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Psychological Inflexibility and Its Associations with Chronotype and Sleep Quality in Spanish Adults

Psikolojik İnfleksibilite ile Kronotip ve Uyku Kalitesi Arasındaki İlişki: İspanyol Yetişkinlerde Bir İnceleme

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Abstract

The primary objective of this study was to analyze self-reported sleep perception in relation to psychological inflexibility traits in adults. A total of 705 adults (65.2% women) participated, with a mean age of 27.21 years standard deviation = 10.67. The instruments used were the Pittsburgh Sleep Quality Index, the Composite Scale of Morningness, and the Acceptance and Action Questionnaire. Results showed that participants with high psychological inflexibility had a significantly greater risk of reporting poor sleep quality [odds ratio (OR) = 2.632] and identifying with an evening chronotype (OR = 2.825) than those with lower inflexibility scores. Higher inflexibility scores were positively associated with sleep disturbances, daily dysfunction due to poor sleep quality, use of sleep medication, and other sleep-related issues. Targeting behaviors associated with psychological inflexibility could help improve sleep-related outcomes.

Keywords: Chronotype, subjective sleep, sleep quality, psychological flexibility, sleep perception

Öz

Bu çalışmanın temel amacı, yetişkinlerde psikolojik esneklik özellikleri ile öz bildirimle belirtilen uyku kalitesi arasındaki ilişkinin incelenmesidir. Toplam 705 yetişkin (%65,2'si kadın) çalışmaya katılmış ve bu katılımcıların yaş ortalaması 27,21 (standart sapma = 10,67) olarak saptanmıştır. Kullanılan ölçüm araçları Pittsburgh Uyku Kalitesi İndeksi, Sabahçıllık-Birleşik Ölçeği ve Kabul ve Kararlılık Anketi'dir. Sonuçlar, psikolojik esnekliği düşük olan katılımcıların, yüksek olanlara kıyasla, kötü uyku kalitesi bildirme [odds ratio (OR) = 2,632] ve akşam kronotipiyle kendini tanımlama (OR = 2,825)açısından anlamlı derecede daha yüksek eğilimde oldukları bulundu. Düşük psikoloji esneklik puanları; uyku bozuklukları, kötü uyku kalitesine bağlı günlük işlev bozukluğu, uyku ilacı kullanımı ve diğer uyku ile ilgili sorunlarla pozitif yönde ilişkili olduğu görüldü. Bu sonuçlar ışığında, psikolojik esneklik ile ilişkili davranışların klinik uygulamalarda hedef alınmasının, uyku sorunlarının iyileştirilmesine katkı sağlayabileceği düşünülmektedir.

Anahtar Kelimeler: Kronotip, öznel uyku, uyku kalitesi, psikolojik infleksibilite, uyku algısı

Introduction

Psychological inflexibility has been conceptualized as a process of engaging with the present experience. It involves experiencing the present fully and consciously, without unnecessary defenses, and accepting it as it is, not as it is said to be. It also involves the ability to persist or change behavior based on freely chosen values (1). Individuals with higher cognitive flexibility are better equipped to solve problems as an adaptive response to situational changes. They typically do so through the following skills or processes: acceptance, cognitive defusion, flexible attention to the present moment, a sense of self–as–context, values, and committed action (2).

Within the framework of Acceptance and Commitment Therapy, psychological inflexibility has been characterized as a transdiagnostic etiological factor, playing a central and significant role in the development and maintenance of problems of an emotional and psychological nature with maladaptive consequences (3,4). An individual who copes with distressing situations through any of the six basic processes increases the risk of progressively developing psychological inflexibility, which manifests as experiential avoidance. This, in turn, can contribute to the emergence of emotional disorders (5).

Psychological inflexibility is closely linked to a wide range of psychological disturbances characterized by avoidant response

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patterns (5,6), including sleep–related problems (4). According to Lundh and Broman (7), two types of processes are involved in sleep–related cognitions: those that interfere with sleep and those that interpret sleep experiences. In this context, psychological inflexibility emerges as a key factor in managing or mediating these processes (4). By examining the interaction between sleep problems and emotional dysregulation, researchers have proposed psychological inflexibility as a transdiagnostic factor that mediates this relationship (4).

The relationship between psychological inflexibility and chronotype has been less extensively studied (7-9). Psychological inflexibility has been linked to a range of difficulties and lower psychological well–being (4-6). Similarly, an evening–type chronotype has been associated with a greater psychological problems and poor sleep quality (10,11). These findings suggest the possibility of a relationship between high psychological inflexibility scores and evening chronotypes. Indeed, existing studies indicate that individuals with higher psychological flexibility are more likely to report morningness and alertness–oriented patterns typical of healthier lifestyles (9,10-13).

The present study examines the relationship between psychological inflexibility and perceived sleep characteristics in Spanish adults. The first hypothesis proposes that individuals with high psychological inflexibility will report poorer sleep quality compared to those with greater psychological flexibility. The second hypothesis predicts that psychological inflexibility will be associated with evening chronotype patterns, which are commonly linked to a higher incidence of behavioral problems.

Materials and Methods

Participants

The sample consisted of 705 individuals, of whom 65.2% were women. Participants ranged in age from 18 to 62 years. Regarding educational attainment, 10.5% had completed primary education, 28.2% had completed secondary education, and 61.3% had completed university studies.

Instruments

An ad hoc interview was administered to collect sociodemographic and educational information. Subjective sleep quality was measured using the Spanish version of the Pittsburgh Sleep Quality Index; Buysse et al. (14) in the version adapted to Spanish by Macías and Royuela. (15) Higher scores indicate poor sleep quality. In the present study, internal consistency was acceptable (Cronbach's $\alpha = 0.85$).

Chronotype was evaluated using The Composite Scale of Morningness [CSM; Smith et al. (16,17), Spanish adaptation by Díaz–Morales and Sánchez–López (18)]. This questionnaire assesses the evening chronotype type, a general morningness factor, and an alertness factor. Internal consistency in this study was acceptable for the CSM–total ($\alpha = 0.82$), CSM–general ($\alpha = 0.79$), and CSM–alert ($\alpha = 0.75$).

Psychological inflexibility was measured using the Acceptance and Action Questionnaire [Bond et al. (19), Spanish adaptation by Ruiz et al. (20)]. Higher scores indicate greater psychological inflexibility. In the present sample, internal consistency was high (Cronbach's $\alpha = 0.93$).

Procedure

A non–probabilistic sampling method was employed using a cross–sectional design. Data were collected online, with survey links distributed via social media and email to the administrations of various social centers, clubs, and adult groups to reach potential participants. Additionally, in–person visits were conducted at several universities, where information about the study was further disseminated among students through social networks, the Moodle platform, and other university–related channels.

This research was approved by the This research was approved by the Andalusian Ethics Committee of Biomedical Research (Evaluation Committee of Huelva. Internal Code: 0423–N–23. Date of approval: 20/06/2023; Act: 06/23). All participants provided informed consent. Data generated in this study are available from the corresponding author upon reasonable request. The authors declare no conflicts of interest.

Statistical Analysis

Descriptive analyses [means, standard deviations (SDs), etc.] were used to characterize the main variables. Internal consistency of the instruments was assessed using Cronbach's alpha (α). For comparisons involving quantitative variables with more than two categories, analysis of variance (ANOVA) was performed using Snedecor's F statistic, followed by Bonferroni post hoc tests. Effect sizes were estimated with eta–squared (η^2), classified as small ($0.01 \leq \eta^2 < 0.06$), medium ($0.06 \leq \eta^2 < 0.14$), or large ($\eta^2 \geq 0.14$). For categorical variables, chi–square tests (χ^2) were used, with effect sizes estimated using Cramer's V: small (<0.20), moderate (0.20–0.60), and large (>0.60). Odds ratios were also calculated. Cluster analyses were conducted to group participants according to psychological inflexibility. All statistical analyses were performed with the SPSS software package (IBM SPSS Statistics, Version 25.0; IBM Corp., Armonk, NY, USA).

Results

The sample included 705 individuals, of whom 245 (34.8%) were men and 460 (65.2%) women. The mean age of the sample was 27.21 years (SD = 10.67). Regarding educational level, 10.5% reported only basic education, 28.2% had completed secondary education, and 61.3% held a university degree.

When participants were grouped into three clusters based on psychological inflexibility scores (low, medium, and high; see Table 1), significant differences were found in sleep quality, with a medium effect size ($\eta^2 = 0.13$). Post-hoc comparisons indicated that group a < b ($p < 0.001$), a < c ($p < 0.001$), and b < c ($p < 0.001$). Differences were also observed in self–reported sleep duration, with a small effect size ($\eta^2 = 0.01$); group a > c ($p = 0.002$) and b > c ($p = 0.046$). Finally, significant differences emerged regarding medication use, with a medium effect size (Cramér's V = 0.173): participants in the high inflexibility group

were more likely to report using sleep medication, whereas those in the low inflexibility group were more likely to report not using it. No significant differences were found in sleep efficiency, although minor residual differences were observed in reported time spent in bed.

When analyzing the three clusters based on chronotype scores (Table 2), the total scale score showed statistically significant differences among the groups, with a small effect size (η^2 = 0.04). Post–hoc comparisons revealed that Group a scored higher than Group b ($p < 0.001$) and Group c ($p < 0.001$), whereas no significant differences were found between Groups b and c ($p = 0.791$).

For the morningness subscale, significant differences were observed with a small effect size (η^2 = 0.03). Post–hoc comparisons indicated that Group a scored higher than Group b ($p = 0.002$) and Group c ($p = 0.006$), whereas no significant difference was observed between Groups b and c ($p = 1.0$). On the alertness subscale, the low inflexibility group again differed from the other two groups, with a medium effect size (η^2 = 0.06): Group a > b ($p < 0.001$), a > c ($p < 0.001$), and b = c ($p = 0.103$).

Finally, when participants were grouped into just two clusters (high vs. low psychological inflexibility), the high inflexibility group showed a significantly greater risk of reporting poor sleep quality, the presence of sleep disturbances, daytime dysfunction due to sleep problems, use of sleep medication, longer sleep latency, and a higher risk of sleeping fewer than six hours per night compared to the low inflexibility group (Table 3).

Discussion

This study examined the relationship between perceived sleep characteristics and psychological inflexibility traits in Spanish adults.

The first hypothesis predicted that individuals with high psychological inflexibility would report poorer sleep quality than those with greater psychological flexibility. The findings supported this hypothesis and are consistent with previous research showing that psychological inflexibility is linked to difficulties in coping with and managing sleep–related issues (3,21,22).

According to Lundh (23), certain sleep disturbances arise from the interaction between arousal–inducing processes and dysfunctional cognitive processes related to the perception

Table 1. Subjective sleep quality characteristics by psychological inflexibility clusters

	Total 705	C1 low PI (a) 322 (45.7)	C2 medium PI (b) 269 (38.2)	C3 high PI (c) 114 (16.2)	Test statistic	p
PSQI	8.70 (4.23)	7.36 (3.79)	9.07 (4.15	11.64 (3.95)	$F_{(2,702)}$=51.25	<0.001
Category PSQI					$Chi^2_{(2,705)}$=31.437	<0.001
Poor quality	526 (74.61)	211 (65.5)	212 (78.8)	103 (90.4)		
Good quality	179 (25.39)	111 (34.5)	57 (21.2)	11 (9.6)		
Time in bed (hrs)	7.51(1.26)	7.57 (1.27	7.55 (1.19)	7.26 (1.37)	$F_{(2,702)}$=2.85	0.059
Sleep duration (hrs)	6.52 (1.15)	6.63 (1.19)	6.52 (1.12)	6.21 (1.09)	$F_{(2,702)}$=5.76	0.003
Sleep efficiency (%)	87.52 (11.88)	88.28 (11.89)	86.98 (11.74)	86.65 (12.14)	$F_{(2,702)}$=1.24	0.290
Medication use					$Chi^2_{(2,705)}$=21.089	<0.001
Yes	137 (19.43)	44 (13.7)	55 (20.4)	38 (33.3)		
No	568 (80.57)	278 (86.3)	214 (79.6)	76 (66.7)		

For categorical variables, values are presented as n (%); for quantitative variables, as M (SD). Poor quality = PSQI >5; Good quality = PSQI ≤5. C1, Low PI; C2, Medium PI; C3, High PI.

SD: Standard deviation, PSQI: Pittsburgh Sleep Quality Index, C: Cluster, PI: Psychological inflexibility.

Table 2. Chronotype characteristics by psychological inflexibility clusters

	Total 705	C1 low PI (a) 322 (45.7)	C2 medium PI (b) 269 (38.2)	C3 high PI (c) 114 (16.2)	$F_{(2,704)}$	p
CSM	33.98 (60.40)	35.34 (6.27)	33.07 (6.01)	32.29 (6.90)	14.463	<0.001
Morningness	26.09 (5.12)	26.91 (5.10)	25.49 (4.79)	25.20 (5.59)	7.844	<0.001
Alertness	7.89 (2.15)	8.43 (2.06)	7.58 (2.09)	7.09 (2.17)	21.955	<0.001
Category CSM					$Chi^2_{(4, 705)}$=19.613	0.001
Morning type	64 (9.08)	40 (12.4)	14 (5.2)	10 (8.8)		
Intermediate type	548 (77.73)	251 (78.0)	218 (81.0)	79 (69.3)		
Evening type	93 (13.19)	31 (9.6)	37 (13.8)	25 (21.9)		

For categorical variables, values are presented as n (%); for quantitative variables, as M (SD). C1, Low Psychological Inflexibility; C2, Medium Psychological Inflexibility; C3, High Psychological Inflexibility.

SD: Standard deviation, PSQI: Pittsburgh Sleep Quality Index, C: Cluster, CSM: Composite Scale of Morningness, PI: Psychological inflexibility.

Table 3. ORs of sleep–related problems comparing high vs. low psychological inflexibility clusters					
	High PI cluster vs. low PI cluster				
	OR	$\chi^2_{(1,157)}$	p	Phi	95% CI
Poor sleep quality	2.632	23.333	<0.001	1.182	1.762–3.933
Presence of sleep disturbances	2.199	11.381	0.001	0.127	1.380–3.459
Daytime dysfunction	2.267	14.919	<0.001	0.145	1.486–3.459
Use of sleep medication	2.319	19.517	<0.001	0.166	1.588–3.387
Sleep latency ≥31 minutes	1.654	7.862	0.005	0.106	1.162–2.356
Sleep Duration <6 h	1.642	9.773	0.002	0.118	1.202–2.243
CSM–evening chronotype	2.825	9.024	0.003	0.240	1.420–5.619
High PI Cluster: Cluster of high psychological inflexibility, Low PI Cluster: Cluster of low psychological inflexibility. OR: Odds ratio, CI: Confidence interval, PSQI: Pittsburgh Sleep Quality Index, CSM: Composite Scale of Morningness, PI: Psychological inflexibility					

of sleep. Specifically, factors that interfere with sleep include stressful life events and maladaptive cognitive patterns that influence how individuals interpret arousal, sleep difficulties, and the consequences of insufficient sleep (7). These factors may help to explain the role of psychological inflexibility in sleep problems.

The second hypothesis proposed that psychological inflexibility would be associated with evening–type chronotype patterns. The results supported this prediction, indicating that higher psychological inflexibility is linked to an evening chronotype, an outcome consistent with previous research (17-20).

In this context, chronotype has been associated with the ways in which individuals seek, regulate, internalize, and process information about their environment and themselves (cognitive styles), as well as how they engage in social interactions (behavioral styles), including the emotions that drive them and the cognitions they have developed (10,11).

Morning–type individuals tend to retain knowledge grounded in tangible and concrete realities, relying on direct experience and observable phenomena (realistic/sensing). They process information primarily through logical analysis and integrate new knowledge in line with established understanding. In contrast, evening–type individuals are more inclined to draw on symbolic and abstract data, often embracing uncertainty and engaging in imaginative reinterpretation of their experiences. Their cognitive style relies more on symbolic and unfamiliar inputs than on concrete and observable evidence (10,24-27).

Study Limitations

This study has several limitations that should be addressed in future research. First, the correlational design does not allow for causal inferences. Second, although the questionnaires used demonstrated acceptable validity and reliability, self–report measures are subject to inherent limitations such as response bias. Third, longitudinal studies are needed, as sleep problems may vary depending on contextual factors (e.g., academic or occupational demands, health conditions). Finally, future research should control for potentially relevant variables (e.g., mental and physical health, socio–occupational and family circumstances) and include more representative samples to strengthen the external validity of the findings.

Conclusion

In conclusion, higher psychological inflexibility is associated with poorer sleep quality, a greater number of sleep–related problems, and a tendency toward evening–type sleep patterns —often linked to additional behavioral and health issues. These findings underscore the potential for interventions aimed at reducing experiential avoidance, cognitive fusion, and attentional rigidity, which constitute core features of psychological inflexibility and may, in turn, improve sleep outcomes.

Ethics

Ethics Committee Approval: All procedures were conducted following the ethical standards of the institutional and national research committees and with the 1975 Helsinki Declaration, as revised in 2013. This research was approved by the Andalusian Ethics Committee of Biomedical Research (Evaluation Committee of Huelva. Internal code: 0423–N–23, date: 20.06.2023, Act: 06/23).

Informed Consent: Informed consent was obtained from all individual participants included in the study.

Footnotes

Authorship Contributions

Surgical and Medical Practices: F.A., A.L.F, A.S.P., J.D.A., Concept: F.A., J.D.A., Design: F.A., A.L.F, J.D.A., Data Collection or Processing: F.A., A.L.F, A.S.P., J.D.A., Analysis or Interpretation: F.A., A.L.F, A.S.P., J.D.A., Literature Search: F.A., A.L.F, A.S.P., J.D.A., Writing: F.A., A.L.F, A.S.P., J.D.A.

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