

Personality traits and body mass index in Asian populations



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abstract

Research on personality and adiposity has focused primarily on Western samples; less is known about the personality correlates of BMI in Asian populations. We examined the association between personality and body mass index (BMI) among community-dwelling Japanese adults ($N = 380$), Chinese adolescents ($N = 5882$), and a meta-analysis inclusive of a published Korean sample (total $N = 10,304$). In the new samples and meta-analysis, Extraversion and Agreeableness were associated with higher BMI among men. In contrast to what is often found in Western samples, Conscientiousness was mostly unrelated to adiposity. These findings link pro-social tendencies to overweight among Asian men; Conscientiousness may be less relevant for BMI in Eastern societies with a low prevalence of obesity and strong social norms for eating but not thinness.

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1. Introduction

There is a substantial literature that links Conscientiousness to more positive health outcomes (see [Friedman, Kern, Hampson, & Duckworth, 2014](#) for a review). In the case of body mass index (BMI), Conscientiousness tends to be associated with healthier body weight. Individuals with the general tendency to be organized and disciplined are leaner ([Terracciano et al., 2009](#)), maintain a more stable weight across adulthood ([Lahti et al., 2013](#); [Sutin, Ferrucci, Zonderman, & Terracciano, 2011](#)) and are at lower risk of developing obesity ([Jokela et al., 2013](#)) than those who score lower on this trait. This protective association has been documented in American ([Chapman, Fiscella, Duberstein, Coletta, & Kawachi, 2009](#); [Sutin et al., 2011](#)), European ([Möttus et al., 2013](#); [Terracciano et al., 2009](#)), Australian ([Magee & Heaven, 2011](#)), and Israeli ([Armon, Melamed, Shirom, Shapira, & Berliner, 2013](#)) samples. The consistency across populations suggests that Conscientiousness may be a protective factor that transcends culture and environment.

In contrast to Conscientiousness, the association between the four other traits and BMI is less straightforward. Despite the complexity, a pattern of sex differences in the relation between BMI

and Neuroticism and Extraversion is starting to emerge: Neuroticism tends to be associated with higher BMI for women but not men, whereas Extraversion tends to be associated with higher BMI for men but not women ([Brummett et al., 2006](#); [Sutin & Terracciano, in press](#)); although not all find these sex differences ([Magee & Heaven, 2011](#)). Agreeableness has likewise been associated with higher BMI among men in some studies ([Chapman et al., 2009](#)) but not others ([Magee & Heaven, 2011](#)), whereas Openness tends to be unrelated to BMI for either sex ([Chapman et al., 2009](#); [Magee & Heaven, 2011](#)). These sex differences may obscure the relation between these traits and BMI.

associations, although the authors did not test whether sex moderated these associations (neither study measured Conscientiousness).

The provocative findings from Shim and colleagues raise the question of whether the association between Conscientiousness and lower body weight is limited to more Western populations and whether it may not always be protective (Lin, Ma, Wang, & Wang, 2015); little research has addressed this association in Eastern cultures. To that end, the present study examines whether Shim and colleagues' results extend to samples of community-dwelling Japanese adults and Chinese adolescents. In addition, we meta-analyze our findings with the published literature to estimate their robustness. We expect that the associations between personality and adiposity in the two new samples will be more similar to those of Shim and colleagues than those from Western samples and that the meta-analysis will support these results.

2. Method

2.1. Japanese adult sample: participants and procedure

Data on Japanese adults were drawn from the Survey of Midlife Development in Japan (MIDJA) Biomarker Study. The MIDJA was designed to parallel the Midlife in the United States (MIDUS) study to compare how culture contributes to age differences in health and well-being. A probability sample of Japanese adults was recruited into the study ($N = 1027$). A subset of the original participants was recruited to complete a biomarker assessment (Markus et al., 2014). To be included in the biomarker assessment, participants had to complete the initial MIDJA assessment and express interest in a clinic visit. Those who agreed ($n = 382$; $M_{\text{age}} = 54.24$, $SD = 14.11$, range 30–79; 56% female) came to a clinic in Tokyo where vital signs, morphometric assessments, and blood assays were obtained. From the total biomarker sample, one participant was excluded because she was pregnant and one participant was missing the personality assessment; the analytic sample size was thus 380. MIDJA data are available for public download here: <http://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/34969?q=midja&searchSource=icpsr-landing>.

2.2. Chinese adolescent sample: participants and procedure

Participants from two high schools in China were drawn from a larger project on psychological functioning, well-being and achievement across adolescence. Participants ($N = 8115$) completed a measure of personality as part of the longer questionnaire administered during regular classroom hours. Participants from one of the high schools also had height and weight measurements from a routine health screening at a local hospital. A total of 5882 participants ($M_{\text{age}} = 16.78$, $SD = 1.12$, 41% female) had valid a personality assessment and measured height and weight.

2.3. Measures

2.3.1. Personality traits

Personality traits in MIDJA were assessed with the Japanese translation of the Midlife Development Inventory (MIDI; Lachman & Weaver, 1997). Participants were asked how much each of 26 adjectives described themselves on a scale ranging from 1 (*not at all*) to 4 (*a lot*). Four items assessed Neuroticism (e.g., moody; $\alpha = .51$), five items assessed Extraversion (e.g., talkative; $\alpha = .83$), seven items assessed Openness (e.g., creative; $\alpha = .84$), five items assessed Agreeableness (e.g., sympathetic; $\alpha = .87$), and five items assessed Conscientiousness

(e.g., organized; $\alpha = .66$). Personality traits in the Chinese sam-

Table 1

Descriptive statistics and bivariate correlations between study variables and adiposity in the sample of Japanese adults.

	Total sample			By sex					
	Descriptive	r_{BMI}	r_{Waist}	Male			Female		
				Descriptive	r_{BMI}	r_{Waist}	Descriptive	r_{BMI}	r_{Waist}
Age	54.23 (14.05)	.19*	.24*	55.34 (13.98)	-.03	.12	53.36 (14.08)	.36*	.38*
Sex (female)	56%	-.36*	-.66*	–	–	–	–	–	–
Education	4.66 (2.02)	.00	.09*	5.13 (2.21)	.01	.04	4.30 (1.77)	-.18*	-.16*
BMI (kg/m ²)	22.60 (2.95)	–	.85*	23.79 (2.86)	–	.89*	21.67 (2.67)	–	.86*
Waist (cm)	76.20 (9.82)	.85*	–	83.48 (8.20)	.89*	–	70.50 (6.73)	.86*	–
Neuroticism	2.13 (.58)	-.08	-.04	2.19 (.57)	.01	-.04	2.08 (.58)	-.23*	-.22*
Extraversion	2.46 (.66)	.09	.05	2.44 (.65)	.17*	.16*	2.48 (.67)	.05	.02
Openness	2.22 (.58)	.04	.04	2.28 (.57)	-.05	-.06	2.17 (.58)	.05	.02
Agreeableness	2.69 (.63)	.06	.06	2.69 (.62)	.11	.08	2.69 (.64)	.04	.06
Conscientiousness	2.65 (.55)	.02	.04	2.68 (.58)	.03	-.02	2.63 (.52)	.01	.05

Note. $N = 380$; $n = 167$ for male and $n = 213$ for female. Means (Standard Deviations) or percentages are reported in the descriptive column. Education is scales from 1 (8th grade/Junior high school) to 8 (graduate degree); 4 = vocational school graduate. BMI = body mass index.

* $p < .05$.**Table 2**

Descriptive statistics and bivariate correlations between study variables and BMI in the sample of Chinese adolescents.

	Total sample		By sex			
	Descriptive	r_{BMI}	Male		Female	
			Descriptive	r_{BMI}	Descriptive	r_{BMI}
Age	16.78 (1.12)	.04**	16.83 (1.12)	.05**	16.72 (1.11)	.01
Sex (female)	41%	-.09**	–	–	–	–
BMI (kg/m ²)	21.32 (3.19)	–	21.55 (3.48)	–	20.97 (2.68)	–
Neuroticism	3.62 (1.07)	-.02	3.60 (1.07)	-.03	3.64 (1.07)	.00
Extraversion	4.32 (1.05)	.06*	4.27 (1.00)	.09**	4.40 (1.11)	.02
Openness	4.63 (.99)	.04**	4.75 (1.00)	.02	4.45 (.94)	.02
Agreeableness	5.01 (.90)	.01	4.96 (.91)	.04*	5.08 (.87)	-.02
Conscientiousness	4.19 (.88)	-.01	4.27 (.89)	.00	4.07 (.85)	-.04*

Note. $N = 5882$; $n = 3492$ for male and $n = 2390$ for female. Means (Standard Deviations) or percentages are reported in the descriptive column. BMI = body mass index.

* $p < .05$.** $p < .01$.**Table 3**

Meta-analysis of the relation between personality and BMI in Asian samples.

	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
Males					
Sample					
Japanese adults	.00	.17*	-.05	.11	.00
Chinese adolescents	-.02	.09**	.02	.04*	-.01
Shim et al. (2014)	.01	.03*	.00	.01	.00
Meta-analysis random model	-.01	.08**	.02	.03*	.00
Heterogeneity					
Q	1.40	6.34*	.59	1.91	.07
I ²	0	68.46	0	0	0
Females					
Sample					
Japanese adults	-.12	.07	.08	.03	-.02
Chinese adolescents	.00	.02	.02	-.02	-.04*
Shim et al. (2014)	-.03	.01	-.07*	.07*	.00
Meta-analysis random model	-.02	.02	.00	.03	-.02
Heterogeneity					
Q	3.46*	.89	13.51*	10.35	2.42
I ²	42.19	0	85.20	80.69	17.34

Note. Total N for the meta-analysis 5154 for males and 5150 for females.

* $p < .05$.** $p < .01$.

association between Neuroticism and BMI for men. The association between Neuroticism and BMI did not reach the conventional level of significance in the analysis stratified by sex ($p = .09$), but the interaction term was significant when combined in a single analysis ($\beta_{N \times \text{sex}} = -.15, p < .05$). Neuroticism was also associated with a smaller waist circumference among women but not men in the Japanese sample. In contrast to the Japanese adults, Neuroticism was unrelated to BMI for either sex in the sample of Chinese

adolescents. Neuroticism was also unrelated to overweight/obesity risk in either sample.²

² Since there was some evidence that higher Neuroticism was associated with lower weight for women, we did a logistic regression to predict risk of underweight from Neuroticism. It was not significant for the sample of Japanese adults ($OR = 1.47$, 95% $CI = .89$ – 2.42) and was in the protective direction for the Chinese adolescents ($OR = .89$, 95% $CI = .81$ – $.99$).

3.2. Extraversion

The sex difference in the relation between Extraversion and BMI was consistent across the samples and in the meta-analysis: Men with a tendency to be outgoing and social had higher BMI, an association not apparent among women. When combined in a single analysis, the interaction with sex was significant in the Chinese sample ($\beta_E \times \text{sex} = -.06, p < .01$) and in the expected direction in the Japanese sample, but not significant ($\beta_E \times \text{sex} = -.10, p = .18$).

females. The interaction with sex, however, was not significant ($\beta_{C \times \text{sex}} = -.02, p = .22$). Conscientiousness was unrelated to risk of overweight/obesity.

4. Discussion

In two samples from Asia, the personality correlates of body weight differed somewhat from the pattern typically found in Western populations. Most striking, Conscientiousness was unrelated to BMI. Across both samples, however, Extraversion was associated with higher BMI among men than women. The meta-analysis with the only other published study of all five FFM personality traits in an Asian sample supported these associations and also indicated a positive association between Agreeableness and BMI for men. The meta-analysis did not support an association between Neuroticism and BMI for either sex. This evidence from East-Asian samples suggests that some personality correlates of weight may differ between Eastern and Western cultures and that the association between Conscientiousness and healthier weight may not be universal.

The literature on personality and BMI tends to show that individuals who are Conscientious are leaner and at lower risk of obesity (Jokela et al., 2013). The majority of these studies, however, focus on Western populations that have different attitudes about eating. For example, the Japanese tend to savor the culinary experience whereas Americans worry about the nutritional content of the food (Rozin, Fischler, Imada, Sarubin, & Wrzesniewski, 1999). In addition, different social norms around food and eating may make Conscientiousness less relevant for adiposity in Asia compared to the United States. That is, when behavior is regulated by external factors, such as cultural norms, there may be less of a need to self-regulate (de Ridder, de Vet, Stok, Adriaanse, & de Wit, 2013). In contrast, when there are no strong social norms and individuals have more choice about what, when, and how much to eat, Conscientiousness may contribute to maintaining a stable weight and protect against obesity.

This difference may also be shaped by differences in prevalence across cultures. That is, countries in Asia have among the lowest prevalence of obesity in the world, with less than <5% of the adult population in China, Japan and South Korea estimated to be obese (OECD, 2013). By contrast, 35% of the American adult population is estimated to be obese (Ogden, Carroll, Kit, & Flegal, 2014).

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