Age, the Big Five, and time-of-day preference: A mediational model ☆

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ABSTRACT

This research examined the extent to which the Big Five personality factors mediated the relationship between age and time-of-day preference. A sample of 491 Americans (M_{age} = 32 yrs) completed the 240-item NEO-PI-R, the 19-item Horne and Östberg's (1976) Morningness–Eveningness Questionnaire (MEQ), and provided demographic information. As demonstrated in previous research, correlations revealed that older people expressed a stronger morning preference. More importantly, using bootstrapping procedures, it was found that the Big Five factor of conscientiousness attenuated the relationship between age and time-of-day preference. These findings indicate that conscientiousness plays a significant role in the relationship between age and time-of-day preference.

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1. Introduction

Circadian rhythms are manifested in different ways, such as core body temperature. One of the most marked of these manifestations is morningness–eveningness preference, also known as a person's time-of-day preference. A person's time-of-day preference generally coincides with when they are physically and cognitively at their peak and therefore feel most alert, energetic, and capable (Kim, Dueker, Hasher, & Goldstein, 2002). These differences in time of peak arousal are responsible for the existence of what is known as morning and evening people. Those with a morning preference (often called larks) are more alert and aroused in the morning, whereas those with an evening preference (often called owls) are more alert and aroused in the evening.

Generally, people who have a morning preference tend to be more optimistic (Randler, 2008) and get better grades in school (Randler & Frech, 2006) than people with an evening preference. People who have an evening preference tend to be more creative (Giampietro & Cavallera, 2007) and intelligent (Roberts & Kyllonen, 1999), but are also more likely to abuse alcohol (Prat & Adan, 2011) than people with a morning preference. Indeed, as discussed at length in Cavallera and Giudici (2008), there are many life domains, both personal (e.g., health behaviors, emotional functioning) and interpersonal (e.g., work, family interactions) that are related to one's time-of-day preference. There are a multitude of factors that shape one's time-of-day preference. Previous research

has shown that genes account for approximately 50% of the variability that we observe in our time-of-day preference (Hur, 2007). Therefore, another 50% of the variability in time-of-day preference is a function of other individual difference factors, such as age and personality.

Most research on individual differences in time-of-day preference has necessarily been correlational (e.g., DeYoung, Hasher, Djikic, Criger, & Peterson, 2007; Randler, 2011). However, few, if any studies have examined mediational models to detect potential mechanisms that could elucidate why certain individual differences exist in time-of-day preference. The purpose of the current research is to assess if and how the Big Five personality factors mediate the relationship between age and time-of-day preference.

1.1. Age and time-of-day preference

The relationship between time-of-day preference and age has been relatively well-established. In their comprehensive review, Adan et al. (2012) noted that prior to age 12, people tend to have a morning preference. At the beginning of adolescence (12–15 yrs), morningness preference shifts to an evening preference, and this latter preference continues into the early 20s, at which time that evening preference subsides and a morningness preference gradually returns (e.g., Randler, 2008; Randler, 2011; Roenneberg et al., 2004). These shifts in time-of-day preference have been explained primarily by examining the relationship between age and physiological changes that people experience as they start adolescence, and subsequently, enter adulthood. For instance, there is an increased need for sleep due to the rapid growth during adolescence (Roenneberg et al.). Likewise, the onset of pubertal development ushers in a variety of hormonal and other physical

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changes that push back one's time-of-day preference to a stronger evening preference. For example, the release of melatonin occurs later in the day in adolescents than in adults leading to later onset of sleepiness and a later natural wake time (Carskadon, Acebo, Richardson, Tate, & Seifer, 1997).

There are also social factors that facilitate an evening preference during adolescence. For instance, parents may allow greater freedom to adolescents to set their own daily schedules and perform tasks at their preferred time of day. Furthermore, social demands, such as raising children and career demands, may force people to become more morning oriented. Of course, age is not the only individual difference factor that has been shown to relate to time-of-day preference.

1.2. Personality and time-of-day preference

In addition to age differences, researchers have examined the contribution of personality in time-of-day preference. A number of studies have examined the Big Five personality traits (agreeableness, openness to experience, conscientiousness, neuroticism, and extraversion) as predictors of time-of-day preference. As summarized in Adan et al. (2012), research in this area is somewhat equivocal about how certain traits are related to time-of-day preference. For instance, higher scores on neuroticism have, in some studies, been associated with an evening preference (e.g., Tonetti, Fabbri, & Natale, 2008), whereas in other studies (e.g., Hogben, Ellis, Archer, & von Schantz, 2007), there was no relationship detected between neuroticism and time-of-day preference. Using a meta-analytic approach, Tsaousis (2010) found that conscientiousness had a moderate relationship with a morning preference ($r = .29$), and agreeableness had a small relationship with a morning preference ($r = .13$). Openness, extraversion, and neuroticism each had much smaller relationships with an evening preference ($rs = -.09, -.06, $ and $-.07$, respectively). Therefore, as Adan et al. (2012) stated, "...conscientiousness showed a positive relationship to morningness and is considered the best predictor of morningness" (p. 1164).

1.3. Age and personality

Similar to age differences in time-of-day preferences, there are established age differences in personality. Lucas and Donnellan (2009), using a dataset of 12,618 respondents, found that as people age, they tend to score higher on measures of conscientiousness and agreeableness. Additionally, they found that extraversion, openness, and neuroticism were lower among older respondents. Subsequent research by Soto, John, Gosling, and Potter (2011) replicated these results in a sample of more than 1 million English-speaking people, though the relationship between age and extraversion was slightly weaker than in Lucas and Donnellan's work. Integrating the strengths of exploratory and confirmatory factor analyses with structural equation modeling, Marsh, Nagengast, and Morin (2013) largely replicated these two sets of results. However, they found that conscientiousness, which tended to increase precipitously through middle-adulthood, began to decline at around age 50. Lucas and Donnellan also noted that age differences in conscientiousness were not perfectly linear, with conscientiousness scores leveling-off (but not declining) at about age 50, and remaining constant until about age 70, when they began increasing again.

What may account for at least some of these age differences in personality? As people progress from early adulthood into middle age, they typically attend to at least two major life tasks, specifically, building career experiences and cultivating close relationships (Erikson, 1968). As Hogan and Roberts (2004) described in detail, being conscientious and agreeable would facilitate the attainment of these two outcomes, partially explaining the positive relationships between age and these two personality traits. As people continue into middle- and late-adulthood, behavioral expressions of these traits would continue to facilitate professional and personal successes.

1.4. The current study

Prior research has established relationships between age and time-of-day preference, personality and time-of-day preference, and age and personality. Despite research establishing these relationships, we know of no research that has tested for mediators of the relationship between age and time-of-day preference. This study was designed to test the mediational role of the Big Five personality factors in the relationship between age and time-of-day preference. To investigate these relationships, participants completed a questionnaire measuring each of the Big Five personality factors (Costa & McCrae, 1992). Additionally, participants completed Horne and Östberg's (1976) Morningness–Eveningness Questionnaire (MEQ) to assess time-of-day preference. Consistent with previous research, we hypothesized that older participants would express a strong morning preference, whereas younger participants would express a stronger evening preference. Furthermore, with previous research suggesting that conscientiousness generally tends to increase with age (e.g., Lucas & Donnellan, 2009) and is strongly associated with a morning preference (e.g., Adan et al., 2012), we hypothesized that conscientiousness would mediate the relationship between age and time-of-day preference.

2. Method

2.1. Participants and procedure

This study had 491 participants (48% female), ranging in age from 17 to 71 yrs ($M = 32.45$ yrs, $SD = 15.29$ yrs). The sample was drawn from two groups of participants. The first group consisted of Introductory Psychology students attending a small liberal arts college in the Midwestern United States. Over the span of two semesters, 223 students completed the measures. These respondents ranged in age from 17 to 27 yrs ($M = 18.7$ yrs, $SD = 1.1$ yrs). One hundred nine students were female. Students received class credit for completing the survey, which was completed during a mass testing session at the start of each semester.

In addition, a sample of 268 people was drawn from an online social science survey service called StudyResponse: http://www.studyresponse.net/index.htm. These respondents ranged in age from 21 to 71 yrs ($M = 45.3$ yrs, $SD = 11.2$ yrs), and they completed the same materials as did the students. The online sample had 126 female participants. Online participants were compensated with $8.00, distributed through Study Response. No data were collected from either sample regarding race or ethnicity.

In sum, 47% of our sample was aged 17–25; 6.2% was aged 26–30; 8.2% was aged 31–35; 8.3% was aged 36–40; 5.4% was aged 41–45; 7.0% was aged 46–50; 5.9% was aged 50–55; 7.7% was aged 56–60; 3.1% was aged 61–65; and 1.2% was aged 66 or older.

2.2. Measures

Participants first completed Costa and McCrae's (1992) 240-item NEO-PI-R measure of the Big Five personality factors. All responses were made using a 1 (*not at all descriptive of me*) to 7 (*very much descriptive of me*) range. There were 48 items that were averaged to form a score for each Big Five Factor. An example item for agreeableness is "I try to be courteous to everyone I meet" ($\alpha = .90$). An example item for openness is "I sometimes lose interest when