



Original Article

Association between morningness–eveningness and the severity of compulsive Internet use: the moderating role of gender and parenting style



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ABSTRACT

Background: Eveningness and Internet addiction are major concerns in adolescence and young adulthood. We investigated the relationship between morningness–eveningness and compulsive Internet use in young adults and explored the moderating effects of perceived parenting styles and family support on such relationships.

Methods: The participants consisted of 2731 incoming college students (men, 52.4%; mean age, 19.4 ± 3.6 years) from a National University in Taiwan. Each participant completed the questionnaires, which included the Morningness–Eveningness Scale (MES), the Yale-Brown Obsessive Compulsive Scale modified for Internet use (YBOCS-IU), the Parental Bonding Instrument for parenting style, the Family Adaptation, Partnership, Growth, Affection, and Resolve questionnaire (APGAR) for perceived family support, and the Adult Self-Report Inventory-4 (ASRI-4) for psychopathology. The morning ($n = 459$), intermediate ($n = 1878$), and evening ($n = 394$) groups were operationally defined by the MES t scores.

Results: The results showed that eveningness was associated with greater weekend sleep compensation, increased compulsive Internet use, more anxiety, poorer parenting styles, and less family support; additionally, the most associated variables for increased compulsive Internet use were the tendency of eveningness, male gender, more anxiety symptoms, less maternal affection/care, and a lower level of perceived family support. The negative association between the morning type and compulsive Internet use severity escalated with increased maternal affection/care and decreased with increased perceived family support. The positive association between the evening type and compulsive Internet use severity declined with increased maternal protection. However, the father's parenting style did not influence the relationship between morningness–eveningness and compulsive Internet use severity.

Conclusions: Our findings imply that sleep schedule and the parental and family process should be part of specific measures for prevention and intervention of compulsive Internet use.

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1. Introduction

Use of the Internet continues to rapidly spread across child to adult populations all over the world [1], particularly in Far Eastern countries [2,3]. Internet use, in which an individual's inability to control his or her use of the Internet causing marked personal distress or functional impairment, has been described in the literature as “Internet addiction” [4] and “compulsive Internet use” [5] based on the Diagnostic and Statistical Manual of Mental Disorders

(DSM-IV) definition for substance dependence and pathologic gambling, respectively [4,6]. Compulsive Internet use may cause wide-ranging negative consequences in an individual's life. Pathologic Internet use can result in individuals spending increasing amounts of time in online activities, leading to social withdrawal [7], poor diet [8], and family problems [9]. Compulsive Internet use also is commonly associated with hostility [10], depression [11], anxiety disorders [12], and increased use of alcohol and tobacco [13]. One of the most serious problems associated with compulsive use of the Internet is disturbed sleep–wake patterns, as sleep is particularly important for learning and memory [1] as well as for regulation of emotion [14], attention [15], and behaviors [16,17]. An epidemiologic survey showed that the Internet usage itself and also screen time affected sleep [18], and a physiologic

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study specified that blue light-emitting diodes influenced the circadian system [19].

Late night use of the Internet also can cause sleep deprivation and fatigue, which can adversely affect daily routine and school performance [20]. Therefore, eveningness is a major concern of parents and teachers in adolescence and young adulthood [21]. Studies have shown that eveningness is strongly associated with school grade levels from childhood to adolescence [22], with emotional and behavioral problems in adolescents [23] and psychopathology in young adults [24,25]. It has been hypothesized that eveningness also may be associated with prolonged and developmentally inappropriate use of the Internet [26].

Students who spent more time using the Internet tended to sleep later [16] and had increased levels of tiredness [27]. Adolescents who engaged in Internet overuse presented more excessive daytime sleepiness with declined school performance [28–31]. The environmental factors, such as decreased parental monitoring [32], impaired parent-child relationships [33], family dysfunction [34], heavy homework load [34–36], overscheduled extracurricular activities [37], and availability of electronic media [31], may affect adolescent's sleep schedules. Our previous studies have shown that factors such as being a boy, being part of a family in which the parent was in less control of his or her child's daily schedules, and being moody were associated with the evening type among children and young adolescents [22,38]. Furthermore, eveningness may be an indicator for adolescents with behavioral and emotional problems [23], especially substance use [39].

Although the literature documents male predominance in the eveningness type and compulsive Internet use and some evidence that parent and family measures may be separately associated with morningness-eveningness and compulsive Internet use, neither study has investigated the relationship between morningness-eveningness and compulsive Internet use or has tested if gender and parent and family measures moderate such a relationship. As the first study to examine the relationship between morningness-eveningness and compulsive Internet use, our research questions were: (1) are eveningness and compulsive Internet use associated with male gender, less family support, and inappropriate parenting? (2) is there an association between morningness-eveningness and Internet use after controlling demographics and parent and family measures? and (3) does gender, family support, and maternal parenting moderate the relationship between morningness-eveningness and Internet use? We hypothesized that young adults who displayed eveningness would be more likely to engage in compulsive Internet use, which would be related to less family support, less parental affection, and more parental overprotection and control.

2. Materials and methods

2.1. Participants

The participants consisted of 2731 incoming college students (1431 men, 52.4%; mean age, 19.4 years; standard deviation, 3.6 years) recruited from a National University in Northern Taiwan. The Research Ethics Committee of the National Taiwan University Hospital approved the study prior to implementation. A research invitation letter was mailed by the university to the newly accepted students. The students were informed that participation in the survey was completely voluntary, and the issue of confidentiality was assured. There was no information regarding the proportion of eligible students who received the letter. The school counselors provided clear instructions on self-administration to the students, who subsequently completed the questionnaire in a designed classroom. Trained research assistants then checked the questionnaires to minimize the missing data.

2.2. Measures

2.2.1. The Yale-Brown Obsessive Compulsive Scale for Internet use

The Yale-Brown Obsessive Compulsive Scale for Internet use (YBOCS-IU) was modified from the Yale-Brown Obsessive Compulsive Scale (YBOCS) [40,41]. The YBOCS includes a five-item obsessive subscale assessing obsessive thoughts and a five-item compulsive subscale assessing compulsive behavior toward Internet use. The obsessive subscale includes (1) time occupied by Internet-related thoughts, (2) interference due to Internet-related thoughts, (3) distress associated with Internet-related thoughts, (4) resistance against Internet-related thoughts, and (5) degree of control over Internet-related thoughts. The compulsive subscale includes (1) time spent Internet use behaviors, (2) interference due to Internet use, (3) distress associated with Internet use, (4) resistance against Internet use, and (5) degree of control over of Internet use. Each item was rated on a 5-point scale (0–4), with a maximum score of 40 [42]. The scores of 0–7, 8–15, and ≥ 16 were defined as a subclinical, mild, and moderate to severe degree of symptoms, respectively [42].

The YBOCS was translated into Chinese and modified to assess the severity of heavy drinking [43] for alcoholism research in Taiwan and was modified to assess the severity of Internet use. Using a sample of 72 young adults aged 18–24 years, the reliability of the Chinese version of the YBOCS-IU was high (intraclass correlations, 0.882 and 0.885; and Pearson product moment correlation coefficients, 0.689 and 0.734 for obsessive thoughts and compulsive behaviors, respectively). The internal consistency of the obsessive (Cronbach $\alpha = 0.958$) and compulsive (Cronbach $\alpha = 0.957$) dimensions in a sample of 1728 young adults aged 18–24 years was high.

2.2.2. Adult version of the Morningness-Eveningness Scale

The adult version of the Morningness-Eveningness Scale (MES), translated from the version of the MES by Smith et al. [44] is a 13-item scale, with a total score ranging from 10 to 43. A higher score indicates a tendency to be the morning type, whereas a lower score indicates a tendency to be evening type. The raw score of the MES was transformed into a *t* score using the norms established in our previous study [45]. Three groups were created based on the *t* score distribution of the MES (*t* score >60 for the morning group [$n = 459$]; *t* score ranging from 40 to 60 for the intermediate group [$n = 1878$]; and *t* score <40 for the evening group [$n = 394$]) [39].

2.2.3. Adult Self-Report Inventory-4 (ASRI-4)

The Adult Self-Report Inventory-4 (ASRI-4) is a 136-item self-reported DSM-IV-referenced rating scale [46] examining a broad range of current or lifetime symptoms of DSM-IV diagnoses. The Chinese translation of the ASRI-4 was prepared with culturally relevant colloquial expressions by Chien et al. [47] with the performance of a two-way translation, ensuring satisfactory linguistic and content validity. For the rating, each item was assigned to one of four responses (0 = never, 1 = sometimes, 2 = often, 3 = very often). The Chinese ASRI-4 has been used to assess the DSM-IV psychopathology in epidemiologic [47,48] and clinical [49] studies in Taiwan. We included a sum score of generalized anxiety disorder, specific phobia, agoraphobia, and panic attacks derived from the ASRI-4 to represent anxiety symptoms, which were included in multivariate analysis as a covariate.

2.2.4. Parental Bonding Instrument

The Parental Bonding Instrument is a 25-item instrument (item rated on a four-point Likert scale from very likely to very unlikely), measuring the father's and mother's behaviors and attitudes toward their child during the child's first 16 years of life [50]. Two principle dimensions, affectionate/care (12 items) and protection (labeled as overprotection, 13 items), were derived from Parker

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