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; τ_1 = -0.2663)**
  - **Depression predicts predicts within person variability (See Table 2; τ_1 = -0.1943)**
  - **Anxiety does not predict between person variability (See Table 1; α_1)**
  - **Depression does not predict between person variability (See Table 2; α_1)**
  - **Anxiety does not predict mean level difference of fragmentation index in those with and without chronic health conditions (See Table 1; β_1)**
  - **Depression does not predict mean level difference of fragmentation index in those with and without chronic health conditions (See Table 2; β_1)**

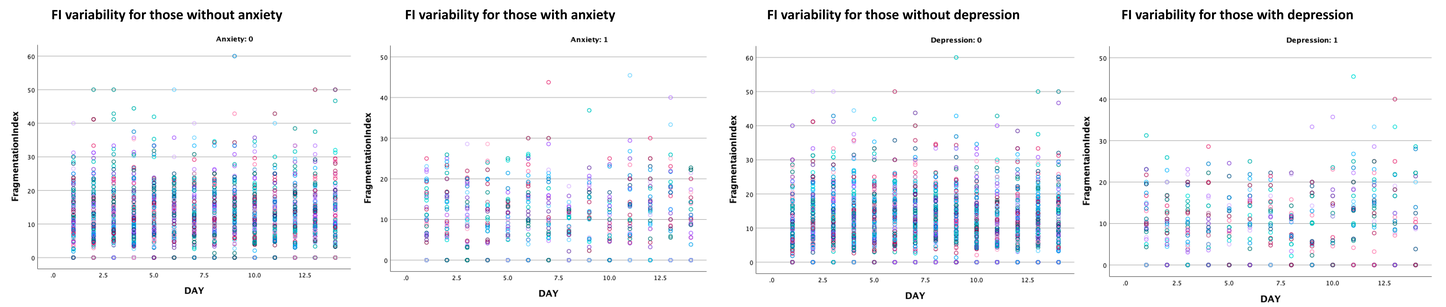

TABLE 1 - Anxiety as a predictor of sleep fragmentation index level and variability

Parameter		Standard Error	t Value	Pr > |t|	95% Confidence Limits		Gradient
β_0	FixedIntercept	0.2600	38.59	<.0001	9.5221	10.5472	-3.39E-6
β_1	AnxietyFixedEffect	0.6334	-1.01	0.3150	-1.8862	0.6105	-1.94E-6
α_0	BetweenIntercept	0.1935	9.78	<.0001	1.5106	2.2731	-1.55E-6
α_1	BetweenAnxietyslope	0.3662	0.31	0.7539	-0.6068	0.8367	1.289E-6
τ_0	WithinIntercept	0.04385	96.88	<.0001	4.1619	4.3347	-0.00001
τ_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
β_0	FixedIntercept	0.2684	37.78	<.0001	9.6106	10.6687	-4.64E-6
β_1	DepressionFixedEffect	0.5642	-1.71	0.0888	-2.0763	0.1477	-2.64E-6
α_0	BetweenIntercept	0.1963	9.58	<.0001	1.4939	2.2678	-0.00002
α_1	BetweenDepSlope	0.3313	0.23	0.8169	-0.5761	0.7297	8.857E-6
τ_0	WithinIntercept	0.04531	93.78	<.0001	4.1595	4.3380	-0.00002
τ_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

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Scan for more info!

EQUATIONS

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

$$\sigma_{v_i}^2 = \exp(u_i^{\tau}\alpha)$$
Variance between

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