# Conscientiousness but Not Agreeableness Decreases Females' Tendency Toward Being Morning-Type

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**Abstract**

Individuals differ in their chronotype as some are identified as morning ones and some others as evening ones. Earlier studies showed that females were higher on morningness, conscientiousness, and agreeableness. In this study we aimed at exploring mediational effects of conscientiousness and agreeableness in the relationship of gender and morningness-eveningness. Participants were 692 university students. Results supported positive relationships between morningness and conscientiousness and agreeableness and between conscientiousness and agreeableness. Females were higher on all these three variables. Mediation analyses suggested that the effect of gender (here females) on chronotype (here morningness) was mediated by conscientiousness but not agreeableness so that after the mediation partially occurred, the gender's effect did not remain significant anymore. This study backed our hypothesis, that in the difference between girls and boys in chronotype conscientiousness might plays a more pronounced role than intrinsic diurnal rhythms.

*Keywords: Morningness-Eveningness, Gender, conscientiousness, Agreeableness, Sex*

**Introduction**

Humans differ in their sleep-wake habits and preferences. Some prefer having a "morningness" chronotype characterized by going to bed early, waking up early in the morning, and reach their physiological as well as mental peak in the early hours of the day. On the other hand, some prefer an "eveningness" chronotype by tending to stay awake longer at night, get up later in the morning, and feel more fresh in the evening hours. Finally, a major number of people possess a "neither-type" chronotype with having a moderate rest-activity rhythm.

Literature shows individual differences in biological as well as psychological factors among chronotypes. For instance, research support variations across men and women in terms of their chronotype. Overall, women show a stronger proclivity for morningness than men do (Adan & Natale, 2002; Randler, 2007; Adan et al., 2012); however, some studies did not find such differences (e.g., Paine, Gender, & Travier, 2006). In a meta-analysis (Randler, 2007) considering fifty-two studies, results revealed a weak but significant effect of gender on morningness with girls and women scoring higher on chronotype scales. Randler (2007) argued that his findings were more in line with large sample studies. Adan et al. (2012) also summarized this individual difference as an advanced phase due to diurnal variations, as well as a shorter intrinsic circadian period in women. Some physiological studies addressed these sex differences and found evidence for an intrinsic shorter period in women, however, effects were not always strong (Duffy et al, 2010; Cain et al., 2010).

Evidence backs individual differences in personality traits across morning types and evening types, as well. Among the dimensions of the Five-Factor Model (The Big Five; Costa & McCrae, 1992), it turned out that some studies suggested a positive relationship between agreeableness and morningness (e.g., Hogben, Ellis, Archer, & von Schantz, 2007) but some other failed to replicate this finding (e.g., Jackson & Gerard, 1996). According to a meta-analysis, conscientiousness was the strongest personality predictor of morningness (Tsaousis, 2010) and it was the only factor of Big Five that showed a consistent association with morningness in all the studies reviewed by Adan et al. (2012). Conscientiousness is characterized by the tendency to follow socially prescribed norms for impulse control, to be goal-directed, plan-oriented, able to delay gratification, and to follow norms and rules (Roberts, Jackson, Fayard, Edmonds, & Meints, 2009). Agreeableness is associated with having

concerns for social orders, being altruistic, appreciative, compliant, trusting and tender-minded. Individuals high on agreeableness seem also to be generous, kind, and put more values on getting along well with others (Furnham & Cheng, 2015). Both of these traits are relevant to adjustment to social norms.

Results on gender differences among Big Five traits have seem to be stable. In a cross-cultural review considering 55 nations to explore a possible consistent pattern of differences in personality traits by gender, results demonstrated women scoring higher on neuroticism, extraversion, agreeableness, and conscientiousness than men across most nations (Schmitt, Realo, Voracek, & Allik, 2008). Another study (Vianello, Schnabel, Sriram, & Nosek, 2013) also corroborated these findings with a large sample size (N = 14,348). Some other studies believe that women's higher conscientiousness only applies to some facets of conscientiousness not the general state conscientiousness. For instance, Weisberg, DeYoung, and Hirsh (2011) argues that females report higher scores of some facets of conscientiousness like dutifulness, self-discipline, and order, although this difference is not observed across cultures or at the Big Five trait level. In general, studies suggest females' advantage in conscientiousness or absence of any difference between genders. In spite of the controversy around conscientiousness, findings steadily support women being higher on agreeableness than men in large sample studies (Weisberg, DeYoung, and Hirsh, 2011; Lehmann, Denissen, Allemand, & Penke, 2013) as well as in meta-analyses (Schmitt, Realo, Voracek, & Allik, 2008).

These findings together sparked a motivation in us to re-consider the main reason of gender differences in chronotypes. Since the effect of gender on chronotype has been small and weak, we would postulate this difference might be caused by personality factors rather than biological ones. In other words, women's higher tendency toward being more morning-oriented might be due to their higher levels of both conscientiousness and agreeableness which make them more synchronized to the society's temporal plans and schedules. The reason we picked these two traits of Big Five is that they both were reported to be higher in females and morning individuals, however with different extents of certainty.

## Methods

The data were collected using an online survey on the university students predominantly from Heidelberg and Mannheim, Germany. We used Pearson's bivariate correlation to reveal the relationships between independent, mediator, and dependent variables. Besides, t-test for

different groups was employed to control for gender differences in chronotype and conscientiousness. Finally, mediation analysis was carried out to measure the direct effect of gender on conscientiousness and its indirect effect through chronotype. In this test, mediation occurs significantly if the 95% bias-corrected confidence intervals for the indirect effect do not comprise zero (Hayes & Scharkow, 2013). All results were obtained based on 5000 bias-corrected bootstrapped samples.

## Participants

The sample consisted of 692 students mostly from the University of Education Heidelberg, the University of Heidelberg, and the University of Mannheim. 72.7 percent (503) of the respondents were female and the rest 27.3 percent (189) were male. The mean of Age was 22.84 ± 5.02 SD ranging from 17 to 57.

## Measures

### Composite Scale of Morningness (CSM)

CSM is a 13-item measure of morningness (Smith, Reilly, & Midkiff, 1989) which has a total score range of 13 to 55 on a 4-point Likert-type scale. Higher responses demonstrate a bigger proclivity toward morningness. In this study Cronbach's alpha was equal to .87.

### Ten-Item Personality Inventory (TIPI)

TIPI (Gosling, Rentfrow, & Swann, 2003) was employed as measure of agreeableness and conscientiousness. This questionnaire assesses Big-Five traits using two items for each single trait. One can answer to the items on a 7-point Likert scale ranging from 1 (disagree strongly) to 7 (agree strongly). The validity and reliability of TIPI have been earlier supported (Gosling, Rentfrow, & Swann, 2003). Cronbach's alpha for the entire measure was .59 in the present study.

## Results

Descriptive statistics assessed the mean and the SD of the measures as follows: CSM (32.91 ± 6.71), conscientiousness (5.23 ± 1.32), and agreeableness (5.19 ± 1.01). Correlation analysis revealed positive relationships between CSM and conscientiousness, CSM and agreeableness, and finally conscientiousness and agreeableness. Table 1 represents the detailed results of correlational analyses.

*Insert Table 1 here, please.*

To find out if any of genders were connected to chronotype, conscientiousness, or agreeableness, a set of comparison analyses was carried out. It turned out that females had higher levels on all the three variables and they differed significantly from their male counterparts with being more morning oriented, more conscientious, and more agreeable. Please see Table 2 for further details on the differences between genders.

*Insert Table 2 here, please.*

Mediational effects were calculated to test any possible mediation by conscientiousness and agreeableness in the relationship of gender and circadian preference. According to Randler (2007), we used age as the covariate because the circadian timing varies during the life span (Roenneberg et al., 2004). Regarding CSM total score, results indicated a significant partial mediation of conscientiousness (unstandardized indirect effect = -.90; 95% CI [-1.36, -.51], completely standardized indirect effect = -.05; 95% CI [-.08, -.03]), a non-significant effect of agreeableness (unstandardized indirect effect = -.18; 95% CI [-.48, .07], completely standardized indirect effect = -.01; 95% CI [-.03, .01]), and a significant total effect of both together (unstandardized indirect effect = -1.08; 95% CI [-1.62, -.62], completely standardized indirect effect = -.07; 95% CI [-.10, -.04]) where the ratio of the indirect effect to the total effect (percent mediation; a marker of mediation effect size proposed by Alwin and Hauser, 1975) for conscientiousness, agreeableness, and both together were PM = .46, .09, and .55, respectively. Results are depicted in Fig. 1.

**Discussion**

In the present study we aimed at testing the effect of gender on possessing a specific chronotype through conscientiousness and agreeableness. Earlier studies supported females being more morning-oriented, conscientious, and partly agreeable, however, the effect of gender on morningness-eveningness was weak, albeit significant. Being a morning person means that the individual is tended to get up early in the morning, which is more in synch with socially-imposed temporal schedules. Both agreeableness and conscientiousness embody the traits of being more adjusted to social norms and standards and people with these traits are able to synchronize themselves to the rules and time plans. Since females seem to be higher on these traits, one could assume that their tendency toward morningness is due to their bigger readiness for adjustment to the rules that make them get up earlier to be present at

the workplace or the class much on time compared to males. This idea led us to perform a study measuring the mediational effect of agreeableness and conscientiousness in the relationship of gender and morningness-eveningness.

The first findings of this study turned out positive relationships between CSM and conscientiousness, CSM and agreeableness, and finally conscientiousness and agreeableness. Earlier studies support such patterns with linking agreeableness and conscientiousness to morningness (Tsaousis, 2010; Adan et al., 2012) and to each other (Costa, McCrae, & Dye, 1991).

T-test analysis between males and females confirmed the results of the past studies with females being higher on morningness (Randler, 2007; Walch, Cochran, & Forger, 2016), conscientiousness (Schmitt et al., 2008; Furnham & Cheng, 2014) and agreeableness (Weisberg et al, 2011) than males are.

Mediation analyses suggested that the effect of gender (here females) on chronotype (here morningness) was mediated by conscientiousness but not agreeableness so that after the mediation occurred, the gender's effect did not remain significant anymore. In total, mediational effect of conscientiousness was big enough to deactivate the link between having a female gender and morningness proclivity significantly, however, the mediation partially occurred and could not nullify the gender's effect fully.

People with higher levels of conscientiousness are more vigilant and punctual (Back, Schmukle, & Egloff, 2006; Werner, Geisler, & Randler, 2015) show planned behavior, and act more dutifully compared to others. Jackson et al. (2010) suggested responsibility, order, impulse control, and lower laziness as a four-factor solution for behavioral manifests of conscientiousness. In addition, conscientiousness was evidenced as the best personality predictor of job performance among Big Five traits (Hurtz & Donavan, 2000) and also seemed to predict the scores of a set of measures of self-regulation ability (Jensen-Campbell et al., 2002). In line with these characteristics, morningness has been found associated with some similar personality traits or behaviors. Morning-oriented people display more proactive behaviors (Randler, 2009), higher energetic arousal and life satisfaction (Jankowski, 2015), and positive affect (Biss & Hasher, 2012). Morning people have sleep-wake habits which are consistent with society-imposed activity-rest cycle. The Society encourages earlier sleep and wake time and daily schedules adjusted to daytime hours. In this regard, morning ones are

those who go to school or work early in the morning and are more fit to the educational and work plans provided by the society. They also seem to be more stable (De Young, Hasher, Djikic, Criger, & Peterson, 2007). Vollmer and Randler (2012) argue that while evening students possessed more individual values (openness to change and self-enhancement), the morning ones exhibited a preference for social values (conservation and self-transcendence) rather than individual values. That is, morning people are more prepared to adjust themselves to social norms and standards because they have higher levels of locus of control compared to their evening counterparts (Jackson & Gerard, 1996). They try to accept the rules and follow them as conscientious people do. That might be an explanation why morning people have proclivity for showing conscientious behaviors.

Agreeableness unlike conscientiousness could not mediate gender's effect on morningness-eveningness and our assumption was not confirmed. One explanation for this finding might be the controversial results about the association of morningness-eveningness and agreeableness. For example, Adan et al. (2012) concluded that there might exist a link between morningness and agreeableness according to some studies, but no stable association between all chronotypes and agreeableness was not detected. Consistent with this finding, Tsaousis (2010) in his meta-analysis suggested while conscientiousness explained about 9% of the variance in morningness, agreeableness was responsible for only 2% of the variations in morningness. Findings of the present study indicated that although females reported higher agreeableness than men, the effect of this trait was not bigger than gender's on morningness-eveningness.

Adan et al. (2012) in their review suggest the diurnal variations in women eventuates in a phase advance compared to men. For example, Duffy et al. (2011) assert that women have shorter intrinsic periods than men do. Adan et al. (2012) also contend that these shorted periods might be due to menstrual cycle which acts against circadian rhythmicity. Despite these biological explanations, our research shows that the role of personality traits is much of importance because when they were placed between gender and morningness-eveningness, the link between being a female and tendency toward morningness got disappeared. Another explanation might be that women's higher ability to get up earlier and being more morning oriented is partially supported by their earlier intrinsic rhythm, and that conscientiousness and morningness are co-occurring. Both morningness and conscientiousness have been linked to some physiological variables, which might support this justification. For instance, literature

supported conscientious individuals possessing healthier cortisol slope through being more generally active (Bogg & slatcher, 2015), and research also indicated that morning individuals reported higher levels of physical activity (Muro, Gomà-i-Freixanet, & Adan, 2009) and cortisol awakening response (Randler & Schall, 2010).

This study faced a number of limitations. The first limitation of this study was using the TIPI as the measure of conscientiousness and agreeableness. Although the validity and reliability of the measure has been well evidenced, future studies are advised to use the measurements assessing both implicit and explicit manifests of a trait. A good example of this would be the Behavioral Indicators of Conscientiousness (BIC; Jackson et al. 2010), which measures behavioral aspects of conscientiousness. Another limitation of this study was having unequal number of male and female participants.

Regarding our preliminary idea of the mediating role of conscientiousness and agreeableness in the relationship of females and morningness, one could assert that the same mediational effect might be existent for extroversion and neuroticism in the relationship of males and eveningness (Adan et al. 2012). This idea would be worth carrying out another study to cover this aspect of psychobiological studies. Future works are also recommended to use menstrual periods in women as a control variable when assessing individual differences in circadian preferences and their link to personality traits because two studies (Roenneberg et al., 2004; Tonetti, Fabri, & Natale, 2008) indicated the disappearance of gender differences in chronotype following menopause in women.

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**Tables**

Table 1. Correlations between CSM, Conscientiousness, and Agreeableness.

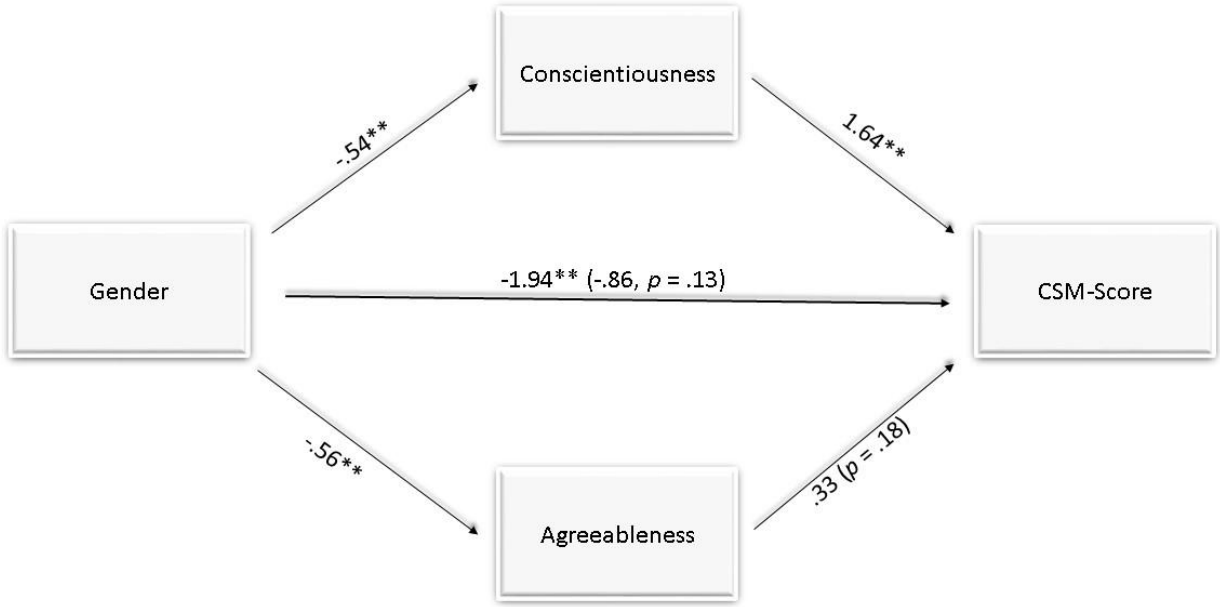
| | 1 | 2 | 3 |
|---|---|---|---|
| 1 CSM | 1 | .34** | .11** |
| 2 Conscientiousness | | 1 | .15** |
| 3 Agreeableness | | | 1 |

*Note:* Pearson's Correlation Coefficients; *$p < 0.05$, **$p < 0.01$

Table 2. Gender differences in CSM, Conscientiousness, and Agreeableness.

| | Men | | Women | | t-Test | |
|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **t** | ***p*** |
| **CSM** | 31.49 | 7.08 | 33.44 | 6.49 | 3.42 | .001 |
| **Conscientiousness** | 9.69 | 2.77 | 10.76 | 2.53 | 4.81 | .001 |
| **Agreeableness** | 9.58 | 2.12 | 10.69 | 1.91 | 6.61 | .001 |

Figure 1. Direct and indirect effect of Gender through Conscientiousness and Agreeableness on CSM.




*Note*: value in parentheses represents the direct effect of gender on CSM, after mediating effect of conscientiousness and agreeableness are accounted for. The values to the left of those parentheses represent the total effect of gender on CSM. Gender coded as women = 1, men = 2; **$p < .01$.