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Morningness–eveningness preference and eating disorders

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ABSTRACT

The aim of this work was to attempt to clarify the relationship between eveningness preferences and eating behaviour. In a survey a sample of 270 females (146 recruited in a treatment centre for eating disorders and 124 control) was administered the reduced version of the morningness–eveningness questionnaire (MEQr) and the eating disorder inventory 2 (EDI-2). A significant higher percentage of evening-type in patient versus control group was observed. About 46 patients who participated in the survey were enrolled in a further prospective study. A significant regression of symptomatology as scored by EDI-2 corresponded to a significant increase in MEQr scores (i.e. shift towards morningness). We concluded that altered eating behaviours could modulate circadian preference. The results are discussed in relation to possible applications for clinical treatment.

1. Introduction

Most biological and behavioural parameters present a rhythmicity synchronised with the light–dark environmental cycle (24-h period or circadian rhythm). Their endogenous origin has been proven to the extent that they continue to present the same behavioural patterns even when there is no environmental input (Wehr, 1996).

However, people living under the same environmental conditions and with similar daily activities present rhythmic variations that differ according to the parameters considered. It has been shown that there are individual differences that affect the expression of circadian rhythms. One of the most robust individual difference is the morningness–eveningness preference or circadian typology (morning-, intermediate-, and evening-type), which seems to be based on endogenous rhythmic control (Kerkhof & Van Dongen, 1996). Systematic investigations in chronobiology and chronopsychology have extensively described the differences between extreme groups in circadian rhythmicity. Morning-types display a phase advance in the peak of body temperature (121 min) and alertness (171 min), and in the sleep–wake cycle (80 min) and performance (from 1 to 6 h depending on the type of task) compared with evening types (Kerkhof, 1985; Tankova, Adan, & Buela-Casal, 1994).

Circadian typology might reflect an underlying difference in the synchronisation of the biological clock with the environment (Natale & Adan, 1999). The morning-type pattern is more synchronised or entrained with environmental (e.g. light–dark cycle) Zeitgeber (i.e. forcing environmental oscillation which entrains a biological self-sustaining rhythm) than the evening type. Moreover, females often appear to be skewed toward a morningness pattern when they are compared to males (Adan & Natale, 2002; Randler, 2007). Morningness–eveningness preference is not a fixed feature but can change during the span of an individual's life. Morning preference is more frequent until 10 years and after 50 years (Roenneberg et al., 2004). Nevertheless, scientists have encountered substantial difficulties in attempting to give an exhaustive explanation of morningness–eveningness preference. Thus, it remains to clarify whether the development of circadian rhythms is determined mainly by biological (Katzenberg et al., 1998), environmental (Natale, Adan, & Chotai, 2002) or cultural factors (Caci et al., 2005; Shinomiya, Takeuchi, Martoni, Natale, & Harada, 2004).

A greater tendency towards eveningness has been observed in different behavioural disorders: bipolar disorder (Hakkarainen et al., 2003), depression (Chelminski, Ferraro, Petros, & Plaud, 1999; Drennan, Klauber, Kripke, & Goyette, 1991), drug addiction (Adan, 1994), impulsivity (Caci, Robert, & Boyer, 2004), and seasonal depression (Johansson et al., 2003,2004; Murray, Allen, & Trinder, 2003; Natale, Adan, & Scapellato, 2005). It is still not clear if eveningness in itself might reflect a premorbid trait or an aspecific risk factor for behavioural diseases (Chelminski et al., 1999) or, rather, if the misalignment amongst biological clock and other rhythms,

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such as social (social jet-lag – Roenneberg, Wirz-Justice, & Merrow, 2003), plays an important role in modulating psychological well-being (Natale et al., 2005).

A possible relationship between eveningness preference and eating disorders has also been suggested (Kasov, 2001; Tortorella, Monteleone, Martiadis, Perris, & Maj, 2007). The tendency to eat in the evening is more prevalent amongst individuals who binge frequently than amongst weight-matched controls (Greeno, Wing, & Marcus, 1995; Rand, Macgregor, & Stunkard, 1997). Both binge and purging are substantially more probable in the evening than during the day, independently from setting, occupation, and day of the week (Johnson, Schlundt, Barclay, Carr-Nangle, & Engler, 1995; Mitchell, Pyle, & Fletcher, 1991). In other words eveningness should increase the probability of binging and purging, increasing the number of waking hours spent during the evening versus day. Binging and purging, therefore should occur more frequently in people biased more towards eveningness than morningness.

This hypothesis is consistent with a study by Latzer, Tzischinsky, Epstein, Kklein, and Lavie (1999), who used ambulatory actigraphic monitoring to assess sleep–wake patterns in bulimic patients and control participants. Although the two groups did not differ in total sleep time or in sleep quality indexes (like sleep latency, sleep efficiency, and motor activity) the bulimic patient's mean time of sleep onset and awaking were approximately 1 h later than those of control participants.

The possible link between circadian typology and eating behaviours could be supported both by biological and personality factors. In the past 10 years, strong evidence has accumulated showing that timing of sleep can be genetically determined (Archer et al., 2003; Katzenberg et al., 1998). Eating disorders are characterised by a disruption of circadian feeding pattern as well as by alterations in the circadian rhythms of hormone release. Those, a possible role of gene polymorphism in the biological vulnerability to eating disorders may by suggested (Tortorella et al., 2007). In the same way many investigations have shown that extreme circadian typology groups significantly differ in cognitive styles (Fabbri, Antonietti, Giorgetti, Tonetti, & Natale, 2007) and personality traits (Cavallera & Giudici, 2008; Diaz-Morales, 2007). The individual profile describes a morning type as who processes information using consolidated schema and considering social norms and rules. On the contrary, the evening-type profile describes a person who processes information through emotional parameters, who builds new and original schema, and is highly creative but lacks of self-confidence in social relationships. Eveningness is positively correlated to novelty seeking, whereas it was negatively correlated to conscientiousness. Consequently, evening types have a less healthy lifestyle than morning types (Adan, Fabbri, Natale, & Prat, 2006; Taillard, Philip, Chastang, Diefenbach, & Bioulac, 2001). Even if a specific personality profile relative to eating disorders does not exist (Claes et al., 2006; Lilenfeld, Wonderlich, Riso, Crosby, & Mitchell, 2006), the above mentioned personality features could support the prevision of a high correlation between eveningness and eating disorders.

The aim of the present study was to analyse the relationship between eating disorders and eveningness in a survey (including both patient and control subjects) and in a prospective research (analyzing eating symptomatology and eveningness in patient with eating disorders along the firsts 6 months of the psychotherapeutic treatment).

2. Survey

To avoid confusing premorbid traits/characteristics with actual symptoms of eating disorders, we chose to perform a survey including a sample of patients with eating disorders and a sample of control participants. If eveningness were really related to altered eating behaviour, we would expect to see scores compatible with eating disorders in evening versus morning types in both samples. In contrast, if the altered eating behaviour acted like a Zeitgeber, we would expect to find a higher percentage of eveningness types in the clinical versus control sample. On account of the novelty of this research, we used a questionnaire to evaluate overall eating behaviour.

2.1. Method

2.1.1. Participants

One hundred forty-six female patients (age = 31.23 ± 11.34 - years; range: 18–44) suffering from eating disorders were recruited for the study from the Gruber Centre, Treatment Centre for Eating Disorders, prior to treatment. According to criteria outlined in the 4th edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1994) of the 146 participants 48 were affected by bulimia nervosa, 41 by anorexia nervosa, and 57 by binge eating disorders. Patients suffering from psychiatric comorbidity or taking psychotropic medications were excluded from the survey.

A total of 124 female subjects (age = 31.98 ± 10.31 years; range: 18–44) with no psychiatric history were used as control group.

All participants provided written informed consent.

2.1.2. Procedure and measures

Each subject completed two questionnaires: the Italian version of the morningness–eveningness questionnaires reduced (MEQr) (Natale, 1999), and the second Italian edition of the eating disorder inventory (EDI-2) (Rizzardi, Trombini, & Trombini Corazza, 1995).

The reduced version of MEQ (MEQr: Adan & Almirall, 1991), whose psychometric properties have been well assessed (Adan & Almirall, 1991; Chelminski, Petros, Plaud, & Ferraro, 2000; Natale, Esposito, Martoni, & Fabbri, 2006a; Natale et al., 2006b), was administered to identify circadian typology. The questionnaire comprised five questions derived from the original 19 items version by Horne and Ostberg (1976). Three questions were set to establish preferred morning wake-up, preferred evening bed time and the hour of day when peak personal efficiency is maximum. Respondents also had to evaluate the degree of tiredness within the first half hour after their awakening and to indicate which circadian type they thought they belonged to. A total score was obtained by summing scores of each question. Overall scores ranged from 4 to 25. Italian cut-off criteria (Natale, 1999) were used to label participants evening- (range 4–10), intermediate- (11–18) or morning-type (19–25) individuals.

EDI-2 (Garner, 1991) consists of 91 questions, divided into 11 dimensions: three specifically refer to eating behaviour (drive for thinness, Bulimia, and body dissatisfaction), the other eight to specific behavioural aspects correlated to eating disorders (ineffectiveness, perfectionism, interpersonal distrust, interoceptive awareness, maturity fears, asceticism, impulse regulation, and social insecurity).

2.2. Results

2.2.1. MEQr score

The MEQr scores ranged from 6 to 23 (mean = 14.75 ± 4.04) in the clinical sample and from 6 to 23 (mean = 15.01 ± 4.14) in the control sample. The frequency distribution of MEQr scores did not differ between the two samples (Kolmogorov–Smirnov). The mean MEQr score was significantly lower in the clinical sample ($t = 2.07$ and $p < .05$). No differences emerged when diagnostic subsamples