Chronic Mental Health Conditions and Sleep Efficiency: A Variability Investigation

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INTRO

- Comprehensive influence of mental health conditions on sleep patterns during the period of emerging adulthood (EA) is insufficiently explored
- While our understanding of how anxiety and depressive symptoms affect sleep patterns in EA is limited, it's crucial to focus on this age group because most in EA don't meet their sleep requirements
- Analyzing sleep efficiency scores helps by providing insight into how effectively individuals with anxiety and depressive symptoms are sleeping during emerging adulthood
- Lower sleep efficiency indicates increased interruptions in sleep patterns and less time asleep, potentially leading to diminished overall sleep quality
- This study aims to:
  - Utilize self reported anxiety and depression diagnoses to examine the variability in an objective measure of sleep efficiency
- Sleep efficiency is calculated by dividing total time asleep by total time in bed and multiplying by 100
  - Measures how effectively time spent in bed is utilized for sleep

METHODS

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

MATERIALS

- Participants indicated diagnosis of chronic mental and physical health conditions by self report
- Individual chronic health conditions were examined, but because of sparse cells only anxiety and depression were used as predictors
- Anxiety/depression was dummy coded
- Collected actigraph data from participants
- Computed sleep efficiency for each participant

PROCEDURES

- Participants completed a health information questionnaire in July 2020
- Actigraph data was collected continuously for 14 consecutive days
- Data Collection: July 2020 - July 2021

Mental health conditions differentially influences variability of sleep efficiency, significant for anxiety within person variability, and average level for both anxiety and depression

Anxiety and depression were used to examine between person, within person, and average level differences of sleep fragmentation index measured over 14 days

- **Anxiety does predict within person variability**
  - **(See Table 1; τ_1 = -0.1447)**
- **Depression does not predict within person variability**
  - **(See Table 1; τ_2 = -0.0348)**
- **Anxiety does not predict between person variability**
  - **(See Table 1; α_1 = 3.7033)**
- **Depression does not predict between person variability**
  - **(See Table 1; α_2 = 0.4447)**
- **Anxiety does predict mean level difference of sleep efficiency in those with and without**
  - **(See Table 1; β_1 = 1.3557)**
- **Depression does not predict mean level difference of sleep efficiency in those with and without**
  - **(See Table 1; β_2 = -0.8232)**

Scan for more info!

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FIGURE 1 - Sleep efficiency variability for those without anxiety

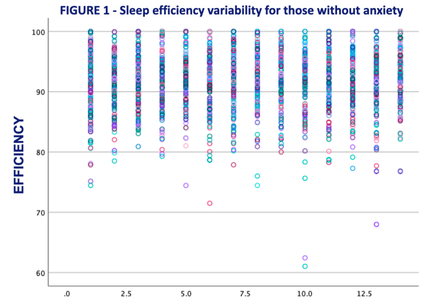

FIGURE 2 - Sleep efficiency variability for those with anxiety

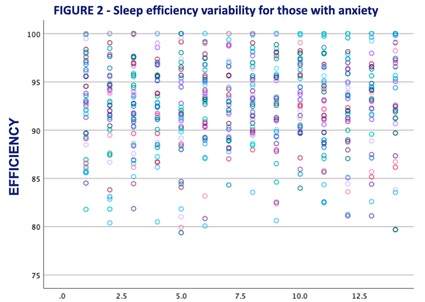

FIGURE 3 - Sleep efficiency residuals for those without anxiety

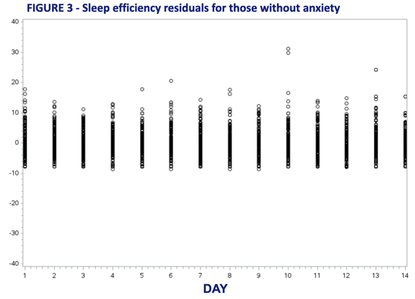

FIGURE 4 - Sleep efficiency residuals for those without anxiety

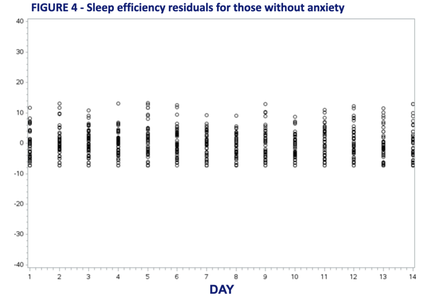

TABLE 1 - Anxiety and Depression as predictors of sleep efficiency level and variability

Parameter		Standard Error	t Value	Pr > |t|	95% Confidence Limits		Gradient
β_0	Mean Intercept	0.2471	372.91	<.0001	91.6595	92.6336	0.000012
β_1	Anxiety Mean Effect	0.5694	2.38	0.0181	0.2334	2.4780	-0.00002
β_2	Depression Mean Effect	0.6347	-1.30	0.1960	-2.0742	0.4277	0.000059
α_0	Between Variability Intercept	3.1003	-0.38	0.7073	-7.2762	4.9449	-0.00009
α_1	Between Variability Anxiety Slope	3.0802	1.20	0.2306	-2.3677	9.7743	-0.00007
α_2	Between Variability Depression Slope	0.3818	1.16	0.2453	-0.3077	1.1972	0.000217
τ_0	Within Variability Intercept	0.03084	88.28	<.0001	2.6620	2.7836	-0.00647
τ_1	Within VariabilityAnxiety Slope	0.06839	-2.12	0.0355	-0.2794	-0.00987	-0.00073
τ_2	Within Variability Depression Slope	0.03003	-1.16	0.2474	-0.09400	0.02436	-0.00187
COV	Scale	0.9513	-3.44	0.0007	-5.1450	-1.3950	-0.00184
varScale	Covariance	0.1250	3.74	0.0002	0.2208	0.7136	-0.01375

DF = 217

STATISTICAL MODEL

$$y_{ij} = x_{ij}^{\tau}\beta + v_i + \epsilon_{ij}$$
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: A single location scale model was estimated with chronic anxiety and depression diagnosis as predictors of sleep efficiency
  - Within-person and between-person variations were examined
- In individual models within person variability was not significant, which reveals the unique aspects of anxiety to be impactful on within person variability
- Future directions will include exploration of data transformations such as arcsine to account for percentage distributions

DISCUSSION

- Approach allowed examination of individual differences in anxiety and depression:
  - Influence on average level (location) and variability (scale) of sleep efficiency
- Underscores significant influence of mental health conditions on sleep quality in emerging adulthood
- Highlights need for nuanced understanding of specific impact on sleep efficiency
- Provides valuable insights for tailored approaches to improve sleep outcomes
- Contributes to broader understanding of sleep health in context of chronic mental health conditions

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