

# Mental Health Conditions and Sleep Fragmentation: A Variability Investigation

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## INTRO

- Comprehensive influence of chronic mental health conditions on sleep patterns during the period of emerging adulthood is insufficiently explored
- Specific ramifications of mental health conditions on the sleep fragmentation index are ambiguous
- Higher fragmentation index indicates increased interruptions in sleep patterns, potentially leading to diminished overall sleep quality
- This study aims to:
  - Utilize indicators of chronic anxiety and depression to examine the variability in an objective measure of sleep fragmentation index

## METHODS

- Utilized a location-scale model to analyze variations in sleep fragmentation index due to reported chronic anxiety and depression
  - Within-person and between-person variations were examined
- Approach allowed examination of individual differences in anxiety and depression:
  - Influence on average level (location) and variability (scale) of sleep fragmentation index
- Aimed to understand how these chronic mental health conditions impact sleep patterns at both individual and group levels
- Individual chronic health conditions were examined, but because of sparse cells only anxiety and depression were used as predictors
- Anxiety/depression was dummy coded
- Data Collection: July 2020 - July 2021

## PARTICIPANTS

- N = 265, Mean Age = 20
- 69.1% Female, 28.7% Male, 0.4% Other
- 53.2% White, 6.4% Black, 22.6% Asian American
- 23.4% Hispanic, 76.6% Non-Hispanic
- 0.8% Queer

## MATERIALS

- Participants indicated diagnosis of chronic mental and physical health conditions by self report
- Collected actigraph data from participants
- Computed sleep fragmentation for each participant
- Sleep fragmentation determined by:
  - Summing minutes of sleep with movement detected
  - Expressed as a percentage of total sleep time involving both movement and immobility

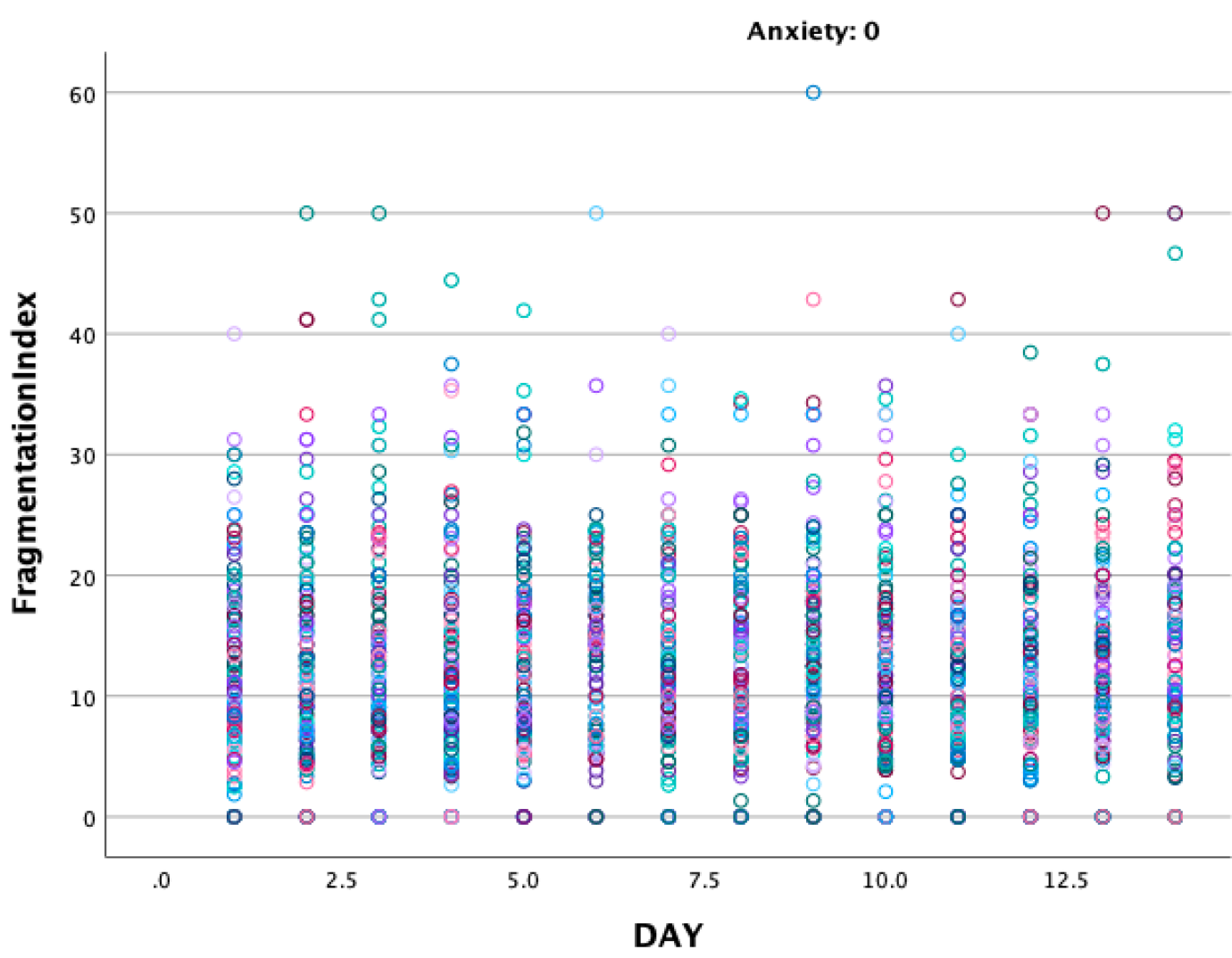
## PROCEDURES

- Participants completed a health information questionnaire in July 2020
- Actigraph data was collected continuously for 14 consecutive days

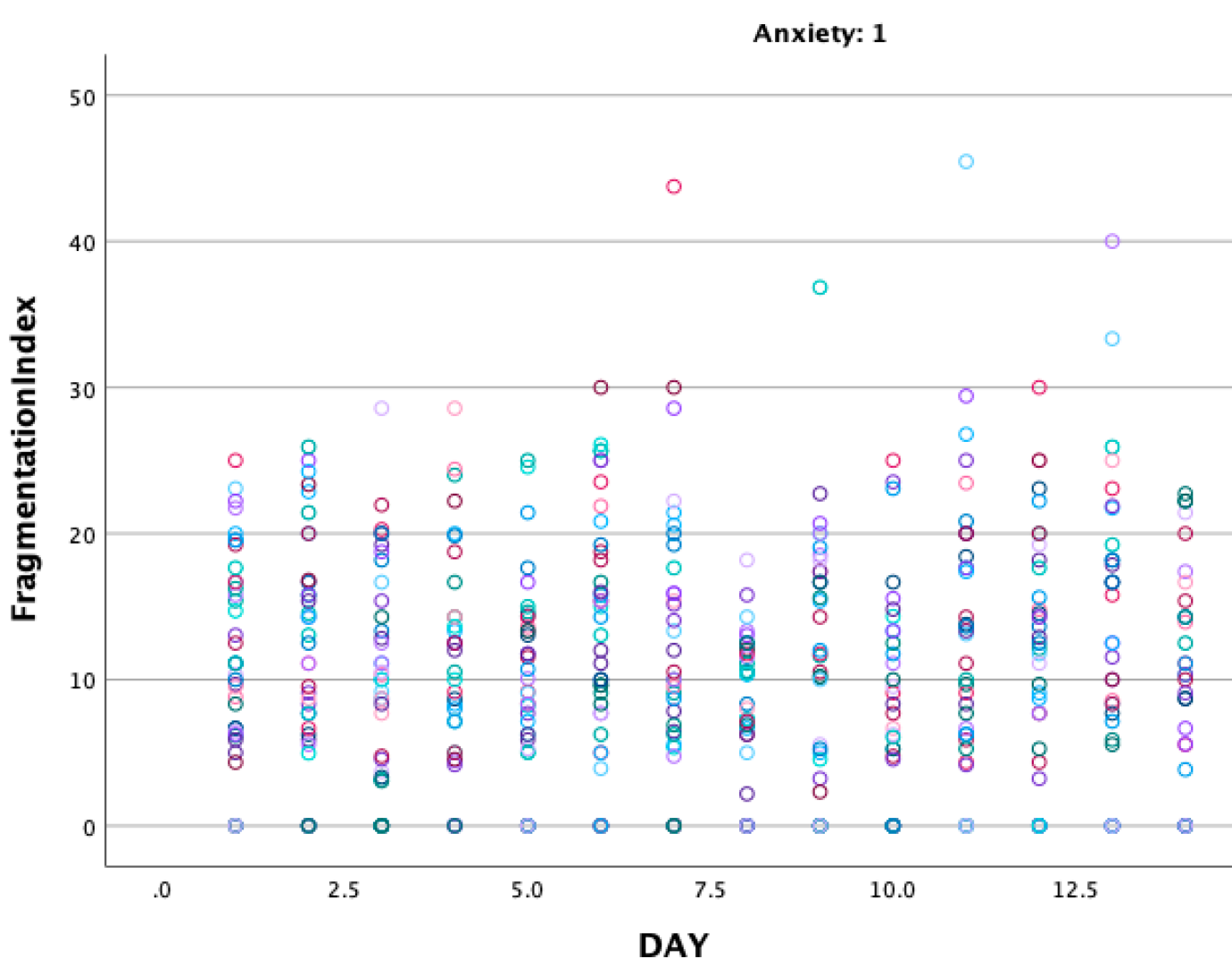
## Mental health conditions differentially influences variability of sleep fragmentation index, significant for within person variability, but not between person or average level.

- Anxiety and depression were individually used to examine between person, within person, and average level differences of sleep fragmentation index measured over 14 days
  - Anxiety predicts within person variability (See Table 1;  $\tau_1 = -0.2663$ )
  - Depression predicts predicts within person variability (See Table 2;  $\tau_1 = -0.1943$ )
  - Anxiety does not predict between person variability (See Table 1;  $\alpha_1$ )
  - Depression does not predict between person variability (See Table 2;  $\alpha_1$ )
  - Anxiety does not predict mean level difference of fragmentation index in those with and without chronic health conditions (See Table 1;  $\beta_1$ )
  - Depression does not predict mean level difference of fragmentation index in those with and without chronic health conditions (See Table 2;  $\beta_1$ )

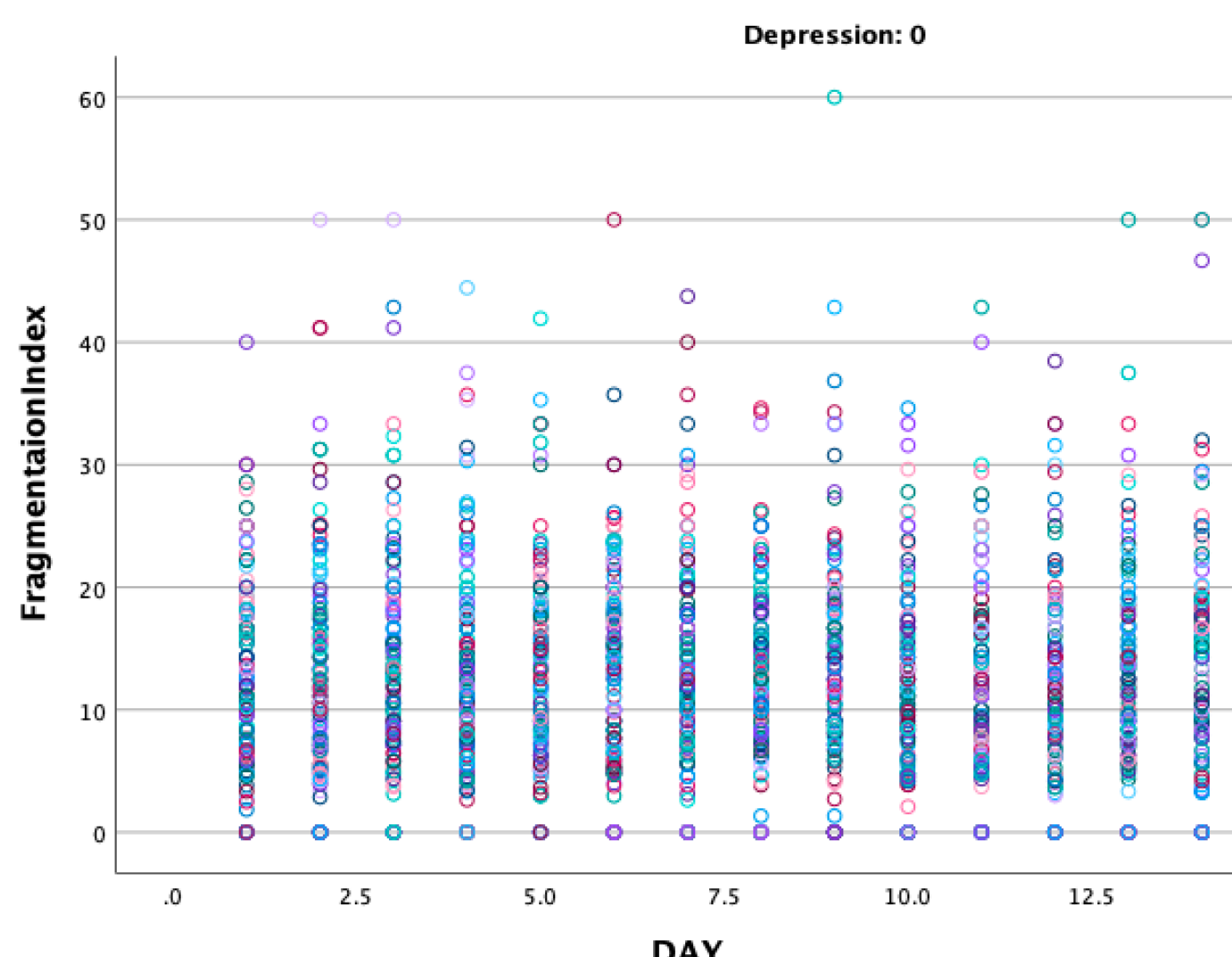
FI variability for those without anxiety



FI variability for those with anxiety



FI variability for those without depression



FI variability for those with depression

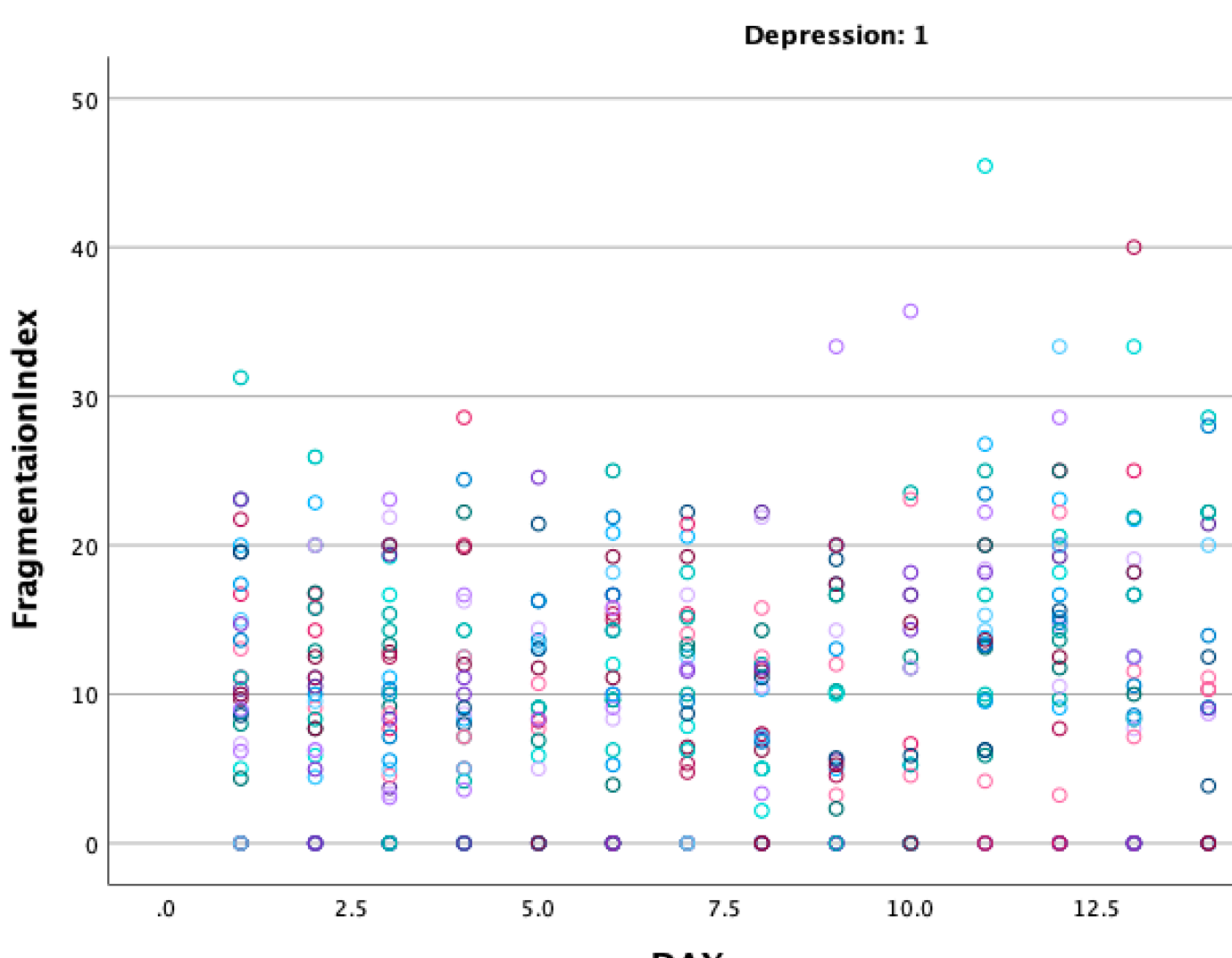


TABLE 1 - Anxiety as a predictor of sleep fragmentation index level and variability

Parameter		Standard Error	t Value	Pr >  t	95% Confidence Limits	Gradient
$\beta_0$	FixedIntercept	0.2600	38.59	<.0001	9.5221 10.5472	-3.39E-6
$\beta_1$	AnxietyFixedEffect	0.6334	-1.01	0.3150	-1.8862 0.6105	-1.94E-6
$\alpha_0$	BetweenIntercept	0.1935	9.78	<.0001	1.5106 2.2731	-1.55E-6
$\alpha_1$	BetweenAnxietySlope	0.3662	0.31	0.7539	-0.6068 0.8367	1.289E-6
$T_0$	WithinIntercept	0.04385	96.88	<.0001	4.1619 4.3347	-0.00001
$T_1$	WithinAnxietySlope	0.1094	-2.43	0.0158	-0.4819 -0.05063	1.409E-6
COV	Scale	0.1602	4.86	<.0001	0.4620 1.0933	3.694E-6
varScale	Covariance	0.03813	4.49	<.0001	0.09599 0.2463	-8.86E-6

DF = 217

TABLE 2 - Depression as a predictor of sleep fragmentation index level and variability

Parameter		Standard Error	t Value	Pr >  t	95% Confidence Limits	Gradient
$\beta_0$	FixedIntercept	0.2684	37.78	<.0001	9.6106 10.6687	-4.64E-6
$\beta_1$	DepressionFixedEffect	0.5642	-1.71	0.0888	-2.0763 0.1477	-2.64E-6
$\alpha_0$	BetweenIntercept	0.1963	9.58	<.0001	1.4939 2.2678	-0.00002
$\alpha_1$	BetweenDepSlope	0.3313	0.23	0.8169	-0.5761 0.7297	8.857E-6
$T_0$	WithinIntercept	0.04531	93.78	<.0001	4.1595 4.3380	-0.00002
$T_1$	WithinDepSlope	0.09678	-2.01	0.0459	-0.3851 -0.00359	-0.00001
COV	Scale	0.1550	4.90	<.0001	0.4537 1.0649	1.296E-6
varScale	Covariance	0.03746	4.51	<.0001	0.09530 0.2430	-0.00001

DF = 217

## EQUATIONS

$$y_{ij} = x_{ij}^T \beta + v_i + \epsilon_{ij}$$

Outcome, fixed/random effects

$$v_i \sim N(0, \sigma_v^2)$$

Random effect between people

$$\epsilon_{ij} \sim N(0, \sigma_\epsilon^2)$$

Random effect within people

$$\sigma_{v_i}^2 = \exp(u_i^T \alpha)$$

Variance between

$$\sigma_{\epsilon_{ij}}^2 = \exp(w_{ij}^T \tau)$$

Variance within

## RESULTS

- Data Analysis: Individual location scale models were estimated with chronic anxiety and depression as predictors of sleep fragmentation index
- No other indication of chronic health was dense enough to use as predictor, therefore only anxiety and depression were used

## DISCUSSION

- Underscores significant influence of chronic health conditions on sleep quality in emerging adulthood
- Highlights need for nuanced understanding of specific impact on sleep fragmentation index
- Revealed intricacies through location-scale models
- Provides valuable insights for tailored approaches to improve sleep outcomes
- Has potential to enhance well-being and quality of life
- Contributes to broader understanding of sleep health in context of chronic mental health conditions



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