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# RELATIONSHIP BETWEEN LONELINESS AND ATTENTION COMPONENTS IN RELATION TO MORNING OR EVENING CHRONOTYPES

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## Abstract

Chronotype, an individual's natural inclination toward specific sleep-wake patterns, reflects biological rhythms influenced by factors such as age, environment, and societal norms. Research links chronotype to various cognitive and emotional aspects, yet its combined effect on attention and loneliness remains unexplored. This study examines the relationships between chronotype, attention, and loneliness, focusing on three attention components assessed by the Attention Network Test (ANT): alerting (maintaining readiness to respond), orienting (shifting attention to a target), and executive control (resolving conflicting information). To this end, A sample of 122 right-handed participants, aged 34-55, completed the Morningness-Eveningness Questionnaire, the UCLA Loneliness Scale, and the ANT. Results revealed a negative correlation between chronotype and loneliness, with evening types reporting higher loneliness levels. Surprisingly, morning chronotypes exhibited poorer executive control performance compared to evening types. While loneliness was not directly associated with attention, a moderation effect emerged in the orienting component, where morning types with low loneliness showed slower orienting performance. These findings underscore the interplay between biological rhythms, emotional states, and cognitive processes, suggesting tailored interventions addressing chronotype and loneliness. Future research should explore these dynamics across diverse populations to inform targeted strategies for improving mental and emotional health.

***Keywords:*** *Chronotype, attention, loneliness.*

## 1. Introduction and objectives

Chronotype, which refers to an individual's natural sleep-wake cycle preference, significantly affects cognitive and emotional functioning, influencing peak alertness and efficiency throughout the day (Zou et al., 2022). While morning chronotypes generally align well with societal norms and structured schedules, evening chronotypes often experience misalignment, leading to adverse cognitive and emotional consequences (Valdez, 2019). Research has established links between chronotype and both attentional performance (Valdez et al., 2012) and loneliness (Luhmann & Hawkley, 2016) independently; however, their combined impact remains unexplored.

Loneliness is a psychological state resulting from a perceived lack of meaningful social connections, which has been linked to cognitive inefficiencies and attentional biases (Cacioppo & Hawkley, 2009). The cognitive framework of loneliness suggests that socially disconnected individuals exhibit heightened vigilance toward negative stimuli, affecting their ability to allocate attentional resources effectively (Cacioppo et al., 2016). However, despite these theoretical assumptions, empirical evidence linking loneliness to distinct attentional components—alerting, orienting, and executive control—remains limited.

This study was aimed to examine the relationships between chronotype, attentional performance, and loneliness. Specifically, it investigates whether loneliness moderates the relationship between chronotype and attentional performance. It was hypothesized that morning chronotypes will exhibit better attentional performance compared to evening, that evening chronotypes will report higher levels of loneliness, and that loneliness will be associated with poorer performance in all three attentional components. Furthermore, it is hypothesized that loneliness will moderate the relationship between chronotype and attention, with the difference between morning and evening types being most accentuated among not-lonely individuals.

## 2. Method

A total of 122 right-handed participants, aged 34 to 55 years (*M*=42.9, *SD*=5.29), were recruited via an online platform (Testable.org). Only native English speakers were included in the study. Participants completed a battery of cognitive and self-report assessments, specifically the Morningness-Eveningness Questionnaire (MEQ; Terman et al., 2001) to classify their chronotype, the UCLA Loneliness Scale (Russel, 1996) to evaluate their subjective loneliness levels, and the Attention Network Test (ANT; Fan et al., 2002) to assess their attentional performance. The ANT provided measures of alerting, orienting, and executive control by analyzing reaction times under different cueing and flanker conditions. The study employed a cross-sectional correlational design. Data was analyzed using ANOVA, multiple regression, and moderation analysis through PROCESS for JASP.

## 3. Results

The analysis revealed a significant negative correlation between chronotype and loneliness, indicating that individuals with an evening chronotype were more likely to report higher loneliness levels. In terms of attentional performance, results unexpectedly showed that morning chronotypes demonstrated poorer executive control compared to evening chronotypes. Loneliness was not associated with attentional performance. Further analysis using path modeling revealed that loneliness moderated the relationship between chronotype and orienting attention. Specifically, morning chronotypes with low loneliness levels exhibited reverse orienting performance—indicative of inhibition of return—while this effect was absent at moderate and high loneliness levels.

## 4. Discussion and conclusions

The findings of this study provide new insights into the complex relationship between chronotype, loneliness, and attentional performance. The observed negative correlation between chronotype and loneliness suggests that evening chronotypes are particularly vulnerable to social isolation. This could be attributed to their reduced engagement in morning-oriented social activities and increased difficulty in synchronizing with conventional work and school schedules. The moderation analysis demonstrated that, as expected, not-lonely morning individuals exhibited an adaptive control over attention orienting. This was expressed in their inhibition of return, which may be interpreted as a more efficient allocation of attention resources. This pattern was not evident among not-lonely evening types or among lonely individuals (regardless of their chronotype). Our findings challenge the notion that loneliness impedes attentional control. Moreover, this study stresses the importance of considering individual characteristics as chronotype in future studies of loneliness and attention.

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