomized to the treatment condition received a psychoeducational intervention that was comprised of two YouTube videos in which their treating ocular oncologist, Dr. Tara McCannel, provided information regarding medical and psychological considerations for UM survivorship. In both videos, Dr. McCannel presented information while standing in front of a projector screen on which a PowerPoint slide deck was presented. The content of the PowerPoint presentation included text and images that coincided with the topics that Dr. McCannel discussed throughout the video.

I developed the content for each video with input from Drs. Tara McCannel and Annette Stanton. The content was informed by a number of sources, including 1) Dr. McCannel's existing informational YouTube videos about UM diagnosis and treatment and 2) my observations while shadowing Dr. McCannel in her appointments with UM patients over the course of a six-month period. During this time, I took notes on important topics Dr. McCannel often discussed with her patients, as well as frequently asked questions that patients had for Dr. McCannel. I wrote scripts for both videos that were edited and approved by Dr. Stanton and Dr. McCannel prior to filming the psychoeducational intervention. Transcripts of both videos can be found in Appendix B.

Video 1 was 20 minutes in length and contained psychoeducation about UM that sought to acknowledge the chronic nature of the disease and its impact (e.g., visual impairments, risk for metastasis), while simultaneously emphasizing ways in which ocular health and vision can be supported throughout survivorship. This latter point of emphasis was targeted through communicating the utility of routine follow-up visits in supporting patients' vision, addressing side effects of the cancer or its treatment, and screening for metastatic disease.

The content of the first video was selected to target illness perceptions of chronicity by highlighting ways in which patients' healthcare providers at the UCLA Jules Stein Eye Institute can help them to successfully treat the cancer and limit ongoing sequelae over time. The intent was to reduce the perceived duration of the illness and its longitudinal consequences throughout survivorship. The content of this first video was also selected to target illness perceptions of control by emphasizing the ways in which patients' providers at UCLA have the means of A) successfully treating the UM tumor, B) addressing visual impairment as a result of the cancer or its treatment, and C) optimizing surveillance for potential metastatic illness. Content was also

chosen to target illness perceptions of coherence, such that all of the information provided was intended to help patients solidify or increase their sense of understanding about various aspects of UM, including initial treatment and follow-up care throughout survivorship.

Video 2 was 28 minutes in length and contained psychoeducation about what survivors can do in their daily lives, despite the inherent uncertainty of UM and its course, to preserve and promote their visual functioning and ocular health, as well as reduce visual sequelae and mitigate risk for metastatic disease. Video 2 also included information regarding mental health in the context of UM, strategies to improve daily mood and well-being, as well as mental health resources and treatment options available to UM survivors at UCLA, both locally and at the national level.

The content of the second video was selected to target illness perceptions of chronicity by highlighting ways in which patients can take steps to mitigate the impact that UM may have on their mental health and well-being over time. The intent was to reduce the perceived longitudinal emotional burden of UM in survivorship. The content of this second video was also selected to target illness perceptions of control by emphasizing the ways in which patients themselves have the ability to take steps to improve their visual and physical health and reduce their risk for metastatic disease. Content was also chosen to target illness perceptions of coherence, such that all of the information provided was intended to help patients feel more confident in their understanding of important visual, medical, and psychological considerations for UM survivorship.

Control Condition

Participants in the control condition were given a "Mental Health Resource Information Sheet" (see Appendix B) and were asked to review its contents. The information sheet listed

various local and national resources that provide information about UM, offer guidance surrounding mental health and well-being in the context of cancer, and mental health treatment options for cancer survivors who are patients at UCLA. The provision of the information sheet is considered an "enhanced" version of "treatment as usual" because participants in the control condition were given a newly developed supportive resource that is not readily available as part of standard patient follow-up care at UCLA Jules Stein Eye Institute. I developed this resource, with input from Drs. Annette Stanton and Tara McCannel. Content of the information sheet was selected to include wider-ranging and more up-to-date information and supportive resources for patients than what is currently provided to participants at the UCLA Jules Stein Eye Institute when they are first diagnosed with UM (i.e., a brief list of local resources offering psychosocial support to cancer patients).

Given that the Mental Health Resource Information Sheet could have also contributed to changes in the identified outcome variables, it was *also* provided to participants in the treatment condition. This approach allowed for the examination of the effects of the psychoeducational intervention on illness appraisals and mental health symptoms *over and above* the effects of the Mental Health Resource Information Sheet alone on said outcomes.

Manipulation Checks

Two manipulation checks were implemented in order to identify participants in the treatment condition who may not have received an adequate "dose" of the intervention. Specifically, we were concerned that the length of the intervention videos may have precluded some participants from watching the videos in their entirety and/or with concentrated attention. While the current study adopted an Intent-to-Treat (ITT) analysis, such that all properly randomized participants and their data were included in the analyses (see Analytic Plan section),

we wanted to have the ability to characterize the quality of the data generated from participants in the treatment condition and consider said quality when contextualizing our findings.

The first manipulation check involved examining the number of minutes that participants spent completing the T0 and T1 surveys (which contained the first and second intervention videos, respectively). For the T0 survey, we identified a duration of 25 minutes as a manipulation check threshold; if participants spent fewer than 25 minutes completing the survey, they were given a rating of 0 on the manipulation check, and if participants spent 25 minutes or more completing the survey, they received a rating of 1. For the T0 survey, 25 minutes was chosen as relatively liberal threshold for completing the survey, as the video itself was 20 minutes in duration, which left participants with only 5 additional minutes to have spent completing the pre-randomization questions and post-video exit survey. For the T1 survey, we identified a duration of 30 minutes as a manipulation check threshold; if participants spent fewer than 30 minutes completing the survey, they were given a rating of 0 on the manipulation check, and if participants spent 30 minutes or more completing the survey, they received a rating of 1. For the T1 survey, 30 minutes was chosen as relatively liberal threshold for completing the survey, as the video itself was 28 minutes in duration, which left participants with only 2 additional minutes to have spent completing the pre-video questions and post-video exit survey. Of note, Qualtrics *also* included time spent idle or away from the survey in said estimate of the duration of time (i.e., minutes) taken by participants to complete a given survey. This means that we cannot be certain that participants who appeared to spend longer than 25 and 30 minutes completing surveys T0 and T1 (respectively) actually *did* spend the reported duration of time watching the videos and/or responding to the survey questions. Thus, this manipulation check data should be interpreted with caution, given the notably liberal threshold to which it has been held.

The second manipulation check was embedded in the post-video exit surveys. In addition to questions that prompted participants to provide feedback on the videos using Likert scale response items, the post-video exit surveys also required that participants provide a free-text response to the question, "*We want to know more about your reactions to the video you just watched. Please tell us at least one thing you found interesting about the video below:*". Participants were unable to bypass this question without typing something into the provided free-text response box. Responses to this question were coded as 0 if there was no reliable indication from the provided response that the participant had watched the video in question. Responses were coded as 1 if responses gave even the slightest indication that the participant had watched the video in question. Ratings were made independently by two study team members, myself and a research assistant. Discrepancies in ratings were discussed between myself and the research assistant and resolved through collaborative discussion.

Total manipulation check scores were generated for T0 and T1 for each participant by summing the first and second manipulation check score at each visit. For each assessment point, possible values of total manipulation check scores ranged from 0 to 2. An overall manipulation check score was calculated by summing the T0 and T1 total manipulation check scores together, with possible scores ranging from 0 to 4. Corresponding labels were assigned to each possible score to facilitate interpretation of each participants' manipulation check score and corresponding data quality: a score of 0 was considered "Very Poor" quality, a score of 1 was considered "Poor" quality data, a score of 2 was considered "Fair" quality, a score of 3 was considered "Good" quality, and a score of 4 was considered "Very Good" quality.

Experimenter Blinding

The current study adopted a single-blind design. While participants were unaware of their assigned study conditions, study team members were aware of participants' assigned study conditions. It was not feasible for me to be blinded to participants' study condition assignments in my role as study coordinator and the primary study contact. To reduce the risk of experimenter bias or effects, I sent all planned email communication for recruitment, survey distribution, survey reminders, and payment using pre-written templates in an effort to standardize the frequency, scope, and content of communication with study participants. Once participants completed T0, T1, or T2 surveys, they were sent automated emails via Qualtrics reminding them that the next online survey would be sent to them via email in one week (or 4 weeks after T2 for the distribution of the T3 survey).

Procedure

Figure 1 outlines the timeline of assessment points and the measures administrated at each assessment point.

Baseline Visit (T0), Randomization, and Treatment Manipulation

All study "visits" were comprised of completing online Qualtrics surveys. The baseline visit (T0) was considered complete when participants submitted their first study survey. The T0 survey had participants complete baseline self-report questionnaires prior to randomization. Once participants completed the T0 baseline questionnaires, Qualtrics automatically and randomly assigned participants to either the treatment or control condition. The T0 Qualtrics survey was programmed to carry out randomization using the "Randomizer" tool and "Evenly Present Elements" option, which ensured for balanced randomization across study conditions.

Participants assigned to the control condition were asked to review the "Mental Health Resource Information Sheet" within the survey, and were also given the opportunity to download

a PDF of the information sheet for their own records and reference. Participants were asked to take some time reviewing the document before answering a brief exit survey (see Appendix A) that asked for their feedback regarding the acceptability, utility, and credibility of the information sheet as a supportive resource for UM survivors at UCLA.

Participants assigned to the treatment condition were asked to watch the first video after completing the baseline questionnaires. The video was 20 minutes in length and was embedded directly in the Qualtrics survey, and participants were also able to watch the video through YouTube using a provided private link (see Appendix B). Participants were able to pause, rewind, and re-watch the video as many times as they would like. After watching the video, participants were asked to complete a brief exit survey (see Appendix A) that asked for feedback regarding the acceptability, utility, and credibility of the video as a supportive resource for UM survivors. After completion of the exit survey, participants in the treatment condition were *also* provided with the same "Mental Health Resource Information Sheet" as participants in the control condition, though they were not asked to provide feedback about the resource.

Second Assessment Point (T1) and Administration of Video #2

The next assessment point took place one week following the baseline study visit. I emailed participants a link to an online Qualtrics survey containing self-report questionnaires (see Figure 1). Following participants' completion of these measures, the Qualtrics survey advanced participants in the treatment condition to the second video that was again embedded directly in the Qualtrics survey, with an additional option to view through YouTube. The second video was 28 minutes in duration, and participants were again able to pause, rewind, and re-watch the video as many times as they would like. Following completion of the video, participants were asked to complete another brief exit survey. Once again, Qualtrics sent an

automated email to participants to remind them that the next survey would be emailed to them in one week. Participants were given up to one week to complete T1 self-report questionnaires before being considered lost to follow-up.

Third Assessment Point (T2)

The third assessment point took place one week following T1 completion. I emailed participants a link to an online Qualtrics survey containing self-report questionnaires (see Figure 1). Once participants completed the survey, they received an automated email reminder that the next online survey would be emailed to them in four weeks. Participants were given up to one week to complete T2 self-report questionnaires before being considered lost to follow-up.

Fourth Assessment Point (T3)

The fourth and final assessment point took place four weeks following T2. The experimenter emailed participants a link to an online Qualtrics survey containing self-report questionnaires (see Figure 1). Participants were given up to one additional month to complete T3 self-report questionnaires before being considered lost to follow-up. Participants were contacted weekly via email (as needed) during that follow-up period to facilitate data collection. Once participants completed the survey, they were notified that they had successfully completed the study.

Measures

Demographic and Medical Variables

At the baseline assessment (T0), participants self-reported demographic information including age, sex, race, ethnicity, employment status, relationship status, educational attainment and annual household income. Years elapsed since initial UM diagnosis was assessed via review of participants' medical records, with their consent.

Brief Illness Perception Questionnaire (Broadbent et al., 2006)

Illness perceptions were assessed via self-report at all assessment points using the Brief Illness Perception Questionnaire (BIPQ). Three items (from the eight-item scale) measured illness perception domains of personal control, illness chronicity and illness coherence. These items are as follows: "*How much control do you feel you have over your illness?*" (personal control), "*How long do you think your illness will continue?*" (illness chronicity), and "*How well do you feel you understand your illness?*" (illness coherence). Participants provided responses based on an 11-point scale, ranging from 0 (i.e., low control: "*absolutely no control*"; low chronicity: "*a very short time*"; low coherence: "*don't understand at all*") to 10 (i.e., high control: "*extreme amount of control*"; high chronicity: "*forever*"; high coherence: "*understand very clearly*"). The BIPQ has sound psychometric properties and has been used to study illness representations in various cancer populations (e.g., Broadbent et al., 2006; Broadbent et al., 2015). The BIPQ also shows appropriate convergent validity to the Illness Perception Questionnaire-Revised (IPQ-R), a 38-item measure of illness perceptions using five to six items to assess each domain of illness appraisal (Moss-Morris et al., 2002). We used the BIPQ, as opposed to the IPQ-R, due to the reduced burden it placed on participants in their survey responses.

Center for Epidemiologic Studies Depression Scale (Radloff, 1977)

Depressive symptoms were assessed at all assessment points with the well-validated 20-item Center for Epidemiologic Studies-Depression Scale (CES-D) (Radloff, 1977). Participants' total scores on the CES-D indicate the degree of depressive symptoms at each assessment point. CES-D scoring guidelines establish a cut-off score of 16 to suggest clinically significant

depressive symptoms. Cronbach's α ranged from 0.91–0.93 for total scores observed from T0 – T3.

Generalized Anxiety Disorder Scale-7 (Spitzer et al., 2006)

Anxiety symptoms were measured at all assessment points with the Generalized Anxiety Disorder Scale-7 (GAD-7). The GAD-7 is a seven-item, self-rated measure of generalized anxiety symptom severity. At T0, the instructions to participants prompted them to provide responses regarding the presence of listed symptoms in the past two weeks. At the remaining assessment points, the instructions were modified and prompted participants to provide responses in relation to the previous week. The original validation study of the GAD-7 was conducted in a large primary care sample and demonstrated that the measure possesses good reliability, and criterion, factorial, and procedural validity (Spitzer et al., 2006). A cutoff score of 10 has been identified as a threshold for clinically significant anxiety symptoms. Cronbach's α ranged from 0.91–0.93 for total scores observed from T0 – T3.

Coping Processes

Coping processes were measured at all assessment points, though only T0 scores were included in our analyses. Approach-oriented coping was assessed with 24 items from six COPE (Carver et al., 1989) subscales (i.e., planning, active coping, acceptance, positive reinterpretation, seeking instrumental support, seeking emotional support) and eight items from the Emotional Approach Coping scales' two subscales, emotional expression and emotional processing (Stanton et al., 2000). Sample items include: "*I make a plan of action*" (planning), "*I get used to the idea that it happened*" (acceptance), "*I ask people who have had similar experiences what they did*" (instrumental support), "*I get sympathy and understanding from someone*" (emotional support), "*I try to see it in a different light, to make it seem more positive*" (positive

reinterpretation), "*I try to understand my feelings*" (emotional processing), and "*I take time to express my emotions*" (emotional expression). Joint use of the COPE and Emotional Approach Coping subscales to measure approach-oriented coping has been used frequently in literature concerning adjustment in various cancer populations and has demonstrated high internal consistency estimates of reliability (e.g., Hoch et al., 2023; Stanton et al., 2018). Avoidance-oriented coping was measured with 12 items from three COPE subscales: mental disengagement (e.g., "*I go to movies or watch TV, to think about it less*"), behavioral disengagement (e.g., "*I just give up trying to reach my goal*"), and denial (e.g., "*I refuse to believe that it has happened*"). All items were anchored to participants' experience of UM survivorship. Coping items were rated on four-point scales; 1 ("*I don't do this at all*"), 2 ("*I do this a little bit*"), 3 ("*I do this a medium amount*"), and 4 ("*I do this a lot*"). Items were averaged across subscales so that scores ranged from 1 to 4. Cronbach's α values ranged from 0.92–0.93 for total Approach-oriented coping scores observed from T0 – T3. Cronbach's α values ranged from 0.63–0.74 for total Avoidance-oriented coping scores observed from T0 – T3.

Exit Surveys

As a means of evaluating their input on the acceptability, credibility, and usefulness of the videos and information sheet, participants in both study conditions completed brief exit surveys following the completion of each intervention video or review of the information sheet. These surveys were developed by the study team and were informed by the well-validated Treatment Acceptability Questionnaire (Hunsley, 1992). The exit surveys contained 7 items with response options on a Likert scale ranging from values of 1 – 5. Response option 1 was labeled "*Not at all*", response option 3 was labeled "*Somewhat*", and response option 5 was labeled "*Very*". Item phrasing was adjusted across exit surveys in the treatment and control conditions to

correspond with the appropriate resource that participants reviewed (i.e., video vs. information sheet). Items included: 1. "*As a survivor of eye cancer, how helpful was the (resource) in providing you with useful information?*", 2. "*As a survivor of eye cancer, how helpful was the (resource) in providing you with psychological support?*", 3. "*In your opinion, how acceptable was the (resource) as a resource for survivors of eye cancer?*", 4. "*How credible did you find the (resource) and the information it contained?*", 5. "*How helpful do you think this (resource) would have been to you at the time of your diagnosis with eye cancer?*", 6. "*How likely are you to refer back to this (resource) in the future?*", and 7. "*How interested are you in having access to resources like this in the future?*". The exit surveys for both conditions included a final open-ended free response question that offered participants the opportunity to provide further feedback about the resource they had just reviewed (i.e., "*If you have any additional reactions or comments to share with us about this (resource), please feel free to type them in the box below"*). Copies of the exit surveys are included in Appendix A.

Analytic Plan

Descriptive Statistics

Descriptive statistics characterized the sample, variable ranges, and bivariate correlations between all predictor and outcome variables. Independent samples t-tests and chi-square tests were used to test for between-group (i.e., study condition) differences in demographic variables and all baseline measures. Independent samples t-tests and chi-square tests were also used to explore whether study non-completers differed from completers on any baseline variables. Descriptive statistics were used to characterize the degree of missing data for all variables at each assessment point (T0-T4). Descriptive statistics also characterized participant feedback in response to the treatment condition (Videos 1 and 2) and the control condition (Mental Health

Resource Information Sheet). Paired and independent samples t-tests evaluated significant differences in domains of participant feedback between Videos 1 and 2 and the information sheet. Descriptive statistics also characterized the quality of data provided by participants in the treatment condition according to previously described manipulation checks.

Composite Psychological Distress Variable

Of note, while I had planned to examine depressive symptoms and anxiety symptoms as separate outcomes in our analyses, I found that the two variables (i.e., CES-D and GAD-7 total scores) were highly and significantly correlated ($p < .05$) at all assessment points (T0 $r = .70$, T1 $r = .76$, T2 $r = .75$, T3 $r = .86$) (see Supplementary Material Table A). As a means of streamlining our interpretations and reducing the number of post-hoc tests, we elected to create a standardized composite score of both variables to represent psychological distress. The composite variable was calculated by converting participants' CES-D and GAD-7 total scores into separate *Z* scores, and then averaging each participant's *Z* scores. The resulting composite variable therefore represents standard deviation units, with a value of 0 representing a grand mean level of psychological distress.

Moderation Analyses

In line with the adopted intent-to-treat analysis, we included data from all participants who were successfully randomized to a study condition in all analyses. Multilevel modeling was used in all moderation analyses to accommodate the hierarchical structure of repeated measures nested within individuals. This approach enabled simultaneous exploration of within-subject variability across time (Level 1) and between-subject differences (Level 2), providing a robust framework to evaluate the impact the predictors had on the specified outcome variables across multiple assessment points. In all multi-level models, participants represented the Level 2

grouping variable. Level 2 predictors included study condition, years since diagnosis, baseline approach-oriented coping, and baseline avoidance-oriented coping. All of these variables were centered at their respective grand means. Time was treated as a Level 1 predictor in all models and was centered at the end of the study at (i.e., at T3, six weeks after the baseline visit).

A multivariate multi-level modeling approach was adopted in the present study, in which all outcome variables were tested simultaneously for a given multi-level model. This approach is one that is recommended in the clinical trial literature as a means of reducing the number of tests conducted and controlling for type I error rate when there are multiple outcome variables being examined (Vickertsaff et al., 2015). In the present study I had four interaction models that I wanted to test on four distinct outcomes (i.e., three illness perception outcomes and one psychological distress outcome). The first model tested the two-way interaction between time and treatment condition in predicting said outcomes. The second model tested the three-way interaction between time, treatment condition, and years since diagnosis on all outcomes. The third model tested the three-way interaction between time, treatment condition and approach-oriented coping, while the fourth model tested the three-way interaction between time, condition, and avoidance-oriented coping. Accordingly, a multivariate approach allowed me to reduce the total number of estimated models from 16 (i.e., four outcomes examined for each of the four proposed models) to four (i.e., one initial test per proposed model).

Each of the four models was specified by first examining an "omnibus" test evaluating a multivariate null hypothesis that the highest order interaction effects (predicting each outcome) were equal to zero. Each analysis generated a Wald statistic that follows a chi-square distribution under the aforementioned multivariate null hypothesis. Because I ran four omnibus models, I chose to use a Bonferroni correction to limit the type I error rate to .05 by holding the

significance threshold for each omnibus test to a *p* value of less than .0125 (i.e., .05/4) (Bonferroni, 1936). If a given omnibus test yielded a *p* value less than .0125, I considered there to be sufficient evidence that the highest order interaction effect was statistically significant in predicting at least one of the specified outcomes.

I did not further limit the significance threshold for post-hoc tests following a significant omnibus test at the $p < .0125$ level. This decision was made to facilitate the dismantling of significant omnibus tests in order to identify which of the component models were statistically significant in predicting their respective outcomes, and to subsequently identify the nature and direction of corresponding simple interactions, simple simple effects, or simple effects as appropriate. In other words, all interpretations of post-hoc tests should be made with caution, acknowledging both the uncontrolled multiplicity of tests and the need for replication in additional samples. Thus, I controlled the type I error rate in testing whether the specified two-way and three-way interactions were significant in predicting the outcome variables over time, but I did not control the type I error rate in testing A) for which outcomes said effects are present or B) at what values of given moderators the effects were statistically significant.

Omnibus Models

Each of the four omnibus models and their equations are listed below and in corresponding figures. In all models, "TreatmentGroup" represents study condition, a dummy-coded categorical variable where a score of 0 reflects membership in the control condition, and a score of 1 reflects membership in the treatment condition. In all models, "Time" represents the passage of time in the study in one-week units. In Model 2, "Years" represents the number of years since participants were diagnosed with UM at the time of study entry (i.e., baseline, T0). In model 3, "APCope" represents each participant's level of self-reported approach-oriented coping

at study entry (i.e., baseline T0). In model 4, "AVCope" represents each participant's level of self-reported avoidance-oriented coping at study entry (i.e., baseline T0).

Model 1. The first omnibus model examined a two-way interaction between time (Level 1) and study condition (Level 2) on the four outcomes (see Figure 2).

Model 2. The second omnibus model examined a three-way interaction between time (Level 1), study condition (Level 2), and years since UM diagnosis (Level 2) on the four outcomes (see Figure 3).

Model 3. The third omnibus model examined a three-way interaction between time (Level 1), study condition (Level 2), and baseline (i.e., pre-treatment) approach-oriented coping (Level 2) on the four outcomes (see Figure 4).

Model 4. The fourth omnibus model examined a three-way interaction between time (Level 1), study condition (Level 2), and baseline (i.e., pre-treatment) avoidance-oriented coping (Level 2) on the four outcomes (see Figure 5).

Blimp Software

Blimp software was used to conduct all moderation analyses (Enders et al., 2020). Blimp is a data analysis modeling program that conducts analyses using Bayesian estimation. Blimp allows for simultaneous Bayesian estimation of coded models and fully Bayesian model-based imputation as a means of handling missing data. For a detailed discussion of Blimp's approach to handling missing data within multi-level models using Bayesian imputation methods, please see the Blimp 3 User's Guide for additional information (Keller & Enders, 2023).

Blimp syntax for all models is included in Appendix C. As can be observed in the syntax, all models specified the same number under the "SEED" command (i.e., 90291) which allowed me to yield identical findings upon re-running or probing given models. All models included a

burn-in period of at least 5,000 iterations in order to yield a highest potential scale reduction (PSR) value less than 1.05 at the end of the burn-in period. Acceptable PSR levels are considered to be less than 1.05, so the burn-in period was set higher than 5,000 iterations in models where the highest PSR was equal to or greater than 1.05 (Keller & Enders, 2023). For each model, the appropriate number of iterations in the burn-in period was specified using the "BURN" command. All models included 10,000 post-burn in iterations, as specified by the "ITERATIONS" command. In models where post-hoc analyses were conducted as a means of probing significant interaction effects, the "PARAMETERS" command was used to specify the values of given variables where simple interactions, simple simple effects, or simple effects should be probed. In all models, the "OUTPUT" command was used to instruct Blimp to generate a *p* value associated with each specified effect in a given model. Blimp output automatically included bootstrapped 95% credible intervals and four R^2 values reflecting the proportion of variance in the outcome variable explained by 1) model coefficients, 2) Level 2 random intercepts, 3) Level 2 random slopes, and 4) Level 1 residual variation.

Mediation Analysis

Another aim of this study was to investigate the potential mediating role of illness perceptions in the association between treatment condition and psychological symptoms. Following an experimental medicine framework, I was not only interested in assessing target engagement of illness perceptions, but also the degree to which target engagement predicted subsequent change in psychological distress Accordingly, one mediation model was examined which tested the indirect effect of treatment condition on the composite psychological distress variable, as mediated by changes in illness perceptions (i.e., target engagement). The model tested multiple mediators concurrently as it included each of the three illness perception

domains. Treatment condition was established at T0, psychological distress change scores were measured across T0 – T3 (i.e., T3 score – T0 score), and changes in illness perceptions were measured from T0 – T2 (i.e., T2 score – T0 score). Standard errors and 95% bias-corrected bootstrap confidence intervals (over 5,000 random samples) were estimated in IBM SPSS with the PROCESS macro using Model 4 (Hayes, 2021). This model is represented in Figure 6.

Qualitative Analysis

Preliminary exploratory qualitative analyses were conducted on the free-response feedback provided by participants regarding the resource they reviewed as part of their assigned study condition (i.e., psychoeducational intervention or mental health resource information sheet). I conducted the analysis, which involved an initial open coding phase of inductive thematic analysis. Specifically, I reviewed all available data and made annotations with descriptive labels to outline emergent themes from participants' responses.

Results

CONSORT Diagram

A CONSORT diagram outlining the number of patients who were contacted, screened, consented, and randomized is included in Figure 7. This diagram also lists the number of participants who completed each study visit by treatment condition. As outlined in the diagram, 423 patients were pre-screened and sent a recruitment letter via email. Of those patients, 110 met with a member of the research team and were formally assessed for study eligibility. All 110 patients were deemed eligible for participation. Two patients declined to provide consent, citing concerns that the study would lead to, or exacerbate existing, psychological distress surrounding their experience with ocular melanoma. Five patients who were deemed eligible for study participation were considered lost to follow-up prior to the baseline visit as they did not provide

HIPAA authorization and/or did not complete the baseline survey. In total, 103 participants completed the baseline survey and were randomized to either the treatment or control condition. Of note, two randomization errors occurred in which participants were randomized to a study condition, but received the wrong intervention at the second study visit. One randomization error occurred for a participant assigned to the treatment condition, and the other participant was assigned to the control condition. Accordingly, these two participants and their data were excluded from data analysis. Following an intent-to-treat analytic approach, data from all successfully randomized participants (N = 101) were included in all analyses.

Sample Characteristics

Characteristics of the study sample are included in Table 1. Participants were men (*n* = 39) and women (*n* = 62) who were on average 64 years old (*SD* = 13.08) and who received a previous UM diagnosis on average 7 years and 1 month (*SD* = 3.13) prior to enrollment in the study at T0. Most participants were white (92%), non-Hispanic/Latinx (92%), and married (70%). The sample is representative of UM populations nationally on mean age at diagnosis, gender, and race/ethnicity (Aronow et al., 2018). Most participants had a bachelor's, master's, professional, or doctoral degree (66%), were retired (55%), and had an annual household income over $100,000 (52%). Four participants reported current metastatic disease (confirmed by chart review) at the time of study entry. Regarding UM treatment type, nearly all participants (*n* = 95) received plaque brachytherapy (i.e., surgically implanted radiation), and two participants received eventual enucleation (i.e., surgical removal of the eye) following initial plaque brachytherapy treatment. Four participants received proton beam radiation (i.e., radiation administered externally).

Regarding metastatic risk level, 44% of participants received cytogenetic test results

indicating high risk, 20% received results indicating low risk, and 36% had no testing or inconclusive results. Our sample is under-representative of patients with low metastatic risk, as rates of low vs. high metastatic risk are typically balanced (i.e., ~ 50% each) when cytogenetic testing is successfully completed within patient samples (e.g., Damato et al., 2007; Onken et al., 2010). Our sample includes a relatively high number of participants who did not undergo cytogenetic testing or who received inconclusive results. It is possible that this high rate of no testing/inconclusive results may be due to the fact that we recruited many participants who were diagnosed before cytogenetic testing became standard practice in UM diagnosis and prognostication (i.e., early 2000s). Further, advances in medical imaging techniques have increasingly allowed for early detection and treatment of UM even with very small tumors, which in turn can make it more difficult for biopsies (taken at the time of treatment) to yield tissue samples that are adequate for conclusive cytogenetic testing results.

Descriptive Statistics

Table 2 displays descriptive statistics for illness perceptions, approach- and avoidance-oriented coping, and depressive and anxiety symptoms (and their composite standardized variable representing psychological distress) across all assessment points. Supplementary Material - Table A contains zero-order correlations of these variables.

At study entry (T0), participants endorsed relatively low levels of anxiety (M = 3.65, SD = 4.43) and depressive (M = 9.80, SD = 9.31) symptoms. On average, participants reported chronicity perceptions with scores above the scale mid-point (M = 7.90, SD = 3.09), control perceptions with scores below the scale mid-point (M = 3.68, SD = 2.64), and coherence perceptions with scores above the scale mid-point (M = 7.77, SD = 2.09). Participants' average level of reported approach-oriented coping was slightly greater than the scale mid-point (M =

2.73, *SD* = 0.56), and their average level of reported avoidance-oriented coping was below the scale mid-point (*M* = 1.63, *SD* = 0.36).

Bivariate and point-biserial correlations between medical and demographic variables with the psychological variables at study entry (T0) were conducted and are included in Supplementary Material - Table B. The only demographic variable that was significantly correlated with any psychological variable was age at study entry. Specifically, older age was significantly associated with lower depressive (r = -.29, p < .01) and anxiety (r = -.30, p < .01) symptoms, as well as lower scores on the composite psychological distress variable (r = -.32, p < .01). The only medical variable that was significantly correlated with any psychological variable was one of the two dummy codes representing type of treatment received. Specifically, anxiety symptoms were significantly correlated with the dummy code representing participants who received plaque brachytherapy (reference group) vs. enucleation (comparison group) (r = .29, p < .01). Enucleation treatment was associated with greater anxiety symptoms at study entry than was plaque brachytherapy treatment alone. The composite psychological distress variable was also correlated with this dummy-coded treatment variable (r = .20, p < .05); enucleation was associated with greater levels of psychological distress at study entry than levels observed for participants who underwent only plaque brachytherapy. The inclusion vs. omission of these variables, both separately and together, did not impact any study finding. We therefore elected to report results from analyses without the variables of participant age and treatment received because the corresponding models were able to run more efficiently (i.e., had smaller burn in periods) and had more streamlined interpretations.

Descriptive Statistics Across Study Conditions

Group differences in descriptive statistics were examined between the treatment and

control conditions to confirm the degree of randomization success. With the exception of two variables, participants in the treatment and control conditions did not significantly differ across any demographic, medical, or psychological variables measured at the baseline study visit (i.e., illness perceptions, coping processes, depressive or anxiety symptoms). Results from all tests of group differences between treatment and control conditions are listed in Tables 3a and 3b.

An independent samples *t*-test detected a significant group difference between the treatment and control conditions in the degree of perceived control at the baseline visit ($t(90) = -3.04$, $p = .003$). Specifically, participants in the treatment condition had a higher mean level of perceived control at the baseline assessment ($M = 4.42$, $SD = 2.70$) compared to the participants in the control condition ($M = 2.81$, $SD = 2.32$). Results from this test are listed in Table 3a. To ensure that this discrepancy between study conditions did not influence findings, all models that did not include control perceptions as an outcome variable were conducted with the inclusion of baseline control perception as a fixed (i.e., level 2) covariate centered at the grand mean (i.e., control perception score = 3.68). Baseline control perceptions were not, however, added to models that specified control perceptions as an outcome variable, as said models inherently accounted for between-participant differences in baseline (i.e., "intercept") control perceptions. The inclusion vs. omission of baseline control perceptions as a covariate did not impact any study finding. We therefore elected to report results from analyses that omitted baseline control perceptions as a covariate, as the corresponding models were able to run more efficiently (i.e., had smaller burn in periods) and had more streamlined interpretations.

A chi-square analysis detected a significant difference between the treatment and control conditions in the number of participants who received proton beam radiation as their primary UM treatment ($\chi 2 = 4.60$, $df = 1$, $p = .03$). Results from this test are included in Table 3b.

However, because only four participants received proton beam radiation treatment in our sample, reliable analysis of group differences on this variable was not possible.

Missing Data

The rate of missing data for analyzed variables increased across the four study visits. There was 2.26% of data missing at T0, 6.22% of data missing at T1, 8.63% of data missing at T2, and 20.93% of data missing at T3 for the analyzed variables. Of the 101 participants, 20 dropped out or were lost to follow up after the T0 visit and were considered "non-completers". Between visit T0 and T1, 5 participants dropped out or were lost to follow up, 2 additional participants were classified as non-completers between T1 and T2, and 13 additional participants did not complete T3. Chi-square analyses and *t*-tests revealed no significant differences ($p < .05$) between completers (n = 81) and non-completers (n = 20) on any variable at T0, nor any differences in their assigned treatment condition. Results of all tests exploring group differences between completers and non-completers are included in Table 4a and Table 4b.

Manipulation Check for Treatment Condition

While all available data were included in all analyses following an intent-to-treat analytic plan, it was important to characterize the degree to which participants received the intended manipulation in the treatment condition in order to contextualize our findings. Of the 53 participants randomized to the treatment condition whose data were included in all analyses, no participants received a total manipulation check score of 0 indicating "Very Poor" data quality. One participant received a total manipulation check score of 1 indicating "Poor" data quality (1.9% of participants), five participants received a total score of 2 indicating "Fair" data quality (9.4% of participants), three participants received a total score of 3 indicating "Good" data quality (5.7% of participants), and 44 participants (83%) received a total score of 4 indicating

"Very Good" data quality. While these results demonstrate some variability in the degree to which participants in the treatment condition likely watched and/or paid attention to the psychoeducational videos, it is likely that a substantial majority of participants received meaningful doses of the study intervention.

Model 1

Model 1 tested a two-way interaction between time and study condition, as well as their component main effects, in predicting the four outcome variables over time (i.e., chronicity perceptions, control perceptions, coherence perceptions, psychological distress). Model 1 was tested with a multivariate omnibus test examining all outcomes simultaneously. The result of this omnibus test was not significant ($\chi^2 = 0.50$, $p = .97$), meaning I cannot reject the null hypothesis that all four two-way interaction effects between time and study condition are equal to zero. Thus, there is no evidence to suggest that change in the outcome variables over time was significantly associated with membership in the treatment vs. control condition.

As an exploratory post-hoc analysis, I examined each component model under the omnibus test to identify any significant main effects of time or study condition on the outcomes. A significant main effect of time was evident for coherence perceptions ($b = -0.60$, $p < .001$), suggesting that a one-week passage of time is associated with a 0.60 point decrease in coherence perceptions scores (i.e., item 7 on the BIPQ) for participants in the control condition. This finding suggests that participants in the control condition endorsed less understanding of their illness over the course of the study. Of note, this main effect should be examined with caution given that it was conducted in the context of multiple exploratory comparisons without restriction of the corresponding significance threshold.

No significant main effects of study condition were found for any of the outcome variables. Coefficient estimates for each component model under the Model 1 omnibus test are included in Table 5. Visualizations of the effects of time on each of the four outcome variables within each study condition are represented by Figures 8 – 11.

Model 2

Model 2 tested a three-way interaction between time, study condition, and the number of years since participants were diagnosed with UM, as well as their component two-way interactions and main effects, in predicting the four outcome variables over time (i.e., chronicity perceptions, control perceptions, coherence perceptions, psychological distress). Model 2 was tested with a multivariate omnibus test examining all outcomes simultaneously. The result of this omnibus test was not significant ($\chi^2 = 1.82$, $p = .77$). The null hypothesis that all four three-way interaction effects between time, study condition, and years since UM diagnosis are equal to zero was not rejected. Thus, there was no evidence to suggest that change in the outcome variables over time was in part a function of membership in the treatment vs. control condition and the number of years since UM diagnosis.

As an exploratory post-hoc analysis, we examined each component model under the omnibus test to identify any significant interactions or main effects. No significant three-way or two-way interaction effects were detected across the component models. A significant main effect of time was again found for coherence perceptions ($b = -0.60$, $p < .001$), suggesting that a one-week passage of time is associated with a 0.60 point decrease in coherence perceptions scores (i.e., item 7 on the BIPQ) for participants in the control condition and when the number of years since UM diagnosis is held at the grand mean (i.e., 7 years and 1 month). This finding suggests that participants in the control condition, who were diagnosed with UM 7 years and 1

month prior, were expected to endorse less understanding of their illness over the course of the study. Of note, this main effect should be interpreted with caution given that it was examined in the context of multiple exploratory comparisons without restriction of the corresponding significance threshold. No significant main effects of study condition or "years since diagnosis" were found for any of the outcome variables. Coefficient estimates for each component model under the Model 2 omnibus test are included in Table 6.

Model 3

Model 3 tested a three-way interaction between time, study condition, and baseline levels of approach-oriented coping, as well as their component two-way interactions and main effects, in predicting the four outcome variables over time (i.e., chronicity perceptions, control perceptions, coherence perceptions, psychological distress). Model 3 was tested with a multivariate omnibus test examining all outcomes simultaneously. The result of this omnibus test was not significant at the chosen significance threshold of $p < .0125$ ($\chi^2 = 9.74$, $p = .05$).

As an exploratory post-hoc analysis, I examined each component model under the omnibus test to identify any significant interaction or main effects. A number of significant effects emerged across the models. Coefficient estimates for each component model under the Model 3 omnibus test are included in Table 7.

First, I detected a three-way interaction between time, study condition, and approach-oriented coping in predicting control perceptions which was significant at the $p < .05$ level ($b = 0.44$, $p = .04$). This finding suggests that the interaction effect between time and study condition on control perceptions is expected to increase by 0.44 given a one unit increase in baseline approach-oriented coping score. We proceeded to conduct an exploratory probe of this three-way

interaction effect by examining simple interactions between time and study condition on control perceptions at various levels of baseline approach-oriented coping.

We initially probed the time by study condition simple interaction when baseline approach-oriented coping was equal to values of 1, 2, 3, and 4 (spanning the range of possible integer score values), as well when baseline approach-oriented coping was equal to the grand mean (i.e., 2.73). We found that the simple interaction between time and study condition on control perceptions was only significant when baseline-approach oriented coping was equal to a value of 1 (b = -0.77, p = .04). Because our interpretation of the three-way interaction effect suggested that the simple interaction between time and study condition should *increase* as values of baseline approach-oriented coping increased, we also probed the simple interaction at additional, higher values of approach-oriented coping (i.e., at values of 5 and 6). Of note, these are not possible values of approach-oriented coping according to COPE scoring guidelines, as the maximum score is a value of 4. However, we chose to probe the simple interaction at these higher (though impossible) values to decompose the three-way interaction effect and examine regions of hypothetical significance on our moderator variable. We found that the simple interaction between time and study condition was significant at baseline approach-oriented coping values of both 5 (b = 0.99, p = .04) and 6 (b = 1.45, p = .04). Thus, we found that the simple interaction between time and study condition was significant at both very low (i.e., score = 1) and impossibly high (i.e., scores = 5, 6) values of pre-treatment approach-oriented coping. Because only the former finding is possible given scoring parameters of approach-oriented coping according to the COPE, we elected to further probe only that simple interaction.

The aforementioned significant simple interaction between time and treatment condition on control perceptions (b = -0.77, p = .04) suggests that there is a difference between the control

and treatment conditions in the effect of time on control perceptions, with said effect being greater in the control condition than in the treatment condition. Next, we deconstructed this simple interaction into simple simple effects of time on control perceptions within the treatment and control conditions when approach-oriented coping is held at a value of 1. Results showed that the effect of time on control perceptions was significant for the control condition (b = 0.79, p = .003), but was not significant in the treatment condition (b = 0.03, p = .92). These simple simple effects of time on control perceptions are visualized in Figure 12.

Because we did not observe baseline approach-oriented coping scores less than 1.46 in our sample, we decided to also probe the simple interaction between time and treatment group at that value in order to avoid interpreting the effect outside of the range of observed data. The simple interaction between time and treatment condition on control perceptions was no longer statistically significant when approach-oriented coping was held constant at a value of 1.46 (b = -0.57, p = .05), suggesting no statistically significant differences in the effect of time on control perceptions between the study conditions at the specified level of approach-oriented coping. Results from all probed simple interaction and simple simple effects under Model 3 are listed in Tables 8a and 8b, respectively.

In sum, the three-way interaction between time, study condition and approach-oriented coping on control perceptions should be interpreted with caution for numerous reasons. First, I elected to probe the three-way interaction in the context of a non-significant omnibus test for Model 3 which suggested that I lacked evidence to reject the null hypotheses that all specified three-way interaction effects were equal to zero (i.e., were not statistically significant). Second, I did not further control the type 1 error rate among the various post-hoc analyses conducted to decompose the three-way interaction. Third, the values of approach-oriented coping at which

simple interaction effects between time and study condition on control perceptions were significant were either A) not possible values given scoring parameters of the COPE measure, or B) not within the range of our observed data at baseline. Finally, the proportion of variance explained by the random slopes for the component model in question was statistically significant, but notably small (R^2 = .08, p = .01), especially in comparison to the proportion of variance explained by the level 2 random intercepts (R^2 = .37, p = .01) and level 1 residual variation (R^2 = .44, p < .001). Thus, the three-way interaction is not only tenuous in its statistical significance, but also appears to be relatively small in its effect size.

Two main effects of time were detected in other component models under the Model 3 omnibus test. We observed a main effect of time on chronicity perceptions (b = 0.11, p = .04), as well as time on coherence perceptions (b = -0.61, p < .001) (see Table 7). These results suggest that given a one-week increase in time, chronicity perceptions were predicted to increase by 0.11 points on the BIPQ (item 2) and that coherence perceptions were predicted to decrease by 0.61 points on the BIPQ (item 7) for participants in the control condition when approach-oriented coping was held constant at the grand-mean. Of note, these main effects should be interpreted with caution given that they were examined in the context of multiple exploratory comparisons without restriction of the corresponding significance threshold. No significant effects were found for the component model examining psychological distress as an outcome variable.

Model 4

Model 4 tested a three-way interaction between time, study condition, and baseline levels of avoidance-oriented coping, as well as their component two-way interactions and main effects, in predicting the four outcome variables over time (i.e., chronicity perceptions, control perceptions, coherence perceptions, psychological distress). Model 4 was tested with a

multivariate omnibus test examining all outcomes simultaneously. The result of this omnibus test was not significant ($\chi^2 = 3.48$, $p = .48$), meaning the null hypothesis was not rejected (i.e., that all four three-way interaction effects between time, study condition, and baseline avoidance-oriented coping are equal to zero).

As an exploratory post-hoc analysis, I examined each component model under the omnibus test to identify any significant interaction or main effects. No significant three-way or two-way interaction effects were detected across the component models. A significant main effect of time was again found for coherence perceptions ($b = -0.60$, $p < .001$), suggesting that a one-week passage of time is associated with a 0.60 point decrease in perceived coherence (i.e., item 7 on the BIPQ) for participants in the control condition and when avoidance-oriented coping is held constant at the grand mean (i.e., COPE avoidance score of 2.67). This finding suggests that participants in the control condition with avoidance-oriented coping at the grand mean were expected to endorse less understanding of their illness over the course of the study.

Another main effect of time was detected for chronicity perceptions ($b = 0.11$, $p = .04$), suggesting that a one-week passage of time is associated with a 0.11-point increase in chronicity perception scores (i.e., item 2 on the BIPQ) for participants in the control condition and when avoidance-oriented coping is held constant at the grand mean. This finding suggests that participants in the control condition with avoidance-oriented coping at the grand mean were expected to endorse more prolonged chronicity perceptions over the course of the study.

A significant main effect of avoidance-oriented coping on psychological distress (composite variable) was detected ($b = 1.16$, $p = .004$), suggesting that a one-point increase in avoidance-oriented coping (on the COPE avoidance sub-scale) at baseline is associated with a 1.62 Z-score increase on the composite standardized variable representing psychological distress,

for participants in the control condition and when time is held constant at the end of the study (i.e., T3). This finding suggests that at the end of the study, participants in the control condition with higher avoidance-oriented coping scores at baseline are expected to evidence higher levels of psychological distress (i.e., higher Z-scores on the composite standardized variable).

Of note, the above main effects should be interpreted with caution given that they were detected in the context of multiple exploratory comparisons without restriction of the corresponding significance threshold. No significant main effects of study condition were found for any of our outcome variables. Coefficient estimates for each component model under the Model 4 omnibus test are included in Table 9.

Mediation Model

One mediation model was examined in order to test the indirect effect of study condition on psychological distress (T3-T0 change scores) as mediated by chronicity, control, and coherence perceptions (T2-T0 change scores). No significant total, direct, or indirect effects of study condition on psychological distress were detected. Further, no significant effects were found between study condition and chronicity perception change scores (i.e., a paths), nor were any significant effects found between chronicity perception and psychological distress change scores (i.e., b paths). Table 10 summarizes results of the mediation analysis.

Intervention Feedback

Quantitative Feedback

Exit surveys administered after review of Video 1 at T0 for participants in the treatment condition and after review of the Mental Health Resource Information Sheet at T0 for participants in the control condition. An exit survey was also administered after review of Video 2 at T1 for participants in the treatment condition. In general, participants rated each resource

positively, with item means reflecting that the resources were generally informative, acceptable, credible, and would have been helpful for participants to have reviewed upon diagnosis. Means, standard deviations, and minimum and maximum scores for the surveys' seven items are included in Tables 11a-c.

Independent samples *t*-tests were conducted to assess for significant differences between the treatment and control groups in their responses to the seven items on the exit survey. Seven *t*-tests explored differences between participants' responses to the exit survey following Video 1 and participants' responses to the exit survey following review of the Mental Health Resource Information Sheet (both at T0). Results indicated that on average, participants in the treatment condition rated Video 1 as more informative ($t(95) = -2.50$, $p = .01$), more acceptable ($t(95) = -2.65$, $p = .01$), and more credible ($t(96) = -3.48$, $p = .001$) than participant ratings of the Mental Health Resource Information Sheet in the control condition. Participants in the control condition reported greater likelihood of referring back to the information sheet than did participants in the treatment condition regarding the likelihood of referring back to Video 1 ($t(95) = 3.49$, $p < .001$). Results from these t-tests are shown in Table 12a.

Seven more independent-samples *t*-tests explored differences between participants' responses to the exit survey following Video 2 (at T1) and participants' responses to the exit survey following review of the Mental Health Resource Information Sheet (at T0). Results indicated that on average, participants in the treatment condition rated Video 2 as more acceptable ($t(91) = -2.39$, $p = .02$) and more credible ($t(92) = -2.24$, $p = .03$) than participant ratings of the Mental Health Resource Information Sheet in the control condition. As with Video 1, we observed participants in the control condition reported greater likelihood of referring back to the information sheet than did participants in the treatment condition referring back to Video 2

($t(91) = 2.22$, $p = .03$). Table 12b contains results from these *t*-tests.

Seven paired samples *t*-tests were conducted to explore differences between participant exit survey responses to Video 1 (at T0) and Video 2 (at T1) in the treatment condition. Only one significant difference emerged, with participants on average rating Video 2 as offering a higher degree of psychological support compared to Video 1 ($t(48) = -2.12$, $p = .04$). Results from these t-tests are shown in Table 12c.

Qualitative Feedback

Exploratory qualitative analyses were conducted on the written feedback of the video and information sheet resources provided by participants in response to the optional, free-response item at the end of the exit surveys. Qualitative analyses consisted of an initial open coding phase of inductive thematic analysis in which I made annotations with descriptive labels to identify emergent themes from participants' responses.

Video 1. Participants in the treatment condition provided written feedback about their experiences reviewing the first video at T0. Feedback was initially categorized as positive or negative (including constructive criticism). Upon reviewing the positive feedback, a number of consistent themes emerged across participant responses. First, a general theme was noted in which participants expressed praise for Video 1 and the information it included. Participants noted that the video was well organized, of an acceptable duration, and contained helpful information about UM. Specifically, participants found information pertaining to A) the importance of protecting the health of the unaffected eye and B) the rationale for Dr. McCannel's recommendation for twice yearly retinal and oncologic screenings to be the most helpful aspects of the video. A second theme emerged surrounding Dr. McCannel's presence in the video, with participants' expressing appreciation for being able to hear the information delivered directly

from Dr. McCannel herself and noting that it underscored the credibility of the presented information. A third theme was identified in which participants described the video as likely being a helpful resource for recently diagnosed UM patients, with many participants expressing a wish to have had access to a video like this when they were first diagnosed. A fourth theme was detected in which participants expressed interest in sharing this video with caregivers, loved ones, and medical providers in order to teach them more about UM.

A number of themes also emerged within the negative and constructive feedback that participants gave in response to the first video. Regarding negative feedback, a theme emerged in which participants felt as if the video was too "clinical" and could have been of better production quality. A second theme emerged regarding suggested additions to the video's content. Some participants recommended that the video (or additional videos) include more in-depth information regarding treatment procedures and expectations for immediate and longer-term recovery in terms of both general and visual functioning. Other recommendations called for the inclusion of interactive components to the video (e.g., hyperlinks to other/relevant resources), and an introduction to members of Dr. McCannel's team at the UCLA Jules Stein Eye Institute.

Video 2. Participants in the treatment condition also provided written feedback about their experiences reviewing the second video at T1. Feedback was again initially categorized as positive or negative (including constructive criticism). Upon reviewing the positive feedback, a number of consistent themes emerged across participant responses. First, a theme was noted in which participants expressed appreciation for the opportunity to review the video, noting positive impacts the video had on their outlook regarding UM. For example, some participants described the video as "uplifting" and noted that it made them feel "less alone". Some participants also reported feeling empowered as a result of watching the video. A second theme emerged

surrounding participants' appreciation of the content included within the video. Specifically, participants expressed that they enjoyed the following presented topics: approach-oriented coping, meaning making in the context of UM, the impact of stress on both general and visual health, and the presented supportive resources (e.g., Simms/Mann Center, mindfulness resources). Similar to the first video, a distinct theme was identified in which participants described Video 2 as likely being a helpful resource for recently diagnosed UM patients, with many participants again expressing a wish to have had access to a video like this when they were first diagnosed. Some participants noted that Video 2 was more comprehensive and helpful than the resource they originally received from UCLA Jules Stein Eye Institute following their UM diagnosis (i.e., a brief list of local resources offering psychosocial support to cancer patients).

Themes also emerged within the negative and constructive feedback from participants in response to the second video. Regarding negative feedback, a similar theme emerged as did for Video 1 in which participants described Video 2 as too "clinical". Participants also found Video 2 to be "too long" in duration. A second theme emerged surrounding recommendations from participants for additional content that could be included in the video (or additional videos). For example, several participants expressed a desire for more information surrounding considerations for navigating and coping with visual impairment over time. Another common recommendation was to include information addressed to caregivers and loved ones, including ways that they can provide support and also cope with their own emotions surrounding the patient's UM diagnosis, treatment, and recovery.

Mental Health Resource Information Sheet. Participants in the control condition provided both positive and negative/constructive feedback about the Mental Health Resource Information Sheet. Within the positive feedback, a general theme emerged in which participants

expressed approval of the information sheet, noting that it contained helpful information and was organized in a clear manner. A second theme emerged in which participants praised the content of the presented information, specifically in regard to recommended supportive resources including the UCLA Simms/Mann Center, Imerman Angeles, mindfulness resources, and Dr. McCannel's existing YouTube videos on the topic of UM diagnosis, treatment, and survivorship. A third theme was identified in which many participants reported that they would have appreciated the opportunity to receive this information sheet following their UM diagnosis, noting that a resource such as this one would have helped them feel more supported in navigating the emotional impact of UM.

Negative/constructive feedback was characterized by two themes. The first consisted of participant recommendations as to additional content that could be included in future iterations of the information sheet. Some participants suggested including more up-to-date resources, noting that Dr. McCannel's existing YouTube videos are several years old. Other participants expressed interest in resources that offered cutting-edge information related to cancer survivorship, such as nutritional guidance. Of note, many participants recommended that the information sheet should include resources related to helping patients navigate visual impairment and/or vision loss throughout survivorship (similar to recommendations made by participants in response to Video 2). The second theme emerged surrounding participants' expressed desire for a UCLA-based support group and/or peer mentorship program in which they could have connected with other patients who had previously been diagnosed and treated for UM at Jules Stein (particularly around the time of their initial diagnosis and treatment).

Discussion

Interpretation of Study Findings

Moderation Models

Analyses were primarily concerned with examining differences in intervention effects on three illness perceptions (i.e., chronicity, control, and coherence appraisals) and psychological distress over time. No significant interaction effects were evident between study condition and time on said outcomes across the four omnibus models. Accordingly, hypotheses were not supported that participants in the treatment condition would evidence more positive (i.e., less threatening) illness perceptions and lower levels of psychological distress across the course of the study. In addition, there was no evidence that treatment effects on outcome variables differed as a result of hypothesized moderator variables (i.e., years since UM diagnosis or pre-treatment levels of approach- and avoidance-oriented coping).

Inspection of the proportion of variances explained (i.e., R^2 estimates) in each component model across the four omnibus tests further underscores the lack of significant treatment effects (see Tables 5 – 9). Specifically, the highest proportions of variance explained in the outcomes were most often attributed to the Level 2 intercepts and unexplained Level 1 variation of the outcome variables. In other words, pre-treatment between-participant levels of a given outcome variable often explained a relatively high (if not the highest) degree of variation in said outcome over time (e.g., R^2 = .37 - .75). Further, there was also a consistently high level of within-subject variation that was left unexplained by the variables in the models (e.g., R^2 = .22 - .74).

In addition, the proportion of variation in the outcomes explained by model coefficients and random slopes were consistently lower, despite often being statistically significant. For example, proportions of variance in the outcome variables explained by our model coefficients ranged from 1 – 6% in 15 of 16 component models, with one component model evidencing a moderate R^2 value of .24. In this latter model, the relatively moderate effect size was likely

driven by the significant main effect of time on the outcome variable (i.e., coherence perceptions) that was observed, as the only other two coefficients in the model were relatively small and not statistically significant (i.e., *b1* = 0.001, *p* = .99; *b2* = 0.17, *p* = .75). Similarly, proportions of variance in the outcome variables that were explained by participants' random slopes on said outcomes were also consistently smaller, ranging from 1 – 10% across all component models.

Thus, results from the omnibus and component models failed to demonstrate any notable treatment effects over time on illness perceptions or psychological distress. The one exception to this pattern of findings was found in a single component model tested under the third omnibus model that examined three-way interactions between time, study condition, and pre-treatment levels of approach-oriented coping. Specifically, in the component model examining control perceptions as an outcome, I found a significant interaction between time, study condition, and approach-oriented coping. Specifically, participants in the control condition evidenced significant increases in control perceptions over time, while participants in the treatment condition evidenced a non-significant positive slope, *only* when the pre-treatment level of approach-oriented coping was at the scale minimum (i.e., score = 1).

While it is possible that provision of the control intervention (i.e., mental health resource information sheet) may have offered participants with low levels of pre-treatment approach-oriented coping some unique benefit toward promoting control perceptions, it is curious that we did not observe this effect for participants in the treatment condition, given that they were also provided with the same resource (in addition to the psychoeducational videos). It is possible that for individuals engaging in low levels of approach-oriented coping at baseline, reviewing the mental health resource information sheet alone may have been a more appropriate or helpful

intervention than reviewing both the information sheet and the psychoeducational videos, thereby promoting statistically significant increases in control perceptions over time. However, my ability to draw meaningful interpretations from this finding is limited, given several factors that call the reliability and robustness of this effect into question. First and foremost, this time by study condition interaction was only detected at a value of approach-oriented coping that was not observed within the participant sample. Interpretations of this effect would therefore be based on extrapolations beyond the study data. Further, this three-way interaction effect was detected upon probing component models despite finding that the initial omnibus test (Model 3) was not statistically significant at either the $p < .05$ or the Bonferroni corrected $p < .0125$ threshold. While the interaction coefficient was itself significant at the $p < .05$ level, it should not be considered as such when appropriately following our plan to control for the overall type I error rate (i.e., by not probing component models in the absence of a significant omnibus model).

Regarding main effects, I did not observe any significant main effect of study condition on any of the three illness perceptions or psychological distress. I did however detect multiple main effects of time across component models. Specifically, I found significant main effects of time on chronicity perceptions when pre-treatment levels of approach- or avoidance-oriented coping were included in the model (and held constant at their respective grand means). All main effects suggested positive chronicity perception slopes, meaning that the degree to which participants viewed their illnesses as lasting further into the future *increased* over the course of the study. These findings were counter to my hypothesis, which specified in part that illness perceptions would grow more positive/less threatening over time. Prolonged chronicity perceptions have historically been conceptualized as more threatening in the literature, and I was surprised to find that they increased, on average.

In order to interpret why chronicity perceptions may have increased over time in the sample, it can be helpful to consider the magnitude of the observed effects. The observed main effects of time on chronicity perceptions were relatively small (i.e., $b = 0.11$ for both main effects). While statistically significant, these effects suggest that throughout the course of our six-week study, participants would be expected to report more prolonged chronicity perceptions by a magnitude of 0.66 points on the BIPQ scale. Given that the scale offers response options ranging from 0 to 10, it is difficult to interpret these main effects as holding notable *clinical* significance. In other trials of illness perception interventions, clinically meaningful improvements in psychosocial adjustment have typically been associated with changes in BIPQ scores in the magnitude of several full points on the scale over time (e.g., Broadbent et al., 2009; Pires et al., 2017; Sararoudi et al., 2017). Our main effects of time on chronicity perceptions should also be interpreted with caution given the lack of a constrained significance threshold to control for the type I error rate across multiple tests under each omnibus model.

Further, it is also helpful to consider what prolonged chronicity perceptions in the sample may represent. While prolonged chronicity perceptions are typically associated with poor adjustment outcomes, I did not observe that chronicity perceptions were significantly correlated with depression or anxiety symptoms (or the composite psychological distress variable) at any assessment point. Thus, it is difficult to ascertain whether the observed increases in chronicity appraisals represent a clinically relevant change in perceptions in response to the study condition manipulations in both groups, or if so, what implications said changes may hold for adjustment.

Main effects of time on coherence perceptions were also observed across all four omnibus models. These effects were all negative, suggesting that participants typically reported that they understood their illness (i.e., UM) *less* over the course of the study. Again, these main

effects were found in the opposite direction of my hypotheses, as I expected participants to report greater understanding of their illness over the course of the study. The main effects of time on coherence perceptions were larger in magnitude than those described above for chronicity perceptions (i.e., b = -0.60 or b = -0.61 across all four main effects). These results suggest that participants were expected to have a decrease in coherence scores by 0.6 points on the BIPQ for each week of time that passed during the study, meaning participants' coherence scores at the end of the study were expected to be 3.6 points lower than their scores at baseline. This predicted decrease in scores could be indicative of clinically meaningful changes in coherence perceptions, as it represents a magnitude representing approximately one third of the scale range.

How do we interpret these reductions in coherence perceptions throughout the study in response to both the control and treatment interventions? These results are somewhat confusing given participants' exit survey responses which indicated that the psychoeducational videos and mental health resource information sheet provided helpful information about UM. Further, many participants specifically mentioned that the information presented in the resources coincided and overlapped with their *existing* knowledge about UM and UM survivorship.

One possible explanation is that participants in both study conditions may have learned new or updated information about UM in response to their intervention manipulation, which in turn may have recalibrated their perceived level of understanding about UM. Put differently, participants may have rated themselves as knowing *less* about UM due to the fact that they could recall a recent experience of learning new or updated information about UM. This possibility is somewhat aligned with the Dunning Kruger effect (Dunning & Kruger, 1999), in which individuals who are highly knowledgeable in a given domain tend to underestimate said knowledge due to their heightened awareness of the complexity of said domain, as well as a

heightened understanding of their own knowledge gaps. Thus, it is possible that when participants were presented with information about UM that was either familiar or newly learned, it primed them to view themselves as having relatively *less* understanding about UM. Relatedly, it is possible that I captured acute, temporary decreases in coherence perception scores for participants in both study conditions, but that coherence perceptions may have returned to baseline levels or even increased over the course of a longer follow-up period with assessment points more distal from a recent learning experience. Further research is needed to adequately test these proposed explanations and interpretations of findings.

As with the main effects of time on chronicity perceptions, these main effects of time on coherence perceptions should also be interpreted with some caution given the lack of a constrained significance threshold to control for the type I error rate across multiple tests within each omnibus, as well as the consistently high levels of unexplained Level 1 variance in coherence perceptions observed across the four component models (R^2 = 71 – 74%). Future research is needed to ascertain whether this observed negative effect of both the control and treatment interventions reliably produce reductions in coherence perceptions over time.

Mediation Model

Regarding the mediation model, I found no significant direct or indirect effects of study condition on the composite psychological distress outcome variable. Given the lack of significant findings surrounding treatment effects on both illness perceptions and psychological distress, it is not surprising that no significant effects emerged. For example, I found no significant "a paths" between study condition and illness perceptions, consistent with the failure to detect significant treatment effects on chronicity, control and coherence appraisals in the aforementioned omnibus models (see Tables 5 – 9). Further, there were no significant "b paths" between illness

perceptions and psychological distress, despite some significant zero-order correlations between these variables at certain assessment points (see Supplementary Material – Table A). Finally, I did not observe a direct effect of study condition on psychological distress, which is again consistent with the failure to detect treatment effects within in any component models testing psychological distress as an outcome (see Tables 5 – 9). Given that the intervention did not confer notable change in illness perceptions (i.e., successful target engagement) or psychological distress, our findings were unable to lend support to either the CSM or GOF models.

Intervention Feedback

Participants' responses to exit surveys following review of the psychoeducational videos or the mental health resource information sheet helped me understand the potential utility these interventions may offer in promoting adjustment outcomes for UM survivors. Quantitative results from self-report items indicated that both resources possess high levels of acceptability, credibility, and informational utility to UM patients. All seven domains upon which the resources were rated evidenced average scores about the scale mid-points (i.e., scores > 3), suggesting an overall favorable reception by participants. Emergent themes from qualitative analyses suggested that participants felt the information presented in both resources was clear and would be especially beneficial for UM patients at or around the time of diagnosis. Another theme suggested that participants in both study conditions desired more information about how to cope emotionally and functionally with visual impairment and/or vision loss across the course of UM survivorship. These findings collectively spoke to the acceptability, credibility, and informational utility of both the psychoeducation videos and the mental health resource information sheet for UM survivors.

Failed Target Engagement

The primary aim of this study was to achieve target engagement of chronicity, control, and coherence perceptions by promoting more positive appraisals in these domains as a result of the psychoeducational intervention. Below, I discuss ways in which the participant sample, intervention design, and study methodology may have hindered my ability to achieve or detect successful target engagement of illness perceptions.

Sample Considerations

The sample was comprised of participants who appeared overall to be rather well-adjusted in their experiences with UM survivorship. The sample had low levels of psychological distress at baseline and throughout the study, as evidenced by their scores on measures of anxiety and depressive symptoms (as well as the composite z-score variable). Visual inspection of the data demonstrated clear negative skews in the anxiety, depression, and composite psychological distress variables. Regarding the distribution of scores on these variables, 68% of participants demonstrated GAD-7 scores in the sub-threshold range (i.e., scores from 0 – 4) and 80% of participants demonstrated CES-D scores below the clinically suggestive threshold of 16.

It is possible that the intervention failed to successfully engage illness perceptions because of participants' relatively low levels of psychological distress, in general or in relation to their experiences as UM survivors. One reason why this might be the case is that participants with low distress levels may possess illness perceptions that are less salient in light of their relatively robust psychological and disease-related adjustment, and that in turn are less likely to be activated and engaged by the intervention. Further, in the interest of maintaining the study blind, participants were unaware that they were receiving any type of intervention. This may have actually limited the degree to which they engaged with their assigned intervention or connected the presented content to their own experiences as UM survivors. Further research is

needed to elucidate the degree to which psychological distress may impact the mutability of illness perceptions in response to targeted intervention.

A related point is that participants, on average, had been diagnosed with UM over 7 years prior to enrolling in the study. In the context of UM survivorship, patients typically complete initial treatment and recovery within the first 6-12 months following initial diagnosis. At UCLA, patients are thereafter recommended to attend twice yearly ophthalmologic and oncologic follow-up appointments in perpetuity to address any ongoing visual impairment and to surveil for UM recurrence or metastatic spread. As previously described, illness perception interventions have been shown to be most effective when delivered to patients at meaningful disease-related junctures (e.g., Crawshaw et al., 2015; Devcich et al., 2012; Goodman et al., 2013; Janssen et al., 2013). Given that the study intervention was *not* anchored to notable clinical junctures, such as diagnosis, treatment, or change in disease prognosis, it is possible that the intervention was unsuccessful in engaging illness perceptions due to a lack of saliency in participants' own identities and current psychosocial needs as UM survivors, especially in light of their relatively positive adjustment. This hypothesis is also supported by qualitative data collected from participants' responses to the intervention exit surveys. As previously noted, a theme emerged within participants' responses to both the control and treatment conditions which suggested that while acceptable and credible, the interventions would likely be most useful to participants around the time of their UM diagnosis. Later, we discuss considerations for participant sampling for future research.

Intervention Considerations

There are at least three elements of the intervention design that could have contributed to the failure to promote more positive illness perceptions over time. First, it is possible that the

intervention may not have included the most effective content, or may not have been comprehensive enough in its scope, to successfully modify illness perceptions. For example, in their open-ended feedback on the exit surveys, many participants expressed a desire for resources that provide emotional and logistical support for navigating visual impairment and vision loss. Unfortunately, neither the psychoeducational videos nor the mental health resource information sheet addressed the topic of coping with visual impairment. It is possible, therefore, that inclusion of content that was more relevant to the current psychosocial and disease-related needs of the participant sample could have optimized the intervention's ability to engage and modify illness perceptions.

Relatedly, the psychoeducational intervention was delivered with a one-size-fits-all approach, such that participants all received the same videos. Intervention content was universal and was *not* tailored to individuals based on any demographic, psychosocial, or disease-related factors. In the literature, illness perception interventions that are delivered from a trained provider in a one-on-one format, with tailored content based on patients' pre-treatment illness perceptions or disease-related functioning have been shown to be especially effective in promoting more positive illness perceptions over time (e.g., Petrie, 2002; Broadbent 2009). Thus, it is possible that my psychoeducational intervention contained information that was overly general in nature and/or failed to address participants' specific questions, concerns, or needs related to their own experiences with UM. Further, using informational tools (i.e., videos) as the mode of treatment delivery could have also hindered the intervention's ability to successfully target participants' illness perceptions. While a more logistically difficult and cost prohibitive pursuit, delivering the intervention via individual- or group-based psychoeducational sessions could have allowed for more sensitive and effective engagement of participants' unique illness

perceptions, as well as the opportunity to address participants' beliefs and behaviors that may reinforce said perceptions.

Finally, the intervention's failure to engage illness perceptions may have in part been due to ceiling effects on what the psychoeducational intervention stood to offer participants over and above the standard of care they have received at UCLA. Specifically, all participants enrolled in the study were patients under the care of Dr. Tara McCannel, the Director of the Ophthalmic Oncology Center at the UCLA Jules Stein Eye Institute. Dr. McCannel is a world expert in the diagnosis and treatment of UM and actively attends to her patients' mental health and holistic well-being throughout every phase of the disease course and survivorship. While the psychoeducational intervention included novel videos featuring Dr. McCannel, as well as consolidated information about various aspects of UM survivorship, it is possible that the intervention was too similar to the standard of care that participants are already receiving from Dr. McCannel. As a result, the intervention may not have offered participants enough *new* information to have significantly influenced their illness perceptions over the course of the study. Some of the qualitative findings support this hypothesis, as many participants reported that they already knew much of the information that was presented in the psychoeducational videos or mental health resource information sheet. Later, we discuss considerations for intervention design that should be incorporated in future research testing similar interventions in UM patient samples.

Methodological Considerations

There are a few ways in which the study methodology could have limited my ability to detect changes in illness perceptions. First, the assessment period in the study was relatively brief as it was only six weeks in duration. It is possible that with a longer assessment period, we could

have observed changes in illness perceptions manifest on a longer-term basis. A longer assessment period would theoretically afford participants more opportunities to consider the information presented in the psychoeducational intervention and apply said information to their own experiences as UM survivors. For example, the psychoeducational videos included recommendations for ways that UM survivors can increasingly bring their visual and physical health under their own control, including promoting stress management, managing other forms of chronic illness, and adopting regular nutrition and exercise regimens. It is possible that the six-week study period was not long enough for participants to begin implementing said suggestions, for their illness perceptions to meaningfully change in response to said implementations, or for changes to be captured by the study's measures.

Further, it is possible that the use of single-item measures of illness perceptions could have limited my ability to detect clinically meaningful changes. While the BIPQ is used widely across the illness perception intervention literature (e.g., Broadbent et al., 2015), it is possible that a measure of illness perceptions with several items corresponding to each domain could have more adequately and reliably captured meaningful changes in the intervention targets, as the single-item measures may not have fully captured the complexity or breadth of the examined constructs. Further, it is possible that the single-item illness perception measures were especially sensitive to random errors or transient influences that could have impacted participants' responses at various testing occasions. Thus, the use of single-item measures could have also served to mask true treatment effects if they detected *both* random error in addition to said effects. Finally, the single-item nature of the measures gave us no opportunity to leverage internal consistency methods to estimate reliability of the assessments. While the IPQ-R (38-items; Moss-Morris et al., 2002) is a measure that includes several items per illness perception

domain, we elected to use the BIPQ due to its convergent validity with the IPQ-R and as a means of reducing participant burden on each survey. Given that this was a first randomized trial of a novel intervention with a relatively brief assessment period, a more comprehensive measure of illness perceptions would likely have been a more appropriate assessment choice for optimizing detection of potential treatment effects and target engagement within the sample. I should note, however, that other illness perception interventions *have* demonstrated significant change on the BIPQ (e.g., Broadbent et al., 2009; Pires et al., 2017; Sararoudi et al., 2016).

Another way in which the methodology may have impacted my ability to detect target engagement concerns my decision to adopt an ITT analysis. With this approach, I included all available study data from participants who were successfully randomized to either study condition, meaning that I did not eliminate data of suboptimal quality according to the manipulation checks for participants in the treatment condition. This means that the analyses included data from participants who received questionable "doses" of the psychoeducational intervention according to the amount of time they spent completing the survey and their responses to embedded knowledge-check items in the intervention exit surveys. In the sample, 15% of the data was categorized as being of "good" quality or less, with over 10% of the data falling into categories of "fair" and "poor". Thus, it is possible that lower quality data in the analyzed sample could be artificially suppressing true target engagement and treatment effects, or it is possible that true effects could have emerged if participants had received a more effective dose of the psychoeducational intervention.

Relatedly, my choice to keep participants unaware of the interventional intent of the study may have limited the ability of the psychoeducational intervention to successfully modify illness perceptions. Had participants been aware that the presented resources were intended to

promote aspects of UM adjustment, they may have engaged more deeply with the intervention content or felt greater motivation to reflect on their experiences, beliefs, and needs in relation to UM survivorship. This approach could have better activated the saliency of participants' illness perceptions and in turn increased their potential for change in response to the intervention. This approach would also possess greater external validity, as interventions delivered to patients in clinical settings do not typically blind participants to their intended effects on adjustment over time. Later, we discuss considerations for future research testing illness perception interventions in UM samples, including recommendations for methodological design.

Study Strengths and Limitations

The current study possesses a number of strengths in its design and execution. First, I designed a novel psychoeducational intervention for UM patients following an experimental medicine approach. Specifically, the contents of the intervention were directly informed by findings from previous research that highlighted important psychosocial treatment targets for this population (i.e., illness perceptions). Further, it incorporated psychoeducation delivered directly from participants' treating oncologist, Dr. Tara McCannel, lending to its relevance, credibility, and ultimate clinical utility for UM patients at UCLA. Second, the study was successful in carrying out a randomized controlled trial of the intervention with an adequate sample size of UM patients, as 101 participants were successfully randomized to one of two study conditions. A third strength is the longitudinal study design that included data collection over four assessment points within a six-week period, affording the opportunity to examine potential change in the variables of interest over time. Additional strengths can be found in the analytic approach. My use of multi-level modeling allowed me to examine both within- and between-subject change in the outcome variables. Conducting the analyses in Blimp software afforded the opportunity to

leverage Bayesian methods for handling missing data concurrently with my model estimations. This allowed me to maximize the number of observations and corresponding power when conducting the moderation analyses across Models 1 – 4. Finally, the methodology included administration of exit surveys which collected quantitative and qualitative feedback from participants about the treatment and control interventions. These data revealed that both interventions were rated as highly acceptable, credible, and informative by UM patients. Further, participants' feedback provided helpful suggestions for areas of improvement and additional content for future iterations of the interventions.

Despite these strengths, the study also had limitations, chiefly in its methodology. First, the intervention content did not discuss specific considerations for coping with visual impairment or loss and their impact on mental health and daily functioning. This was a topic that I learned was of high interest to participants through their open-ended responses to the intervention exit surveys. Second, in an effort to maintain blinding to their assigned study condition, participants were told that the study sought to obtain patient reactions and feedback in response to newly developed supportive resources for UM patients at the UCLA Jules Stein Eye Institute. If participants had been made aware of the active interventional intent of the study, they may have engaged more meaningfully with the intervention content or may have been more directly primed to reflect on their own experiences and adjustment needs as UM survivors.

Some aspects of the methodology may have also made it more difficult to detect true intervention effects, such as the relatively brief follow-up period (i.e., six weeks) and the use of single-item measures of illness perceptions at each assessment point. In addition, my use of an ITT analytic approach meant that I analyzed all participants' data, regardless of its estimated quality. Further, the manipulation checks were based on limited data, including the amount of

time spent completing the surveys and participants' responses to embedded knowledge-check items in the exit surveys. Thus, I have somewhat limited confidence in the degree to which participants received an adequate "dose" of the psychoeducational intervention. In turn, this could explain either a true lack of treatment effects *or* a masking of actual treatment effects by the inclusion of poor quality data.

Finally, the study contained only a single-blind regarding participants' assigned study condition. While participants were unaware of their randomization to the treatment vs. control condition, I was aware of participants' assigned conditions. Specifically, I could have unknowingly impacted participants' responses to the study assessments through my expectations, attitudes, or behaviors shaped by my knowledge of their assigned study condition. Given that no significant treatment effects or target engagement were evident, it is likely that experimenter effects were largely mitigated. However, the single-blind nature of the study inherently precludes me from ruling out the possibility of experimenter bias.

Future Directions

Several insights have been gained from this randomized trial of a novel psychoeducational intervention which will inform future research to examine its effects on adjustment within additional UM samples. Given participants' strongly positive feedback that the treatment and control interventions would be useful if administered closer to the time of UM diagnosis, a trial of the psychoeducational intervention with a sample of recently diagnosis UM patients is warranted. While I detected no moderating or main effects of "years since diagnosis" on changes in illness perceptions or psychological distress, recently diagnosed participants were notably under-represented in the sample, with only seven - 6.9% of the sample - having been diagnosed less than 1 year prior. For reasons outlined above, presenting the intervention

transparently to UM patients as a resource designed to promote their current adjustment in relation to their disease is also recommended. Further, inclusion of a longer assessment period may offer greater opportunity to observe potential changes in illness perceptions and psychological distress.

Another consideration for future trials is to include additional information pertaining to management of visual impairment or vision loss. Participants expressed a desire for information and resources to help them cope with emotional and logistical challenges presented by worsening vision due to UM and its treatment. Perhaps a third video could be dedicated to the topic of visual impairment and vision loss. For example, a third video could discuss existing visual and psychosocial resources for patients with visual impairment and vision loss (i.e., "low vision" or blindness) through UCLA's Low Vision division of the Ophthalmology department, as well as through the Braille Institute of America.

With the inclusion of this third video, subjective visual impairment should be considered as an additional treatment target for inclusion and measurement. As described earlier, MacDonald and colleagues (2021) found that subjective visual impairment was associated with depressive symptoms in a sample of UM patients in the year following diagnosis. Providing psychoeducation regarding coping with visual impairment and vision loss via an intervention that is delivered closer to UM diagnosis could not only better address patients' psychosocial and disease-related needs at that time, but may also be an important means by which more positive illness perceptions and appraisals of visual impairment can be achieved. In turn, these changes in participants' disease-related appraisals could lead to better adjustment outcomes during a critical phase of UM survivorship.

While the intervention and study design were informed by the CSM and GOF models, results from this trial were unable to lend support to either theoretical framework as illness perceptions did not change significantly as a function of the intervention. Future trials of the intervention could be better poised to test components of both models by evaluating changes in coping processes alongside changes in illness perceptions. Such an approach would allow for central tenets of the CSM to be evaluated, including whether changes in illness perceptions inspire both subsequent changes in coping processes and ultimate changes in psychological adjustment outcomes. The GOF could be tested by evaluating whether concurrent levels of illness perceptions and coping processes predict subsequent adjustment. If illness perceptions were successfully engaged and modified over time, cross-lagged panel analyses could elucidate directional influences of changes in illness perceptions and coping processes on one another, and on indices of adjustment in UM patients over time.

Beyond additional trials of a revised psychoeducational intervention, future research could also explore whether certain illness perception domains have phase-specific influences on adjustment outcomes in survivorship to UM or other chronic illnesses. In our previous research within UM survivors at UCLA, we found that patients' chronicity perceptions in the weeks after initial diagnosis significantly predicted depressive symptoms one year later when levels of approach-oriented coping were low, and when avoidance-oriented coping was high, even when controlling for pre-diagnosis levels of depressive symptoms and trait levels of optimism and pessimism (Hoch et al., 2023). However, we did not find any significant relationship between illness perceptions and psychological distress variables in the current sample of UM survivors, who had been diagnosed 7 years prior, on average.

It is interesting to consider that chronicity perceptions, amongst others, may be uniquely associated with adjustment outcomes at various phases of disease survivorship. Could it be that prolonged chronicity perceptions pose a greater risk for adjustment at earlier stages of UM survivorship when overall coping resources may be fewer, by virtue of the more recent diagnosis? This could very well be the case for UM patients who, anecdotally, are often unaware that it is even possible for cancer to develop in the eye. Further, results from both Hoch et al. (2023) and MacDonald et al. (2021) demonstrated that UM patients with more threatening appraisals of their illness (i.e., prolonged chronicity perceptions and greater subjective visual impairment, respectively) were at greater risk for elevated depression symptoms one year after diagnosis, *only* when lower levels of coping resources were *also* observed (i.e., approach-oriented coping and trait optimism, respectively). Thus, it could be the case that as patients move through later phases of survivorship and develop more (and more effective) coping resources, illness perceptions alone are less influential on psychosocial adjustment, regardless of how positive vs. threatening said perceptions may be. Future research should examine the relative impact that illness perceptions may have on adjustment at various phases of disease survivorship, both in UM samples and in other chronically ill populations.

Conclusion

I tested a novel psychoeducational intervention designed specifically to promote more positive illness perceptions and adjustment in UM survivors. This was the first such intervention to be tested in a UM patient sample, and it was found to be accessible, credible, and informative according to participant feedback. Although evidence did not support my hypotheses that the intervention would inspire less threatening illness perceptions over time, I gained valuable

insights as to how we may better serve patients at UCLA and elsewhere in their experiences as UM survivors.

Appendix A – Copies of Measures

Demographics Questionnaire

Please fill in the blanks below or check the item that describes you best.

Age _____ Gender: Male Female Other

Education
___Some high school education
___High School degree
___Some college education
___College degree
___Some graduate education
___Graduate degree

Race:
___American Indian or Alaska Native
___Asian
___Black or African American
___Native Hawaiian or Other Pacific Islander
___White

Ethnicity:
___Hispanic or Latino/a
___Not Hispanic or Latino/a

Approximate total yearly family income:

Current employment status:

____ employed at least 30 hours/week _____employed fewer than 30 hours/week

____unemployed ____retired ____disabled

Are you:
____married/living as married ____single ____divorced/separated ____widowed

If you can recall, please note the month and year in which you were first diagnosed with eye cancer: _____ _____

(month) (year)

Brief Illness Perception Questionnaire (BIPQ; Broadbent, 2006)

For the following questions, please circle the number that best corresponds to your views about eye cancer:

How much does your illness affect your life?

0	1	2	3	4	5	6	7	8	9	10
no effect at all										severely affects my life

How long do you think your illness will continue?

0	1	2	3	4	5	6	7	8	9	10
a very short time										forever

How much control do you feel you have over your illness?

0	1	2	3	4	5	6	7	8	9	10
absolutely no control										extreme amount of control

How much do you think your treatment has helped your illness?

0	1	2	3	4	5	6	7	8	9	10
not at all										extremely helpful

How much do you experience symptoms from your illness?

0	1	2	3	4	5	6	7	8	9	10
no symptoms at all										many severe symptoms

How concerned are you about your illness?

0	1	2	3	4	5	6	7	8	9	10
not at all concerned										extremely concerned

How well do you feel you understand your illness?

0	1	2	3	4	5	6	7	8	9	10
don't understand at all										understand very clearly

How much does your illness affect you emotionally? (e.g., does it make you angry, scared, upset, or depressed?)

0	1	2	3	4	5	6	7	8	9	10
not at all affected emotionally										extremely affected emotionally

Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977).

Using the scale below, indicate the number which best describes how often you felt or behaved this way – **DURING THE PAST WEEK.**
0 = Rarely or none of the time (less than 1 day)
1 = Some or a little of the time (1 - 2 days)
2 = Occasionally or a moderate amount of time (3 - 4 days)
3 = Most or all of the time (5 - 7 days)

DURING THE PAST WEEK

____ 1. I was bothered by things that usually don't bother me.
____ 2. I did not feel like eating; my appetite was poor.
____ 3. I felt I could not shake off the blues, even with help from family or friends.
____ 4. I felt that I was just as good as other people.
____ 5. I had trouble keeping my mind on what I was doing.
____ 6. I felt depressed.
____ 7. I felt that everything I did was an effort.
____ 8. I felt hopeful about the future.
____ 9. I thought my life had been a failure.
____ 10. I felt fearful.
____ 11. My sleep was restless.
____ 12. I was happy.
____ 13. I talked less than usual.
____ 14. I felt lonely.
____ 15. People were unfriendly.
____ 16. I enjoyed life
____ 17. I had crying spells.
____ 18. I felt sad.
____ 19. I felt that people disliked me.
____ 20. I could not get "going."

Generalized Anxiety Disorder Scale– 7 (GAD-7; Spitzer, 2006)

Over the last week, how often have you been bothered by the following problems?	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious, or on edge				
2. Not being able to stop or control worrying				
3. Worrying too much about different things				
4. Trouble relaxing				
5. Being so restless that it is hard to sit still				
6. Becoming easily annoyed or irritable				
7. Feeling afraid, as if something awful might happen				

COPE (Carver, Scheier, & Weintraub, 1989) and Emotional Approach Scale (Stanton, 2000).

We want to understand how people respond when they confront cancer. There are many ways to deal with problems. These items ask what **YOU HAVE BEEN DOING TO COPE WITH YOUR HISTORY OF OCULAR MELANOMA IN THE PAST WEEK.** We want to know to what extent (how much or how frequently) you have been doing what each item says. Rate each item separately from the others. Make your answers as true FOR YOU as you can.

1 = I don't do this at all.
2 = I do this a little bit.
3 = I do this a medium amount.
4 = I do this a lot.

____ 1. I learn something from the experience.
____ 2. I take time to figure out what I'm really feeling.
____ 3. I concentrate my efforts on doing something about it.
____ 4. I admit to myself that I can't deal with it, and quit trying.
____ 5. I accept the reality of the fact that it happened.
____ 6. I try to get advice from someone about what to do.
____ 7. I try to come up with a strategy about what to do.
____ 8. I try to find comfort in my religion or spiritual beliefs.
____ 9. I delve into my feelings to get a thorough understanding of them.
____ 10. I take action to try to make the situation better.
____ 11. I act as though it hasn't even happened.
____ 12. I get help and advice from other people.
____ 13. I say to myself "this isn't real."
____ 14. I take time to express my emotions.
____ 15. I pretend that it hasn't really happened.
____ 16. I learn to live with it.
____ 17. I think hard about what steps to take.
____ 18. I allow myself to express my emotions.
____ 19. I seek God's (or a higher power's) help.
____ 20. I try to see it in a different light, to make it seem more positive.
____ 21. I get comfort and understanding from someone.
____ 22. I put my trust in God or my spiritual beliefs.
____ 23. I look for something good in what is happening.
____ 24. I feel free to express my emotions.
____ 25. I get emotional support from others.
____ 26. I refuse to believe that it has happened.
____ 27. I get used to the idea that it happened.
____ 28. I realize that my feelings are valid and important.
____ 29. I daydream about things other than this.
____ 30. I just give up trying to deal with it.
____ 31. I do something to think about it less, such as going to movies or watching TV.
____ 32. I let my feelings come out freely.
____ 33. I give up the attempt to cope.
____ 34. I sleep more than usual to think about it less.
____ 35. I acknowledge my emotions.
____ 36. I pray or meditate.
____ 37. I try to grow as a person as a result of the experience.
____ 38. I reduce the amount of effort I'm putting into dealing with it.
____ 39. I turn to work or other activities to take my mind off things.
____ 40. I accept that this has happened and that it can't be changed.

Exit Survey – Treatment Condition

Thank you for watching our video. Please answer these questions that deal with your reactions to the video. Select the answer that best describes your reactions.

a. As a survivor of eye cancer, how helpful was the video you just watched in providing you with useful information?

1	2	3	4	5
Not at all helpful		Somewhat helpful		Very helpful

b. As a survivor of eye cancer, how helpful was the video you just watched in providing you with psychological support?

1	2	3	4	5
Not at all helpful		Somewhat helpful		Very helpful

c. In your opinion, how acceptable was the video as a resource for survivors of eye cancer?

1	2	3	4	5
Not at all acceptable		Somewhat acceptable		Very acceptable

d. How credible did you find the video and the information it contained?

1	2	3	4	5
Not at all credible		Somewhat credible		Very credible

e. How helpful do you think this video would have been to you at the time of your diagnosis with eye cancer?

1	2	3	4	5
Not at all likely		Somewhat likely		Very likely

f. How likely are you to refer back to this video in the future?

1	2	3	4	5
Not at all likely		Somewhat likely		Very likely

g. How interested are you in having access to videos like this in the future?

1	2	3	4	5
Not at all interested		Somewhat interested		Very interested

h. If you have any additional reactions or comments to share with us about this video, please feel free to type them in the box below:

Exit Survey – Control Condition

Thank you for reviewing our Mental Health Resource Information Sheet. Please answer these questions about your reactions to the resource. Select the answer that best describes your reactions.

a. As a survivor of eye cancer, how helpful was the information sheet in terms of providing you with useful information?

1	2	3	4	5
Not at all helpful		Somewhat helpful		Very helpful

b. As a survivor of eye cancer, how helpful was the information sheet in providing you with psychological support?

1	2	3	4	5
Not at all helpful		Somewhat helpful		Very helpful

c. In your opinion, how acceptable was the information sheet for survivors of eye cancer?

1	2	3	4	5
Not at all acceptable		Somewhat acceptable		Very acceptable

d. How credible did you find the information sheet and the information it contained?

1	2	3	4	5
Not at all credible		Somewhat credible		Very credible

e. How helpful do you think this information sheet would have been to you at the time of your diagnosis with eye cancer?

1	2	3	4	5
Not at all likely		Somewhat likely		Very likely

f. How likely are you to refer back to this information sheet in the future?

1	2	3	4	5
Not at all likely		Somewhat likely		Very likely

g. How interested are you in having access to resources like this in the future?

1	2	3	4	5
Not at all interested		Somewhat interested		Very interested

h. If you have any additional reactions or comments to share with us about the information sheet, please feel free to type them in the box below:

Appendix B – Video Transcripts and Mental Health Resource Information Sheet

Video #1 YouTube Link: https://youtu.be/Kmr0tk20qGg

Video #1 Script:

Welcome to the webinar today. I'm Dr. Tara McCannel. I'm the director of the ophthalmic oncology center at UCLA and I'm a member of the Department of Ophthalmology at the Stein Eye and Doheny Eye institutes at UCLA, and it's a privilege to be here to speak to you about ocular melanoma survivorship. In this video, I'm going to be talking about important considerations for ocular melanoma survivors, including important things you can do to promote your ocular health, your physical health, your mental health– no matter how recently you may have been diagnosed or received treatment. Here at Jules Stein Eye Institute at UCLA, we have historically held three priorities in our care for patients who are diagnosed with ocular melanoma. Our first priority is to save life and promote long-term survivorship. Our second priority is to do everything we can to save the affected eye. Our third priority is to save the patient's sight and maintain it over time – including the sharpness of your vision, management of side effects from the cancer and its treatment, as well as your overall visual quality of life.

As you may or may not know, we at Jules Stein have been pursuing health psychology research with the psychology department at UCLA. Health psychology research seeks to bridge our understanding of how mental and physical health influence one another. Our research has examined how receiving a diagnosis of ocular melanoma has influenced mental health and well-being over time. For example, we conducted a study with patients here at Jules Stein where we sent them questionnaires about their experiences with ocular melanoma to understand their needs from the time of diagnosis up to one year later – if you have been patient here at Jules Stein for several years, you may have actually participated in this study! We published our results of this study in a paper by Timothy Williamson and colleagues in the academic journal JAMA Ophthalmology in 2018. We found that ocular melanoma survivors felt they had a high level of unmet needs related to information about their illness, as well as psychological support surrounding their experience with eye cancer. Thus, we learned that ocular melanoma patients at UCLA wanted more information about their illness, as well as resources to help address their mental and emotional health.

This research has made us increasingly dedicated to providing ocular melanoma survivors with informational resources and psychological support. We believe that providing patients like you more information about ocular melanoma, as well as resources for improving visual, physical, and mental health, will not only address ongoing needs for information and psychological support, but will also help us to uphold our priorities of saving life, saving the eye, and saving sight.

Today's video is the first of a 2 video series that we have developed to provide survivors like yourself with important information about how you and your doctors at Jules Stein can take steps to promote your long-term physical, visual, and mental health. In this first video, we are going to be focusing on important considerations for ocular melanoma survivorship, including information about how your doctors can help to promote your ocular and physical health over time.

Ocular melanoma is a highly treatable form of cancer when we are able to detect it early. Advances in medical imaging technology have allowed for us to detect even incredibly small tumors, something that wasn't available to doctors decades ago. Luckily, even if tumors are detected when they are on the larger side, our current treatments, such as radiation with plaque brachytherapy, are almost always successful in treating the initial tumor. Because of the high degree of success of our treatments in killing the initial tumor, recurrence of ocular melanoma in the affected eye is quite rare. Even in rare cases where we see the cancer come back, we are usually able to detect that quite early on in the growth of the tumor due to the imaging technology that we use at all of your standard follow-up visits.

This is one reason we here at Jules Stein really emphasize the importance of receiving follow-up ophthalmological care from us here, or from your treating retinal specialist, every six months. Being able to evaluate your eye health and collect full labs and images of the eye allow us to detect any potential recurrence of ocular melanoma as early as possible. In the rare cases where we have seen recurrences occur, we are typically able to catch the tumors early and successfully treat the tumor again using radiation treatment.

Furthermore, these twice-yearly ocular evaluations allow us to attend to your overall vision and visual functioning as well. While treatment for ocular melanoma is often highly successful and usually completed within a matter of months after diagnosis, we understand the long-term consequences that survivors face due to consequences of the cancer and its treatment, as well as the uncertainty you may experience about how your vision may change over time. At your twice-yearly visits with us, the tests we run help us detect early signs of visual side effects from the cancer and radiation treatment, such as radiation retinopathy. For example, the images we take of your eye at your follow-up visits allow us to catch these side effects before they begin to affect your vision. In turn, we can then take early action to provide a number of treatments, such as laser treatment and medications, that can help prevent or slow the progression of these side effects.

It is typical for ocular melanoma survivors to notice visual impairments in their affected eye. However, the degree to which people experience these impairments ranges quite a bit from person to person, and tends to depend on where in the eye the melanoma tumor was located, as well as its size at the time of treatment. When tumors are more centrally located in the eye, as well as bigger in size, both the tumor itself as well as the radiation we use to treat the tumor can result in more vision loss or visual impairment compared to tumors that are smaller and/or located further from the center of the eye. That being said, there is no way to know for sure how much the vision becomes affected or impaired after treatment, and many people report that they come to learn how to manage or adjust to impairments to their vision in the affected eye quite well over time.

No matter how much visual impairment you have experienced, or may go on to experience, we are committed to helping maintain whatever we can of your visual functioning and your visual quality of life. Blindness in the affected eye, or total vision loss, is relatively rare as a result of ocular melanoma and its treatment. This is because of advances in our radiation treatment approaches that allow us to protect your eye and your vision. For example, we use radiation plaques that are designed specifically for your tumor, and for some patients we place an oil bubble in the eye prior to radiation treatment as a way of shielding the eye and its vision centers from the effects of radiation.

In cases where patients experience significant vision loss in the affected eye, we see that most people are able to maintain adequate peripheral vision, vision on the sides of their visual field, that can be of huge help in your ability to see. Patients who have only peripheral vision in their affected eye, but who have a healthy unaffected eye, are often able to maintain good visual quality of life and go on to have little impairment in their day to day functioning.

Further, we are able to offer a number of helpful treatments that can maintain, or even promote, vision in the affected eye. We can offer medications to address poor vision, as well as referrals to our optometry team to help with vision correction efforts such as glasses and contacts. We can also offer treatments for visual impairment you might experience due to floaters or cataracts; which people sometimes experience over time after radiation treatment and as they age. Finally, we can help treat more temporary forms of visual impairment that you might experience in the months following radiation treatment, such as using eye exercises or other procedures reduce double-vision. That being said, the best way to help the eye and its vision adjust after treatment has ended is to actually use your eye – so once the plaque is out, try to use your eye as you normally would! Don't keep it covered with a patch unless I expressly instruct you to.

No matter how much impairment you may experience with your visual acuity, we are confident in our ability to help you maintain the vision that you ***do*** have in the affected eye. Most patients go on to continue enjoying a similar quality of life as they did before their diagnosis and treatment, even in cases where they notice significant impairment to their vision in the affected eye.

As an ocular melanoma survivor, your unaffected or untreated eye will, in virtually all cases, be your stronger eye. Thus, it is important for you, and we as your doctors, to do everything we can to maintain and promote the health and sight in that eye. Not only is your strong eye going to be important for helping you maintain your visual sharpness, but it also has a very important role in supporting the vision of your affected eye, which is in most cases going to be weaker. The brain actually takes the visual information from both eyes, your strong eye and your weaker eye, and combines the information to produce your overall vision. The brain and the strong eye work hard to try to make up for the visual impairment you may have experienced as a result of uveal melanoma and radiation treatment. Most people report that their overall vision allows them to continue going about their lives as usual, especially when the health and sight of the unaffected eye is maintained.

Again, this is why at Jules Stein, we highly recommend that all patients with a history of ocular melanoma see a retinal specialist here, or with a local provider, every six months, indefinitely. Routinely attending your follow-up visits with us can not only help us address the health and vision in your affected eye, but it can importantly allow us to also monitor and help protect the health and sight of your unaffected eye. As we age, our vision can decline even without experiencing something like ocular melanoma or radiation treatment. With age, both affected and unaffected eyes are also at a greater risk of developing conditions such as cataracts, glaucoma, and macular degeneration. Coming to your routine follow-up visits allows us to support your stronger eye in its health and vision, which ultimately helps to support the vision in your affected eye as well.

With ocular melanoma, as with any cancer, there is a risk of the cancer spreading to other parts of the body. This risk is present even though the initial melanoma tumor is completely killed from radiation or other treatment. We call the spread of cancer "metastasis" or "metastatic disease". In the case of ocular melanoma, it virtually always spreads to the liver. We don't know exactly why it spreads, or why it spreads to the liver in particular, but we know a few things that can help predict the risk of metastasis for a given patient.

First, by taking a biopsy of the tumor at the time of treatment, it helps us learn more about a patient's prognosis, that is, whether they may be at a relatively low or relatively high risk for the cancer spreading. We can combine the information that we get from the biopsy with other factors, such as the patient's age and tumor size at the time of treatment, to help us better understand their level of risk for the cancer spreading to other parts of their body. We call this process "cytogenetic testing" because genetic information in the tumor cells can tell us about your risk for the cancer spreading. Cytogenetic testing is a part of standard care at Jules Stein and at treatment centers around the world, unless you specifically request not to know this information. We have done health psychology research with ocular melanoma patients here at Jules Stein and we learned that, by in large, people want to know about their relative risk for metastasis. We learned from speaking to patients like you, that the more information people have and know about their prognosis, the more in control they can feel in relation to their health, which ultimately helps people take care of both their mental and physical health for the better.

That being said, we recommend the same course of follow-up visits after treatment for every patient with a history of ocular melanoma at Jules Stein, regardless of their cytogenetic testing results or their risk for metastatic disease. Why? Because the genetic testing can only give us ***general*** risk information, but the information is not a guarantee. For example, we know that even patients who receive genetic testing that tells us they have a higher risk for metastasis may actually have a better prognosis than the test reveals – especially if their tumor was small at the time of treatment, because smaller tumor size significantly reduces the risk for metastasis. Furthermore, every patient is different, not only in terms of their ocular melanoma tumors, but also in regards to their medical history and whole-body health, which can also be important factors that influence the spread of the cancer. Thus, the genetic testing results serve as ***one*** source of information that we use to estimate your risk for metastasis.

However - we want to make sure that **every** patient has the same opportunity to detect any possible cancer recurrence or metastatic spread of the cancer as early as possible, when patients have the most options available to them and there is the greatest chance for effective treatment. Thus, we recommend that **every patient**, regardless whether they are thought to be at high or low risk for metastasis, undergoes the **same general recommendations for follow up and screening.** At UCLA Jules Stein, this means that we recommend all patients receive abdominal oncologic screenings every six months for the rest of their lives. These screens, typically involving ultrasound, PET, or MRI scans, are done to look at the liver and abdomen for any signs of metastatic ocular melanoma. This is done to give you and your doctors confidence in the absence of metastatic spread, and the best opportunity for treatment should metastatic disease occur. When caught early, metastatic ocular melanoma of the liver has a higher chance of being successfully treated with surgery and/or chemotherapy. There have also been important developments in treatment for metastatic ocular melanoma that spreads to the liver, such that there is now for the first time ever, an FDA approved medication that has been shown to promote survival for patients with metastatic ocular melanoma.

These twice-yearly scans are recommended not due to an abundance of risk, but rather, due to an abundance of caution. We as your doctors want to give you all of the resources possible to promote your quality of life and longevity, and to help you feel confident and in control of your health and your healthcare options moving forward.

Sometimes, you may find that your oncologists or your insurance company may question the need for twice-yearly scans. Often times oncologists and insurance companies are not familiar with the nature of ocular melanoma and the associated risks of metastasis. If you run into any difficulty with having your oncologist or your insurance company provide coverage for these scans, please reach out to our team here at Jules Stein as we are able to help provide documentation and information to help you secure that coverage. Your oncologist may recommend that you switch to yearly scans due to concerns about radiation exposure during PET scans. If this is the case, we recommend that you alternate between PET and MRI scans every six months, or use non-PET imaging techniques. Finally, if you are a long-term survivor of ocular melanoma, such that you were treated 10 or more years ago, your oncologist may suggest that you switch your screening frequency to once per year. While your risk for metastasis does somewhat decline after the 10 year survival mark, the risk does not entirely disappear. Thus, our best medical advice is that you continue twice-yearly scans whenever possible. Again, this is recommended to give you the greatest sense of confidence and control over your health and survivorship as possible.

We believe that the more information you have at your disposal about your health, the more control you can have over your life, your health, and your well-being. Today we have shared information about ocular melanoma, including what your doctors can do to promote your health across the course of treatment, recovery, and survivorship. We understand the challenges that survivors of ocular melanoma face when it comes to their eye health, their physical health, as well as their mental health. In the next video, we discuss what you can do to place your health in your own hands, despite the uncertainty that is inherent to this disease and its impact on your life over time.

Video #2 YouTube Link: https://youtu.be/Qo_CHcJvNpo

Video #2 Script:

Welcome back. Once again, I am Dr. Tara McCannel, the director of the ophthalmic oncology center at UCLA. I am a member of the Department of Ophthalmology at the Stein Eye and Doheny Eye institutes at UCLA, and it's a privilege to be here to continue speaking to you about ocular melanoma survivorship. In this video, I'm going to continue talking about important considerations for ocular melanoma survivors, including things that you can do to promote your ocular, physical, and mental health– no matter how recently you may have been diagnosed or received treatment.

We believe that the more information you have at your disposal about your health, the more control you can have over your life, your health, and your well-being. We understand the challenges that survivors of ocular melanoma face when it comes to their eye health, their physical health, as well as their mental health. I want to note from the very beginning of today's presentation that there is ***nothing*** you did to contract ocular melanoma – nothing in your behavior or lifestyle that would have caused it. Furthermore, if the cancer comes back or spreads to other parts of your body, it will ***not*** be your fault and it will ***not*** be due to something that you have done or have failed to do. That being said, here at Jules Stein we ***do*** believe in empowering patients to take their health into their own hands, and have as much information at their disposal to help them feel in control of their health across the course of survivorship. In this video, we discuss the ways in which we believe your health can be increasingly under your control, despite the uncertainty that is unfortunately inherent to this disease and its potential impact on your vision and your life over time.

I'd like to start by talking about the things that you can do to promote your eye health and reduce the risk for metastatic disease, where the cancer spreads to other parts of your body. If you are a patient who has been diagnosed with metastatic disease, the information I will share is also relevant for your eye health, physical health, and mental health as well! Following successful treatment of your ocular melanoma, the best way to protect the health of your eye and your sight, and the best way to potentially prevent or battle metastatic illness, is to take care of your body and your physical health. A lot of patients I work with are surprised to hear me say this, but the health of your eyes can very much be affected by the health of the rest of your body.

Therefore, in order to promote your ocular health, your vision, and your visual quality of life, it is important for you to keep your physical health in good shape. In particular, I recommend being sure to keep up to date on treating and managing any other forms of chronic illness you may have. For example, research shows that people with heart disease may be at a higher risk of developing certain types of eye problems, especially if the heart disease is not properly treated or managed. According to the American Academy of Ophthalmology, research shows that people who have heart disease have a higher chance of developing vision loss due to age-related macular degeneration compared to people without heart disease. Thus, taking care of your cardiovascular health can be one way to help promote the health of both of your eyes, as well as prevent vision problems over time.

Further, it is my belief that anything you can do to promote your general physical health can only ***help*** your body in preventing or battling metastatic disease. It is possible to have ocular melanoma spread to other parts of the body even if you do maintain good health and a healthy lifestyle, however every little thing you can do to promote your health is an added layer of protection against metastasis in my experience and expert opinion. Another chronic illness that can negatively impact eye health is diabetes. People with type 1 or type 2 diabetes are at an elevated risk for developing an eye problem called diabetic retinopathy, which can result in impaired vision or even eventual vision loss. The risk for developing diabetes retinopathy is higher for people with diabetes whose illness is less well-managed, such as those who have elevated blood sugar, blood pressure, and cholesterol levels. If you are someone who has diabetes, it is therefore incredibly important to manage your diabetes as a means of protecting not only your physical health, but your eye health in particular. Even if you do not have diabetes, heart disease, or another form of illness, maintaining a healthy lifestyle is ***still*** important in protecting your ocular health. As I mentioned earlier, whatever is good for your body in general is good for your eye in particular, and can only help your body to prevent impairment to your vision and other health concerns such as cancer recurrence and metastasis in the long run.

So I've been emphasizing this idea that keeping your physical health in good shape can do wonders for promoting your ocular health and reducing your risk for metastatic disease. If you have metastatic ocular melanoma, maintaining your physical health is also incredibly important for fighting the metastatic spread! But what do I mean by keeping a healthy lifestyle other than managing or preventing forms of chronic illness? Let's talk about it! Let's start with the topic of exercise. It is so important to adopt a regular exercise routine in line with your physical ability. I always like to encourage people to find a way to exercise in a way that works for them. Walking is great for the body and is a great place to start if you do not presently have an exercise routine. Going for daily, brisk walks for 30 minutes or more can offer you important health benefits such as decreasing your risk of chronic diseases such as heart disease, diabetes, or even cancer. That being said, I encourage you to find whatever form of exercise feels like the right fit for you. Yoga and stretching can offer important health benefits, especially when they are practiced regularly. All forms of exercise also have important mental health benefits as they are shown to improve mood and reduce stress both in the short term, as well as in the long term.

Now let's talk about diet - you may have heard this advice from other doctors, but I will repeat it here as a means of highlighting how you can increasingly take control of your health, including your vision and your risk for metastasis, by changing aspects of your daily life. Whatever you can do to eat healthier, as simple as it sounds, will promote each and every aspect of your health. Important considerations for a heathy diet include eating plant-based foods such as vegetables, as well as reducing your intake of red meat, sugar, and processed foods. Maintaining a healthy diet has been shown to be specifically beneficial for the prevention of cancer, and if you'd like more information about recommended nutrition for cancer survivors, you can consult the integrative nutrition team at the UCLA Simms/Mann Center for Integrative Oncology or other nutritional experts.

I will talk more about the Simms/Mann center later on in today's video, but for now I'll mention that the center offers free resources to UCLA patients who received cancer treatment and/or follow-up care within the UCLA health system. As a Jules Stein patient, you are automatically eligible to receive free resources from the Simms/Mann center, including nutritional counseling. If you are interested in learning more about the ways in which you can improve your diet and your nutritional health, I strongly encourage you to reach out to the Simms/Mann center, your primary care physician, or other qualified nutrition specialists to whom you may have access.

These pieces of advice – exercising and eating healthy - may sound like general, conventional medical wisdom; however they can truly make a difference in your ocular health, visual acuity, and longevity. And they are at the top of my list of suggestions that I give ocular melanoma survivors who ask me what they can do to protect their vision and help prevent the cancer from coming back or spreading. Another recommendation that I frequently make to people who are looking to improve their health is to take care of your mental health and stress levels. Mental health and reduced stress are important aspects of health in and of themselves, while also being directly related to your physical and ocular health as well. When we talk about cancer survivorship, we are not only talking about people staying alive, but we are also talking about people achieving a quality of life that feels acceptable and meaningful to them. Mental health and emotional well-being are crucial aspects of a person's quality of life. In the field of medicine, we are increasingly learning about the ways in which the mind and body influence one other. Mental health is vital for physical health and vice versa. As an oncologist, I am very familiar with not only the physical, but also the emotional stress that cancer, treatment, and recovery place on an individual. Research has consistently shown that rates of anxiety and depression symptoms are higher in people diagnosed with cancer than in the general population, demonstrating the toll that one's physical health can have on their mental health.

We also know that mental health can affect physical health as well. For example, studies have shown that lower levels of stress, anxiety and depression, can be protective against cancer onset, as well as predict better treatment outcomes, such as longer survival, for people undergoing cancer treatment or in recovery. On the other hand, research has also shown that high levels of depression and stress can increase one's risk for cancer progression. Thus, addressing your mental health is not only important for your emotional well-being and quality of life, but it is also a crucial aspect of promoting and protecting your physical health as well! Furthermore, we know that mental health and stress levels have specific consequences with your eye health. Believe it or not, stress can actually cause blurred and disrupted vision! Stress has been shown to cause an eye condition called central serous retinopathy (CSR), where fluid accumulates in the macula, the area of the eye chiefly responsible for your vision. This causes the vision to become blurred and distorted for up to several months at a time. Stress can also cause the body to launch a number of physiological and immune system defenses, such as increased inflammation and cortisol, or stress hormone, in the body. These processes can also weaken your overall physical and ocular health, potentially leaving you more vulnerable to other eye conditions as well.

Through our collaboration with the psychology department at UCLA, we have conducted several health psychology research projects with ocular melanoma patients here at Jules Stein. Many of these projects have specifically looked at factors that influence patients' mental health over time. This research has taught us important things that you can do to maintain or improve your mental health, well-being, and quality of life as an ocular melanoma survivor.

The leading insights we have gained from our health psychology research concern the topic of coping. We wanted to know - What are some of the best ways to cope with ocular melanoma and its consequences for your vision, ocular health, and general physical health? How can people best cope with these sources of stress to support their mental health and well-being? Research, including our own, has demonstrated that a certain type of coping, what we call "approach-oriented coping", tends to be associated with the best psychological, physical, and disease-related outcomes for cancer survivors, including ocular melanoma survivors.

So, what is Approach-oriented coping? Approach-oriented coping can be defined as mental and behavioral efforts people take to manage stressful experiences in ways that address the stressor directly. In other words, when people engage in approach-oriented coping, they attempt to manage their stress by going towards, or approaching, the stressor in some way, such as by trying to resolve the stressor, create a plan for dealing with the stressor, or expressing their emotions about the stressor. Approach-oriented coping is often contrasted with avoidance-oriented coping, which is a type of coping in which people move away from, or avoid, a given stressor as a means of dealing with their stress. Avoidance-oriented coping includes things like denial of one's stressful circumstances, withdrawing from their activities, as well as withdrawing from their thoughts and emotions. Things that make you "check out" from what you're going through, or "numbing your feelings". Approach-oriented coping, as opposed to avoidance-oriented coping, has been shown to be associated with an array better mental, physical, and quality of life outcomes for patients with various forms of cancer, including uveal melanoma.

Let's talk in a bit more detail about what approach-oriented coping looks like. There are many different forms of approach-oriented coping, involving different behaviors and mental processes. I will talk about what approach-oriented coping might look like, for example, in the context of coping with uveal melanoma and its aftermath across the course of survivorship. One form of approach-oriented coping is seeking social support from others to help manage stress or other difficult emotions. This could include, for example, talking to a friend, partner, or family member about the difficulties you are facing in your experience with ocular melanoma. Seeking social support could also include participation in a support group for cancer survivors, whether that be in person or online. Further, seeking social support could include asking for help from your loved ones – such as asking for someone to drive you to and from medical appointments, or even attend them with you as a source of emotional and practical support. When patients bring loved ones to appointments with them, I often encourage the loved one to help the patient take notes, keep track of questions, or even record parts of our appointment on their smart phones, while I talk to the patient and answer their questions. These are all just a few examples of the ways in which ocular melanoma survivors can cope with illness related stress through seeking social support from loved ones. As I mentioned, this can include both emotional and practical support – relying on others to support you with your emotional experiences, as well as helping you carry out important tasks in your daily life. Research shows that the more cancer survivors engage in this form of approach-oriented coping, the better they tend to fare with their mental health and adjustment to their illness over time.

Another example of approach-oriented coping includes something that the health psychology field refers to as "benefit finding". Benefit finding refers to identifying positive life changes that have resulted from a challenging experience in your life, such as an illness like cancer. In the context of ocular melanoma survivorship, you could think of benefit finding as a practice of finding silver linings in your experience with cancer.

For example, some common benefits people tend to report as a result of their experience with cancer include: a greater appreciation for life, recognizing their own strength and resilience, growing closer to family and friends, focusing more on their health, and reprioritizing values in life. When people practice benefit finding, they often experience something that we call "meaning making" – drawing a higher meaning in life from having gone through difficult experiences. While there are certainly aspects of your cancer experience that have been stressful and challenging to say the very least, research shows identifying benefits and meaning from your experiences with cancer can offer you important mental health benefits such as more positive moods and lower levels of depression and anxiety symptoms over time.

Finally, another form of approach-oriented coping I wanted to cover today is emotional-approach coping, which involves two core components of emotional processing and emotional expression. Health psychology research has shown that survivors of cancer and other chronic illnesses tend to have much better mental and physical health outcomes when they are able to engage in both emotional processing and emotional expression. Let's break them down a bit. First we have emotional processing - as the name suggests, emotional processing involves processing your emotions. What does this mean? Taking time to sit with your internal experience and reflect on what you are feeling. Seeing if you can identify and understand the emotions you are feeling – be they positive, negative, or neutral. Emotional processing is different from ruminating or dwelling on negative emotions – instead it allows you to practice slowing down, and allowing for space and time between the experience of an emotion and your mind's impulse to think and act in immediate response to the emotion. People practice emotional processing a number of different ways, but some people find it helpful to set aside time for themselves to process their emotions, such as during mindfulness or meditation practice, talk therapy, or other activities that foster self-reflection, such as going for a walk. Research shows that people who engage in higher levels of emotional processing are able to achieve a sense of healthy distance from their emotions when they are heightened and negative, which we think helps to promote overall mental health and well-being and reduce stress levels.

Next we have emotional expression. As the name suggests, it involves expressing the emotions you are feeling. There are a number of different ways to engage in emotional expression – it can involve expressing emotions to others, such as loved ones, members of a support group, or a mental health specialist or therapist. You can also engage in emotional expression by yourself! You can practice emotional expression with yourself in a variety of ways – whatever might work best for you! Some people enjoy journaling, blogging, or even talking out loud to themselves as a way of expressing their emotions. Emotional expression may be easier for some people than others, especially since certain backgrounds, cultures, and identities may hold different beliefs about the value of emotional expression, especially when it comes to sharing difficult emotions with others. This is one reason why it is important to identify a means of emotional expression that allows you to express your feelings in a way that is consistent with your values and comfort level.

The reason I encourage you to find one way or another to practice emotional expression is because research has shown that it can be very important for mental health and well-being, especially in the context of a stressful experiences such as cancer survivorship and the management of a chronic illness. Specifically, higher levels of coping through emotional expression have been shown to be associated with lower levels of depression symptoms in the context of cancer survivorship.

On the other hand, emotional *suppression*, holding in our emotions, has been shown to be a risk factor for depression symptoms and other forms of distress. Thus – processing your emotions and finding an outlet through which you can express them are important and helpful ways of coping with stressful life experiences, including difficulties or challenges you may face as an ocular melanoma survivor.

We have provided you with a lot of information in this video about ways in which you can take your ocular, physical, and mental health into your own hands to improve your health, longevity, and quality of life. We understand this may be a lot of information to process, and we want to leave you with other resources that you may wish to consult as you consider taking steps to improve your health in any of the domains discussed in this video. While you have the power to take steps to improve your health, we want you to know that you are not alone! There are wonderful local resources available to support you in your efforts of improving your health. I will briefly summarize some of these resources now, but you can also reference them on the Mental Health Resource Information Sheet that will be provided to you after today's video.

The first resource I wanted to direct you towards is the UCLA Mindful Awareness Research Center, referred to as UCLA MARC. MARC's mission is to offer people access to mindfulness training through education and research. Mindfulness is one type of meditation practice that you may find useful in reducing stress, improving mood, and helping you engage in emotional processing, a type of approach-oriented coping that I just mentioned. I personally love to recommend mindfulness meditation to my patients, as I have been really impressed with the data on how it can help to improve various aspects of mental and physical health. For example, research has showed that people who engaged in mindfulness and meditation show better immune function and lower levels of cortisol, one of our main stress hormones. In turn, this can really help to promote healing and health in the body! Research has also shown that people who practice mindfulness or meditation also tend to have longer telomeres, which are pieces of our DNA. In essence, longer telomeres are associated with better health and longer survival – how amazing is that? That mindfulness and meditation can have such immense impact on our mental and physical health! If you'd like to get involved with mindfulness or meditation, UCLA MARC offers free mindfulness meditation programming online and via zoom. If you are interested in other resources for learning about and practicing mindfulness meditation, I encourage you to check out mobile apps on your phone such as Headspace and Calm, which also offer free and low-cost guided mindfulness meditations and practice opportunities.

One of the most important resources I have to offer in terms of supporting your mental health is the Simms/Mann Center for Integrative Oncology at the UCLA medical center. The Simms/Mann center offers free resources to cancer survivors who receive treatment and/or follow-up care within the UCLA health system – meaning that you are eligible for their services! The Simms/Mann center offers psychotherapy, psychiatry, nutrition, spiritual counseling and guidance, support groups, as well as workshops on important health topics such as improving sleep and reducing stress. Simms/Mann also offers free resources to your caregivers and loved ones, such as support groups and informational seminars. To access services at the Simms/Mann center, you can reach an intake coordinator at the information listed on the Mental Health Resource Information Sheet, or ask one of your UCLA doctors to help connect you to the center.

Another great resource that I wanted to tell you about is called Imerman Angels. This is a non-profit organization that seeks to connect people who have been diagnosed with cancer to a peer mentor who has previously been diagnosed and treated for the same form of cancer. Once connected, peer mentors can offer their peer mentees information, support, and guidance as they navigate treatment, recovery, and survivorship moving forward. Many ocular melanoma patients at Jules Stein have been involved with this organization, both as peer mentors and as peer mentees. If you are interested in being connected with a peer mentee who is further along in their journey with ocular melanoma, you can contact Imerman Angels and they will help match you with a peer mentor. On the other hand, if you are interested in being a peer mentor and offering support to people who are recently diagnosed with ocular melanoma, you can also contact the organization to register as a volunteer. Contact information is listed on the Mental Health Resource Information Sheet that you will receive shortly after this video.

The last resource I wanted to discuss today is the Cancer Support Community. The Cancer Support Community is a professionally led, international, nonprofit network of cancer support. They are dedicated to ensuring that all people impacted by cancer feel empowered by knowledge, strengthened by action, and sustained by community. Their website, cancersupportcommunity.org is an incredible resource in and of itself, containing informational resources for navigating all aspects of cancer survivorship – including resources for mental health, navigating insurance matters, and giving support to loved ones and caregivers. The Cancer Support Community also facilitates a large variety of support groups, for people at all different stages of cancer survivorship, as well as caregivers.

That brings me to the end of the video – thank you for watching our two-part video series. We hope this information has outlined important steps that you and your doctors can take to promote your ocular, physical, and mental health. We are here to help you feel in control of your health and in control of your life as a survivor of ocular melanoma.

Mental Health Resource Information Sheet

We launched this study to solicit patient feedback about supportive resources that we have developed for people who have been diagnosed with, or have a history of, ocular melanoma. Specifically, we are interested in your feedback on the attached Mental Health Resource Information Sheet. We created this information sheet to offer ocular melanoma survivors several resources that could be helpful in promoting their mental health and well-being, as well as provide them with information about ocular melanoma survivorship. **Please note that all of the resources listed on this information sheet completely free, unless otherwise noted**.

Under **"Informational Resources"** you will find a link to a series of YouTube videos in which Dr. McCannel presents on the topics of ocular melanoma diagnosis, treatment, and recovery. The videos have been compiled into a YouTube "playlist" for your convenience.

Under **"Mental Health Resources"** you will find a sub-section titled **"Cancer Support"**.

The first resource is the **UCLA Simms/Mann Center for Integrative Oncology**. The Simms/Mann Center is part of the UCLA healthcare system and offers completely free mental health resources to UCLA patients with cancer, or a history of cancer, as well as their loved ones. These resources include, but are not limited to: individual talk therapy, group counseling, support groups, spiritual counseling, psychiatry and nutritional services, as well as lectures and workshops. Most of these resources are being offered online to patients who live in the state of California. If you are interested in learning more about Simms/Mann, or being connected to services there, you can contact them at the phone number or email listed below.

The next three resources are for the **Cancer Support Community, Ocular Melanoma Foundation,** and **Melanoma Research Foundation**. All of these groups have websites that include helpful information regarding cancer survivorship, including information about support groups that you may have access to online or in-person in your area. The fourth resource is for **Imerman Angels**, which is an organization that seeks to pair individuals who are navigating a specific cancer diagnosis, such as ocular melanoma, with a volunteer "mentor" who has previously been diagnosed and treated for the same disease. Several patients at Jules Stein have been involved with this organization, as both volunteer mentors and recipients of their services ("*mentees*"). We recommend this resource to any patient who would be interested in speaking with someone who has gone through ocular melanoma diagnosis, treatment, and recovery.

At the bottom of the Mental Health Resource Information Sheet, you will find a number of free or low-cost apps, as well as free websites, that contain **mindfulness resources**. Mindfulness is considered to be the practice of paying attention to the present moment, on purpose, and without judgment. Mindfulness practices have been shown to be very helpful for reducing stress as well as improving mental health and well-being for people who have been diagnosed with a chronic disease. Dr. McCannel believes strongly in the mental health benefits of mindfulness practice for her patients, and wanted to make sure that you had access to free and low-cost resources should you be interested in learning more or trying out various mindfulness exercises.

Informational Resources

Doctor McCannel's YouTube videos about ocular melanoma:
https://youtube.com/playlist?list=PLHh8V8qRN_8dLxQuJaF9Hr_vBzfPXKTB7

Mental Health Resources

Cancer Support

UCLA Simms/Mann Center for Integrative Oncology
200 UCLA Medical Plaza, Suite 502
Los Angeles, CA 90095-6934
Phone: (310) 794-6644
Email: SimmsMannCenter@mednet.ucla.edu
https://www.simmsmanncenter.ucla.edu/

Cancer Support Community
https://www.cancersupportcommunity.org/

Ocular Melanoma Foundation (OMF)
http://www.ocularmelanoma.org/other-online-resources.htm

Melanoma Research Foundation
https://melanoma.org/patients-caregivers/

Imerman Angels
https://imermanangels.org/

Mindfulness Apps

Headspace
https://www.headspace.com/

Calm
www.calm.com

Insight Timer
https://insighttimer.com/

Mindfulness Websites

UCLA Mindful Awareness Research Center (MARC)
https://www.uclahealth.org/marc/

Tara Brach's Website
https://www.tarabrach.com/guided-meditations/

Sharing Mindfulness Website
http://www.sharingmindfulness.com/audio/

Appendix C – Blimp Syntax for Moderation Analyses

Model 1:

```
DATA: ~/desktop/Long Data with Model Vars 7.2.24.txt;
NOMINAL: IDNUM TXCON;
MISSING: 999;
CLUSTERID: IDNUM;
MODEL:
BIPQ2_14 ~ time_cent6@B11 TXCON@B21 time_cent6*TXCON@B31 | time_cent6 ;
BIPQ3_14 ~ time_cent6@B12 TXCON@B22 time_cent6*TXCON@B32 | time_cent6 ;
BIPQ7_14 ~ time_cent6@B13 TXCON@B23 time_cent6*TXCON@B33 | time_cent6 ;
COMPZ_14 ~ time_cent6@B14 TXCON@B24 time_cent6*TXCON@B34 | time_cent6 ;
BIPQ2_14 BIPQ3_14 BIPQ7_14 COMPZ_14 ~~ BIPQ2_14 BIPQ3_14 BIPQ7_14 COMPZ_14;
TEST:
B31 = 0;
B32 = 0;
B33 = 0;
B34 = 0;
SEED: 90291;
BURN: 10000;
ITERATIONS: 10000;
OUTPUT: default wald pvalue;
```

Model 2:

```
DATA: ~/desktop/Long Data with Model Vars 7.2.24.txt;
NOMINAL: IDNUM TXCON;
MISSING: 999;
CLUSTERID: IDNUM;
CENTER: grandmean = years_dxt1;
MODEL:
BIPQ2_14 ~ time_cent6@B11 TXCON@B21 years_dxt1@B31 time_cent6*TXCON@B41 time_cent6*years_dxt1@B51
years_dxt1*TXCON@B61 TXCON*years_dxt1*time_cent6@B71 | time_cent6 ;
BIPQ3_14 ~ time_cent6@B12 TXCON@B22 years_dxt1@B32 time_cent6*TXCON@B42 time_cent6*years_dxt1@B52
years_dxt1*TXCON@B62 TXCON*years_dxt1*time_cent6@B72 | time_cent6 ;
BIPQ7_14 ~ time_cent6@B13 TXCON@B23 years_dxt1@B33 time_cent6*TXCON@B43 time_cent6*years_dxt1@B53
years_dxt1*TXCON@B63 TXCON*years_dxt1*time_cent6@B73 | time_cent6 ;
COMPZ_14 ~ time_cent6@B14 TXCON@B24 years_dxt1@B34 time_cent6*TXCON@B44 time_cent6*years_dxt1@B54
years_dxt1*TXCON@B64 TXCON*years_dxt1*time_cent6@B74 | time_cent6 ;
BIPQ2_14 BIPQ3_14 BIPQ7_14 COMPZ_14 ~~ BIPQ2_14 BIPQ3_14 BIPQ7_14 COMPZ_14;
TEST:
B71 = 0;
B72 = 0;
B73 = 0;
B74 = 0;
SEED: 90291;
BURN: 5000;
ITERATIONS: 10000;
OUTPUT: default wald pvalue;
```

Model 3:

DATA: ~/desktop/Long Data with Model Vars 7.2.24.txt;
NOMINAL: IDNUM TXCON;
MISSING: 999;
CLUSTERID: IDNUM;
CENTER: grandmean = APT1fix;
MODEL:
BIPQ2_14 ~ time_cent6@B11 TXCON@B21 APT1fix@B31 time_cent6*TXCON@B41 time_cent6*APT1fix@B51 APT1fix*TXCON@B61 TXCON*APT1fix*time_cent6@B71 | time_cent6 ;
BIPQ3_14 ~ time_cent6@B12 TXCON@B22 APT1fix@B32 time_cent6*TXCON@B42 time_cent6*APT1fix@B52 APT1fix*TXCON@B62 TXCON*APT1fix*time_cent6@B72 | time_cent6 ;
BIPQ7_14 ~ time_cent6@B13 TXCON@B23 APT1fix@B33 time_cent6*TXCON@B43 time_cent6*APT1fix@B53 APT1fix*TXCON@B63 TXCON*APT1fix*time_cent6@B73 | time_cent6 ;
COMPZ_14 ~ time_cent6@B14 TXCON@B24 APT1fix@B34 time_cent6*TXCON@B44 time_cent6*APT1fix@B54 APT1fix*TXCON@B64 TXCON*APT1fix*time_cent6@B74 | time_cent6 ;
BIPQ2_14 BIPQ3_14 BIPQ7_14 COMPZ_14 ~~ BIPQ2_14 BIPQ3_14 BIPQ7_14 COMPZ_14;
TEST:
B71 =0;
B72 = 0;
B73 = 0;
B74 = 0;
SEED: 90291;
BURN: 10000;
ITERATIONS: 10000;
OUTPUT: default wald pvalue;
PARAMETERS: simpintTTXAP1 = B42 + (B72*-1.73);
PARAMETERS: simpintTTXAP1.46 = B42 + (B72*-1.27);
PARAMETERS: simpintTTXAP2 = B42 + (B72*-.73);
PARAMETERS: simpintTTXAP2.73 = B42 + (B72*0);
PARAMETERS: simpintTTX3 = B42 + (B72*.27);
PARAMETERS: simpintTTX4 = B42 + (B72*1.27);
PARAMETERS: simpintTTXAP5 = B42 + (B72*2.27);
PARAMETERS: simpintTTXAP6 = B42 + (B72*3.27);
PARAMETERS: simpsimpb01 = B12 + B52*-1.73;
PARAMETERS: simpsimpb11 = B12 + B42 + B52*-1.73 + B72*-1.73;
PARAMETERS: simpsimpb01.46 = B12 + B52*-1.27;
PARAMETERS: simpsimpb11.46 = B12 + B42 + B52*-1.73 + B72*-1.27;

Model 4:

DATA: ~/desktop/Long Data with Model Vars 7.2.24.txt;
NOMINAL: IDNUM TXCON;
MISSING: 999;
CLUSTERID: IDNUM;
CENTER: grandmean = AVT1fix;
MODEL:
BIPQ2_14 ~ time_cent6@B11 TXCON@B21 AVT1fix@B31 time_cent6*TXCON@B41 time_cent6*AVT1fix@B51 AVT1fix*TXCON@B61 TXCON*AVT1fix*time_cent6@B71 | time_cent6 ;
BIPQ3_14 ~ time_cent6@B12 TXCON@B22 AVT1fix@B32 time_cent6*TXCON@B42 time_cent6*AVT1fix@B52 AVT1fix*TXCON@B62 TXCON*AVT1fix*time_cent6@B72 | time_cent6 ;
BIPQ7_14 ~ time_cent6@B13 TXCON@B23 AVT1fix@B33 time_cent6*TXCON@B43 time_cent6*AVT1fix@B53 AVT1fix*TXCON@B63 TXCON*AVT1fix*time_cent6@B73 | time_cent6 ;
COMPZ_14 ~ time_cent6@B14 TXCON@B24 AVT1fix@B34 time_cent6*TXCON@B44 time_cent6*AVT1fix@B54 AVT1fix*TXCON@B64 TXCON*AVT1fix*time_cent6@B74 | time_cent6 ;
BIPQ2_14 BIPQ3_14 BIPQ7_14 COMPZ_14 ~~ BIPQ2_14 BIPQ3_14 BIPQ7_14 COMPZ_14;
TEST:
B71 =0;
B72 = 0;
B73 = 0;
B74 = 0;
SEED: 90291;
BURN: 10000;
ITERATIONS: 10000;
OUTPUT: default wald pvalue;

Appendix D – Figures

Figure 1

Schematic of Study Procedure and Assessments

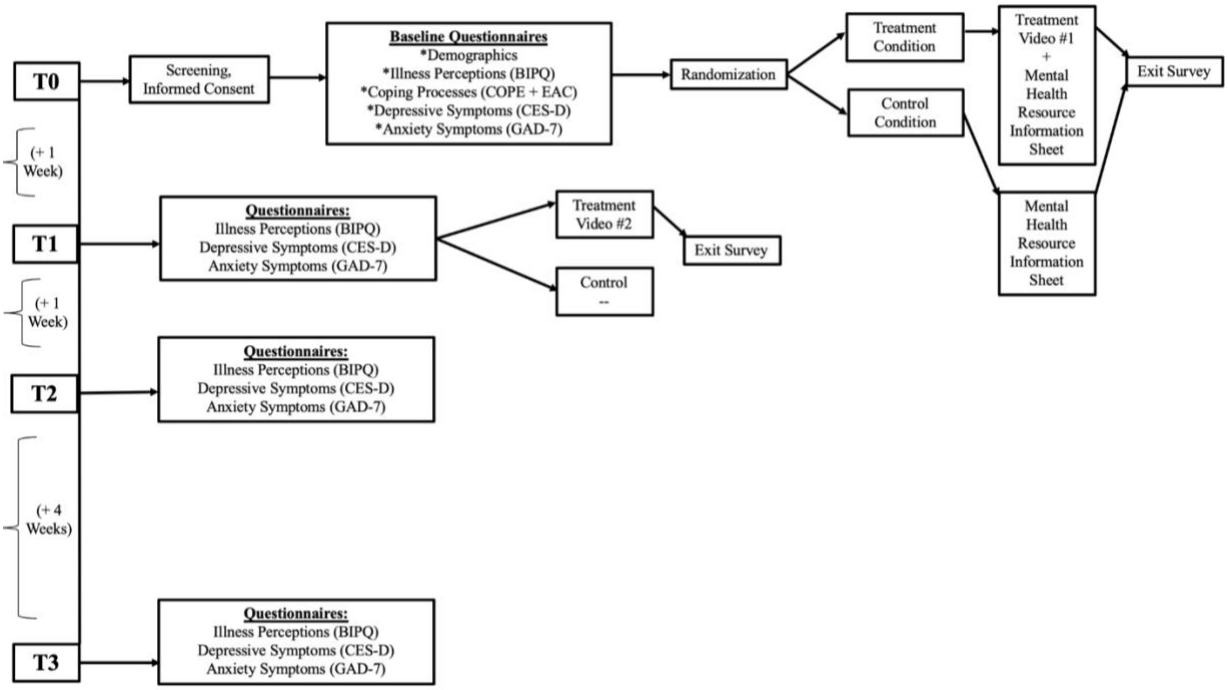


Figure 2

Model 1 Equation

Model #1

Level 1:

$$Y_{ij} = \beta_{0i} + \beta_{1i}Time_{ij} + \varepsilon_{ij}$$

Level 2:

$$\beta_{0i} = \beta_{00} + \beta_{01}TreatmentGroup_j + u_{0j}$$
$$\beta_{1i} = \beta_{10} + \beta_{11}TreatmentGroup_j + u_{1j}$$

Combined Equation:

$Outcome_{ij}$* =

$$\beta_{00} + \beta_{01}TreatmentGroup_j + \beta_{10}Time_{ij} + \beta_{11}(TreatmentGroup_j{*}Time_{ij}) + u_{0j} + (u_{1j}{*}Time_{ij}) + \varepsilon_{ij}$$

*Separate models will be examined for Personal $Control_{ij}$, $Chronicity_{ij}$, $Coherence_{ij}$ and $Distress_{ij}$ trajectories

Figure 3

Model 2 Equation

Model #2

Level 1:

$$Y_{ij} = \beta_{0i} + \beta_{1i}Time_{ij} + \varepsilon_{ij}$$

Level 2:

$$\beta_{0i} = \beta_{00} + \beta_{01}TreatmentGroup_j + \beta_{02}Years_j + u_{0j}$$
$$\beta_{1i} = \beta_{10} + \beta_{11}TreatmentGroup_j + \beta_{12}Years_j + \beta_{13}TreatmentGroup_j{*}Years_j + u_{1j}$$

Combined Equation:

$Outcome_{ij}$* =

$$\beta_{00} + \beta_{01}TreatmentGroup_j + \beta_{02}Years_j + \beta_{03}(TreatmentGroup_j{*}Years_j) + \beta_{10}Time_{ij} + \beta_{11}(TreatmentGroup_j{*}Time_{ij}) + \beta_{12}(Years_j{*}Time_{ij}) + \beta_{13}(TreatmentGroup_j{*}Years_j{*}Time_{ij}) + u_{0j} + (u_{1j}{*}Time_{ij}) + \varepsilon_{ij}$$

*Separate models will be examined for Personal $Control_{ij}$, $Chronicity_{ij}$, $Coherence_{ij}$ and $Distress_{ij}$ trajectories

Figure 4

Model 3 Equation

Model #3

Level 1:

$$Y_{ij} = \beta_{0i} + \beta_{1i}Time_{ij} + \varepsilon_{ij}$$

Level 2:

$$\beta_{0i} = \beta_{00} + \beta_{01}TreatmentGroup_j + \beta_{02}\ APCope_j + u_{0j}$$
$$\beta_{1i} = \beta_{10} + \beta_{11}TreatmentGroup_j + \beta_{12}APCope_j + \beta_{13}TreatmentGroup_j{*}APCope_j + u_{1j}$$

Combined Equation:

$Outcome_{ij}$* =

$$\beta_{00} + \beta_{01}TreatmentGroup_j + \beta_{02}APCope_j + \beta_{03}(TreatmentGroup_j{*}APCope_j)$$
$$+\ \beta_{10}Time_{ij} + \beta_{11}(TreatmentGroup_j{*}Time_{ij}) + \beta_{12}(APCope_j{*}Time_{ij}) + \beta_{13}(TreatmentGroup_j{*}APCope_j{*}Time_{ij})$$
$$+ u_{0j} + (u_{1j}{*}Time_{ij}) + \varepsilon_{ij}$$

*Separate models will be examined for Personal $Control_{ij}$, $Chronicity_{ij}$, $Coherence_{ij}$ and $Distress_{ij}$ trajectories

Figure 5

Model 4 Equation

Model #4

Level 1:

$$Y_{ij} = \beta_{0i} + \beta_{1i}Time_{ij} + \varepsilon_{ij}$$

Level 2:

$$\beta_{0i} = \beta_{00} + \beta_{01}TreatmentGroup_j + \beta_{02}\ AVCope_j + u_{0j}$$
$$\beta_{1i} = \beta_{10} + \beta_{11}TreatmentGroup_j + \beta_{12}AVCope_j + \beta_{13}TreatmentGroup_j{*}AVCope_j + u_{1j}$$

Combined Equation:

$Outcome_{ij}$* =

$$\beta_{00} + \beta_{01}TreatmentGroup_j + \beta_{02}AVCope_j + \beta_{03}(TreatmentGroup_j{*}AVCope_j)$$
$$+\ \beta_{10}Time_{ij} + \beta_{11}(TreatmentGroup_j{*}Time_{ij}) + \beta_{12}(AVCope_j{*}Time_{ij}) + \beta_{13}(TreatmentGroup_j{*}AVCope_j{*}Time_{ij})$$
$$+ u_{0j} + (u_{1j}{*}Time_{ij}) + \varepsilon_{ij}$$

*Separate models will be examined for Personal $Control_{ij}$, $Chronicity_{ij}$, $Coherence_{ij}$ and $Distress_{ij}$ trajectories

Figure 6

Mediation Model

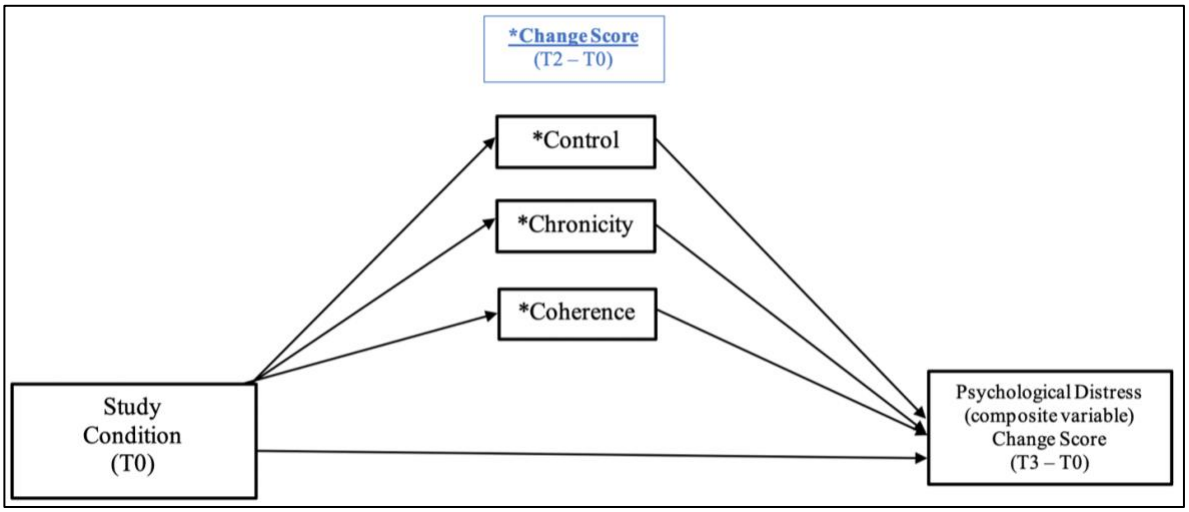


Figure 7

CONSORT Diagram

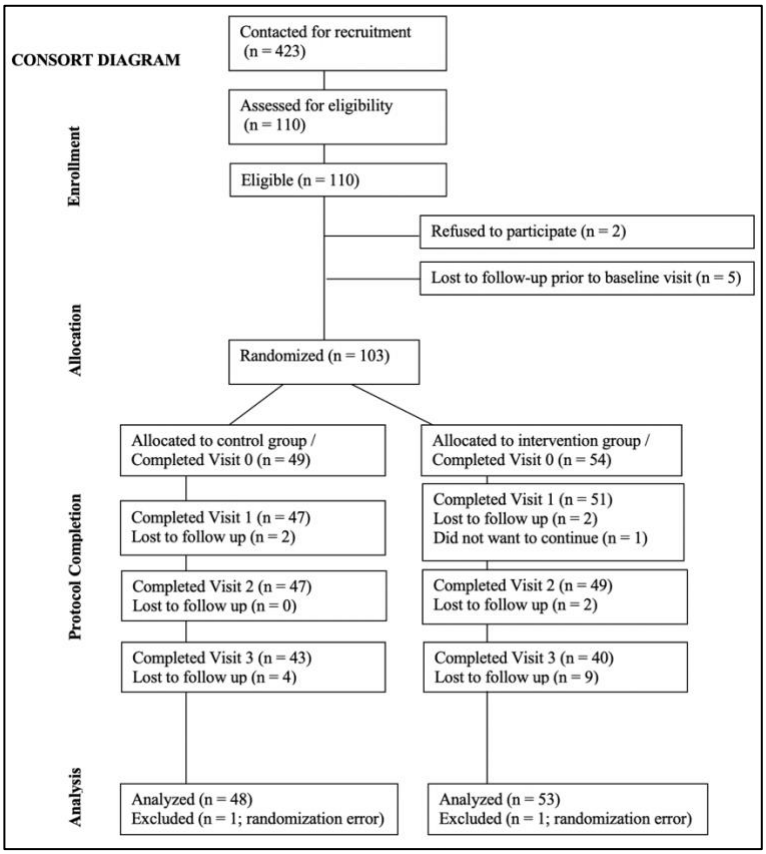


Figure 8

Model 1 Predicting Chronicity Perceptions

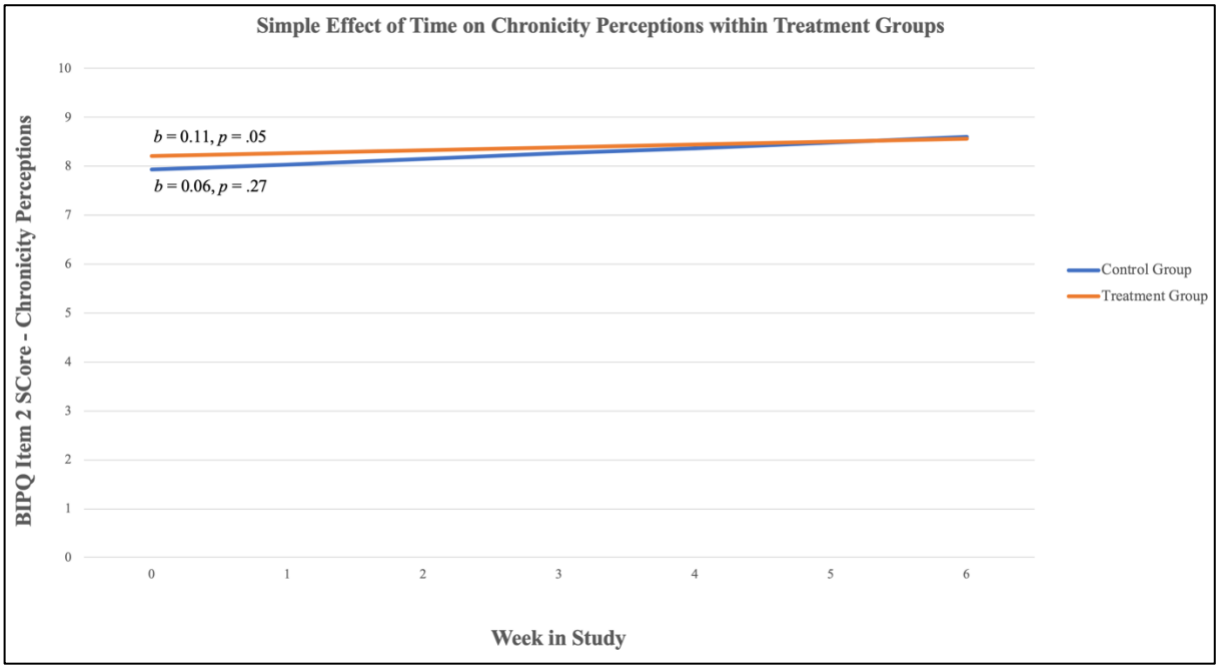


Figure 9

Model 1 Predicting Control Perceptions

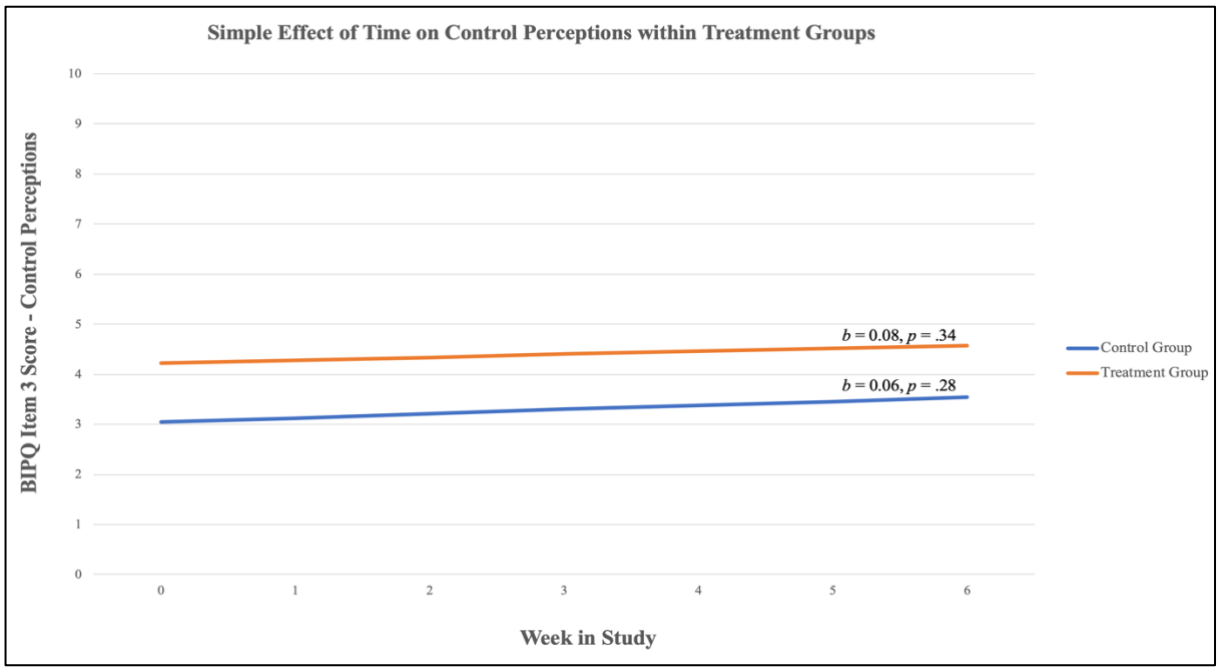


Figure 10

Model 1 Predicting Coherence Perceptions

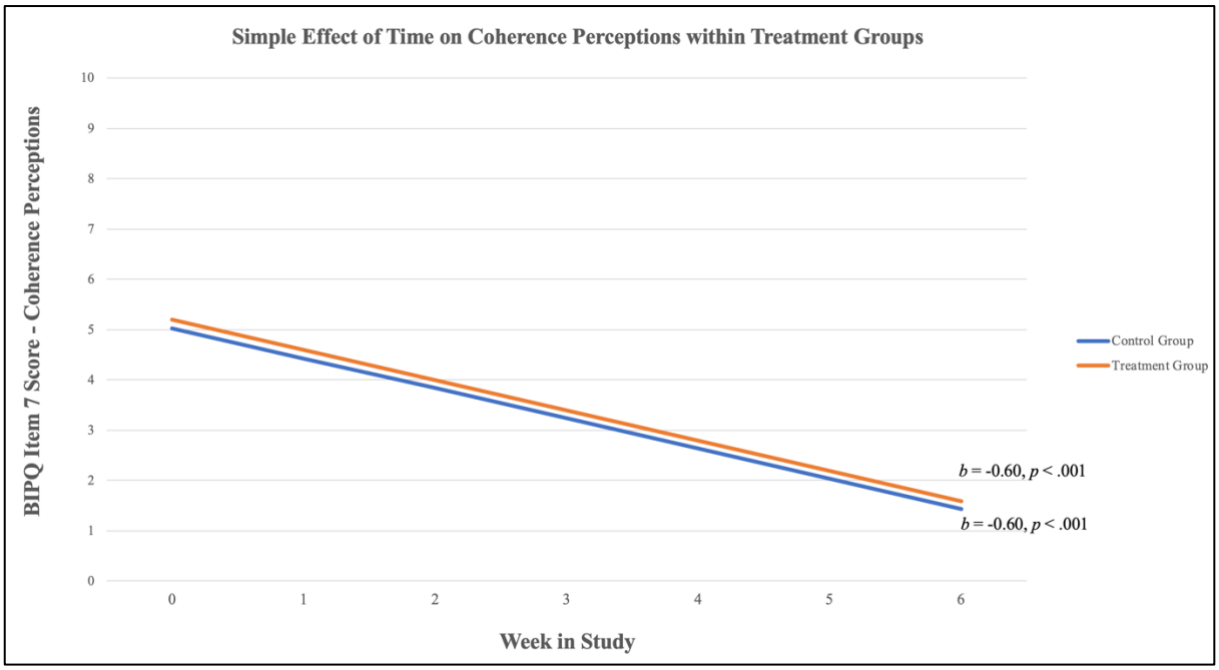


Figure 11

Model 1 Predicting Psychological Distress (Z-Scores)

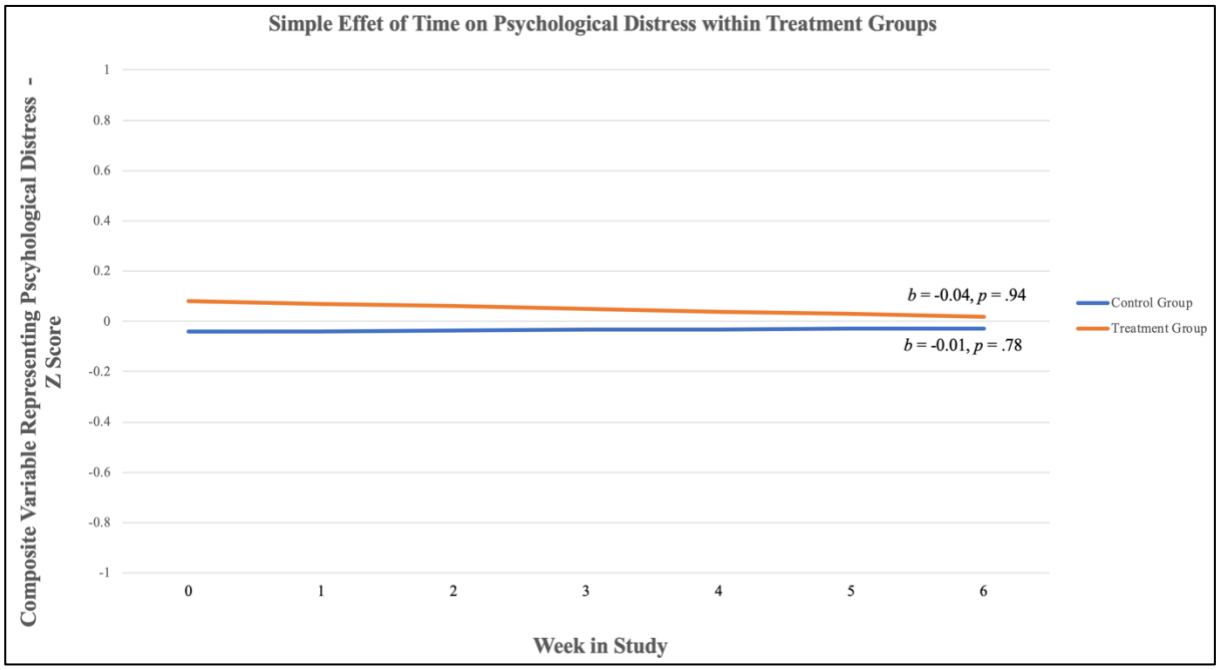
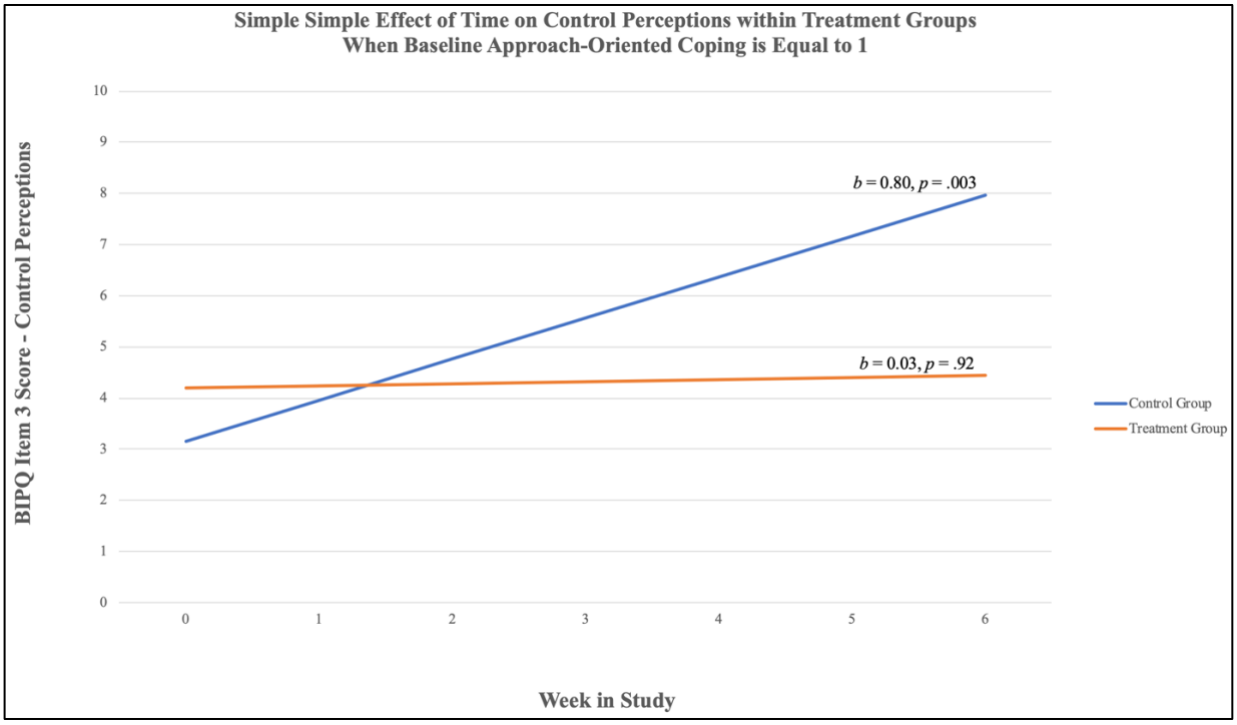


Figure 12

Model 3 Predicting Control Perceptions



Appendix E – Tables

Table 1

Characteristics of Participants at Study Entry (T0; n = 99 – 101)

	N	Mean	SD	Minimum	Maximum
Age	101	64.04	12.84	20	90
Years since UM diagnosis	101	7.09	3.13	0.08	51.24
		Frequency		**Percentage of sample (%)**	
Sex					
Male		39		38.60	
Female		62		61.40	
Race					
White		93		92.08	
Multiracial		3		2.97	
Asian		1		0.99	
Native Hawaiian or other Pacific Islander		1		0.99	
Unknown / Do not wish to report		3		2.97	
Ethnicity					
Hispanic/Latinx		8		7.90	
Not Hispanic/Latinx		93		92.10	
Marital Status					
Married or living as married		71		70.30	
Not married		30		29.70	
Employment Status					
Employed		36		35.64	
Retired		55		54.46	
Unemployed		7		6.93	
Disabled		3		2.97	
Annual Household Income					
Less than $50k		18		17.82	

$50k - $74.9k	15	14.85
$75k - $100k	14	13.86
Greater than $100k	51	50.50
Missing	2	1.98
Level of Education		
High School graduate / Diploma / GED	8	7.90
Some college credit	21	20.79
Trade/Tech/Vocational training	1	0.99
Associate's degree	4	3.96
Bachelor's degree	39	38.61
Master's degree	19	18.81
Professional degree	4	3.96
Doctorate Degree	5	4.95
Metastatic Risk Level		
High Risk	47	43.93
Low Risk	21	19.63
Unknown Risk	39	36.45
Current Metastatic Disease		
Yes	4	3.96
No	97	96.04
Treatment Type		
Plaque brachytherapy	95	94.06
Proton beam radiation	4	3.96
Enucleation	2	1.98

Table 2

Descriptive Statistics – Psychological Variables

	Visit	*N*	Mean	St. Dev	Minimum	Maximum
Chronicity Perceptions	T0	99	7.90	3.09	0	10
	T1	96	8.28	2.88	0	10
	T2	92	8.66	2.63	0	10
	T3	80	8.48	2.73	0	10
Control Perceptions	T0	92	3.68	2.64	0	10
	T1	92	3.51	2.58	0	9
	T2	89	3.97	2.58	0	9
	T3	76	4.00	2.50	0	10
Coherence Perceptions	T0	99	7.77	2.09	1	10
	T1	91	7.77	1.66	3	10
	T2	92	7.73	2.03	0	10
	T3	80	7.96	1.79	2	10
Anxiety Symptoms	T0	99	3.65	4.43	0	18
	T1	96	3.68	4.98	0	21
	T2	93	3.84	4.78	0	21
	T3	80	3.24	4.39	0	21
Depressive Symptoms	T0	100	9.80	9.31	0	42
	T1	96	10.57	10.41	0	40
	T2	93	10.00	10.12	0	45
	T3	81	8.94	9.72	0	43
Psychological Distress (Z-Score)	T0	99	-.002	0.92	-0.94	2.85
	T1	96	-.0002	0.94	-0.88	2.76
	T2	93	-.0002	0.94	-0.90	2.90
	T3	80	-.02	0.93	-0.83	3.52
Approach-Oriented Coping	T0	101	2.73	0.56	1.46	3.79
Avoidance-Oriented Coping	T0	101	1.63	0.36	1.00	2.83
Valid *N* (listwise)		60				

Table 3a

Independent Samples t-Test of Participants Randomized to the Treatment (n = 53) and Control (n = 48) Conditions (Equal Variances Assumed) on Variables at T0

Variables (at T0)	Mean difference	Std. error difference	t	df	Sig. (2-tailed)
Age	3.58	2.60	1.38	99	.17
Years since UM diagnosis	1.07	1.56	0.68	99	.50
Chronicity Perceptions	-0.25	0.63	-0.41	97	.69
Control Perceptions	-1.61	0.53	-3.04	90	.003
Coherence Perceptions	0.20	0.42	0.47	97	.64
Depressive Symptoms	-0.60	1.87	-0.32	98	.75
Anxiety Symptoms	-0.50	0.90	-0.56	97	.58
Psychological Distress (Z-Score)	-0.09	0.19	-0.49	97	.62
Approach-oriented Coping	-0.10	0.11	-0.87	99	.39
Avoidance-oriented Coping	0.03	0.11	0.39	99	.70

Table 3b

Pearson Chi-square Comparison of Participants Randomized to the Treatment (n = 53) and Control (n = 48) Conditions on Variables at T0

Variables at T0	Value	df	Asymptotic significance (2-sided)
Sex	0.05	1	.83
Race	4.86	4	.30
Ethnicity	0.78	1	.38
Marital status	1.23	3	.75
Employment Status	7.34	4	.12
Annual Household Income	0.27	3	.97
Level of Education	6.47	7	.49
Metastatic Risk Level	1.94	2	.38
Current Metastatic Disease	1.26	1	.26
Treatment Type*	7.04	2	.03
Brachytherapy vs. Proton Beam Radiation**	4.60	1	.03
Brachytherapy vs. Enucleation***	1.62	1	.20

* 4 cells (66.7%) have expected count less than 5. The minimum expected count is .95.
** 2 cells (50.0%) have an expected count less than 5. The minimum expected count is 1.90.
*** 2 cells (50.0%) have an expected count less than 5. The minimum expected count is .95.

Table 4a

Independent Samples t-Test of Participants with Incomplete (n = 20) and Complete (n = 81) Data (Equal Variances Assumed) on Variables at T0

Variables (at T0)	Mean difference	Std. error difference	t	df	Sig. (2-tailed)
Age	-5.97	3.23	-1.85	99	.07
Years since UM diagnosis	2.28	1.95	1.17	99	.25
Chronicity Perceptions	0.06	0.78	0.08	97	.94
Control Perceptions	1.21	0.72	1.69	90	.10
Coherence Perceptions	-0.36	0.54	-0.68	97	.50
Depressive Symptoms	2.54	2.37	1.07	98	.29
Anxiety Symptoms	1.68	1.12	1.49	97	.14
Psychological Distress (Z-Score)	0.33	0.23	1.40	97	.17
Approach-oriented Coping	-0.04	0.14	-0.30	99	.38
Avoidance-oriented Coping	0.10	0.09	1.08	99	.29

Table 4b

Pearson Chi-square Comparison of Participants with Incomplete (n = 20) and Complete (n = 81) Data on Variables at T0

Variables at T0	Value	df	Asymptotic significance (2-sided)
Sex	0.78	1	.38
Race	1.88	4	.76
Ethnicity	1.71	1	.19
Marital status	3.78	3	.29
Employment Status	7.82	4	.10
Annual Household Income	4.74	3	.19
Level of Education	3.19	7	.87
Metastatic Risk Level	1.42	2	.49
Current Metastatic Disease	1.03	1	.31
Treatment Type	1.58	2	.46
Study Condition	3.07	1	.08

Table 5

Omnibus Model 1: Interaction Between Time and Study Condition on Illness Perception and Psychological Distress Outcomes (N = 101)

Comparing Iterations Across 2 Chains		**Highest PSR**	
5001 to 10000		1.02	
	Omnibus Multivariate Test		
Wald Statistic (Chi Square)	**Number of Parameters Tested (df)**	**Probability (*p* value)**	
0.50	4	.97	
Outcome: Chronicity Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		6.20	1.29	<.001
Level 2:Cov(time_cent6,Intercept)		-0.03	0.11	.79
Level 2 : Var(time_cent6)		0.02	0.01	.13
Residual Var.		2.07	0.19	<.001
Coefficients				
Intercept		8.55	0.42	<.001
Time (Centered @ Week 6)		0.12	0.05	.05
Study Condition		-0.01	0.60	.99
Time*Study Condition		-0.05	0.08	.55
Proportion Variance Explained				
by Coefficients		0.01	0.01	.24
by Level-2 Random Intercepts		0.75	0.04	<.001
by Level-2 Random Slopes		0.01	0.01	.14
by Level-1 Residual Variation		0.23	0.03	<.001
Outcome: Control Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		3.91	1.25	.001
Level 2:Cov(time_cent6,Intercept)		0.39	0.23	.07
Level 2 : Var(time_cent6)		0.14	0.06	.01
Residual Var.		3.12	0.35	<.001
Coefficients				
Intercept		3.57	0.42	<.001
Time (Centered @ Week 6)		0.09	0.09	.32
Study Condition		1.00	0.59	.09
Time*Study Condition		-0.03	0.12	.80
Proportion Variance Explained				
by Coefficients		0.05	0.03	0.06
by Level-2 Random Intercepts		0.40	0.06	<.001
by Level-2 Random Slopes		0.10	0.04	0.01
by Level-1 Residual Variation		0.44	0.06	<.001
Outcome: Coherence Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		0.26	0.26	.21
Level 2:Cov(time_cent6,Intercept)		0.05	0.06	.27
Level 2 : Var(time_cent6)		0.01	0.14	.25
Residual Var.		6.08	0.47	<.001
Coefficients				

Intercept	1.41	0.38	<.001
Time (Centered @ Week 6)	-0.60	0.09	<.001
Study Condition	0.16	0.54	.76
Time*Study Condition	-0.001	0.12	.99
Proportion Variance Explained			
by Coefficients	0.24	0.04	<.001
by Level-2 Random Intercepts	0.01	0.01	.21
by Level-2 Random Slopes	0.01	0.01	.23
by Level-1 Residual Variation	0.74	0.04	<.001

Outcome: Psychological Distress (Z-Score)	**Median coefficient**	**St. dev**	***p* value**
Variances			
Level 2 : Var(Intercept)	0.76	0.15	<.001
Level 2:Cov(time_cent6,Intercept)	0.06	0.02	.01
Level 2 : Var(time_cent6)	0.02	0.01	<.001
Residual Var.	0.12	0.01	<.001
Coefficients			
Intercept	-0.02	0.15	0.88
Time (Centered @ Week 6)	0.002	0.03	0.93
Study Condition	0.07	0.21	0.74
Time*Study Condition	-0.01	0.04	0.80
Proportion Variance Explained			
by Coefficients	0.01	0.02	0.34
by Level-2 Random Intercepts	0.73	0.04	<.001
by Level-2 Random Slopes	0.13	0.03	<.001
by Level-1 Residual Variation	0.13	0.02	<.001

Table 6

Omnibus Model 2: Interaction Between Time, Study Condition and Years Since UM Diagnosis (T0) on Illness Perception and Psychological Distress Outcomes (N = 101)

Comparing Iterations Across 2 Chains		**Highest PSR**	
2501 to 5000		1.04	
	Omnibus Multivariate Test		
Wald Statistic (Chi Square)	**Number of Parameters Tested (df)**	**Probability (*p* value)**	
1.82	4	.77	
Outcome: Chronicity Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		6.15	1.30	<.001
Level 2:Cov(time_cent6,Intercept)		-0.05	0.10	.72
Level 2 : Var(time_cent6)		0.02	0.02	.20
Residual Var.		2.09	0.20	<.001
Coefficients				
Intercept		8.54	0.41	<.001
Time (Centered @ Week 6)		0.10	0.05	.05
Study Condition		0.06	0.59	.92
Years Since UM Diagnosis		0.01	0.04	.91
Time*Study Condition		-0.04	0.08	.60
Time*Years		0.01	0.01	.41
Years*Study Condition		0.08	0.09	.37
Time*Study Condition*Years		-0.004	0.01	.75
Proportion Variance Explained				
by Coefficients		0.04	0.03	.09
by Level-2 Random Intercepts		0.72	0.04	<.001
by Level-2 Random Slopes		0.01	0.01	.21
by Level-1 Residual Variation		0.22	0.03	<.001
Outcome: Control Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		3.86	1.31	.002
Level 2:Cov(time_cent6,Intercept)		0.40	0.24	.08
Level 2 : Var(time_cent6)		0.14	0.06	.01
Residual Var.		3.14	0.36	<.001
Coefficients				
Intercept		3.59	0.42	<.001
Time (Centered @ Week 6)		0.08	0.09	.34
Study Condition		0.87	0.60	.15
Years Since UM Diagnosis		-0.03	0.04	.53
Time*Study Condition		-0.05	0.13	.72
Time*Years		0.01	0.01	.46
Years*Study Condition		-0.09	0.09	.34
Time*Study Condition*Years		-0.02	0.02	.29
Proportion Variance Explained				
by Coefficients		0.10	0.04	0.01
by Level-2 Random Intercepts		0.38	0.06	<.001
by Level-2 Random Slopes		0.10	0.04	0.01
by Level-1 Residual Variation		0.42	0.06	<.001

Outcome: Coherence Perceptions	**Median coefficient**	**St. dev**	***p* value**
Variances			
Level 2 : Var(Intercept)	0.27	0.30	.24
Level 2:Cov(time_cent6,Intercept)	0.05	0.07	.28
Level 2 : Var(time_cent6)	0.02	0.02	.24
Residual Var.	6.13	0.47	<.001
Coefficients			
Intercept	1.42	0.38	<.001
Time (Centered @ Week 6)	-0.60	0.09	<.001
Study Condition	0.11	0.56	.85
Years Since UM Diagnosis	-0.01	0.04	.81
Time*Study Condition	-0.01	0.12	.94
Time*Years	0.001	0.01	.96
Years*Study Condition	-0.40	0.09	.65
Time*Study Condition*Years	<0.001	0.02	.98
Proportion Variance Explained			
by Coefficients	0.25	0.04	<.001
by Level-2 Random Intercepts	0.01	0.01	.23
by Level-2 Random Slopes	0.01	0.01	.23
by Level-1 Residual Variation	0.73	0.04	<.001

Outcome: Psychological Distress (Z-Score)	**Median coefficient**	**St. dev**	***p* value**
Variances			
Level 2 : Var(Intercept)	0.78	0.15	<.001
Level 2:Cov(time_cent6,Intercept)	0.05	0.02	.001
Level 2 : Var(time_cent6)	0.02	0.01	<.001
Residual Var.	0.12	0.01	<.001
Coefficients			
Intercept	-0.03	0.14	0.83
Time (Centered @ Week 6)	0.003	0.03	0.92
Study Condition	0.09	0.21	0.64
Years Since UM Diagnosis	0.01	0.02	0.50
Time*Study Condition	-0.003	0.04	0.93
Time*Years	0.002	0.003	0.41
Years*Study Condition	0.01	0.03	0.79
Time*Study Condition*Years	0.004	0.01	0.45
Proportion Variance Explained			
by Coefficients	0.04	0.02	0.08
by Level-2 Random Intercepts	0.71	0.04	<.001
by Level-2 Random Slopes	0.12	0.03	<.001
by Level-1 Residual Variation	0.13	0.02	<.001

Table 7

Omnibus Model 3: Interaction Between Time, Study Condition and Approach-Oriented Coping (T0) on Illness Perception and Psychological Distress Outcomes (N = 101)

Comparing Iterations Across 2 Chains		**Highest PSR**	
5001 to 10000		1.02	
	Omnibus Multivariate Test		
Wald Statistic (Chi Square)	**Number of Parameters Tested (df)**	**Probability (*p* value)**	
9.74	4	.05	
Outcome: Chronicity Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		6.29	1.37	<.001
Level 2:Cov(time_cent6,Intercept)		-0.03	0.11	.88
Level 2 : Var(time_cent6)		0.02	0.01	.15
Residual Var.		2.08	0.20	<.001
Coefficients				
Intercept		8.55	0.43	<.001
Time (Centered @ Week 6)		0.11	0.05	.04
Study Condition		0.08	0.61	.89
Approach Coping T0		0.01	0.79	.99
Time*Study Condition		-0.05	0.08	.51
Time*Approach Coping		0.08	0.10	.43
Approach Coping*Study Condition		-0.88	1.08	.41
Time*Study Condition*Approach Coping		-0.06	0.14	.70
Proportion Variance Explained				
by Coefficients		0.04	0.03	.09
by Level-2 Random Intercepts		0.72	0.04	<.001
by Level-2 Random Slopes		0.01	0.01	.15
by Level-1 Residual Variation		0.22	0.03	<.001
Outcome: Control Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		3.93	1.30	.003
Level 2:Cov(time_cent6,Intercept)		0.38	0.23	.08
Level 2 : Var(time_cent6)		0.12	0.05	.01
Residual Var.		3.11	0.36	<.001
Coefficients				
Intercept		3.52	0.42	<.001
Time (Centered @ Week 6)		0.06	0.09	.49
Study Condition		1.03	0.60	.08
Approach Coping T0		-0.40	0.77	.61
Time*Study Condition		-0.01	0.12	.97
Time*Approach Coping		-0.43	0.15	.01
Approach Coping*Study Condition		0.92	1.07	.40
Time*Study Condition*Approach Coping		0.44	0.21	.04
Proportion Variance Explained				
by Coefficients		0.12	0.04	0.002
by Level-2 Random Intercepts		0.37	0.06	<.001
by Level-2 Random Slopes		0.08	0.03	0.01
by Level-1 Residual Variation		0.42	0.06	<.001

Outcome: Coherence Perceptions	**Median coefficient**	**St. dev**	***p* value**
Variances			
Level 2 : Var(Intercept)	0.28	0.27	.19
Level 2:Cov(time_cent6,Intercept)	0.06	0.06	.21
Level 2 : Var(time_cent6)	0.02	0.02	.18
Residual Var.	5.90	0.45	<.001
Coefficients			
Intercept	1.43	0.38	<.001
Time (Centered @ Week 6)	-0.61	0.09	<.001
Study Condition	0.06	0.54	.92
Approach Coping T0	0.52	0.71	.47
Time*Study Condition	-0.01	0.12	.96
Time*Approach Coping	-0.14	0.16	.38
Approach Coping*Study Condition	0.86	0.97	.37
Time*Study Condition*Approach Coping	0.33	0.22	.13
Proportion Variance Explained			
by Coefficients	0.27	0.04	<.001
by Level-2 Random Intercepts	0.01	0.01	.23
by Level-2 Random Slopes	0.01	0.01	.17
by Level-1 Residual Variation	0.71	0.04	<.001

Outcome: Psychological Distress (Z-Score)	**Median coefficient**	**St. dev**	***p* value**
Variances			
Level 2 : Var(Intercept)	0.73	0.15	<.001
Level 2:Cov(time_cent6,Intercept)	0.05	0.02	.001
Level 2 : Var(time_cent6)	0.02	0.01	<.001
Residual Var.	0.12	0.01	<.001
Coefficients			
Intercept	-0.05	0.15	0.76
Time (Centered @ Week 6)	-0.001	0.03	0.97
Study Condition	0.06	0.20	0.76
Approach Coping T0	-0.40	0.26	0.13
Time*Study Condition	-0.01	0.04	0.81
Time*Approach Coping	-0.07	0.05	0.17
Approach Coping*Study Condition	0.61	0.37	0.10
Time*Study Condition*Approach Coping	0.12	0.07	0.09
Proportion Variance Explained			
by Coefficients	0.04	0.02	0.06
by Level-2 Random Intercepts	0.70	0.04	<.001
by Level-2 Random Slopes	0.13	0.03	<.001
by Level-1 Residual Variation	0.13	0.02	<.001

Table 8a

Simple Interactions Between Time and Study Condition on Control Perceptions at Probed Values of Approach-Oriented Coping (T0) (N = 101)

Probed Value of Approach-Oriented Coping (T0)	Median Simple Interaction Coefficient	St. dev	*p* value
1 (Scale minimum)	-0.77	0.28	.04
1.46 (Observed minimum)	-0.57	0.29	.05
2	-0.32	0.19	.10
2.73 (Grand mean)	-0.01	0.12	.97
3	0.11	0.13	.39
4 (Scale maximum)	0.55	0.30	.06
5 (Exploratory probe)	0.99	0.50	.04
6 (Exploratory probe)	1.43	0.70	.04

Table 8b

Simple Simple Effects of Time within Study Conditions When Approach-Oriented Coping (T0) is Probed at a Value of 1 (N = 101)

Probed Value of Approach-Oriented Coping (T0)	Study Condition	Median Simple Simple Effect Coefficient	St. dev	*p* value
1 (Scale minimum)	Control Condition	0.80	0.27	.003
1 (Scale minimum)	Treatment Condition	0.03	0.27	.92

Table 9

Omnibus Model 4: Interaction Between Time, Study Condition and Avoidance-Oriented Coping (T0) on Illness Perception and Psychological Distress Outcomes (N = 101)

Comparing Iterations Across 2 Chains		**Highest PSR**	
5001 to 10000		1.04	
	Omnibus Multivariate Test		
Wald Statistic (Chi Square)	**Number of Parameters Tested (df)**	**Probability (*p* value)**	
3.48	4	.48	
Outcome: Chronicity Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		5.93	1.33	<.001
Level 2:Cov(time_cent6,Intercept)		-0.05	0.11	.75
Level 2 : Var(time_cent6)		0.02	0.02	.19
Residual Var.		2.10	0.20	<.001
Coefficients				
Intercept		8.49	0.43	<.001
Time (Centered @ Week 6)		0.11	0.05	.04
Study Condition		0.06	0.61	.91
Avoidance Coping T0		1.95	1.29	.13
Time*Study Condition		-0.05	0.08	.54
Time*Avoidance Coping		-0.04	0.16	.80
Avoidance Coping*Study Condition		-2.94	1.67	.08
Time*Study Condition*Avoidance Coping		0.03	0.22	.90
Proportion Variance Explained				
by Coefficients		0.06	0.03	.06
by Level-2 Random Intercepts		0.70	0.04	<.001
by Level-2 Random Slopes		0.01	0.01	.20
by Level-1 Residual Variation		0.22	0.03	<.001
Outcome: Control Perceptions		**Median coefficient**	**St. dev**	***p* value**
Variances				
Level 2 : Var(Intercept)		3.84	1.30	.002
Level 2:Cov(time_cent6,Intercept)		0.39	0.24	.08
Level 2 : Var(time_cent6)		0.14	0.06	.01
Residual Var.		3.14	0.37	<.001
Coefficients				
Intercept		3.58	0.42	<.001
Time (Centered @ Week 6)		0.09	0.09	.31
Study Condition		0.98	0.60	.11
Avoidance Coping T0		1.32	1.31	.32
Time*Study Condition		-0.04	0.12	.75
Time*Avoidance Coping		0.18	0.28	.51
Avoidance Coping*Study Condition		-2.57	1.66	.12
Time*Study Condition*Avoidance Coping		-0.37	0.35	.29
Proportion Variance Explained				
by Coefficients		0.08	0.03	0.01
by Level-2 Random Intercepts		0.39	0.05	<.001
by Level-2 Random Slopes		0.10	0.03	0.01
by Level-1 Residual Variation		0.43	0.32	<.001

Outcome: Coherence Perceptions	**Median coefficient**	**St. dev**	***p* value**
Variances			
Level 2 : Var(Intercept)	0.30	0.30	.21
Level 2:Cov(time_cent6,Intercept)	0.06	0.06	.25
Level 2 : Var(time_cent6)	0.02	0.16	.21
Residual Var.	6.11	0.48	<.001
Coefficients			
Intercept	1.41	0.38	<.001
Time (Centered @ Week 6)	-0.60	0.09	<.001
Study Condition	0.20	0.55	.71
Avoidance Coping T0	-0.72	1.14	.52
Time*Study Condition	0.01	0.12	.97
Time*Avoidance Coping	-0.18	0.26	.48
Avoidance Coping*Study Condition	1.61	1.52	.29
Time*Study Condition*Avoidance Coping	0.49	0.34	.15
Proportion Variance Explained			
by Coefficients	0.25	0.04	<.001
by Level-2 Random Intercepts	0.01	0.01	.19
by Level-2 Random Slopes	0.01	0.01	.21
by Level-1 Residual Variation	0.73	0.04	<.001

Outcome: Psychological Distress (Z-Score)	**Median coefficient**	**St. dev**	***p* value**
Variances			
Level 2 : Var(Intercept)	0.64	0.13	<.001
Level 2:Cov(time_cent6,Intercept)	0.07	0.02	.001
Level 2 : Var(time_cent6)	0.02	0.01	<.001
Residual Var.	0.12	0.01	<.001
Coefficients			
Intercept	-0.02	0.14	0.84
Time (Centered @ Week 6)	0.002	0.03	0.95
Study Condition	0.07	0.19	0.71
Avoidance Coping T0	1.16	0.40	0.004
Time*Study Condition	-0.01	0.04	0.79
Time*Avoidance Coping	-0.06	0.08	0.43
Avoidance Coping*Study Condition	-0.44	0.52	0.40
Time*Study Condition*Avoidance Coping	-0.02	0.10	0.84
Proportion Variance Explained			
by Coefficients	0.22	0.06	<.001
by Level-2 Random Intercepts	0.52	0.05	<.001
by Level-2 Random Slopes	0.13	0.03	<.001
by Level-1 Residual Variation	0.13	0.02	<.001

Table 10

Mediation Model Testing Indirect Effect of Study Condition on Psychological Distress via Illness Perceptions (N = 69)

	Coefficient	SE	*t*	*p*	Bootstrapped 95% CI
a Paths					
Study Condition → Chronicity Perceptions	0.24	0.54	0.44	.66	[-0.84, 1.31]
Study Condition → Control Perceptions	-1.01	0.57	-1.76	.08	[-2.15, 0.13]
Study Condition → Coherence Perceptions	0.10	0.44	0.23	.82	[-0.77, 0.97]
b Paths					
Chronicity Perceptions → Psychological Distress	0.09	0.23	1.72	.09	[-0.01, 0.19]
Control Perceptions → Psychological Distress	0.02	0.05	0.48	.63	[-0.08, 0.12]
Coherences Perceptions → Psychological Distress	-0.003	0.05	-0.04	.97	[-0.13, 0.13]
Direct Effect					
Study Condition → Psychological Distress (c' path)	.08	0.23	0.34	0.73	[-0.38, 0.54]
Total Effect					
Study Condition → Psychological Distress (c path)	0.08	0.23	0.33	0.74	[-0.37, 0.52]

	Coefficient	Bootstrapped SE	Bootstrapped 95% CI
Indirect Effects			
Study Condition → Chronicity Perceptions → Psychological Distress	0.02	0.06	[-0.09, 0.14]
Study Condition → Control Perceptions → Psychological Distress	-0.02	0.05	[-0.13, 0.07]
Study Condition → Coherence Perceptions → Psychological Distress	-0.0003	0.03	[-0.03, 0.09]
Total Indirect Effect			
Study Condition → (Chronicity, Control, Coherence Perceptions) → Psychological Distress	-0.004	0.08	[-0.15, 0.17]

Table 11a

Descriptive Statistics of Item Responses to the Exit Survey for Video 1

Exit Survey Item	N	Mean	SD	Min.	Max.
1. How helpful was the video in providing useful information?	52	4.54	0.85	1	5
2. How helpful was the video in providing psychological support?	53	3.75	1.05	1	5
3. How acceptable was the video?	53	4.64	0.68	2	5
4. How credible was the video and the information it contained?	53	4.92	0.27	4	5
5. How helpful would this video have been when you were diagnosed with eye cancer?	53	4.60	0.77	2	5
6. How likely are you to refer back to this video?	53	3.02	1.38	1	5
7. How interested are you in having access to videos like this in the future?	53	4.28	0.97	2	5

Table 11b

Descriptive Statistics of Item Responses to the Exit Survey for Video 2

Exit Survey Item	N	Mean	SD	Min.	Max.
1. How helpful was the video in providing useful information?	49	4.37	0.86	2	5
2. How helpful was the video in providing psychological support?		4.12	0.97	2	5
3. How acceptable was the video?	49	4.61	0.73	2	5
4. How credible was the video and the information it contained?	49	4.80	0.41	4	5
5. How helpful would this video have been when you were diagnosed with eye cancer?	49	4.59	0.86	1	5
6. How likely are you to refer back to this video?	49	3.39	1.26	1	5
7. How interested are you in having access to videos like this in the future?	49	4.33	0.97	1	5

Table 11c

Descriptive Statistics of Item Responses to the Exit Survey for the Mental Health Resource Information Sheet

Exit Survey Item	N	Mean	SD	Min.	Max.
1. How helpful was the sheet in providing useful information?	45	4.00	1.21	1	5
2. How helpful was the information sheet in providing psychological support?	44	3.66	1.25	1	5
3. How acceptable was the information sheet?	44	4.18	0.97	2	5
4. How credible was the information sheet and the information it contained?	45	4.51	0.76	2	5
5. How helpful would this information sheet have been when you were diagnosed with eye cancer?	45	4.60	0.84	2	5
6. How likely are you to refer back to this information sheet?	44	3.98	1.30	1	5
7. How interested are you in having access to resources like this in the future?	45	4.09	1.24	1	5

Table 12a

Independent Samples t-test of Participants' Exit Survey Responses at T0 in the Treatment (N = 49 - 53) and Control (N=44 - 45) Conditions

Exit Survey Item	Mean difference	Std. error difference	*t*	df	Sig. (2-tailed)
1. How helpful was the resource in providing useful information?	-0.54	0.22	-2.50*	77.64	.01
2. How helpful was the resource in providing psychological support?	-0.10	0.23	-0.41	95	.68
3. How acceptable was the resource?	-0.46	0.17	-2.65*	75.03	.01
4. How credible was the resource and the information it contained?	-0.41	0.12	-3.48*	53.25	.001
5. How helpful would this resource have been when you were diagnosed with eye cancer?	-0.004	0.16	-0.02	96	.98
6. How likely are you to refer back to this resource?	0.96	0.27	3.49	95	<.001
7. How interested are you in having access to resources like this in the future?	-0.19	0.22	-0.87	96	.39

*Equal variances not assumed

Table 12b

Independent Samples t-test of Participants' Exit Survey Responses at T1 (Treatment Condition, N = 49) and T0 (Control Condition, N = 44 - 45)

Exit Survey Item	Mean difference	Std. error difference	t	df	Sig. (2-tailed)
1. How helpful was the video in providing useful information?	-0.37	0.22	-1.69*	78.84	.10
2. How helpful was the video in providing psychological support?	-0.46	0.23	-2.00	91	.05
3. How acceptable was the video?	-0.43	0.18	-2.39*	79.45	.02
4. How credible was the video and the information it contained?	-0.28	0.13	-2.24*	66.18	.03
5. How helpful would this video have been when you were diagnosed with eye cancer?	0.01	0.16	0.05	92	0.96
6. How likely are you to refer back to this video?	0.59	0.27	2.22	91	.03
7. How interested are you in having access to videos like this in the future?	-0.24	0.28	-1.03	92	.30

*Equal variances not assumed

Table 12c

Paired Samples t-test of Treatment Condition Participants' Exit Survey Responses to Videos 1 and 2 (Equal Variances Assumed) (N = 44 - 53)

	Paired Differences					
Exit Survey Item	**Mean**	**SD**	**St. error mean**	**t**	**df**	**Sig. 2 tailed**
1. How helpful was the video in providing useful information?	0.15	0.85	0.12	1.19	47	.24
2. How helpful was the video in providing psychological support?	-0.35	1.15	0.16	-2.19	48	.04
3. How acceptable was the video?	0.02	0.80	0.12	0.18	48	.86
4. How credible was the video and the information it contained?	0.12	0.48	0.07	1.77	48	.08
5. How helpful would this video have been when you were diagnosed with eye cancer?	-0.20	1.18	0.17	-0.12	48	.90
6. How likely are you to refer back to this video?	-0.25	1.28	0.18	-1.34	48	.19
7. How interested are you in having access to videos like this in the future?	-0.20	1.07	0.15	-0.13	48	.89

References

Alfonsson, S., Johansson, K., Uddling, J., & Hursti, T. (2017). Differences in motivation and adherence to a prescribed assignment after face-to-face and online psychoeducation: An experimental study. *BMC Psychology*, *5*(1), 3. https://doi.org/10.1186/s40359-017-0172-5

Alyami, M., Serlachius, A., O'Donovan, C. E., van der Werf, B., & Broadbent, E. (2021). A systematic review of illness perception interventions in type 2 diabetes: Effects on glycaemic control and illness perceptions. *Diabetic Medicine : A Journal of the British Diabetic Association*, *38*(3), e14495. https://doi.org/10.1111/dme.14495

Amaro, T., Yazigi, L., & Erwenne, C. (2010). Depression and quality of life during treatment of ocular bulb removal in individuals with uveal melanoma. *European Journal of Cancer Care, 19,* 476-481. https://doi.org/10.1111/j.1365-2354.2009.01073.x

Aronow, M. E., Topham A. K., & Singh, A. D. (2018). Uveal melanoma: 5-Year update on incidence, treatment, and survival (SEER 1973-2013). *Ocular Oncology and Pathology, 4*,145-151. https://doi.org/10.1159/000480640

Beale, I. L., Kato, P. M., Marin-Bowling, V. M., Guthrie, N., & Cole, S. W. (2007). Improvement in cancer-related knowledge following use of a psychoeducational video game for adolescents and young adults with cancer. *The Journal of Adolescent Health : Official Publication of the Society for Adolescent Medicine*, *41*(3), 263–270. https://doi.org/10.1016/j.jadohealth.2007.04.006

Bedikian, A. Y. (2006). Metastatic uveal melanoma therapy: Current options. *International Ophthalmology Clinics, 46*(1), 151-166.

Bergerot, C. D., Bergerot, P. G., Philip, E. J., De Domenico, E., Manhaes, M., Pedras, R. N., Salgia, M. M., Dizman, N., Ashing, K. T., Li, M., Dale, W., & Pal, S. K. (2018). Assessment of distress and quality of life in rare cancers. *Psycho-Oncology, 27*(12), 2740–2746. https://doi.org/10.1002/pon.4873

Bonferroni, C. E. (1936). Teoria statistica delle classi e calcolo delle probabilità. *Pubblicazioni del R Istituto Superiore di Scienze Economiche e Commerciali di Firenze, 8*, 3-62.

Brandberg, Y., Kock, E., Oskar, K., Af Trampe, E., & Seregard, S. (2000). Psychological reactions and quality of life in patients with posterior uveal melanoma treated with ruthenium plaque therapy or enucleation: A one year follow-up study. *Eye, 14*, 839–846.

Broadbent, E., Ellis, C. J., Thomas, J., Gamble, G., & Petrie, K. J. (2009). Further development of an illness perception intervention for myocardial infarction patients: A randomized controlled trial. *Journal of Psychosomatic Research, 67*(1), 17–23. https://doi.org/10.1016/j.jpsychores.2008.12.001

Broadbent, E., Petrie, K. J., Main, J., & Weinman, J. (2006). The Brief Illness Perception Questionnaire. *Journal of Psychosomatic Research, 60*(6), 631-637.

Broadbent, E., Wilkes, C., Koschwanez, H., Weinman, J., Norton, S., & Petrie, K. J. (2015). A systematic review and meta-analysis of the Brief Illness Perception Questionnaire. *Psychology & Health, 30*(11), 1361-1385.

Brown, S. L., Hope-Stone, L., Heimann, H., Damato, B., & Salmon, P. (2018). Predictors of anxiety and depression 2 years following treatment in uveal melanoma survivors. *Psycho-Oncology, 27*(7), 1727–1734. https://doi.org/10.1002/pon.4715

Brown, L.F., Kroenke, K., Theobald, D.E., Wu, J. and Tu, W. (2010). The association of depression and anxiety with health-related quality of life in cancer patients with depression and/or pain. *Psycho-Oncology, 19,* 734-741

Buffart, L. M., Schreurs, M., Abrahams, H., Kalter, J., Aaronson, N. K., Jacobsen, P. B., Newton, R. U., Courneya, K. S., Armes, J., Arving, C., Braamse, A. M., Brandberg, Y., Dekker, J., Ferguson, R. J., Gielissen, M. F., Glimelius, B., Goedendorp, M. M., Graves, K. D., Heiney, S. P., Horne, R., … Verdonck-de Leeuw, I. M. (2020). Effects and moderators of coping skills training on symptoms of depression and anxiety in patients with cancer: Aggregate data and individual patient data meta-analyses. *Clinical Psychology Review*, *80*, 101882. https://doi.org/10.1016/j.cpr.2020.101882

Carver, C. S., Scheier, M. F., & Weintraub, J. K. (1989). Assessing coping strategies: A theoretically based approach. *Journal of Personality and Social Psychology*, *56*(2), 267-283.

Cerbone, L., Van Ginderdeuren, R., Van den Oord J, Fieuws S., Spileers, W., Van Eenoo, L., Wozniak, A., Sternberg, C. N., & Schöffski, P. (2014). Clinical presentation, pathological features and natural course of metastatic uveal melanoma, an orphan and commonly fatal disease. *Oncology, 86,* 185-189.

Chabert, S., Velikay-Parel, M., & Zehetmayer, M. (2004). Influence of uveal melanoma therapy on patients' quality of life: A psychological study. *Acta Ophthalmologica Scandinavica, 82*, 25-31. https://doi.org/10.1046/j.1600-0420.2003.0210.x

Chan, C. W., Richardson, A., & Richardson, J. (2011). Managing symptoms in patients with advanced lung cancer during radiotherapy: Results of a psychoeducational randomized

controlled trial. *Journal of Pain and Symptom Management*, *41*(2), 347–357. https://doi.org/10.1016/j.jpainsymman.2010.04.024

Charalambous, A., Kaite, C. P., Charalambous, M., Tistsi, T., & Kouta, C. (2017). The effects on anxiety and quality of life of breast cancer patients following completion of the first cycle of chemotherapy. *SAGE Open Medicine*, *5*. https://doi.org/10.1177/2050312117717507

Crawshaw, J., Rimington, H., Weinman, J., & Chilcot, J. (2015). Illness perception profiles and their association with 10-year survival following cardiac valve replacement. *Annals of Behavioral Medicine : A Publication of the Society of Behavioral Medicine*, *49*(5), 769–775. https://doi.org/10.1007/s12160-015-9695-2

Damato, B., Duke, C., Coupland, S. E., Hiscott, P., Smith, P. A., Campbell, I., Douglas, A., & Howard, B. (2007). Cytogenetics of uveal melanoma: A 7-year clinical experience. *Ophthalmology*, *114*(10), 1925-1931.

de Castro, E. K., Kreling, M., Ponciano, C., Meneghetti, B. M., & Chem, C. M. (2012). Longitudinal assessment of illness perceptions in young adults with cancer. *Psicologia-Reflexao E Critica*, *25*, 671–678. https://doi.org/10.1590/S0102-79722012000400006

Devcich, D. A., Ellis, C. J., Broadbent, E., Gamble, G., & Petrie, K. J. (2012). The psychological impact of test results following diagnostic coronary CT angiography. *Health Psychology*, *31*(6), 738–744. https://doi.org/10.1037/a0026502

Dempster, M., Howell, D., & McCorry, N. K. (2015). Illness perceptions and coping in physical health conditions: A meta-analysis. *Journal of Psychosomatic Research*, *79*(6), 506–513. https://doi.org/10.1016/j.jpsychores.2015.10.006

Edelman, S., Craig, A., & Kidman, A. D. (2000). Group interventions with cancer patients: Efficacy of psychoeducational versus supportive groups. *Journal of Psychosocial Oncology, 18*(3), 67–85. https://doi.org/10.1300/J077v18n03_05

Ekhtiari, H., Rezapour, T., Aupperle, R. L., & Paulus, M. P. (2017). Neuroscience-informed psychoeducation for addiction medicine: A neurocognitive perspective. *Progress in Brain Research*, *235*, 239–264. https://doi.org/10.1016/bs.pbr.2017.08.013

Enders, C. K., Du, H., & Keller, B. T. (2020). A model-based imputation procedure for multilevel regression models with random coefficients, interaction effects, and other nonlinear terms. *Psychological Methods*, *25*, 88-112.

Etain, B., Scott, J., Cochet, B., Bellivier, F., Boudebesse, C., Drancourt, N., Lauer, S., Dusser, I., Yon, L., Fouques, D., Richard, J. R., Lajnef, M., Leboyer, M., & Henry, C. (2018). A study of the real-world effectiveness of group psychoeducation for bipolar disorders: Is change in illness perception a key mediator of benefit?. *Journal of Affective Disorders, 227*, 713–720. https://doi.org/10.1016/j.jad.2017.11.072

Finkelstein-Fox, L., & Park, C. L. (2019). Control-coping goodness-of-fit and chronic illness: a systematic review of the literature. *Health Psychology Review, 13*(2), 137–162. https://doi.org/10.1080/17437199.2018.1560229

Fischer, M. J., Wiesenhaan, M. E., Does-den Heijer, A., Kleijn, W. C., Nortier, J. W., & Kaptein, A. A. (2013). From despair to hope: A longitudinal study of illness perceptions and coping in a psycho-educational group intervention for women with breast cancer. *British Journal of Health Psychology*, *18*(3), 526–545. https://doi.org/10.1111/j.2044-8287.2012.02100.x

Freeman-Gibb, L. A., Janz, N. K., Katapodi, M. C., Zikmund-Fisher, B. J., & Northouse, L. (2017). The relationship between illness representations, risk perception and fear of cancer recurrence in breast cancer survivors. *Psycho-Oncology, 26*(9), 1270–1277. https://doi.org/10.1002/pon.4143

Goodman, H., Firouzi, A., Banya, W., Lau-Walker, M., & Cowie, M. R. (2013). Illness perception, self-care behaviour and quality of life of heart failure patients: A longitudinal questionnaire survey. *International Journal of Nursing Studies*, *50*(7), 945-953. https://doi.org/10.1016/j.ijnurstu.2012.11.007

Gragoudas, E. S., Egan, K. M., Seddon, J. M., Glynn, R. J., Walsh, S. M., Finn, S. M., Munzenrider, J. E. & Spar, M. D. (1991). Survival of patients with metastases from uveal melanoma. *Ophthalmology, 98*(3), 383-389.

Greenlee, R. T., Goodman, M. T., Lynch, C. F., Platz, C. E., Havener, L. A., & Howe, H. L. (2010). The occurrence of rare cancers in U.S. adults, 1995–2004. *Public Health Reports, 125*(1), 28–43. https://doi.org/10.1177/003335491012500106

Hagger, M. S., Koch, S., Chatzisarantis, N., & Orbell, S. (2017). The Common Sense Model of self-regulation: Meta-analysis and test of a process model. *Psychological Bulletin, 143*(11), 1117–1154. https://doi.org/10.1037/bul0000118

Hagger, M. S., & Orbell, S. (2003). A meta-analytic review of the Common-Sense Model of illness representations. *Psychology & Health, 18*(2), 141–184.

Hagger, M. S., & Orbell, S. (2021). The Common Sense Model of illness self-regulation: A conceptual review and proposed extended model. *Health Psychology Review*, 16(3), 347-377. https://doi.org/10.1080/17437199.2021.1878050

Hayes, A. F. (2021). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (3rd ed.). Guilford Press.

Hoch, M. M., MacDonald, J. J., Jorge-Miller, A., McCannel, T. A., Beran, T. M., & Stanton, A. L. (2023). Depression in uveal melanoma survivorship: Examining psychological predictors of adjustment in the first year following diagnosis. *Annals of Behavioral Medicine : A Publication of the Society of Behavioral Medicine, 57*(12), 1081–1096. https://doi.org/10.1093/abm/kaad057

Hegel, M. T., Moore, C. P., Collins, E. D., Kearing, S., Gillock, K. L., Riggs, R. L., Clay, K. F., & Ahles, T. A. (2006). Distress, psychiatric syndromes, and impairment of function in women with newly diagnosed breast cancer. *Cancer, 107*(12), 2924–2931. https://doi.org/10.1002/cncr.22335

Horick, N. K., Muzikansky, A., Gutierrez, H. L., Boyd, K. L., & Finkelstein, D.M. (2018). Physical symptoms in long-term survivors of rare cancer. *Cancer Survivorship, 12(6),* 835-842. https://doi.org/10.1007/s11764-018-0721-9

Hunsley, J. (1992). Development of the Treatment Acceptability Questionnaire. *Journal of Psychopathology and Behavioral Assessment, 14*(1), 55–64. https://doi.org/10.1007/BF00960091

Husson, O., Poort, H., Sansom-Daly, U. M., Netea-Maier, R., Links, T., & Mols, F. (2020). Psychological distress and illness perceptions in thyroid cancer survivors: Does age matter? *Journal of Adolescent and Young Adult Oncology, 9*(3), 375-383. https://doi.org/10.1089/jayao.2019.0153

International Rare Cancers Initiative (IRCI). (2017). Five-year progress report.

Jansen, D. L., Heijmans, M. J., Rijken, M., Spreeuwenberg, P., Grootendorst, D. C., Dekker, F. W., Boeschoten, E. W., Kaptein, A. A., & Groenewegen, P. P. (2013). Illness perceptions and treatment perceptions of patients with chronic kidney disease: Different phases, different perceptions?. *British Journal of Health Psychology*, *18*(2), 244–262. https://doi.org/10.1111/bjhp.12002

Janssen, V., De Gucht, V., van Exel, H., & Maes, S. (2013). Changes in illness perceptions and quality of life during participation in cardiac rehabilitation. *International Journal of Behavioral Medicine, 20,* 582–589. https://doi.org/10.1007/s12529-012-9260-3

Kath, R., Hayungs, J., Bornfeld, N., Sauerwein, W., Höffken, K., & Seeber, S. (1993). Prognosis and treatment of disseminated uveal melanoma. *Cancer, 72*(7), 2219-2223.

Keller, B. T., & Enders, C. K. (2023). *Blimp user's guide* (Version 3). Retrieved from https://www.appliedmissingdata.com/blimp

Khoja, L., Atenafu, E. G., Suciu, S., Leyvraz, S., Sato, T., Marshall, E., Keilholz, U., Zimmer, L., Patel, S. P., Piperno-Neumann, S., Piulats, J., Kivelä, T. T., Pfoehler, C., Bhatia, S., Huppert, P., Van Iersel, L. B. J., De Vries, I. J. M., Penel, N., Vogl, T., Cheng, T., … Joshua, A. M. (2019). Meta-analysis in metastatic uveal melanoma to determine progression free and overall survival benchmarks: An international rare cancers initiative (IRCI) ocular melanoma study. *Annals of Oncology: Official Journal of the European Society for Medical Oncology*, *30*(8), 1370–1380. https://doi.org/10.1093/annonc/mdz176

Kujala, E., Mäkitie, T., & Kivelä, T. (2003). Very long-term prognosis of patients with malignant uveal melanoma. *Investigative ophthalmology & visual science, 44*(11), 4651-4659.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping.* Springer publishing company.

Lazarus, R. S., & Folkman, S. (1987). Transactional theory and research on emotions and coping. *European Journal of Personality, 1,* 141–169.

Lee, J. Y., Park, H. Y., Jung, D., Moon, M., Keam, B., & Hahm, B. J. (2014). Effect of brief psychoeducation using a tablet PC on distress and quality of life in cancer patients undergoing chemotherapy: a pilot study. *Psycho-Oncology*, *23*(8), 928–935. https://doi.org/10.1002/pon.3503

Leventhal, H., Meyer, D., & Nerenz, D. (1980). The common sense representation of illness danger. In S. Rachman (Ed.), *Contributions to medical psychology* (Vol. II, pp.7–30). New York: Pergamon Press.

Linden, W., Vodermaier, A., Mackenzie, R., & Greig, D. (2012). Anxiety and depression after cancer diagnosis: Prevalence rates by cancer type, gender, and age. *Journal of Affective Disorders*, *141*(2-3), 343–351. https://doi.org/10.1016/j.jad.2012.03.025

Llewellyn, C. D., McGurk, M., & Weinman, J. (2007). Illness and treatment beliefs in head and neck cancer: Is Leventhal's Common Sense Model a useful framework for determining changes in outcome over time? *Journal of Psychosomatic Research 63*(1), 17-26.

Lu, D., Andersson, T. M., Fall, K., Hultman, C. M., Czene, K., Valdimarsdóttir, U., & Fang, F. (2016). Clinical diagnosis of mental disorders immediately before and after cancer diagnosis: A nationwide matched cohort study in Sweden. *JAMA Oncology*, *2*(9), 1188–1196. https://doi.org/10.1001/jamaoncol.2016.0483

MacDonald, J. J., Jorge-Miller, A., Enders, C. K., McCannel, T. A., Beran, T. M., & Stanton, A. L. (2021). Visual impairment and depression in uveal melanoma: Optimism and

pessimism as moderators. *Health Psychology, 40*(6), 408–417. https://doi.org/10.1037/hea0001080

Mausbach, B. T., Schwab, R. B., & Irwin, S. A. (2015). Depression as a predictor of adherence to adjuvant endocrine therapy (AET) in women with breast cancer: A systematic review and meta-analysis. *Breast Cancer Research and Treatment, 152*(2), 239–246. https://doi.org/10.1007/s10549-015-3471-7

McCorry, N. K., Dempster, M., Quinn, J., Hogg, A., Newell, J., Moore, M., Kelly, S., & Kirk, S. J. (2013). Illness perception clusters at diagnosis predict psychological distress among women with breast cancer at 6 months post diagnosis. *Psycho-Oncology*, *22*(3), 692–698. https://doi.org/10.1002/pon.3054

Melia, M., Moy, C. S., Reynolds, S. M., Hayman, J. A., Murray, T. G., Hovland, K. R., Earle, J. D., Kurinij, N., Dong, L. M., Miskala, P. H., Fountain, C., Cella, D., Mangione, C. M., & Collaborative Ocular Melanoma Study-Quality of Life Study Group (2006). Quality of life after iodine 125 brachytherapy vs enucleation for choroidal melanoma: 5-year results from the Collaborative Ocular Melanoma Study: COMS QOLS Report No. 3. *Archives of Ophthalmology (Chicago, Ill. : 1960)*, *124*(2), 226–238. https://doi.org/10.1001/archopht.124.2.226

Miniati, M., Fabrini, M. G., Genovesi Ebert, F., Mancino, M., Maglio, A., Massimetti, G., Massimetti, E., & Marazziti, D. (2018). Quality of life, depression, and anxiety in patients with uveal melanoma: A review. *Journal of Oncology*, *2018*, 5253109. https://doi.org/10.1155/2018/5253109

Moss-Morris, R., Weinman, J., Petrie, K. J., Horne, R., Cameron, L. D., & Buick, D. (2002). The revised Illness Perception Questionnaire (IPQ-R). *Psychology & Health, 17*(1), 1–16. https://doi.org/10.1080/08870440290001494

National Cancer Institute (NCI) (2013). Rare Tumors Initiative.

Onken, M. D., Worley, L. A., Tuscan, M. D., & Harbour, J. W. (2010). An accurate, clinically feasible multi-gene expression assay for predicting metastasis in uveal melanoma. *The Journal of Molecular Diagnostics, 12*(4), 461-468.

Petrie, K. J., Cameron, L. D., Ellis, C. J., Buick, D., & Weinman, J. (2002). Changing illness perceptions after myocardial infarction: An early intervention randomized controlled trial. *Psychosomatic Medicine, 64*(4), 580–586. https://doi.org/10.1097/00006842-200207000-00007

Pinquart, M., & Duberstein, P. R. (2010). Depression and cancer mortality: A meta-analysis. *Psychological Medicine, 40*(11), 1797–1810. https://doi.org/10.1017/S0033291709992285

Pires, G. E., Peuker, A. C., & Castro, E. K. (2017). Brief intervention for stress management and change in illness perception among hypertensive and normotensive workers: Pilot study and protocol. *Psicologia, Reflexao e Critica : Revista Semestral do Departamento de Psicologia da UFRGS*, *30*(1), 26. https://doi.org/10.1186/s41155-017-0080-x

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401. https://doi.org/10.1177/014662167700100306

Ranchor, A. V., Wardle, J., Steptoe, A., Henselmans, I., Ormel, J., & Sanderman, R. (2010). The adaptive role of perceived control before and after cancer diagnosis: A prospective study.

Social Science & Medicine, 70(11), 1825–1831. https://doi.org/10.1016/j.socscimed.2009.10.069

Rantala, E. S., Hernberg, M., & Kivelä, T. T. (2019). Overall survival after treatment for metastatic uveal melanoma: A systematic review and meta-analysis. *Melanoma Research, 29*(6), 561-568.

Richardson, E. M., Schüz, N., Sanderson, K., Scott, J. L., & Schüz, B. (2017). Illness representations, coping, and illness outcomes in people with cancer: A systematic review and meta-analysis. *Psycho‐Oncology, 26*, 724– 737. https://doi.org/10.1002/pon.4213.

Riddle, M., & Science of Behavior Change Working Group. (2015). News from the NIH: Using an experimental medicine approach to facilitate translational research. *Translational Behavioral Medicine, 5*(4), 486–488. https://doi.org/10.1007/s13142-015-0333-0

Roesch, S. C., & Weiner, B. (2001). A meta-analytic review of coping with illness: Do causal attributions matter?. *Journal of Psychosomatic Research, 50*(4), 205–219. https://doi.org/10.1016/s0022-3999(01)00188-x

Sararoudi, R. B., Motmaen, M., Maracy, M. R., Pishghadam, E., & Kheirabadi, G. R. (2016). Efficacy of illness perception focused intervention on quality of life, anxiety, and depression in patients with myocardial infarction. *Journal of Research in Medical Sciences: The Official Journal of Isfahan University of Medical Sciences, 21*, 125. https://doi.org/10.4103/1735-1995.196607

Satin, J. R., Linden, W., & Phillips, M. J. (2009). Depression as a predictor of disease progression and mortality in cancer patients: a meta-analysis. *Cancer, 115*(22), 5349–5361. https://doi.org/10.1002/cncr.24561

Schuermeyer, I., Maican, A., Sharp, R., Bena, J., Triozzi, P. L., & Singh, A. D. (2016). Depression, anxiety, and regret before and after testing to estimate uveal melanoma prognosis. *JAMA Ophthalmology*, *134*(1), 51–56. https://doi.org/10.1001/jamaophthalmol.2015.4343

Setyowibowo, H., Yudiana, W., Hunfeld, J., Iskandarsyah, A., Passchier, J., Arzomand, H., Sadarjoen, S. S., de Vries, R., & Sijbrandij, M. (2022). Psychoeducation for breast cancer: A systematic review and meta-analysis. *Breast (Edinburgh, Scotland)*, *62*, 36–51. https://doi.org/10.1016/j.breast.2022.01.005

Siemonsma, P. C., Stuive, I., Roorda, L. D., Vollebregt, J. A., Walker, M. F., Lankhorst, G. J., & Lettinga, A. T. (2013). Cognitive treatment of illness perceptions in patients with chronic low back pain: A randomized controlled trial. *Physical Therapy*, *93*(4), 435–448. https://doi.org/10.2522/ptj.20110150

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Stanton, A. L., & Hoch, M. M. (2024). Cognition, coping, and adjustment in chronic disease. In T. W. Smith & N. B. Anderson (Eds.), *APA Handbook of Health Psychology* (Vol. 1: Foundations and Context of Health Psychology, pp. 485-508). American Psychological Association.

Stanton, A. L., Kirk, S. B., Cameron, C. L., & Danoff-Burg, S. (2000). Coping through emotional approach: Scale construction and validation. *Journal of Personality and Social Psychology, 78,* 1150-1169. https://doi.org/10.1037/0022-3514.78.6.1150

Stanton, A. L., Wiley, J. F., Krull, J. L., Crespi, C. M., & Weihs, K. L. (2018). Cancer-related coping processes as predictors of depressive symptoms, trajectories, and episodes. *Journal of Consulting and Clinical Psychology, 86*(10), 820–830. https://doi.org/10.1037/ccp0000328

Sua, Y. S., Jiang, Y., Thompson, D. R., & Wang, W. (2020). Effectiveness of mobile phone-based self-management interventions for medication adherence and change in blood pressure in patients with coronary heart disease: A systematic review and meta-analysis. *European Journal of Cardiovascular Nursing*, *19*(3), 192–200. https://doi.org/10.1177/1474515119895678

Tao, W. W., Tao, X. M., Wang, Y., & Bi, S. H. (2020). Psycho-social and educational interventions for enhancing adherence to dialysis in adults with end-stage renal disease: A meta-analysis. *Journal of Clinical Nursing*, *29*(15-16), 2834–2848. https://doi.org/10.1111/jocn.15301

Theofilou, P., & Panagiotaki, H. (2012). A literature review to investigate the link between psychosocial characteristics and treatment adherence in cancer patients. *Oncology Reviews*, *6*(1), e5. https://doi.org/10.4081/oncol.2012.e5

Toscano, A., Blanchin, M., Bourdon, M., Bonnaud Antignac, A., & Sébille, V. (2020). Longitudinal associations between coping strategies, locus of control and health-related quality of life in patients with breast cancer or melanoma. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation, 29*(5), 1271–1279. https://doi.org/10.1007/s11136-019-02401-8

Traeger, L., Penedo, F. J., Gonzalez, J. S., Dahn, J. R., Lechner, S. C., Schneiderman, N., & Antoni, M. H. (2009). Illness perceptions and emotional well-being in men treated for

localized prostate cancer. *Journal of Psychosomatic Research*, *67*(5), 389–397. https://doi.org/10.1016/j.jpsychores.2009.03.013

Tsai, J., Huang, M., Rosenheck, R. A., & Wilkinson, S. (2020). A randomized controlled trial of video psychoeducation for electroconvulsive therapy in the United States. *Psychiatric Services (Washington, D.C.)*, *71*(6), 562–569. https://doi.org/10.1176/appi.ps.201900448

Vickerstaff, V., Ambler, G., King, M., Nazareth, I., & Omar, R. Z. (2015). Are multiple primary outcomes analysed appropriately in randomised controlled trials? A review. *Contemporary clinical trials*, *45*(Pt A), 8–12. https://doi.org/10.1016/j.cct.2015.07.016

Wang, Y., Lin, Y., Chen, J., Wang, C., Hu, R., & Wu, Y. (2020). Effects of internet-based psycho-educational interventions on mental health and quality of life among cancer patients: A systematic review and meta-analysis. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*, *28*(6), 2541–2552. https://doi.org/10.1007/s00520-020-05383-3

Ward, S., Donovan, H., Gunnarsdottir, S., Serlin, R. C., Shapiro, G. R., & Hughes, S. (2008). A randomized trial of a representational intervention to decrease cancer pain (RIDcancerPain). *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *27*(1), 59–67. https://doi.org/10.1037/0278-6133.27.1.59

Weinman, J., Petrie, K. J., Moss-Morris, R., & Horne, R. (1996). The Illness Perception Questionnaire: A new method for assessing the cognitive representation of illness. *Psychology & Health*, *11*(3), 431–445. https://doi.org/10.1080/08870449608400270

Weis, J. B., Gschwendtner, K., Giesler, J. M., Adams, L., & Wirtz, M. A. (2020). Psychoeducational group intervention for breast cancer survivors: A non-randomized multi-center pilot study. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*, *28*(7), 3033–3040. https://doi.org/10.1007/s00520-019-05076-6

Weldam, S., Schuurmans, M. J., Zanen, P., Heijmans, M., Sachs, A., & Lammers, J. J. (2017). The effectiveness of a nurse-led illness perception intervention in COPD patients: A cluster randomised trial in primary care. *ERJ Open Research, 3*(4), 00115-2016. https://doi.org/10.1183/23120541.00115-2016

Wiener, C. H., Cassisi, J. E., Paulson, D., Husson, O., & Gupta, R. A. (2019). Information support, illness perceptions, and distress in survivors of differentiated thyroid cancer. *Journal of Health Psychology*, *24*(9), 1201–1209. https://doi.org/10.1177/1359105317692143

Williamson T. J., Jorge-Miller, A., McCannel, T. A., Beran, T. M., & Stanton, A. L. (2018). Sociodemographic, medical, and psychosocial factors associated with supportive care needs in adults diagnosed with uveal melanoma. *JAMA Ophthalmology*, *136*(4), 356–363. https://doi.org/10.1001/jamaophthalmol.2018.0019

Yan, J., You, L. M., Liu, B. L., Jin, S. Y., Zhou, J. J., Lin, C. X., Li, Q., & Gu, J. (2014). The effect of a telephone follow-up intervention on illness perception and lifestyle after myocardial infarction in China: A randomized controlled trial. *International Journal of Nursing Studies*, *51*(6), 844–855. https://doi.org/10.1016/j.ijnurstu.2013.10.011

Zabora, J., BrintzenhofeSzoc, K., Curbow, B., Hooker, C., & Piantadosi, S. (2001) The prevalence of psychological distress by cancer site. *Psycho-Oncology, 10*, 19-28. https://doi.org/10.1002/1099-1611(200101/02)10:1<19::AID-PON501>3.0.CO;2-6

Zhang, Z., Yang, L., Xie, D., Wang, Y., Bi, L., Zhang, T., Wang, D., Shi, H., Li, G., & Yu, D. (2020). Illness perceptions are a potential predictor of psychological distress in patients with non-muscle-invasive bladder cancer: A 12-month prospective, longitudinal, observational study. *Psychology, Health & Medicine*, *25*(8), 969–979. https://doi.org/10.1080/13548506.2019.1707242