What is a poor night's sleep? A quantitative approach to unravel the meaning of sleep quality

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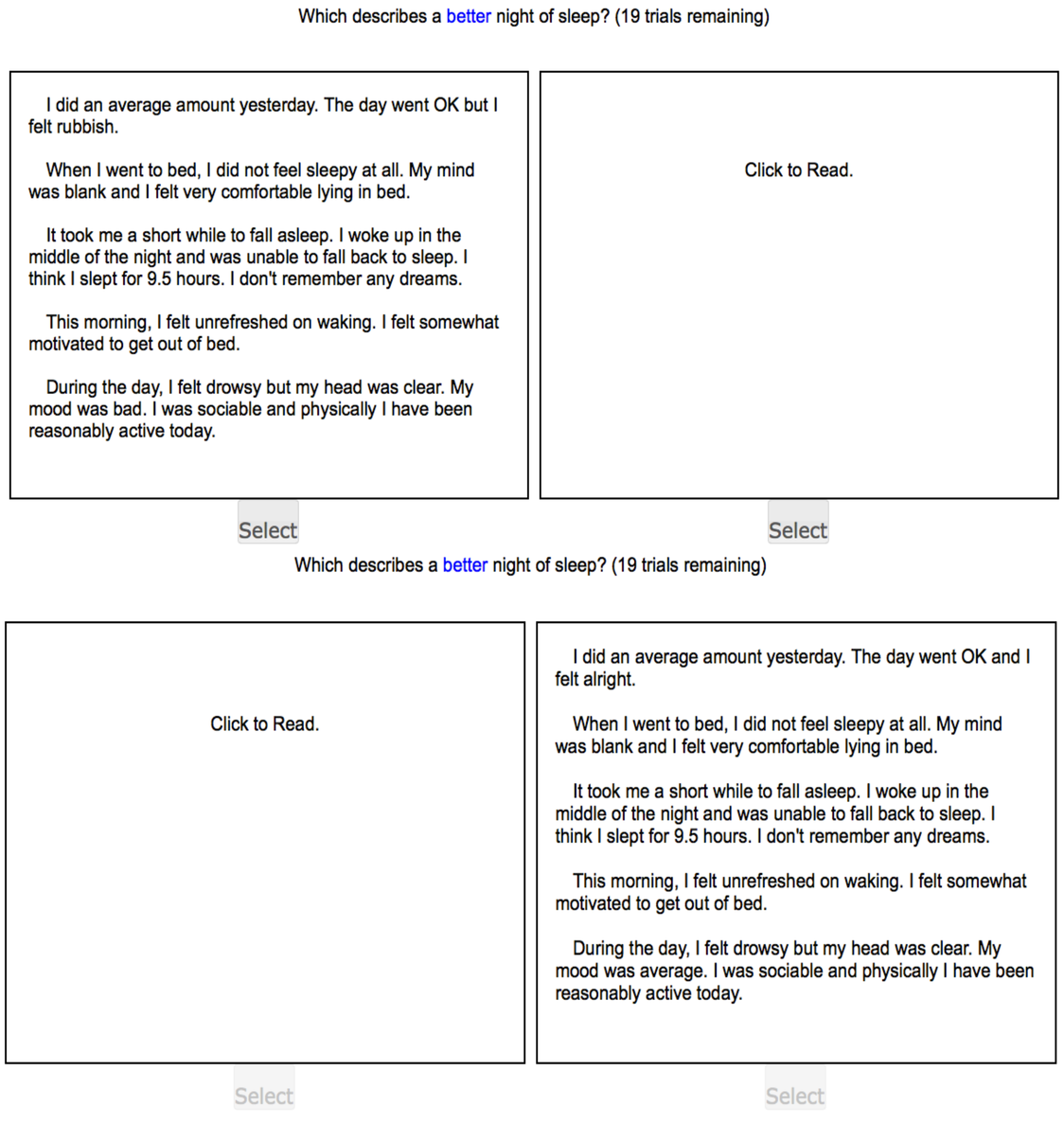
INTRODUCTION

- Poor sleep quality is a key determinant of sleep complaints but what makes a poor night's sleep?
- Previous studies have used qualitative methods to uncover the subjective meaning of sleep quality. These methods have high face and ecological validity but are vulnerable to interpretation biases from both participants and researchers.
- **Aim**: To identify the important parameters of sleep quality using a quantitative choice-making approach.

METHOD

- Participants were 87 healthy adults: Good sleepers (scored ≥8 on the Insomnia Severity Index- ISI); Poor sleepers (scored ≤7 on the ISI).
- Participants were asked to choose which of two stories represented a "better" or "worse" night's sleep (Figure 1). Stories could differ on any 17 parameters relating to what happened the day before, pre-sleep, during sleep, post-sleep, and the day after (parameters given in Figure 3).
- Their choices enabled us to estimate how much each parameter contributes to subjective sleep quality.
- Because the total number of possible stories exceeded 200 million (3 options$^{16\text{parameters}}$ x 5 options$^{1\text{parameter}}$), we applied Markov Chain Monte Carlo with People (MCMCP) to sample the most relevant stories.
- Each participant completed 48 trials.
- **Analysis**:
  - Logistic regression models were fit to the choice data.
  - The logistics regression parameters are interpretable as log odds ratios: they quantify how much more or less likely a participant would choose a story if a particular option is included.

Figure 1 Example of a choice that was presented to a participant



RESULTS

1. Parameters

- Parameters that occurred pre-sleep, during sleep, post-sleep and the day after had a significant impact on the participants' choices (indicated by * in Figure 3).

2. Parameters interactions

- Of the pairwise interactions between sleep and post-sleep/ next day parameters, only WASO and feeling refreshed had a significant impact (p<0.001). Either feeling refreshed or sleeping through the night meant good sleep quality, both were not necessary.

3. Interactions between parameters and type of sleepers

- There was no significant effect on the type of sleepers

4. Interactions between parameters and type of questions

- Only one significant interaction was found between type of questions and feeling refreshed (p= 0.003). When it was a case of a worse night's sleep, participants were less concerned about feeling unrefreshed than they were when judging a better night's sleep.

Figure 3 Parameters of sleep quality

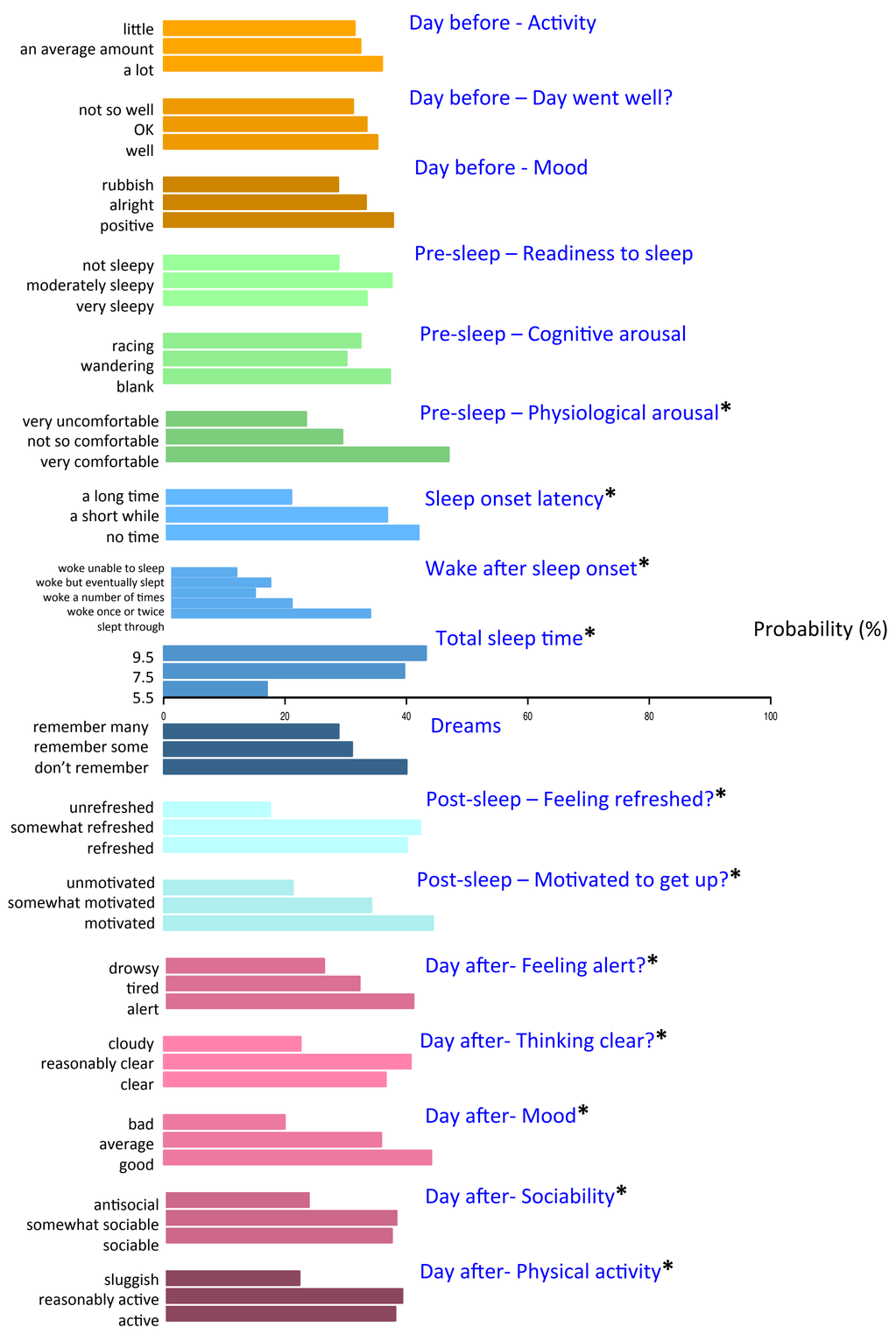


Table 1 Participant characteristics

		Group total *N*= 87	Good sleeper *n*= 44	Poor sleeper *n*= 43	t(85)
Age (18-30 years)		22.5 (2.6)	22.6 (2.6)	22.3 (2.6)	6.8
Body mass index		21.7 (3.3)	21.7 (2.8)	21.8 (3.8)	-0.2
Insomnia Severity Index		8 (5.3)	3.61 (2.1)	12.5 (3.5)	-14.5*
Typical sleep onset latency		24.9 (24)	15 (14)	35.12(27)	-4.3*
Typical wake after sleep onset		6.5 (10.4)	3.2 (6.4)	9.9 (12.5)	-3.2*
Typical total sleep time		457 (77.1)	483 (78.7)	430 (66.5)	3.4*
					χ^2
Sex	Male	35	20	28	3.3
	Female	52	24	15	
Ethnic Origins	White	27	16	11	93.3
	White Irish	1	1	0	
	Asian British: Chinese	30	14	16	
	Asian British: Indian	10	7	3	
	Asian British: Asian other	15	4	11	
	Black or Black British	1	1	0	
	British mixed	1	0	1	
	Other	2	1	1	
First language	English	38	20	18	1.4
	Other	49	24	25	

*p<0.001

CONCLUSIONS

- The overall judgment of sleep quality appears to be determined by not only what happened during sleep, but also upon waking and performance during the day.
- Good and poor sleepers appear to be using the same parameters when they make judgment on their daily sleep quality.

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PhD Scholarship:
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