

Available online at www.sciencedirect.com



Personality and Individual Differences 42 (2007) 453-463

PERSONALITY AND INDIVIDUAL DIFFERENCES

www.elsevier.com/locate/paid

Morning and evening types and creative thinking

M. Giampietro *, G.M. Cavallera

Department of Psychology, University Cattolica del Sacro Cuore, Largo Gemelli, 1 20123 Milano, Italy

Received 9 August 2005; accepted 12 June 2006 Available online 6 October 2006

Abstract

This exploratory study investigates the relationship between morning and evening types and creative thinking as defined by Guilford's factorial hypothesis. The research was carried out on a sample of 120 subjects, 52 males and 68 females aged between 19 and 76. The data show that evening-disposition is correlated with the ability to apply divergent thinking strategies to visual content. There was no significant difference between men and women but many differences were found with respect to age group. These findings suggest the need for in-depth studies to investigate morning and evening types and their relationship with creative thinking.

© 2006 Elsevier Ltd. All rights reserved.

Keywords: Personality; Creativity; Morning-evening types; Circadian rhythms

1. Introduction

The morning type, also called "lark", wakes up early and refreshed, he is active in the morning and goes to bed early in the evening. Larks are considered conscientious, trustworthy and emotionally stable.

The evening type, or "owl", wakes up with difficulty and is still tired, he is inactive during the morning and stays awake late at night. Owls are described as creative, emotionally unstable and

E-mail address: marina.giampietro@unicatt.it (M. Giampietro).

^{*} Corresponding author. Fax: +39 (0) 2 72342280.

have difficult social and familial relations. While among morning types liveliness and good mood decrease along the day, the opposite pattern occurs with evening personalities. Nocturnal types show psychological and stress-bound disorders more frequently and intensely than diurnal types and they have more problematic environmental and social demands (Mecacci & Rocchetti, 1998). Evening types show greater behavioural troubles, low academic performances, higher stress rates in their family lives and more difficulties in social adaptation (Achilles, 2003). The relationship between the occurrence of cognitive failures and morning and evening dimensions has also been explored: among extreme morning types cognitive failures can occur especially during the evening hours, whereas in extreme evening types the occurrence of cognitive failures are uniformly distributed throughout the day (Mecacci, Righi, & Rocchetti, 2004).

Some physiological data sets concerning variability in circadian periodicity show the difference between morning and evening disposition. With regards to temperature, we observe that both types show an acrophase during the second part of the day: in morning types around 6:00 p.m. and in evening types around 8:00 p.m. (Horne & Östberg, 1976). Adernalin production (Patkai, 1971), electro-cortical activity, some cardiovascular parameters (Kerkhof, Willesme, Geest, Korving, & Rfietveld, 1980) and cortisol levels in saliva have higher values during the first hours of the day (Bailey & Heitkemper, 1991) among morning subjects. Specific hormones secretion is linked to the sleep—wake phases (e.g. growth hormone) while the renin—angiotensin—aldosterone system is correlated with REM sleep cycles. As already observed (Follenius, Krnauth, Saini, & Brandenberger, 1992), the time of waking up affects the secretion of aldosterone. A relationship between circadian and acrophase types was found too, counting melatonin rhythm which is significantly advanced in morning subjects (Gibertini, Graham, & Cook, 1999).

The inclination towards morning and evening types may vary throughout life. For people aged from 20 to 50, a small number of studies have pointed out the following percentages: 15% diurnal, 70% intermediate, 15% nocturnal – taking into consideration age and job differences (Ishihara, Miyake, Miyasita, & Miyata, 1992; Mecacci, Zani, Rocchetti, & Lucioli, 1986). Among university students we can observe an inclination towards evening disposition that accounts for 20–30%. The rhythmicity of the circadian system among people over 50 shifts increasingly towards the morning types (Åkerstedt & Torsvall, 1981).

As far as gender differences are concerned, different studies (Tankova, Adan, & Buela-Casal, 1994) have assessed an inclination towards morning-disposition among women although they did not reach statistical significance.

The two different types of personality emphasize different approaches concerning social relations (Cofer et al., 1999). Evening people often have greater difficulties at school, higher school failure rate, they are less open and interactive within the family, they have a low level of appetite in the morning and are not pro-active in getting ready for school. Furthermore evening types smoke and drink more coffee than morning types, especially during the evening. The only personality trait associated with caffeine intake is Venturesomeness; highly Venturesome people, as measured on I_7 (Eysenck, Pearson, Easting, & Allsopp, 1985) take less caffeine throughout the day and women usually drink more evening caffeine than men (Wilson, 1990).

Differences in the time or frequency of meals, in alcohol and caffeine consumption and in smoking habits were analyzed by Ishihara et al. (1985) on a sample of 1500 students of Japanese university using a Japanese version of the Horne and Östberg Questionnaire (Ishihara, Saitoh, Inoue, & Miyata, 1984) and the Life Habits Inventory. Significant differences between two groups,

morning and evening types, were found for all the examined habits (e.g. night meal, caffeine, smoke, alcohol). Evening types have frequent night meals, consume more caffeine and alcohol, and smoke more cigarettes than morning types. Concerning mealtimes there were no significant differences between the two types, however, 34.8% evening type students of the whole sample usually skipped breakfast, contrary to morning type students (only 5.5%).

Positive correlations were found between evening personality and rebellious, non-conformist and irresponsible behaviours tending to be unpredictable (McCutcheon, 1998). Cimbalo and Hughey (1986) discovered that evening types have some characteristics that associate them with Zuckerman's "sensation seekers"; subjects attracted by novelty and risk.

The ability to identify possible alternatives to codified rules as a characteristic of creative thinking led us to investigate possible relationships between evening-disposition and creativity.

Personality and mood and their relationship with the Horne and Östberg Morningness-Eveningness Questionnaire (1976) have been studied by Matthews (1988) who used the MEQ, 16PF (Cattell, Eber, & Tatsuoka, 1970), EPI (1964) and EPQ (1975) with a sample of three groups of subjects: 40 Cambridge University students, 60 University of Wales student and 100 Aston University students. He showed that MEQ scores were related to personality traits associated with trait anxiety in males and psychoticism in females and MEO score was related to extraversion only in females. For all subjects he showed that the strongest negative correlations between MEQ and 16PF were on radicalism and self-sentiment; however, a number of 16PF factors were significantly correlated with MEQ score in one sex only, notably: in males with Ego Strength (positively), Guilt Proneness and Ergic Tension (negatively), in females with Dominance, Surgency and Venturesomeness (negatively) and Superego Strength (positively). Data from the University of Wales sample showed that MEQ and Extraversion were significantly negatively correlated in females only (r = .-44; p < .05); MEQ was also significantly negatively correlated with Psychoticism (r = .-49; p < .001) for females. A direct comparison of EPI Impulsivity and Sociability as predictors of MEO score was carried out in the Aston university student group and showed a significant negative correlation only in the female group (Impulsivity: r = .-49; p < .001; Sociability: r = .-49; p < .001). The negative correlations between the MEQ score and Psychoticism suggests a more general association between mild psychopathology and Eveningness.

Wilson (1990) found that the correlation between Extraversion and Morningness reached positive significance (r=.23; p<.005), and between Psychoticism and Morningness negative significance (r=-.31; p<.005). Adan and Almirall (1990) made an adaptation and standardization of a Spanish version of the Horne and Östberg Morningness–Eveningness Questionnaire and pointed out that extraversion correlated negatively with Morningness (r=-0.163; p<.0001) and Neuroticism attained no significance. Monk et al. (1991) studied circadian and personality characteristics as measured by the Horne and Östberg Morningness–Eveningness Questionnaire, the Circadian Type Questionnaire by Folkard, Monk, and Lobban (1979) and the Eysenck Personality Inventory (EPI) by Eysenck and Eysenck (1964) and found that Neuroticism consistently failed to correlate with Morningness.

In a study by Larsen (1985) which examined 74 undergraduate students, Morningness as measured on the MEQ and Extraversion as measured on the EPQ were negatively correlated (r = -.27; p < .05); Morningness measured by the MEQ and Extraversion measured by the 16PF were negatively correlated at the same level. Sociability, as a subfactor of Extraversion, and Morningness were also examined in this study and were significantly correlated using the

Eysenck Personality Inventory (EPI) by Eysenck and Eysenck (1964) (r = -.23; p < .05), EASI III by Buss and Plomin (r = -.39; p < .01), and the 16PF by Cattell (r = -.29; p < .05).

Torsvall and Åkerstedt (1980) studied correlations between personality dimensions and Morningness–Eveningness using a short Morningness–Eveningness scale (DTS, Diurnal Type Scale) and the EPQ and observed a low but significant correlation between Morningness and Neuroticism (r = -.17; p < .01), while no correlation between Morningness and Extraversion was found.

In a research concerning the construction of a predictive test of adjustment to shift work by Folkard et al. (1979), Morningness measured by the Circadian Type Questionnaire (CTQ) and Extraversion measured by the EPI were negatively correlated (r = -.34; p < .02).

It has been shown (Mecacci et al., 1986) on the EPQ that compared to nocturnal types, diurnal types have higher scores on Neuroticism, while nocturnal types have higher Psychoticism scores.

Personality traits and their relationship with creativity have been reported in the recent literature, mainly with respect to the dimensions of neuroticism, psychoticism, extraversion, impulsivity, agreeableness, conscientiousness, openness to experience.

A study by Kwang and Rodrigues (2002) explored the relationship between two creative types (adaptors and innovators) and the Big Five personality traits (extraversion, agreeableness, conscientiousness, openness to experience and neuroticism). Adaptable persons were significantly more conscientious than innovators while the latter were significantly more extraverted and open to experience than adaptable persons.

The individual stylistic variations of creative potential and conceptual tempo were investigated by Broberg and Moran (1987) who found no difference between reflective and impulsive persons on the ideational fluency measure. However, greater originality scores were evidenced among fast/accurate and slow/inaccurate groups. The relationship between reflection-impulsivity and creativity was examined through a study on primary-school children with impaired and unimpaired hearing; respectively 26 and 16 children (8–13 years old). Anderson (1983) administered the Matching Familiar Figures Test and the Torrance Tests of Creative Thinking. Correlation coefficients were calculated to examine the relationship between impulsivity scores and four creativity dimensions (fluency, flexibility, elaboration, originality). For hearing children, as expected, more impulsive responding was generally associated with greater creativity. However, no significant relationships between creativity and impulsivity were found for the deaf Ss.

Eysenck (1983) reviews his own and others' findings on psychoticism, neuroticism, and introversion personality traits and their relationship with creativity and originality. Findings showed a correlation between artistic creativity and Introversion, Neurotic behaviour and higher scores on psychoticism. In a study by Wakefield and Goad (1981), creativity is discussed with Eysenck's personality theory. Creative persons are characterized by introversion, neuroticism, psychoticism, and moderate or high intelligence.

A study by Walker (1995) compared neurotic and depressive personality characteristics in autobiographies of creative achievers (n = 30) versus eminent but non-creative achievers (n = 18). California Q-Set ratings assessed the five personality factors of neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Creative achievers were rated significantly higher on neuroticism, depressive style, and impulsivity.

In our study, we referred to the factorial orienting by Guilford (1967), where creativity is defined as the ability to produce valuable solutions to problems in an innovative way.

According to Guilford when talking about creative thinking it is fundamental to make the distinction between convergent and divergent thinking. Within convergent thinking new information is consequentially produced responding to a precise situation and considering a correct or better answer. Divergent thinking provides multiple possibilities and freely produces new information. Through this way of thinking, according to Guilford, creativity is expressed. In divergent thinking fluidity of association and ideas, originality, flexibility, sensitivity towards new problems and ability to redefine and restructure involved elements play a crucial role.

The Torrance Creative Thinking Test (1989) is based on this theoretical construct and will be used in this study. The instrument was elaborated from the definition of creativity as a process. According to the author, the creative process is stimulated by sensitivity to problems, missing elements and discordance. It includes research and experiment of hypotheses regarding the nature of identified problems (Torrance, 1989).

Visual Series of the test were used; they evaluated, according to Guilford's model, the principal factors of creativity which have been proved to be independent: flexibility, fluidity, originality and elaboration.

Our hypothesis is that lower scores on r-MEQ and lower inclination towards morningness leads to a stronger creative disposition.

In this exploratory study, we have not considered variable "time of day" (e.g. the relationship between time of the day and creativity) which could be explored further by future research.

2. Method

2.1. Subjects

The sample was composed of 120 subjects, 52 (43.3%) men and 68 (56.7%) female. Their age was between 19 and 76 and the average age was 43. The subjects were divided into two age groups: 19–52 years old (79 ss; 65.8%); 53–76 years old (41 ss; 34.2%). This division was chosen with reference to different studies which showed that people tend towards the morningness dimension with increasing age (Mecacci et al., 1986; Wilson, 1990). Tankova et al. (1994) suggested that subjects who are over-fifty tend to be more morning-oriented. Other studies have analyzed the relationship between creativity and age in people over 52 years old (Creed, 2005; Helson, Roberts, & Agronick, 1995).

The participants of our study were volunteers living near Milan. Researchers administered the instruments in two laboratories of the Catholic University in Milan and the tests were given to all participants during the same session. The administration, distribution and collection of the material took approximately 50 minutes and the subjects were told to answer spontaneously.

2.2. Measures

2.2.1. Reduced Morningness–Eveningness Questionnaire (r-MEQ)

To evaluate the degree of morning disposition we used an Italian version of the reduced Morningness–Eveningness Questionnaire – r-MEQ (Natale, 1999) which is a self-report questionnaire

made of five questions. Questions one to three ask the subject to indicate on a 24 h time scale when they feel at their best; at what time they prefer to get up and at what time they prefer to go to bed. The remaining two questions are multiple choice: question four concerns the degree of tiredness perceived during the first half hour after waking on a Likert scale as follows: Very tired (1) – Fairly tired (2) – Fairly rested (3) – Very well rested (4). Question five asks the subject to indicate when he considers himself more active, in the morning or in the evening, on a scale as follows: Definitely more active in the morning (4); Slightly more active in the morning than in the evening (3); Slightly more active in the evening than in the morning (2); Definitely more active in the evening (1). In the Italian version morning subjects have been identified between a score range of 18 and 25, whereas intermediate subjects in score range 12–17 and evening subjects in score range 4–11.

Natale (1999) started with the reduced Spanish version of the MEQ by Adan and Almirall (1991) to construct this Italian version which retains good internal consistency (Cronbach' $\alpha = 0.71$); the correlation between the five items is positive (from 0.60 to 0.67) and the correlation coefficient between the MEQ and r-MEQ is significantly high (r = 0.90; p < 0.000). The reduced scale of the Morningness–Eveningness Questionnaire has proved to be a satisfactory and quick instrument both psychometrically and practically speaking.

2.2.2. Torrance Test of Creative Thinking (TTCT)

Creative thinking was evaluated by the Torrance Test of Creative Thinking (TTCT), Visual Series, Form A which is part of a test set that evaluates creative thinking by verbal and visual tests. The visual series refer particularly to visual content. The instrument consists of three activities and the creative thinking factors evaluated on the basis of theoretical concepts are: flexibility, fluidity, originality and elaboration.

Fluidity can be defined as the ability to conceive many ideas, hypotheses and memories without focusing on the quality; this flow of thoughts happens to increase the availability of potentially useful elements in problem solving. Flexibility defines a thinking pattern that allows an easy exchange of ideas, conceiving strategies and that the ability to pass from one scheme to another, from one category to another and from one chain of ideas to another. Statistically, the ability to find unusual and rare answers is an expression of the Originality factor.

Elaboration consists of the ability to further develop a concept by adding new elements aiming to put it in a distinct and communicable form. Sensitivity to problems means the ability to grasp various aspects of a problem and thus to establish new links.

The first activity of the test is called "Build a picture". The subject is first asked to draw a picture using a round figure that was previously shown by the experimenter and then asked to give a title to it. This test examines the tendency to find a purpose for something that has no actual use and which is then elaborated in a way for which it eventually becomes communicable, in this way, it is an aspect of creative thinking. The second activity is called "Incomplete shapes": there are ten incomplete shapes made of straight and curved lines and the subject is asked to add more lines in order to change them into pictures to which s/he must give a title afterwards. The third activity called "Lines" consists of thirty pairs of vertical lines. The parallel lines are open shapes and therefore, this activity refers also to a closure tendency. Each of the three activities is scored on Originality and Elaboration factors, while the "Build a picture" and "Lines" tests are scored on Fluidity and Flexibility too. "Build a picture" is also scored on Originality of the title given

to the shapes and on Elaboration with respect to elements like shadows, colours and details. Using the same process "Incomplete shapes" is scored on Originality and Elaboration factors, for Fluidity we referred to the whole number of shapes that were completed and for Flexibility we referred to the whole number of categories that link with given answers. For "Lines", we used the same method concerning Originality, Elaboration and Flexibility but for Fluidity we subtracted irrelevant answers from the whole set. We considered high variable scores as indicators of high dimensions within the variable itself.

3. Results

Table 1 reports frequency distribution for r-MEQ scores on the whole sample (M = 15.1, SD = 2.9).

The distribution of the composite ranges between 6 and 20 (possible range is 4–25). High scores indicate a high degree of morningness.

Using One-Way ANOVA we found no significant difference between females (M = 15.2, SD = 2.9) and males (M = 14.96, SD = 2.8) though we did find a significant difference between subjects aged 19–52 (M = 14.6, SD = 2.8) and subjects over 52 (M = 16.1, SD = 2.8). Subjects from the first age group obtained significantly lower scores compared to those of the second age group ($F_{1-118} = 7.773$; p < .05).

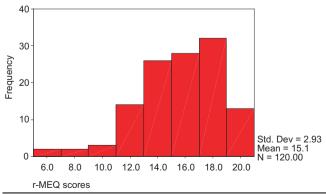
According to the r-MEQ by Natale's cut-off scores, subjects were divided into three categories: evening types (14, 11.6%) intermediate types (80, 66.1%) and morning types (26, 22.3%).

We analyzed the relationship between r-MEQ types and TTCT scores using One-Way ANOVA.

We used T scores for TTCT (see the results in Table 2).

Concerning Originality scores there were statistical differences between subjects with an evening disposition and subjects with a morning disposition: as shown by the Tukey post-hoc test evening personalities having significantly higher scores ($F_{2-119} = 3.082$; p < .05).





T Fluidity scores T Flexibility scores T Originality scores T Elaboration scores 78.57* Eveningness types Mean 60.36 59.29 53.57 Subjects 14 14 14 14 SD 21.96 20.36 15.74 14.86 Intermediate types Mean 56.75 56.00 70.19 50.68 Subjects 80 80 80 80 SD 18.16 17.36 18.69 17.29 Morningness types Mean 50.57 49.42 63.46* 43.85 Subjects 26 26 26 16.02 16.32 19.63 12.19 SD 54.95 49.54 Total Mean 55.83 69.70 Subjects 120 120 120 120

Table 2
ANOVA between r-MEQ types and TTCT scores

SD

18.29

Even though there were no statistical differences among other categories we may emphasize that evening types have higher scores on all creativity dimensions.

18.92

16.24

17.63

We calculated a Factorial ANOVA (GLM Unvaried) to evaluate the interactive effect of the independent variables of gender and age on the relation between r-MEQ types and TTCT scores but these analyses did not reveal a significant main effect of the creativity categories.

The correlation between r-MEQ scores and TTCT scores was further clarified with the calculation of the Pearson *r* correlation co-efficient (Table 3).

Considering the whole sample there was a significant negative correlation between morning disposition and creativity scores for the Originality factor (r = -181; p < .05).

With respect to age, subjects over 52 showed a negative correlation between morning disposition and creative dimensions referring to Fluidity (r = -457; p < .01), Flexibility (r = -442; p < .01) and Originality (r = -310; p < .05).

Considering gender, there were no significant correlations between morning disposition and creativity scores.

Table 3 Pearson product-moment correlation coefficients computed between r-MEQ scores and TTCT scores for the whole group (n = 120), for females (n = 68), for males (n = 52), for subsample aged 19–52 (n = 79), and for the subsample over 52 (n = 41)

	Fluidity	Flexibility	Originality	Elaboration
r-MEQ				
N	076	118	−.181 ^a	107
Age 19-52	.116	.057	072	.011
Age over 52	$457^{\rm b}$	442^{b}	310^{a}	176
Males	245	268	246	219
Females	.068	.009	121	.016

^a The correlation is significant at level 0.05 (2-code).

^{*} $p \le 0.05$.

^b Correlation is significant at a level of 0.01 (2-code).

4. Discussion

The general hypothesis predicted a negative correlation between scores on morningness—eveningness personalities and creative thinking evaluated by Torrance's Test of Creative Thinking, Visual form.

Although exploratory, these data are nevertheless promising.

Subjects inclining towards the nocturnal dimension had higher scores in those components of creative thinking such as fluidity, flexibility and originality.

We may suppose that evening types tend to conceive many ideas, hypotheses and memories and that allows them to easily change their conceptual strategy.

This study also clearly highlights the correlation between nocturnal inclination and originality, which is defined as the tendency to give unusual answers. Original pictures reflect the ability to control the pressure towards closure and to produce answers that break with what is considered obvious or common place without becoming "bizarre". In fact, scores are awarded only when the answers are suitable and show "creative strength".

Our study also supports the notion that creative characteristics persist in aged people, consistent with previous literature (Laicardi & Piperno, 1980; Williams, 1993) which showed how the principal factors of divergent and creative thinking remain intact in the cognitive functioning of the elderly.

A few studies have shown that creative activity is still functioning in aged people and might even reach a higher level of development when elderly people change their attitude towards the environment as a consequence of the shock of retirement (Cesa-Bianchi, 1987).

Moreover, people who define themselves as basically nocturnal may clash with social demands and convention that they do not accept. A few studies have reported that evening types have much more relational difficulty within the family and in a social context that are bound up with the way in which they plan their time (Cofer et al., 1999).

Agreeing with Matthews (1988), we may assume that the relationship between personality traits and circadian types is indirect. Cognitive and social factors affect personality characteristics but they might also be influenced by different kinds of synchronization to the environment, which is determined by reference to the circadian type.

We suppose then that being in a condition which diverges from conventional habit – nocturnal types often experience this situation – may encourage the development of a non-conventional spirit and of the ability to find alternative and original solutions that eventually aim to find a compromise between inner and outer demands.

We have to be cautious with this kind of interpretation. A morning or evening disposition may have a meaning and an effect linked to many psychological and personality variables and of course to the social context desired.

We must also add that creative thinking skills, measured by our instrument, refers to the use of divergent thinking strategies stimulated by visual inputs.

Finally, the confirmation of the initial hypothesis should encourage further research on this subject. The relation between inclination to nocturnal personality and originality characteristics is a particular aspect that requires more in-depth studies: research on larger samples may highlight other aspects and lead to generalized results. In order to obtain a wider picture of thinking patterns with reference to morning and evening types, future research should focus on divergent

thinking skills relating them to, for example the semantic field or to behaviour, and it could also investigate the relationship between these two personality types and their cognitive styles.

References

- Åkerstedt, T., & Torsvall, L. (1981). Shiftwork: Shift dependent wellbeing and individual differences. *Ergonomics*, 24, 265–273.
- Achilles, G. M. (2003). Individual differences in Morningness–Eveningness and patterns of psychological functioning, social adaptation and family stress. *Dissertation Abstracts International: Section B: The Science and Engineering*, 64, 6-B.
- Adan, A., & Almirall, H. (1990). Adaptation and Standardization of a Spanish Version of the Morningness– Eveningness Questionnaire. Personality and Individual Differences, 11, 1223–1230.
- Adan, A., & Almirall, H. (1991). Horne & Östberg Morningness–Eveningness Questionnaire: A Reduced Scale. Personality and Individual Differences, 12, 241–253.
- Anderson, R. (1983). Reflection-impulsivity and creativity in deaf and hearing children. *Paper presented at conference of the Midwestern Psychological Association (Chicago, IL, May 5–7, 1983)*.
- Bailey, A. L., & Heitkemper, M. M. (1991). Morningness-eveningness and early salivary cortisol levels. *Biological Psychology*, 32, 181–192.
- Broberg, G. C., & Moran, J. D. (1987). Creative potential and conceptual tempo in preschool children. *Paper presented at the Biennial Meeting of the Society for Research in Child Development, Baltimore, MD, April 23–26, 1987.*
- Cattell, R. B., Eber, H. W., & Tatsuoka, M. M. (1970). *Handbook for the sixteen personality factors questionnaire*. Champaign, IL: IPAT.
- Cesa-Bianchi, M. (1987). *Psicologia dell'invecchiamento: caratteristiche e problemi*. Roma: La Nuova Italia Scientifica. Cimbalo, R. S., & Hughey, A. M. (1986). Preferences and behaviors of morning and night people: Self report. *Psychological Reports*, 59, 502.
- Cofer, L., Grice, J., Sethre-Hofstad, L., Radi, C., Zimmerman, L., Palmer-Seal, D., et al. (1999). Developmental perspectives on morningness–eveningness and social interactions. *Human Development*, 42, 169–198.
- Creed, I. (2005). Creativity: Self-perception over the time. *International Journal of Aging and Human Development*, 60(1), 1–18.
- Eysenck, H. J. (1983). The roots of creativity. Roeper Review, 5(4), 10-12.
- Eysenck, H. J., & Eysenck, S. B. G. (1964). The Eysenck Personality Inventory. London: University of London Press.

 Eysenck, S. B. G. Pearson, P. O. R. Easting, G. & Allsonn, J. E. (1985). Age norms for impulsiveness.
- Eysenck, S. B. G., Pearson, P. O. R., Easting, G., & Allsopp, J. F. (1985). Age norms for impulsiveness, venturesomeness and empathy in adults. *Personality and Individual Differences*, 5, 613–619.
- Folkard, S., Monk, T., & Lobban, M. (1979). Towards a predictive test of adjustment to shift work. *Ergonomics*, 22, 79–91.
- Follenius, M., Krnauth, M. O., Saini, J., & Brandenberger, G. (1992). Effects of awakening on aldosterone. *Journal of Endocrinological Investigation*, 15, 475–478.
- Gibertini, M., Graham, C., & Cook, M. (1999). Self-report of circadian type reflects the phase of the melatonin rhythm. Biological Psychology, 50, 19–33.
- Guilford, J. P. (1967). The nature of human intelligence. New York: McGraw-Hill.
- Helson, R., Roberts, B., & Agronick, G. (1995). Enduringness and change in creative personality and the prediction of occupational creativity. *Journal of personality and social Psychology*, 69(6), 1173–1183.
- Horne, J. A., & Östberg, O. (1976). A self-assessment questionnaire to determine morningness–eveningness in human circadian rhtythms. *International Journal of Chronobiology*, 4, 97–110.
- Ishihara, K., Miyake, S., Miyasita, A., & Miyata, Y. (1992). Morningness–eveningness preferences and sleep habits in Japanese office workers of different ages. *Chronobiologia*, 19, 9–16.
- Ishihara, K., Miyasita, A., Inugami, M., Fukuda, K., Yamazaki, K., Miyata, Y., et al. (1985). Differences in the time or frequency of meals, alcohol and caffeine ingestion, and smoking between "morning" and "evening" types. *Psychological Reports*, *56*, 391–396.

- Ishihara, K., Saitoh, T., Inoue, Y., & Miyata, Y. (1984). Validity of the Japanese version of the Morningness– Eveningness Questionnaire. *Perceptual and Motor Skills* (59), 863–866.
- Kerkhof, G. A., Willesme, V. D., Geest, H. M. M., Korving, H. J., & Rfietveld, W. G. (1980). Diurnal differences between morning-type and evening-type subjects in some indices of central and autonomous nervous activity. In *Night and shiftwork: Biological and social aspects*. In A. Reinberg & P. Andlauer (Eds.). *Advances in biosciences* (30). New York: Pergamon Press.
- Kwang, N. A., & Rodrigues, D. (2002). A Big-Five Personality Profile of the Adaptor and Innovator. *Journal of Creative Behaviour*, 36(4), 254–268.
- Laicardi, C., & Piperno, A. (1980). La qualità della vita nella terza età. Roma: Borla.
- Larsen, R. J. (1985). Individual differences in circadian activity rhythms and personality. Personality and Individual Differences, 6(3), 305–311.
- Matthews, G. (1988). Morningness-eveningness as a dimension of Personality: Trait, state and psychophysiological correlates. *European Journal of Personality*, 2, 277–293.
- McCutcheon, L. E. (1998). Stereotyping the nocturnal person: Findings with some alarming implications. *Journal of Social Psychology*, 138(3), 411–413.
- Mecacci, L., Righi, S., & Rocchetti, G. (2004). Cognitive failures and circadian typology. *Personality and Individual Differences*, 37(1), 107–113.
- Mecacci, L., & Rocchetti, G. (1998). Morning and evening types: Stress related personality aspects. *Personality and Individual Differences*, 25(3), 537–542.
- Mecacci, L., Zani, A., Rocchetti, G., & Lucioli, R. (1986). The relationship between morningness-eveningness, aging and personality. *Personality and Individual Differences*, 7, 911–913.
- Monk, T. H., Reynolds, C. F., Buysse, D. J., Hoch, C. C., Jarret, D. B., Jennings, R., et al. (1991). Circadian characteristics of healthy 80-yr-olds and their relationship to objectively recorded sleep. *Journal of Gerontology*, 45, M171–M175.
- Natale, V. (1999). Validazione di una Scala ridotta di mattutinità (r-MEQ). *Bollettino di Psicologia Applicata*, 229, 19–26.
- Patkai, P. (1971). Interindividual differences in diurnal variations in alertness, performances and adrenaline excretion. *Acta Physiological Scandinavia*, 81, 35–46.
- Tankova, I., Adan, A., & Buela-Casal, G. (1994). Circadian typology and individual differences. A review. Personality and Individual Differences. 16(5), 671–684.
- Torrance, E. P. (1989). Test di pensiero creativo, manuale tecnico e norme. Firenze: Organizzazioni Speciali, orig. ed. 1966.
- Torsvall, L., & Åkerstedt, T. (1980). A diurnal type scale: Construction, consistency and validation in shift work. Scandinavian Journal of Work, Environment and Health, 6.
- Wakefield, J. A., & Goad, N. A. (1981). Creativity, personality and intelligence. *Creative Child and Adult Quarterly*, 6(1), 13–18.
- Walker, A. (1995). Personality correlates of Depressive Style in autobiographies of creative achievers. *Journal of Creative Behavior*, 29(2), 75–94.
- Williams, F. (1993). Creativity assessment packet. New York: Pro Edition.
- Wilson, G. D. (1990). Personality, time of day and arousal. Personality and Individual Differences, 11(2), 153-168.