

## Research Paper

## The Comparison of Executive Functions, Risk Behaviors, and Academic Motivation Among Adolescents With Chronology Type Morningness and Eveningness

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**ABSTRACT****Objectives** This research was conducted with the goal of comparison of executive functions, risk behaviors, and academic motivation among adolescents with chronology type morningness and eveningness.**Methods** This is a comparative study in a population of high school students in Isfahan in 2014-15 academic year. Accessible sampling was used as a sampling method in two phases. In the first phase 320 students were selected, and in the second phase, 106 students with different chronology types were chosen as a final sample. The data gathered by using Horne and Östberg's Morningness-eveningness questionnaire, Mohammadi and his colleagues' Iranian Adolescents Risk Scale, Abdekhodae's Achievement motivation questionnaire, and Wisconsin card sorting test. Independent samples t test and Mann-Whitney U test were employed for analyzing data using SPSS-21.**Results** Significant relationship was found between two aspects of executive functions containing preservation error and incorrect answers responses, and chronology types ( $P < 0.05$ ), whereas no significant relationship existed in other aspects. In addition, morningness and eveningness chronology types were significantly different among adolescents in terms of risky behaviors and academic motivation ( $P < 0.05$ ).**Conclusion** The adolescents with morningness chronology type performed better in executive function and academic motivation in comparison with eveningness type and had lower risky behaviors.**Key words:**

Chronology as topic, Executive functions, Risky behaviors, Academic motivation

**Extended Abstract****1. Introduction**

**C**hronotype refers to the individual differences in bio-rhythms that induced to differences in bio and psychological functions [1]. Bio-rhythms can be divided into morningness and eveningness chronotypes [2]. Adolescence is an important period to learn social skills, maintain healthy interpersonal relations, and awareness of life meaning [8].

The psychological status of adolescents is not stable, and most of the behavioral problems occur at this stage [9]. The executive functions are neurological structures that are important to psychological functions such as consciousness and thinking [13]. It has been observed that changes in the chronotype of adolescents lead to lack of coordination and inconsistencies with school conditions and affect executive functions in some of the activities related to academic performance [18]. In comparison with other age groups, adolescents are more prone to risky behaviors. Manifestations

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of these behaviors increase in middle adolescence stage and decrease in late adolescence stage [19].

One of the factors of academic problems is academic motivation [28]. Motivation is a common concept of educational systems [29]. The study of high-risk behaviors in terms of the consequences for life, health, psychological and social development of adolescents such as mental and psychological disorders, including depression, illness, and even death [20], AIDS and sexual diseases [21], dropout, school escape, academic and occupation failure [22], and involvement in various offenses is of great significance. Drug use, violence, and sexual behaviors are responsible for many deaths in adolescence and early adulthood [23]. This study was undertaken with the goal to compare executive functions, risk behaviors, and academic motivation among adolescents with morningness and eveningness chronology types.

## 2. Method

The research plan was a comparative study and population was high school students in Isfahan in the academic year 2014-15. Accessible sampling was used as a sampling method in two phases. In the first phase, 320 students were selected from the population. Sample selection was done in coordination with the Department of Education, Isfahan. Then, one of the education districts from Isfahan was selected. After identifying the schools, the date and time of attending schools were decided in consultation with the school administrators. We collected the data using Horne and Östberg's Morningness-Eveningness Questionnaire (1976), Mohammadi et al. Scale of Iranian Adolescents Risk, Abdekhodae's Achievement Motivation Questionnaire, and Wisconsin Card Sorting Test.

The students whose scores were in the range of 41-58 in Morningness-Eveningness Questionnaire were eliminated from the study. In the final sample, 106 students were included in the morningness chronotype (scores in the range of 59-86) and eveningness chronotypes (scores in the range of 16-41). The participants were fully aware of the study's objectives and participated on their own will. The participants were allowed to leave the project at any time. Inclusion criterion to participate in the test were being high-school students, and exclusion criteria consisted of failure to answer the questions and diagnosis of epilepsy. Data obtained from the study firstly were analyzed using SPSS 21 software by descriptive statistics, inferential analysis (after study of normality with Kolmogorov-Smirnov test), and equality of variances (with Levene test) presumptions) including independent-samples t test and Mann-Whitney U test.

## 3. Results

We observed no significant differences in demographics variables between the two groups, so we did not need to control them. Difference between the two aspects of executive functions and chronology types appeared significant ( $P < 0.05$ ). No discernible difference was found in other aspects. Further, among adolescents, significant difference was found between morningness and eveningness chronology types with regard to risky behaviors and academic motivation ( $P < 0.05$ ). No significant difference was observed in any other variables.

## 4. Discussion

This research was conducted with the goal of comparing executive functions, risk behaviors, and academic motivation among adolescents with morningness and eveningness chronology types. Obtained results are discussed in the following. The results obtained for time types and executive functions showed that there was a significant difference in the dimensions of executive functions (perseveration and inadequate responses) between the two groups. In fact, perseveration and inadequate responses are likely to be more at eveningness type adolescents. Executive functions may be compromised at school in the morning. The adolescents tested in this study at a desirable time performed better than those who were tested at an undesirable time.

Researchers have described different functions for sleep. When people are asleep, their brains are active; this activity is necessary for all body functions such as memory enhancement, learning, cognitive development, mental health, immune function, and physical growth and recovery. It is noteworthy that sleep plays an important role in people's daily activities. Given that sleep-awakening rhythms and activity-rest of the eveningness type are delayed in those with morningness type, eveningness type people sleep late and wake up late in the morning and compensate for their sleep deprivation. But for teenagers of the eveningness type, this lack of sleep is less compensated during the school.

The results for time types and high-risk behaviors indicated that there was a significant difference between adolescents of morningness and eveningness in terms of high-risk behaviors and the dimensions of high-risk behaviors (e.g. drug, alcohol, cigarette, violence, sexual relations with the opposite sex, and dangerous driving). In fact, high-risk behaviors are higher in adolescents of the eveningness type. Types of morningness are likely to be futuristic, and as a result, they will look at the consequences of their behavior in the future; while the eveningness types tend to enjoy the present time and they

are more eager to experience the instant pleasure [27]. It can be argued that compared with morningness people, eveningness ones are more prone to consume alcohol and smoke cigarettes to compensate for and eliminate drowsiness since they have more sleep, emotional, and behavioral problems during the week and weekends.

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### **Conflict of Interest**

The authors declared no conflicts of interest.