Pre-Transplant Vascular Composite Allograft Psychosocial Assessment

Multidisciplinary Approach and Procedures

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Disclosures

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NIH funding as PI and Co-I

- NHLBI: R01 HL148327; R01 HL148424; R01 HL130237; R01 HL109219; R01 HL122836; R01 HL080664; R01 HL065503; R01 HL091920
- NIA: R61 AG080615-01; R01 AG066719; R38 AG065762; P30 AG072958; UH3 AG056925; R01 AG042599
- NINR: R01 NR017801; R01 NR020470-01A1

Foundation: Cystic Fibrosis; Boomer Esiason; Foundation of Hope

Industry: Alexion Pharmaceuticals (Acceptance and Commitment Pilot Trial)

Outline

1. Psychosocial Evaluation Principles
   - Timing and urgency of assessment
   - What factors matter? Distal vs. proximal risks
   - Modalities of assessment

2. Importance of Multidisciplinary Context

3. Assessment Domains
   - Behavioral Adherence
   - Substance Use
   - Personality
   - Mood / coping
   - Social Support
   - Cognitive Function

4. Questions / Discussion

Linda Cendales, MD

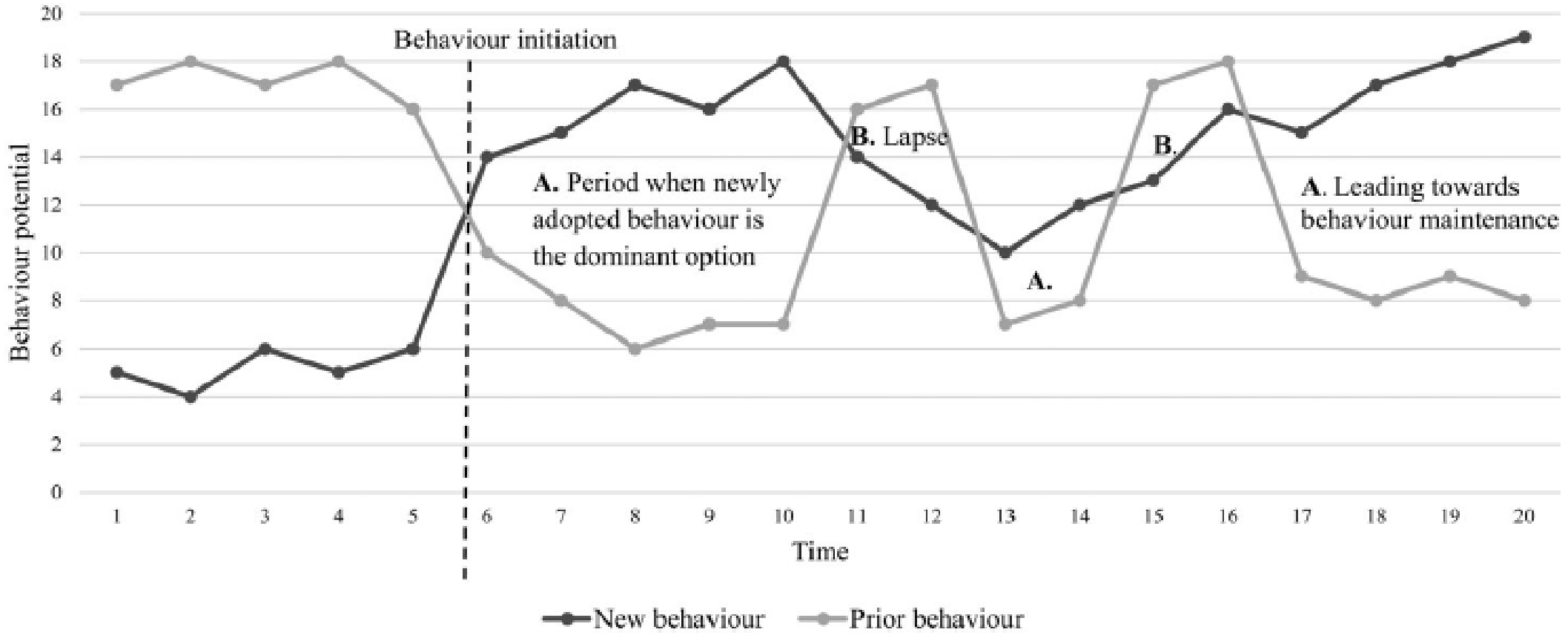
Ben Hoffman, PhD

Virginia O'Hayer, PhD

Psychosocial Evaluation Principles: Timing

- 'Timing is everything'
  - Less urgency for decisions due to mortality risk (in contrast to SOT)
  - Longitudinal assessment often clarifies diagnostic ambiguities
    - Reassessment after one-year often beneficial (Kumnig & Jowsey-Gregoire, 2016)
    - Target behavioral assessment domains often vary across context and time
      - Adherence to a complex medical regimen
      - Coping with transplant-related challenges
      - Durability of social support
      - Personality characteristics -> behavioral adherence

Behavioral Variability



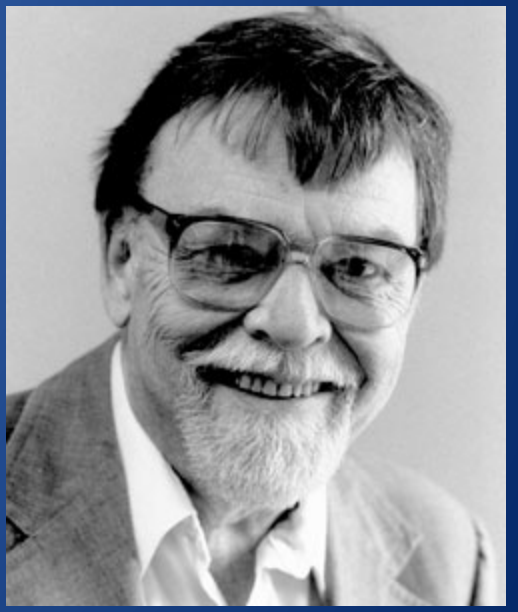
Kwasnicka et al, 2016

Psychosocial Evaluation Principles:
Variable Assessment Modalities

- ‘Not everything that can be counted counts, and not everything that counts can be counted’
  - Psychometric Self-Report: Mood, Anxiety, Distress
    - PHQ-9, GAD-7, Perceived Stress Scale, etc.
  - Clinical Interview: Personality, Clinical Diagnoses, Behavioral Patterns
  - Clinician Assessment: Cognitive Functioning
  - Multi-marker + Clinician Assessment: Adherence
    - Integration of multiple provider ratings most predictive
    - Multiple ‘soft’ / ‘fuzzy’ markers available for supplementation
      - e.g. refills, missed clinic visits, lab values, rehab engagement

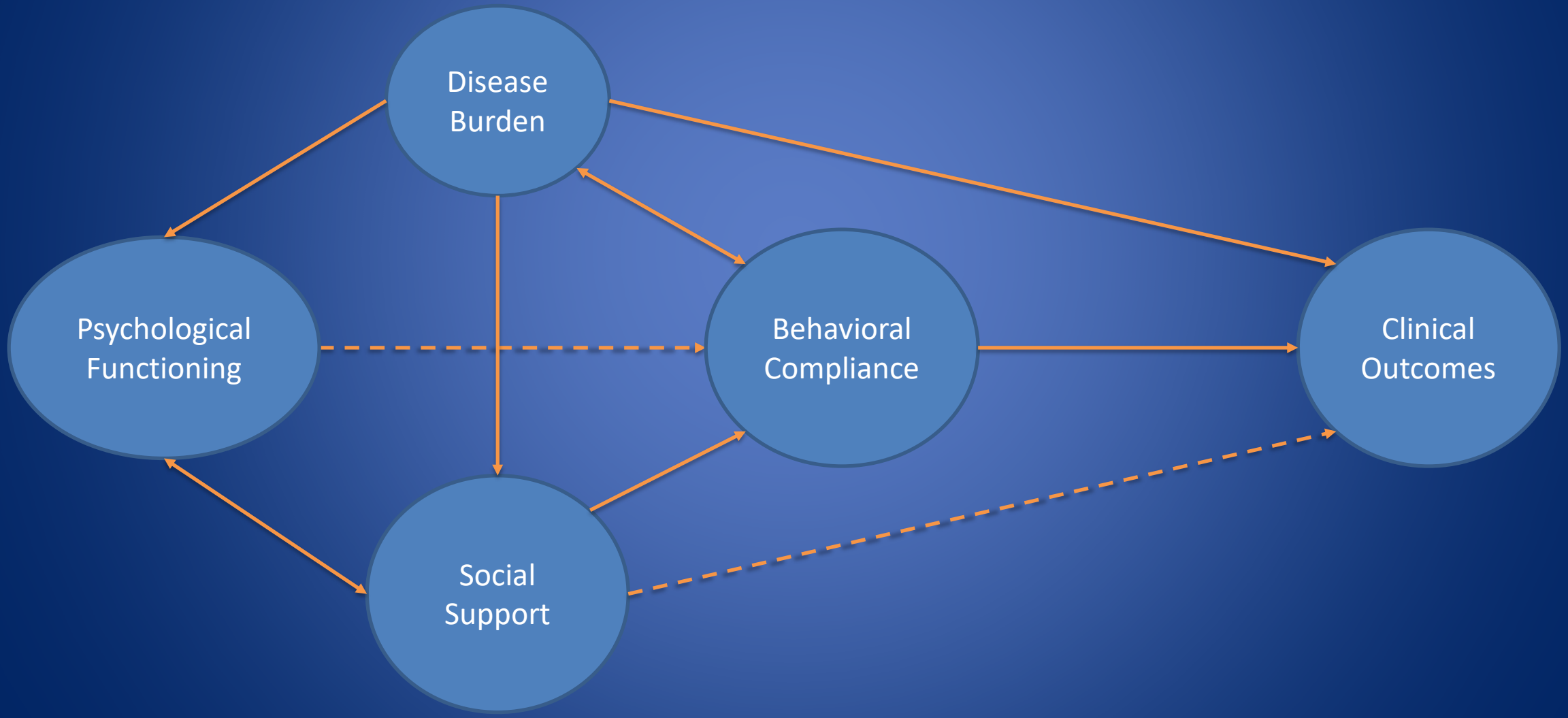
Psychosocial Evaluation Principles:
Variable Assessment Modalities

- ‘Don’t tell me what you value, show me your budget’
  - **Adherence** is the most potent predictor of outcomes
  - Psychosocial risk -> risk of possible non-adherence
  - Multiple distal risk factors for poor outcomes
    - Depressive symptoms
    - Physical activity
    - Cognitive impairment
    - Low social support
  - Resilience -> predicted by past behavior?



Paul Meehl, PhD

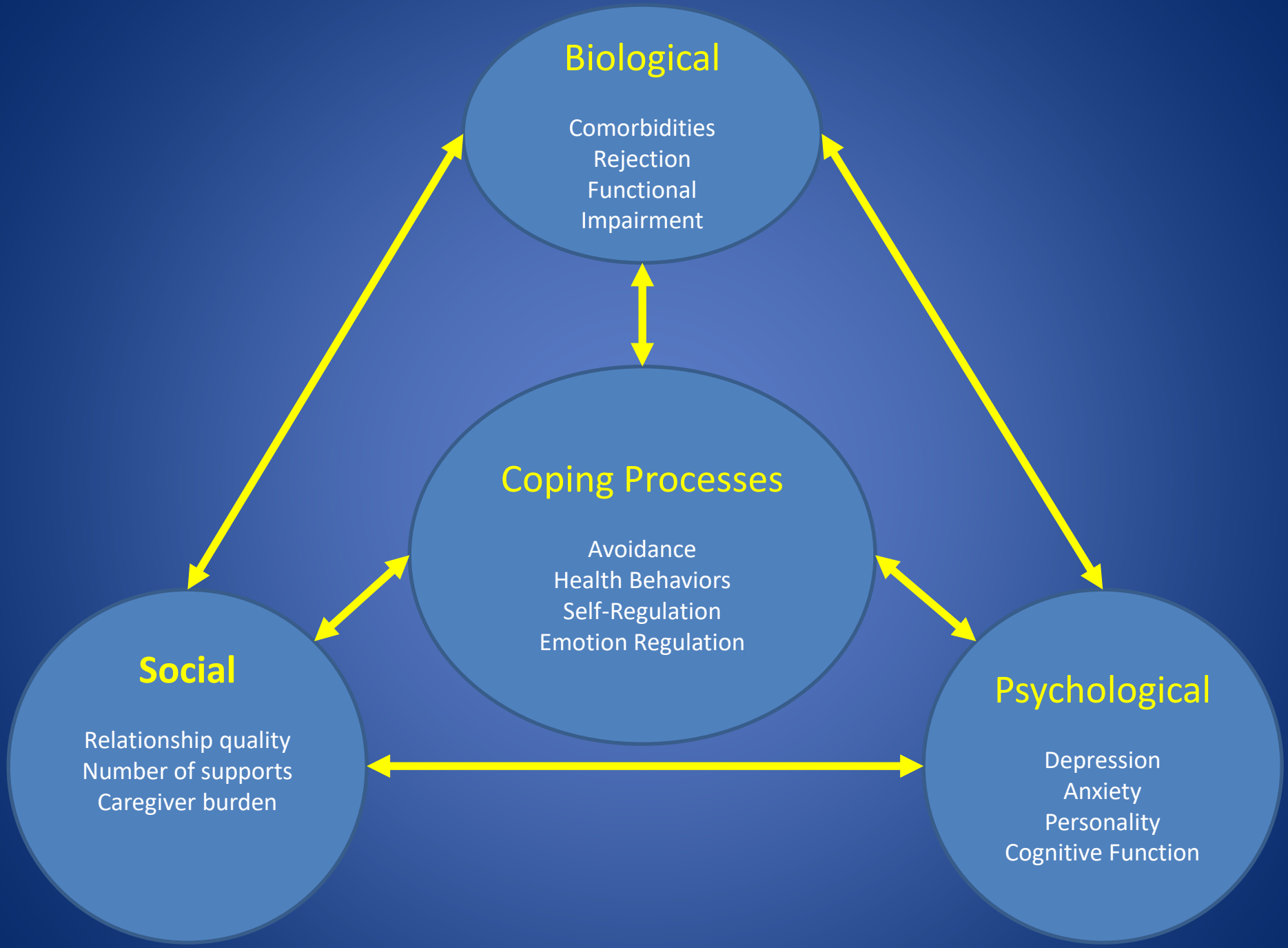
Conceptual Example:
Psychosocial Impact on Outcomes



Multidisciplinary Considerations

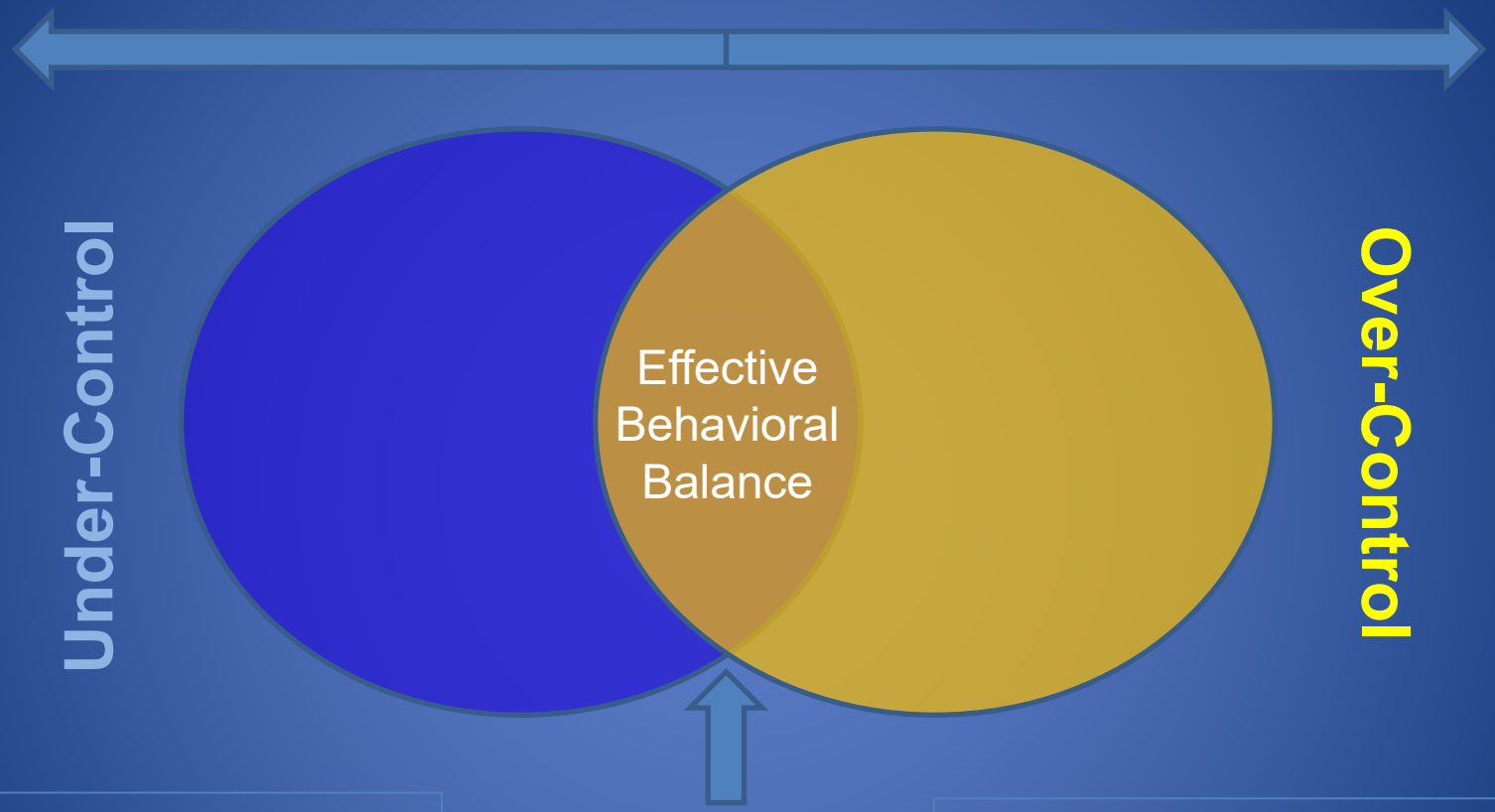
- Blatant non-adherence and substance abuse
  - Salient and often identified by primary team
  - May require multiple clinical encounters and context to fully ascertain relevance and clinical impact
  - ‘Subclinical’ non-adherence much more common

- Behavioral compliance is THE critical determinant of success
  - Multidetermined (e.g. depression, personality, cognition)
  - Subtle to assess and often unmasked under distress


Biological
Comorbidities
Rejection
Functional
Impairment
Coping Processes
Avoidance
Health Behaviors
Self-Regulation
Emotion Regulation
Social
Relationship quality
Number of supports
Caregiver burden
Psychological
Depression
Anxiety
Personality
Cognitive Function

Behavioral / Motivational Approaches

Cognitive / Acceptance Approaches



Lower inhibition, poor vigilance, and disorganization. Behavioral control requires increased motivation, sensitivity to risk, or external support.

Medical Stressors

Higher inhibition, organization, and vigilance. Lower openness and experiential acceptance. Behavioral modification requires cognitive reappraisal and acceptance.

Smith et al, 2023

Demographic and Clinical History

Assessment Characteristic	Schedule	Description
Demographic Variables	Pre-Transplant	Age, gender, ethnicity, marital status, living circumstances, socioeconomic barriers.
Clinical Characteristics	Pre-Transplant	Etiology of illness (e.g. congenital), duration and complexity of illness, trajectory of recovery (if acquired injury), influence of injury on psychosocial / developmental trajectory, compensatory coping strategies.
Education / Occupational Background	Pre-Transplant	Educational attainment, job complexity, premorbid intellectual abilities, ability to maintain committed professional relationships, diversity and frequency of employments, impact on medical literacy and/or familiarity with medical setting.
Behavioral / Medication Compliance	Pre- / Post-Transplant	Past engagement with medical providers, ability to build trusting / stable relationships with treatment team, prior evidence of medication non-compliance, prior instances of follow-up loss, blood sugar (non-medical) variability, metabolic risk factor control.
Substance Use History	Pre-Transplant	Active substance use and/or abuse, substance type, prior history of treatment for substance abuse, engagement with prior substance treatment (e.g. relapse prevention), evidence of role impairment, evidence of protective factors mitigating risk (e.g. participation in AA), evidence of insight re: prior substance abuse.
Social Support	Pre- / Post-Transplant	Availability and engagement of social support members, patient-caregiver relationship (e.g. spouse, family member, friend), duration of relationship with caregiver, living circumstances (e.g. lives with patient), familiarity with medical setting, past experience with chronic medical conditions, caregiver medical literacy.

Psychometric Variables: Personality

Assessment Measure (Schedule)	Description and Psychometric Properties
Personality Assessment Inventory (Pre-transplant)	Self-administered inventory of adult personality function that assesses multiple clinically-relevant domains, including anxiety, depression, somatic concerns, paranoia, borderline and antisocial features, and substance abuse. Provides additional insight regarding interpersonal style and social facilitation, as well as stability of self-concept. The PAI consists of 344 items with 22 non-overlapping scales, including 11 clinical scales. Normative t-scores are provided for each scale to aid interpretation.
NEO-Personality Inventory (Pre-transplant)	Assesses personality traits with transdiagnostic importance, including neuroticism, extraversion, openness to experience, conscientiousness, and agreeableness. Provides additional insight regarding intrinsic motivation and flexibility of emotional response patterns. The NEI-PI consists of 240 items and provides normative scores within the 5 primary domains and 30 personality facets using normative t-scores.
Direct Provider Observation	Personality is a critical component of transplant success and may be assessed differentially by different providers. Discrepancies between provider 'level' can be discriminating and a red flag for narcissism, anti-social tendencies, and manipulation.

Psychometric Variables: Mood and Anxiety

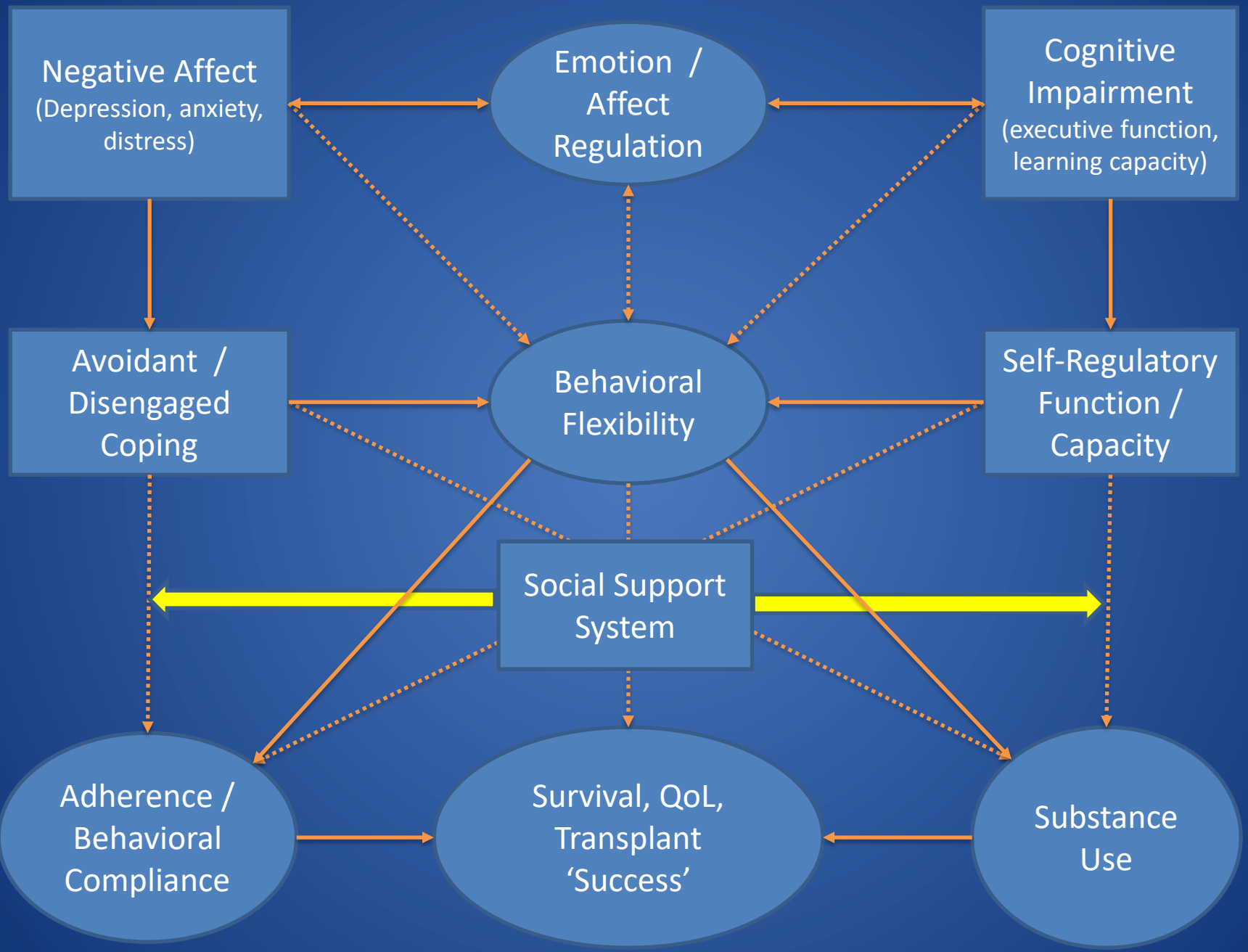
Assessment Measure (Schedule)	Description and Psychometric Properties
Clinician-Administered PTSD Scale (Pre-transplant)	Clinician-administered PTSD scale (CAPS-5) is a 30-item questionnaire assessing PTSD symptomatology using based on DSM-5 criteria experienced over the past two weeks. In the Duke VCA program, a lifetime version of CAPS-5 is also obtained. For both two-week and lifetime assessments, higher scores reflect greater symptomatology.
Life Events Checklist (Pre-transplant)	Life Event Checklist (LEC-5) is a 17-item self-report screening measure assessing exposure to traumatic events over the course of the individuals' lifetime. Higher scores reflect greater exposure to traumatic events.
Beck Depression Inventory-II (Pre-transplant / Post-transplant)	The BDI-II is a 21-item self-report measure assessing the presence and severity of depressive symptoms, including cognitive, somatic, and affective symptomatology. Total scores range from 0 to 63, with higher scores reflecting greater depressive symptoms (Minimal: 0-13; Mild: 14-19; Moderate: 20-28; Severe: 29-63).
Beck Anxiety Inventory (Pre-transplant / Post-transplant)	The BAI is a 21-item self-report inventory assessing the severity of anxious symptoms, including physical, cognitive, and emotional symptomatology. Total scores range from 0 to 63, with higher scores reflecting greater symptoms of anxiety (Minimal: 0-7; Mild: 8-15; Moderate: 16-25; Severe: 26-63).

Psychometric Variables: Social Support

Assessment Measure (Schedule)	Description and Psychometric Properties
Norbeck Social Support Questionnaire (Pre-transplant)	The NSSQ is a network-based social support inventory designed to assess overall perception of how supported one feels, including a) how many supportive network members they have and b) how much affection, affirmation, and aid each network member provides. Scores range from 0 to 66, with higher scores reflecting greater social support levels.
Direct Observation and Engagement	Caregiver direct engagement with transplant process very useful in prognosticating commitment. Difficult to quantify, clinically salient, may be differentially assessed across providers. Multidisiplinary input on caregivers' engagement is critical to gaining an accurate assessment.

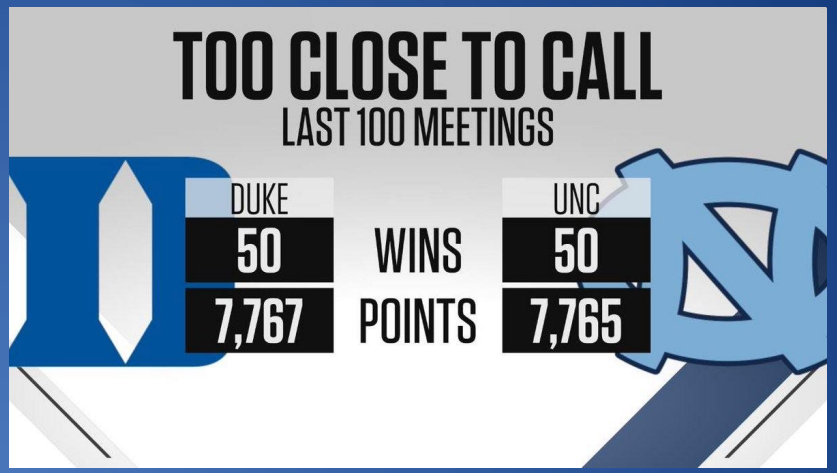
Cognitive Variables

Cognitive Test Measure (Schedule)	Description
Wide Range Achievement Test-4, Reading Subtest (Pre-transplant)	The WRAT-4 Reading subtest provides an efficient and brief assessment of premorbid reading ability, as well as associating closely with estimates of premorbid IQ. The WRAT-4 is typically interpreted using standard scores, ranging from 55 to 145 with a mean of 100 and an SD of 15 (similar to intelligence quotient scores). Greater scores reflect higher estimated premorbid reading levels.
Wechsler Abbreviated Scale of Intelligence (Pre-transplant)	The WASI assesses intellectual function across multiple domains, including verbal and non-verbal intelligence; specific subtests include Block Design, Vocabulary, Matrix Reasoning, and Similarities. Summary scores provided from the WASI include t-scores representing estimated Verbal Comprehension Index (VCI), Perceptual Reasoning Index (PRI), and Full-Scale Intelligence Quotient (FSIQ).
Repeatable Battery for the Assessment of Neuropsychological Status (Pre-transplant)	The RBANS assesses neuropsychological function across multiple domains, including attention, language, memory, and visuospatial / construction; includes additional subtests not included in the WASI that index confrontation naming, semantic and phonemic fluency. The RBANS has been used in transplant samples to assess cognitive change.(48) The RBANS provides normative score estimates using standard scores (mean = 100, SD = 15) within multiple domains, including Immediate Memory, Visuospatial / Construction, Language, Attention, Delayed Memory, and a Total Scale score. Standard scores ranging from 90-109 are generally considered to be within normal limits.


Negative Affect
(Depression, anxiety, distress)
Emotion / Affect Regulation
Cognitive Impairment
(executive function, learning capacity)
Avoidant / Disengaged Coping
Behavioral Flexibility
Self-Regulatory Function / Capacity
Social Support System
Adherence / Behavioral Compliance
Survival, QoL, Transplant 'Success'
Substance Use

Thank You

- Linda Cendales, MD
- Scott Palmer, MD
- Laurie Snyder, MD
- Courtney Frankel, PT, MS
- Jon Singer, MD
- Benson Hoffman, PhD
- Virginia O'Hayer, PhD
- Krista Ingle, PhD
- James Blumenthal, PhD
- Michael Babyak, PhD
- Gary Koch, PhD
- Stephanie Mabe, MS



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Additional Slides

INSPIRE F/U

- 6-month post-transplant
- 18-month depression
  - BDI-II: HR = 1.61 (1.15, 2.26)

American Journal of Transplantation 2015; XX: 1–7
Wiley Periodicals Inc.

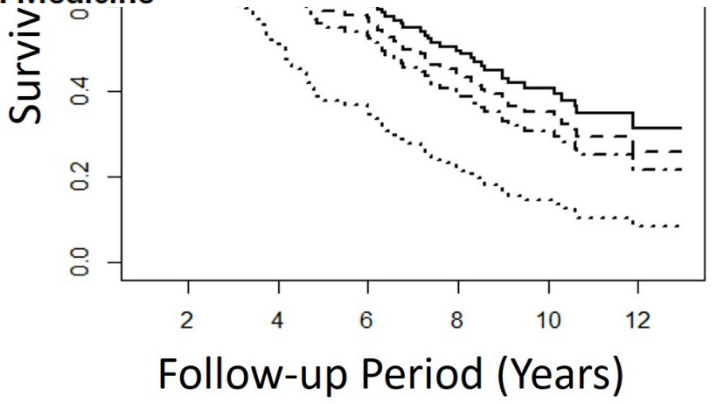
doi: 10.1111/ajt.13447

Psychosocial Predictors of Mortality Following Lung Transplantation

P. J. Smith[1,*], J. A. Blumenthal[1], E. P. Trulock[2], K. E. Freedland[2], R. M. Carney[2], R. D. Davis[3], B. M. Hoffman[1] and S. M. Palmer[4]

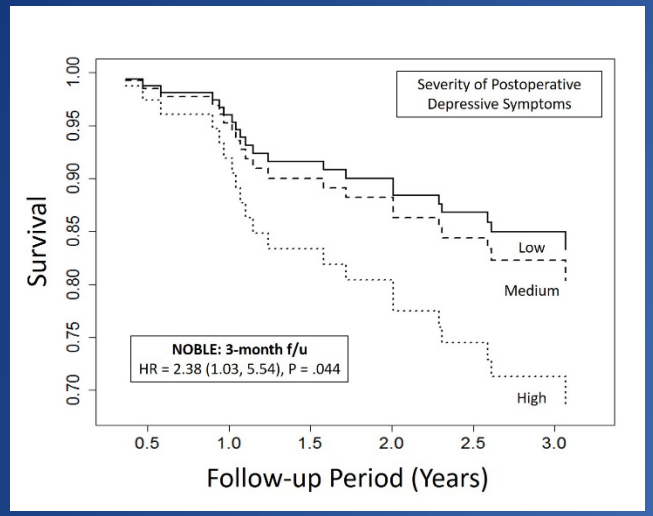
[1]Department of Psychiatry and Behavioral Sciences,

Questionnaire; HR, hazard ratio; INSPIRE, Investigational Study of Psychological Intervention in Recipients of Lung Transplant; LAS, lung allocation score; Q, quartile; STAI, Spielberger State–Trait Anxiety Inventory; UMC, usual medical care; WUSM, Washington University School of Medicine

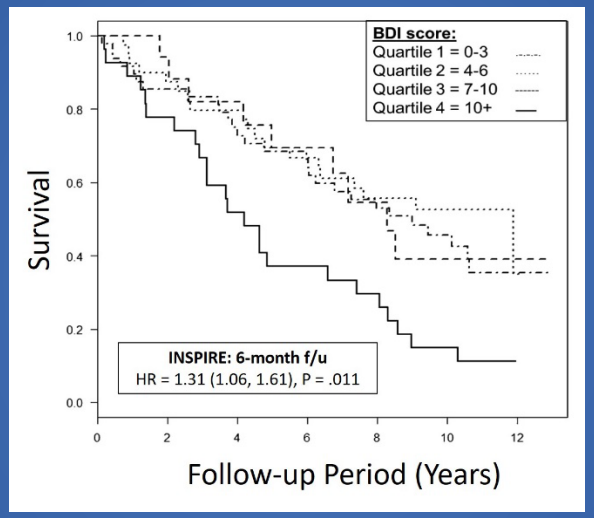


Smith et al, 2016; Smith et al, 2014

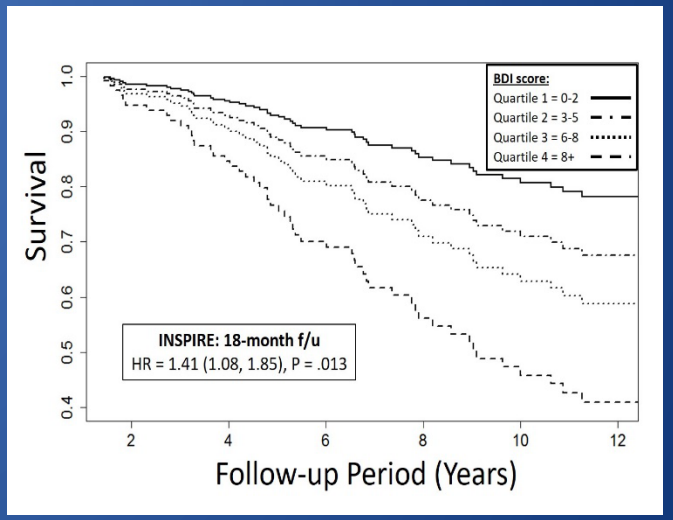
Depressive Symptoms and Clinical Events



3-months post



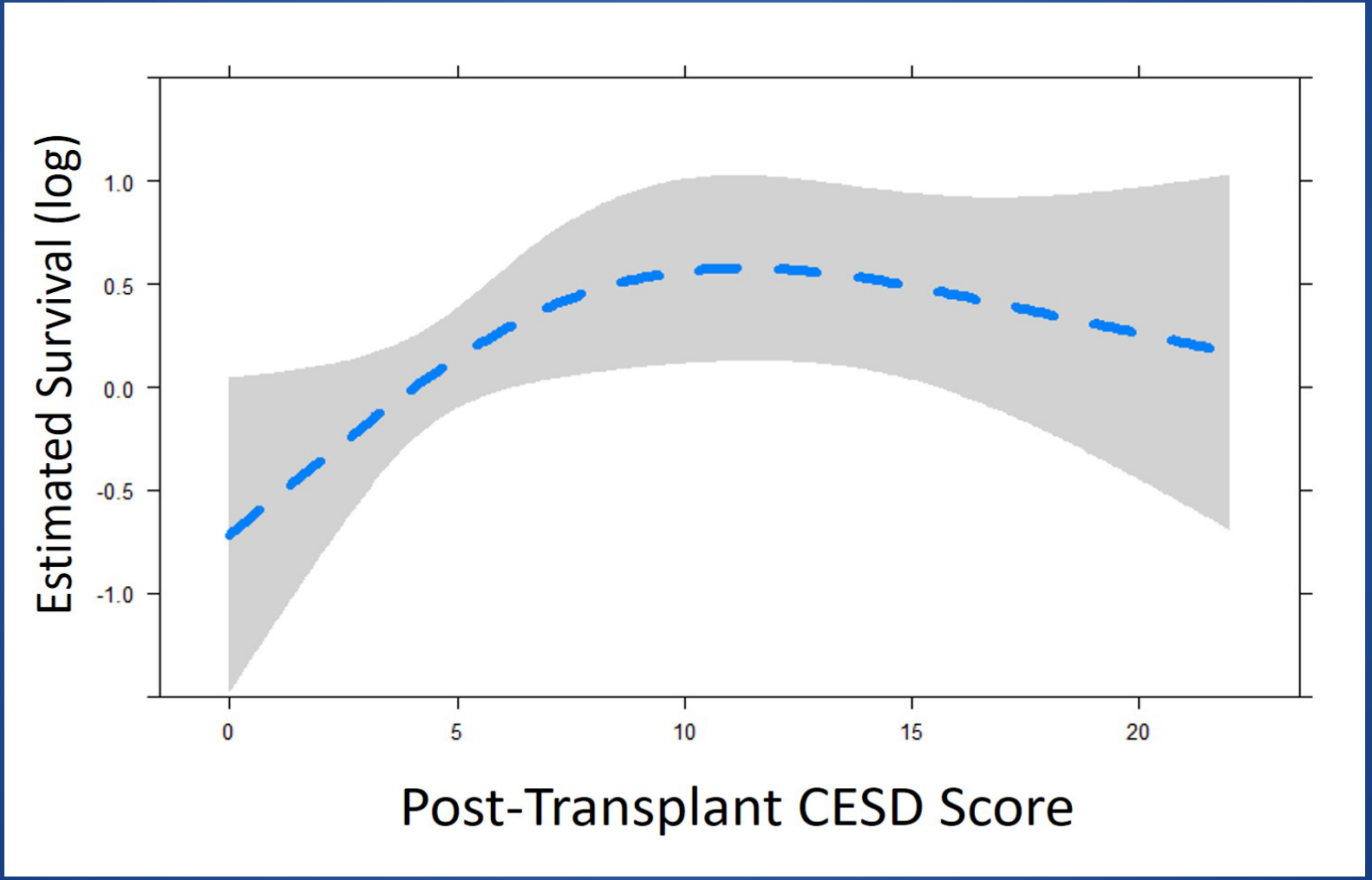
6-months post



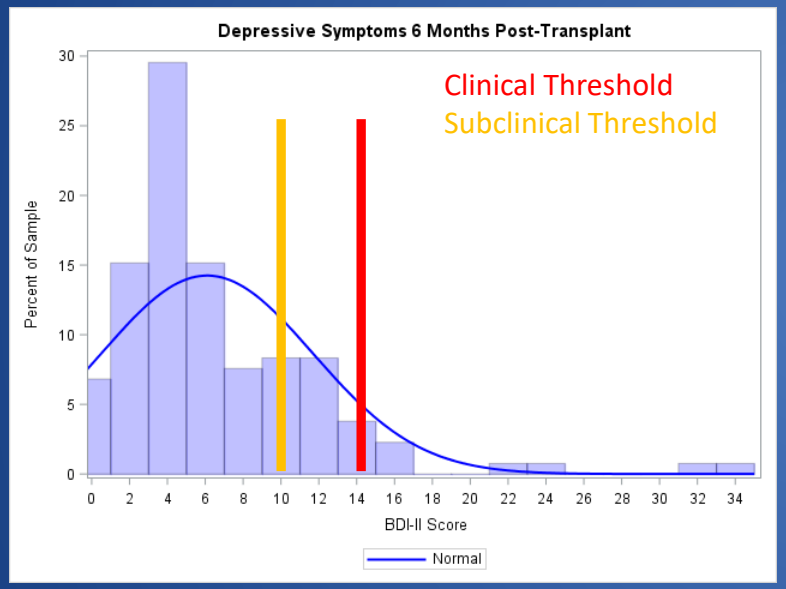
18-months post

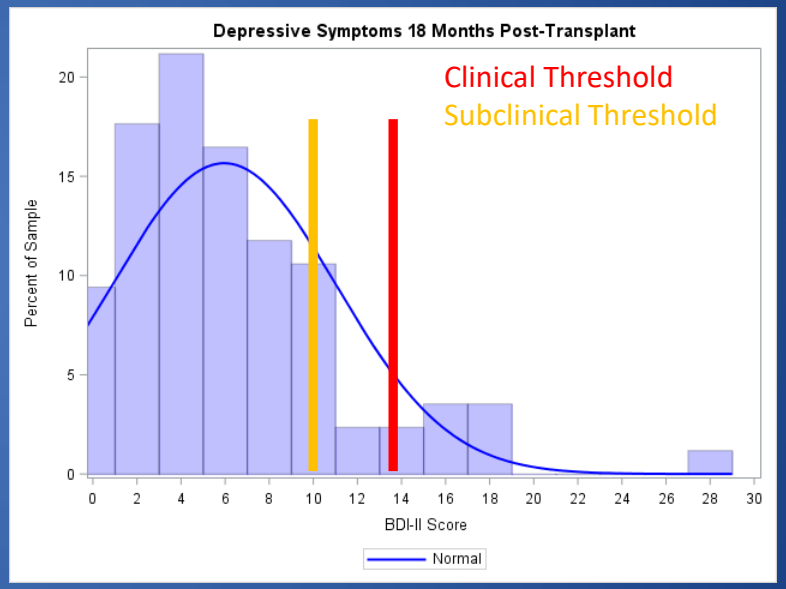
(Smith et al, 2014; Smith et al, 2015; Smith et al, 2017)

Subclinical Depressive Symptoms



Context for Depressive Symptoms



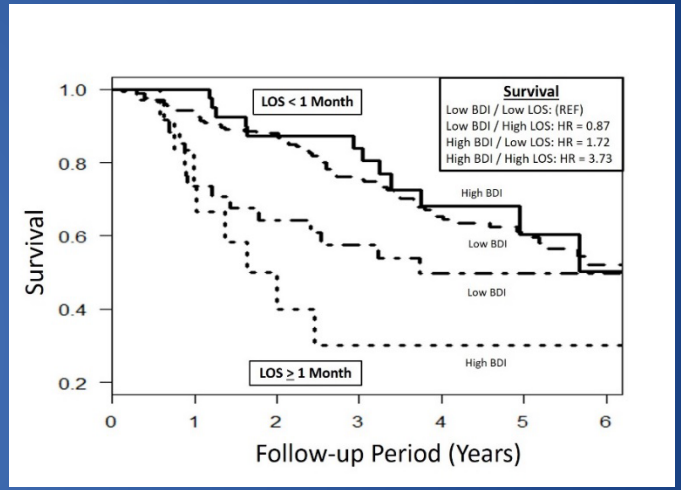


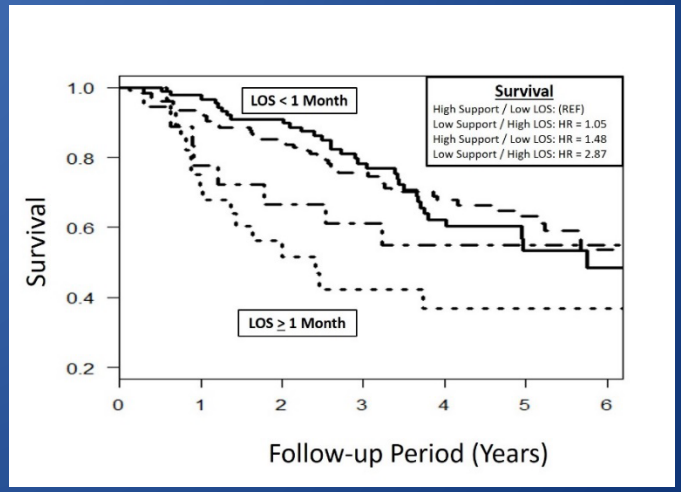
6-months post

18-months post

Depression, Social Support, and Survival

- Median f/u 5.7 years (range 0.1, 7.4)
- 113 deaths (41%)
  - 31 Pulmonary (27%)
  - 25 Unknown (22%)
  - 17 Infection (15%)
  - 14 Graft failure (12%)
  - 10 Malignancy (9%)
  - 9 Multi-organ failure (8%)
  - 6 Cardiovascular / cerebrovascular (8%)
  - 1 Other (1%)



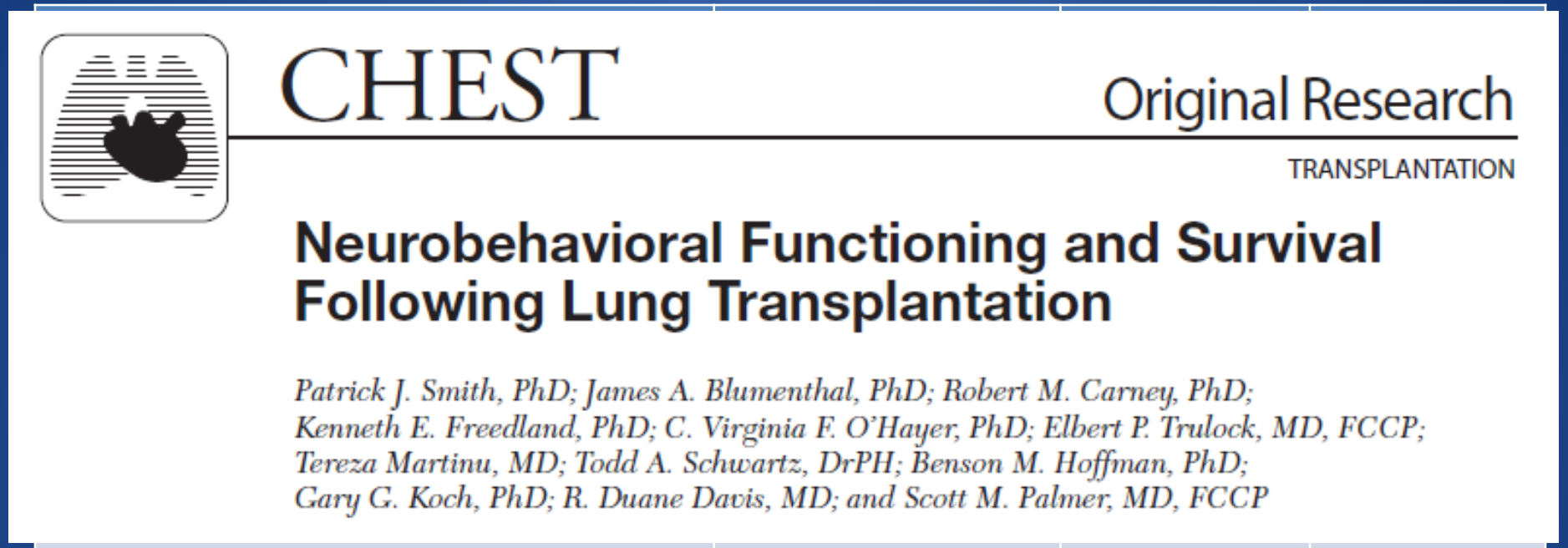


- High depression or low social support
  - 3-fold increase in mortality with longer LOS

Smith et al, 2018

Executive Function Findings

(n = 86; 48 deaths)



CHEST

Original Research

TRANSPLANTATION

Neurobehavioral Functioning and Survival Following Lung Transplantation

Patrick J. Smith, PhD; James A. Blumenthal, PhD; Robert M. Carney, PhD; Kenneth E. Freedland, PhD; C. Virginia F. O'Hayer, PhD; Elbert P. Trulock, MD, FCCP; Tereza Martinu, MD; Todd A. Schwartz, DrPH; Benson M. Hoffman, PhD; Gary G. Koch, PhD; R. Duane Davis, MD; and Scott M. Palmer, MD, FCCP

6-minute Walk Distance, 500 feet	1.27	0.89, 1.82	.196
FEV-1, 10% of normal	1.10	0.88, 1.38	.401
Education, years	1.00	0.88, 1.13	.963
Framingham Stroke Risk Profile	1.10	0.97, 1.23	.133
Executive Function	0.42	0.19, 0.91	.012

Individual Predictors

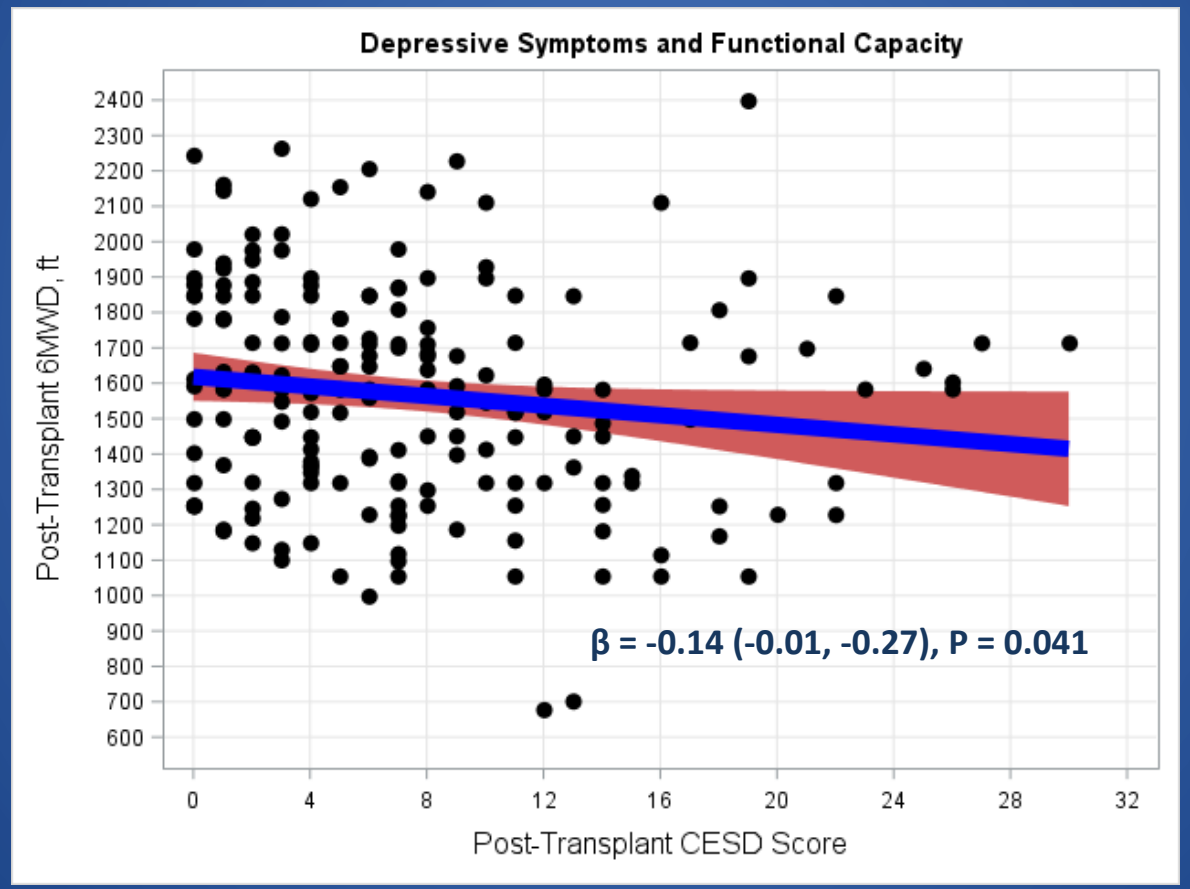
Predictor	Hazard Ratio (95% CI)
Executive Function	
Trail Making Part B	1.29 (0.61, 2.74)
Trail Making Part A	1.22 (0.93, 1.60)
Digit Symbol	0.70 (0.38, 1.30)
Ruff 2 & 7	0.72 (0.48, 1.08)
Stroop Word	0.52 (0.29, 0.95)
Stroop Color	0.50 (0.31, 0.82)
Stroop Interference	0.39 (0.20, 0.75)
Verbal Memory	
Digit Span Backwards	0.93 (0.61, 1.42)
Digit Span Forwards	0.47 (0.25, 0.89)
Verbal Paired Associates	0.91 (0.58, 1.42)
Logical Memory	0.88 (0.55, 1.40)

Results are from separate cox proportional hazards models. Parameters are scaled by IQR (75^{th} vs 25^{th} %)

INSPIRE F/U

Predictor	Hazard ratio	95% CI	p-value
Forced expiratory volume in 1 s	0.72	0.53, 0.99	0.041
CF vs. COPD	0.59	0.28, 1.25	0.170
IPF vs. COPD	1.31	0.71, 2.39	0.387
Other vs. COPD	0.81	0.38, 1.73	0.587
Rejection episodes in first 6 months, n	1.10	0.83, 1.45	0.501
Transplant type, bilateral vs. unilateral	0.76	0.25, 2.31	0.624
INSPIRE treatment group, CBT vs. UMC	0.71	0.44, 1.15	0.163
Education level	0.90	0.75, 1.09	0.285
Gross family income	1.07	0.91, 1.26	0.389
Perceived social support	1.14	0.83, 1.56	0.421
Negative affect	1.55	1.08, 2.22	0.017

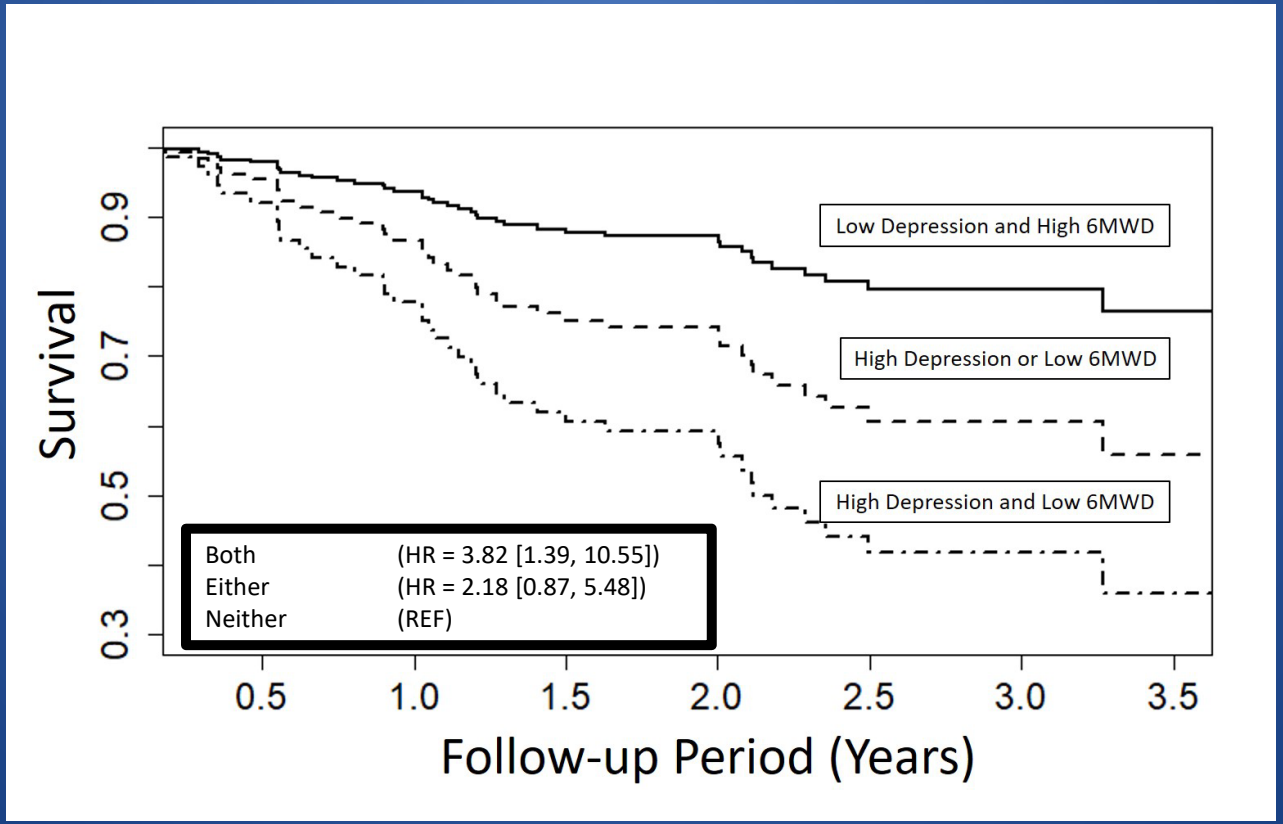
Depression and 6MWD



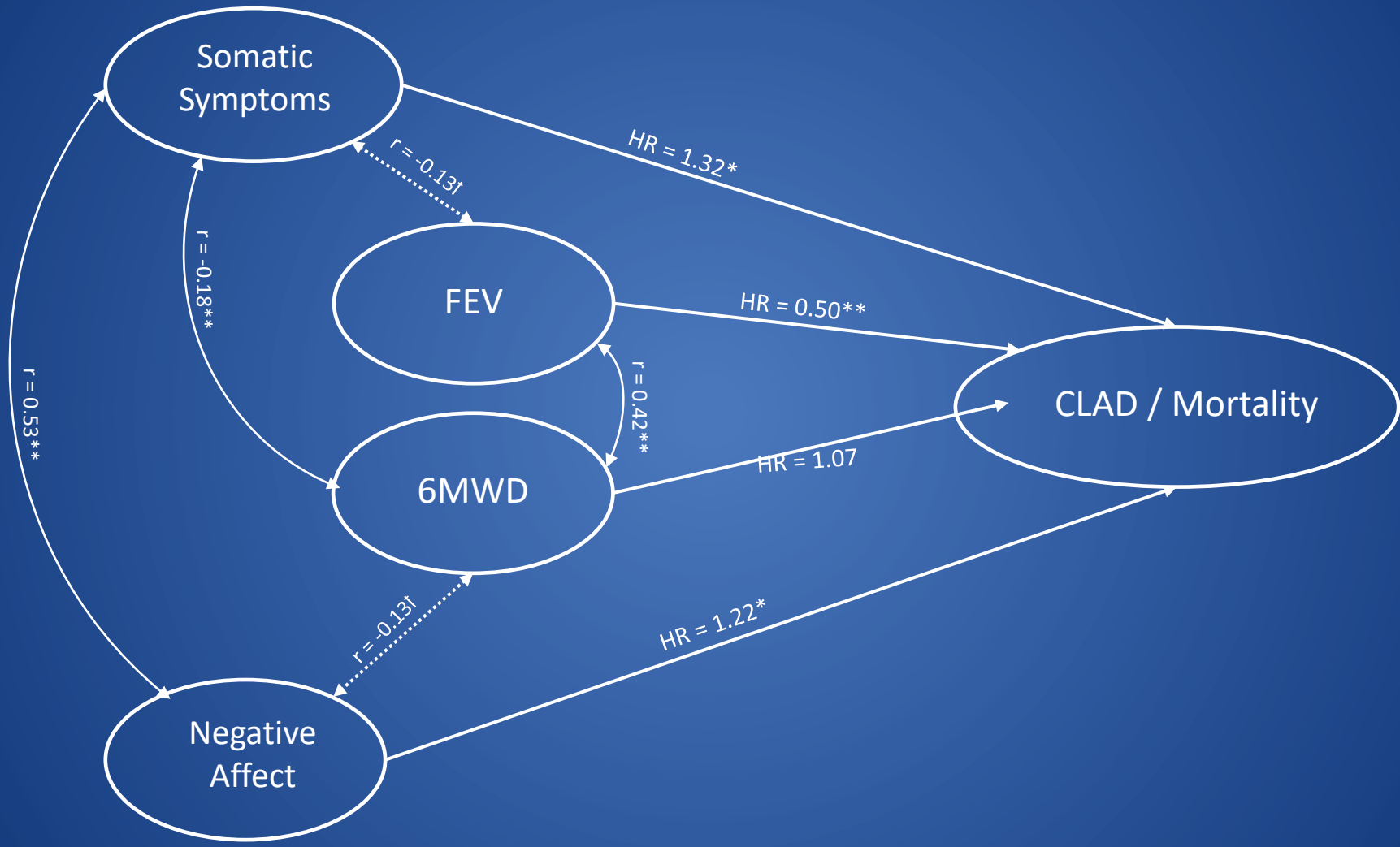
Depressive symptoms and 6MWD. Controlling for age at the time of transplant, greater depressive symptoms were associated with lower exercise capacity (β = -0.14 [-0.01, -0.27], P = 0.041).

Final Survival Model

Predictor	Hazard Ratio (95% CI)	P-value
Age (22)	1.37 (0.89, 2.14)	0.161
Post-Rehab 6MWD (420)	0.58 (0.38, 0.90)	0.021
Post-Rehab CESD (8)	1.39 (1.05, 1.84)	0.021



CLAD / Mortality Outcomes



Post-Transplant Cognition

- Executive Function Findings
  - 49 participants (31 deaths)
  - 13-year follow-up (median = 6.4 [IQR = 7.2])

Predictor	Hazard Ratio	95% CI	P-value
FEV_1 at 6-months	0.39	0.04, 39.32	.692
CF vs. COPD	0.41	0.10, 1.63	.207
IPF vs. COPD	0.93	0.38, 2.27	.876
Other vs. COPD	0.42	0.13, 1.36	.417
Education, years	0.90	0.75, 1.08	.263
Rejection Episodes, #	0.62	0.34, 1.11	.107
Executive Function	0.60	0.37, 0.97	.035