IUNS-ICN 2025

International Congress of **Nutrition**
24-29 August 2025 | Paris, France

SUSTAINABLE FOOD FOR GLOBAL HEALTH

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DECLARATION OF CONFLICTS OF INTEREST

Sex-specific associations between anxiety, insomnia and their comorbidity and incident obesity in a general-population cohort

Nutritional Epidemiology Research Team (EREN)
Sorbonne Paris Nord University

Pauline Duquenne*, C. Samieri, S. Chambaron, M-C. Brindisi, E. Kesse-Guyot, F. Berthy, P. Galan, S. Hercberg, M. Touvier, D. Léger, L. K. Fezeu, V. A. Andreeva

*p.duquenne@eren.smbh.univ-paris13.fr
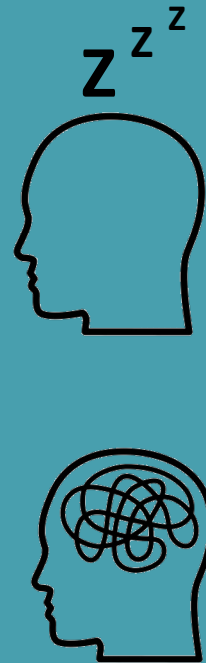
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The authors have no relevant financial or non-financial interests to disclose.

Anxiety, sleep disorders and obesity

Short sleep duration   + →   **Obesity incidence**

Poor sleep quality   + →

Insomnia   ? →
Inconsistent results

Anxiety disorders   ? →
Inconsistent results

Cappuccio et al. 2008 ; Wu et al 2014 ; Baccaro et al. 2020 ; Guimaraes et al. 2022 ; Fatima et al. 2016 ; Tang et al. 2017 ; Perez-Pinar et al. 2016

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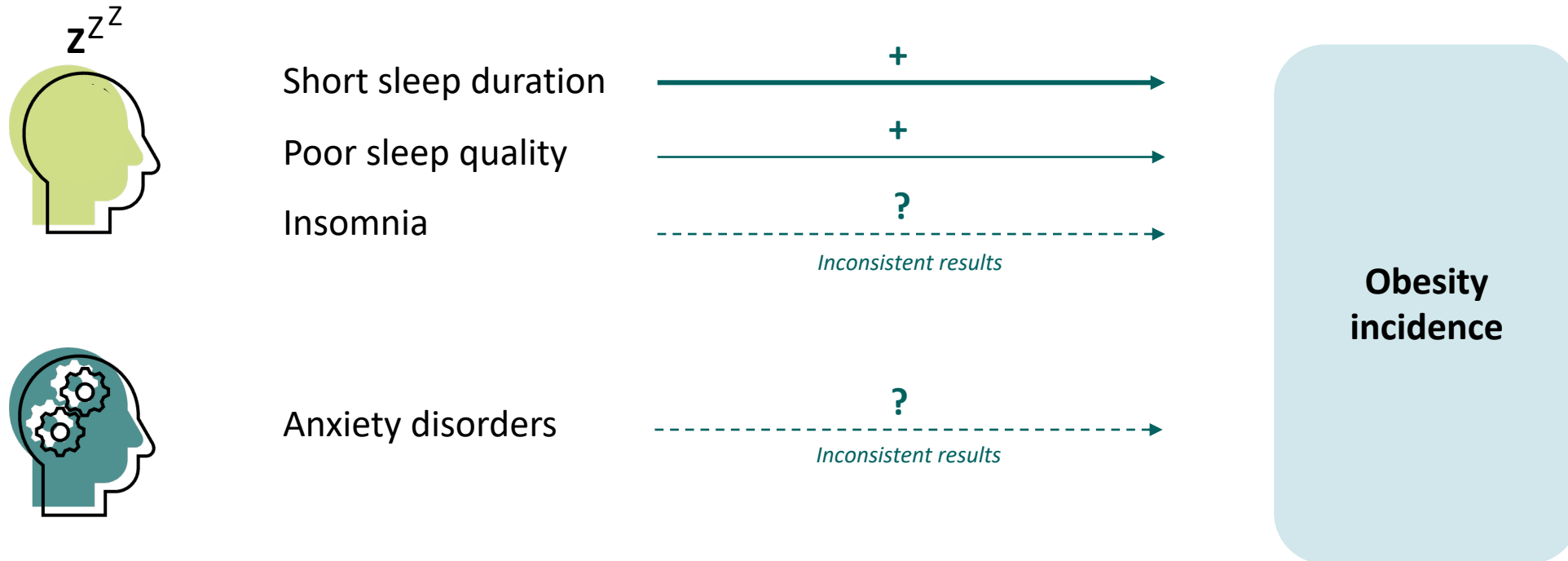
Anxiety-insomnia comorbidity

33% of those with insomnia also have anxiety symptoms

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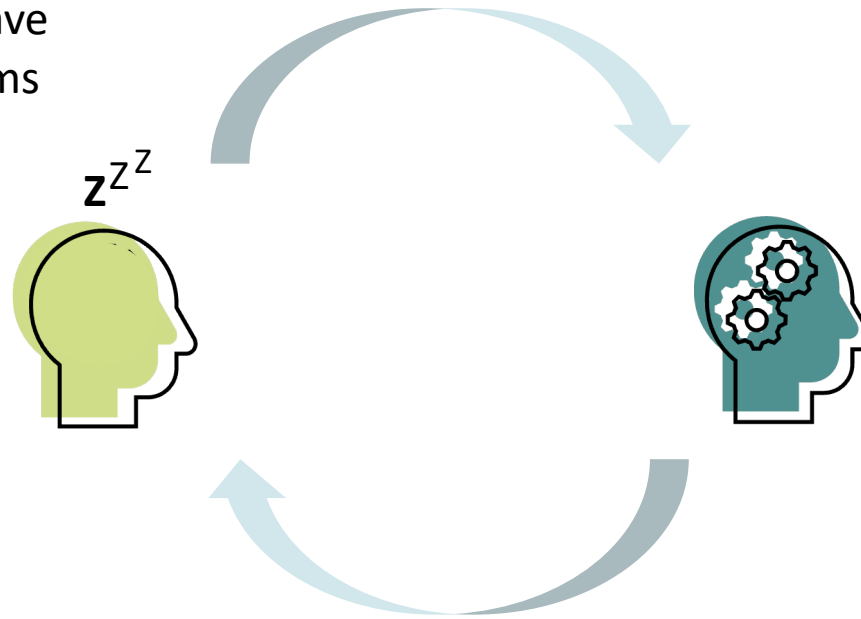
25-50% of individuals with anxiety also have insomnia symptoms

Impact of the anxiety-insomnia comorbidity on obesity incidence ?

Sohner et Harvey et al. 2012 ; Breslau et al. 1996

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NutriNet-Santé Study

- Web-based cohort

- Launched in 2009

- French adults >18 years with Internet access

- Recruited via multimedia campaigns

- > 170,000 participants, recruitment still ongoing

- 5 annual questionnaires
  - Diet
  - Physical & mental health
  - **Anthropometrics** ⟶ **Body Mass Index**
  - Physical activity
  - Sociodemographic & lifestyle

- **Specific questionnaires** completed on a voluntary basis during follow-up

| **Anxiety questionnaire (2013-2016)** STAI : trait anxiety High trait anxiety : > 40 | **Sleep questionnaire (2014)** Chronic insomnia defined with established criteria (ICSD-3, DSM-5) |

Comorbidity groups

Anxiety only	Insomnia only
No insomnia or anxiety	**Anxiety-insomnia comorbidity**

Statistical analysis

Comorbidity groups

Anxiety only	Insomnia only
No insomnia or anxiety	**Anxiety-insomnia comorbidity**

Multivariable Cox proportional hazards model

Adjusted for

- Age (time scale)
- Sex
- Marital status
- Employment
- Educational level
- Sedentariness

- Physical activity
- Alcohol consumption
- Smoking status
- Depressive symptoms
- Eating disorders

**Incident obesity
Body Mass Index ≥ 30 kg/m²**

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Sample description

n = 36,474 participants with complete data for T-STAI and insomnia

Exclusion :

n = 4,242 pregnant women

n = 185 without anthropometric data at baseline

n = 2,090 with < 2 anthropometric questionnaires

n = 2,172 with missing covariate data

n = 2,867 with obesity (BMI>30 kg/m^2) at baseline

n = 393 with < 6 months of follow-up

n = 728 with a history of obesity

23,797 final sample for analysis

56 years

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67 %

72 %

Comorbidity groups

Anxiety only	Insomnia only
27 %	**8 %**
No insomnia or anxiety	**Anxiety-ins. comorbidity**
54 %	**12 %**

6.2 ± 2 years of follow-up

733
incident obesity cases

Cox models results

Full sample

Hazard Ratio (HR) for incident obesity (95% CI)

● Anxiety only

● Insomnia only

● Anxiety-insomnia comorbidity

Cox models adjusted for age (time scale), marital status, employment, educational level, sedentariness, physical activity, alcohol consumption, smoking status, depressive symptoms, eating disorders
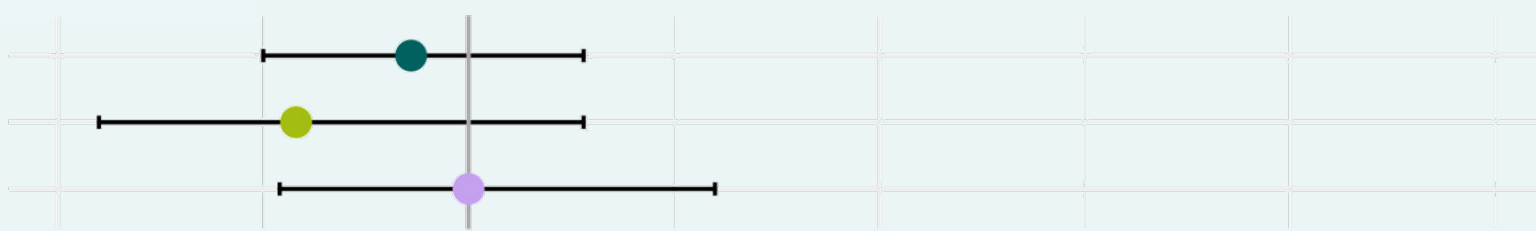
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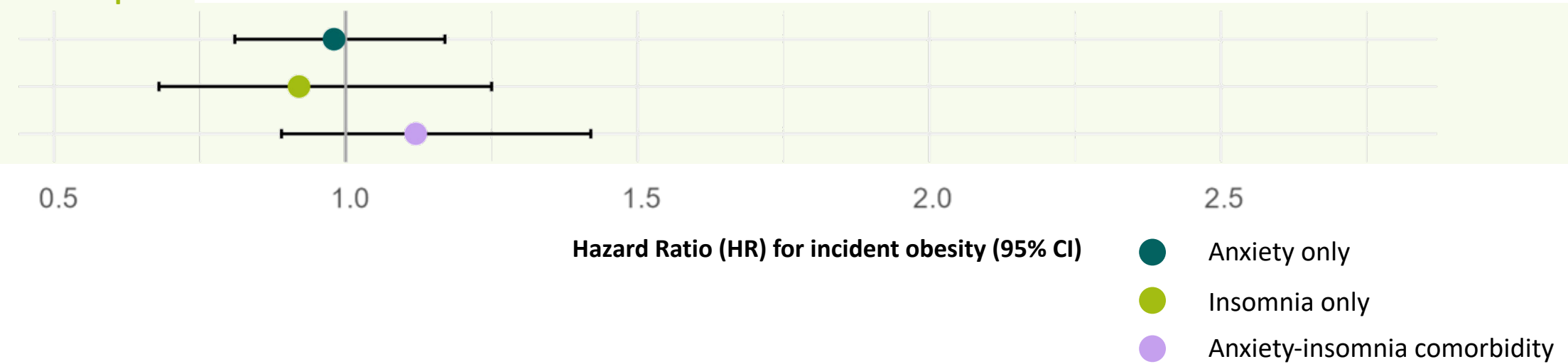
Cox models results

Full sample
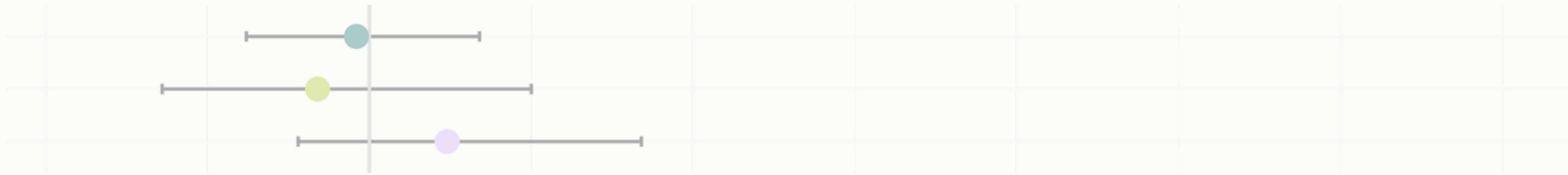
Women

Anxiety only

Insomnia only

Anxiety-insomnia comorbidity

Men

Anxiety-insomnia comorbidity

0.5   1.0   1.5   2.0   2.5
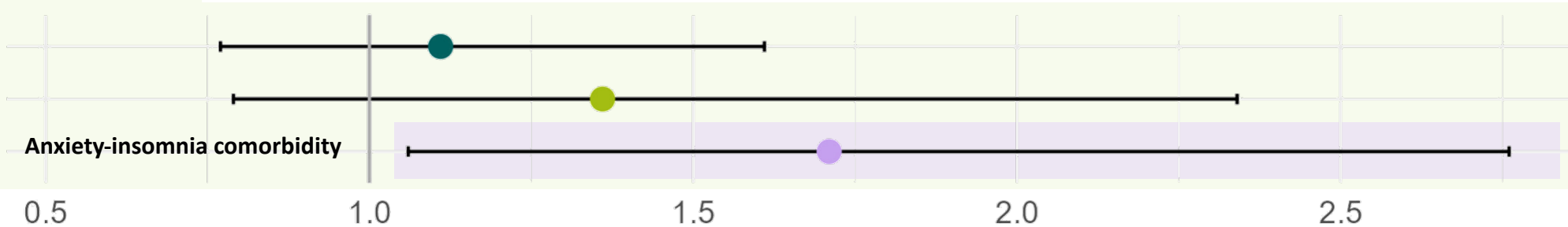
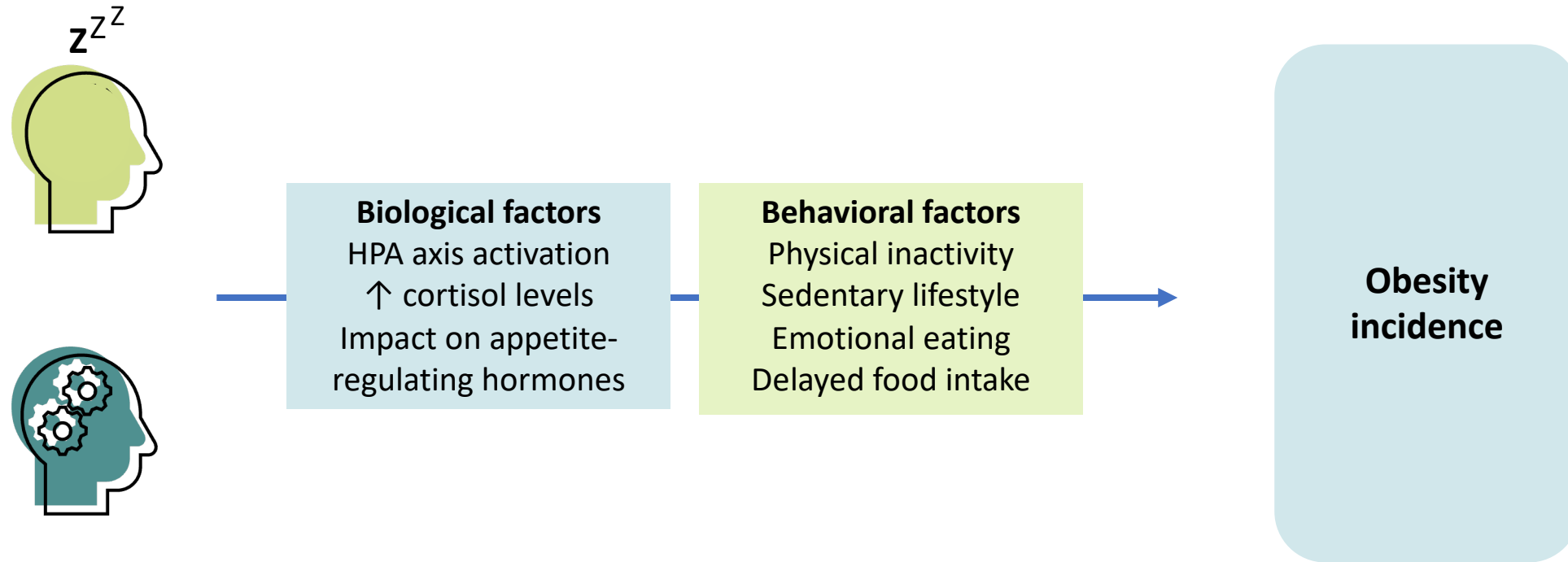**Hazard Ratio (HR) for incident obesity (95% CI)**

Cox models adjusted for age (time scale), marital status, employment, educational level, sedentariness, physical activity, alcohol consumption, smoking status, depressive symptoms, eating disorders

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Potential mechanisms

Biological factors
HPA axis activation
↑ cortisol levels
Impact on appetite-regulating hormones

Behavioral factors
Physical inactivity
Sedentary lifestyle
Emotional eating
Delayed food intake

Obesity incidence

Bose et al. 2009 ; Hirotsu et al. 2015 ; Stubbs et al. 2017 ; Chan et al. 2018

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Limitations and strengths

- 70% women with higher socioeconomic status

- BMI: does not reflect fat distribution or abdominal obesity

- Subjective measures of insomnia

- No validated cut-off value for T-STAI

- Large sample of participants, wide range of covariates

- Longitudinal design with >6 years of follow-up

- Insomnia questionnaire based on ICSD-3 and DSM-5

- Validated anxiety questionnaire

Conclusion

Male participants with **anxiety-insomnia comorbidity were more likely to develop obesity** than participants with no anxiety or insomnia

Future prospective studies are needed to confirm the **impact of the anxiety-insomnia** comorbidity, using **objective measures of insomnia and anxiety**

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Thank you !