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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.

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 (Mõttus 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.

Research on personality and adiposity, however, has relied primarily on Western samples. Shim and colleagues (Shim et al., 2014) recently reported strikingly different associations between personality traits and BMI in an Asian population: In their sample of approximately 4000 Korean adults, Conscientiousness was unrelated to BMI ($\beta = .00$). The association between Neuroticism and BMI was likewise surprising: Among women, a stronger tendency to experience negative emotions was associated with lower body weight rather than higher body weight. The sex difference in the association between Extraversion and BMI, however, was similar to the pattern found in Western samples (Brummett et al., 2006; Sutin & Terracciano, in press). Interestingly, one study of Japanese adults (Kakizaki et al., 2008) found similar sex-specific associations between Neuroticism and Extraversion and body weight and another study (Otonari et al., 2012) also found similar

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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 ($n = 382$; $M_{age} = 54.24$, $SD = 14.11$, 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.7(complete)-3idjapane

Table 1
Descriptive statistics and bivariate correlations between study variables and adiposity in the sample of Japanese adults.

	Total sample			By sex					
				Male			Female		
	Descriptive	r_{BMI}	r_{Waist}	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			
			Male		Female	
	Descriptive	r_{BMI}	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 ($\beta_{N \times sex}$ = −.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).

Table 4
Regression analysis predicting adiposity from personality traits in the total samples and by sex.

	Japanese adults						Chinese adolescents		
	BMI			Waist circumference			BMI		
	Total	Sex		Total	Sex		Total	Sex	
		Male	Female		Male	Female		Male	Female
Age	.15**	−.05	.34**	.19*	.11	.39**	.04**	.05**	.01
Sex (female)	−.34**	–	–	−.63*	–	–	−.09**	–	–
Education	−.02	.02	−.04	.03	.09	−.01	–	–	–
Personality									
Neuroticism	−.07	.00	−.12	−.04	.00	−.09	−.02	−.02	.00
Extraversion	.11*	.17*	.07	.07*	.16*	.04	.07**	.09**	.02
Openness	.02	−.05	.08	−.01	−.07	.04	.02	.02	.02
Agreeableness	.06	.11	.03	.04	.07	.05	.02	.04*	−.02
Conscientiousness	−.01	.00	−.02	−.02	−.06	.01	−.02	−.01	−.04*

Note. $N = 380$ for the total sample of Japanese adults, $n = 167$ for male and $n = 213$ for female. $N = 5882$ for the total sample of Chinese adolescents; $n = 3492$ for male and $n = 2390$ for female. Coefficients are standardized beta coefficients from linear regression.
* $p < .05$.
** $p < .01$.

Table 5
Logistic regression predicting overweight from personality traits.

Predictor	Total	By sex	
		Male	Female
Japanese adults			
Age	1.08 (.89–1.32)	.90 (.71–1.13)	1.60 (1.11–2.32)*
Sex	.25 (.14–.43)**	–	–
Education	.98 (.86–1.11)	.98 (.84–1.14)	1.01 (.77–1.32)
Personality			
Neuroticism	.86 (.54–1.40)	.99 (.55–1.78)	.71 (.29–1.70)
Extraversion	1.57 (1.05–2.34)*	2.09 (1.23–3.53)*	1.01 (.50–2.03)
Openness	1.21 (.76–1.92)	.97 (.54–1.73)	1.72 (.79–3.77)
Agreeableness	1.35 (.89–2.06)	1.75 (1.02–3.01)*	.91 (.44–1.88)
Conscientiousness	.98 (.60–1.58)	.91 (.51–1.62)	1.23 (.50–3.03)
Chinese adolescents			
Age	1.04 (.97–1.12)	1.06 (.97–1.15)	1.00 (.87–1.15)
Sex	.46 (.38–.55)**	–	–
Personality			
Neuroticism	.96 (.89–1.03)	.96 (.88–1.05)	.94 (.81–1.09)
Extraversion	1.23 (1.13–1.33)**	1.28 (1.16–1.41)**	1.12 (.97–1.30)
Openness	1.12 (1.03–1.21)**	1.08 (.99–1.19)	1.21 (1.03–1.43)*
Agreeableness	1.09 (1.01–1.18)*	1.12 (1.02–1.23)*	1.02 (.87–1.20)
Conscientiousness	.98 (.90–1.06)	.97 (.88–1.07)	1.02 (.86–1.19)

Note. $N = 380$ ($n = 78$ overweight) for the total sample of Japanese adults, $n = 167$ ($n = 55$ overweight) for male and $n = 213$ ($n = 23$ overweight) for female. $N = 5882$ ($n = 670$ overweight) for the total sample of Chinese adolescents; $n = 3492$ ($n = 500$ overweight) for male and $n = 2390$ ($n = 170$ overweight) for female. Coefficients are odds ratios (95% confidence intervals).
* $p < .05$.
** $p < .01$.

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 ($\beta_{E \times sex} = -.06$, $p < .01$) and in the expected direction in the Japanese sample, but not significant ($\beta_{E \times sex} = -.10$, $p = .18$). Extraversion was likewise more strongly related to a larger waist circumference for men than women in the Japanese sample and was associated with greater risk of overweight/obesity in both samples.

3.3. Openness

There was no relation between Openness and BMI in the meta-analysis or in either of the two new samples. Although not apparent in the continuous analysis, Openness was associated with risk of overweight/obesity among female Chinese adolescents.

3.4. Agreeableness

Although only significant in the Chinese sample, the meta-analysis revealed a small positive association between Agreeableness and BMI for males: Men who scored higher on Agreeableness tended to have higher BMI, a relation not apparent among women. The interaction with sex was significant in the Chinese sample ($\beta_{A \times sex} = -.04$, $p < .05$). There was a similar pattern in the Japanese sample for both BMI and waist circumference, but neither interaction with sex was significant. Finally, Agreeableness was associated with greater risk of overweight/obesity for men but not women in both samples.

3.5. Conscientiousness

Conscientiousness was unrelated to BMI for either sex in the meta-analysis. There was no relation with BMI or waist circumference in either sex in the Japanese sample. In the sample of Chinese adolescents, Conscientiousness was unrelated to BMI in the total sample, but there was a significant negative association among

females. The interaction with sex, however, was not significant ($\beta_{C \times sex} = -.02$, $p = .22$). 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). As such, there may not be enough variance in body weight to be associated with Conscientiousness. One association with Conscientiousness did emerge in the expected direction: adolescent girls in China who scored higher in Conscientiousness had lower BMI. China is undergoing rapid urbanization and with it rapid growth in childhood obesity in urban areas (Zhang, Zhao, & Chu, 2014). As cities become more Western, the traits associated with healthier weight in the west may become more relevant. As obesity rises in China, social awareness and emphasis on thinness (for both aesthetic and for health reasons) are likely to increase as well. Individuals who are more Conscientious are likely to devote their attention and discipline toward the goal of avoiding excess weight and adhere to norms for thinness. The small association in the Chinese girls is likely to spread to men and become stronger as the prevalence of obesity increases, along with the denigration and stigmatization of excess weight typical in Western cultures.

Even with this restricted range, however, other traits were associated with adiposity. In particular, the stronger association between Extraversion and BMI among men is consistent with a growing literature that indicates that men who are sociable and outgoing tend to weigh more, whereas this association is less apparent among women (e.g., Brummett et al., 2006; Jokela et al., 2013; Shim et al., 2014; Sutin & Terracciano, in press). When eating in a group, individuals tend to consume more food and drink than when by themselves (Hetherington, Anderson, Norton, & Newson, 2006), and Extraversion has been associated with eating more in response to external (e.g., social) cues (Keller & Siegrist, 2014). Surprisingly, this association may be more common across cultures than the association between Conscientiousness and BMI. In addition to Extraversion, the meta-analysis also revealed a small positive association between Agreeableness and higher BMI among males. Together with the Extraversion relation, it suggests that males who are more socially skilled in Asia are also more likely to have a higher BMI. Given the modest nature of the association, however, it needs to be replicated before drawing any firm conclusions from it.

The association between Neuroticism and BMI remains unclear. Similar to the South Korean sample, Neuroticism was associated with lower BMI among women compared to men in the Japanese sample. Two other published studies also suggest a negative association between Neuroticism and BMI in Japanese populations (Kakizaki et al., 2008; Otonari et al., 2012), which is opposite to what is found in American samples (e.g., Brummett et al., 2006; Sutin et al., 2011). Women in the United States are more likely to report eating for emotional reasons than women in Japan (Hawks, Madanat, Merrill, Goudy, & Miyagawa, 2003), which suggests that women high in Neuroticism in the United States may be more likely to regulate their emotions with food than women high in Neuroticism in Japan. Neuroticism was, however, unrelated to BMI among the Chinese adolescents. It is unclear whether this difference is due to developmental reasons (i.e., Neuroticism matters more for BMI in adulthood than adolescence), cultural differences (i.e., Neuroticism matters less for individuals from China than Japan), or whether any relation is due to chance.

The present research has several strengths, including two community-dwelling samples covering both adolescence and adulthood, validated measures of the five-factor model of personality, and staff assessed measurements of adiposity. The results were consistent across BMI and waist circumference in the Japanese sample, and across analytic methods (continuous and dichotomous BMI) in both samples. The meta-analysis provided a summary of the available literature on BMI and the five major dimensions of personality in Asian samples. There were also some limitations that could be addressed in future research. First, the measure of personality assessed only the broad domains; it would be worthwhile to use a more detailed personality measure to be able to examine more specific facets of personality, in addition to the domains. Second, the alpha reliabilities for Neuroticism and Conscientiousness were somewhat low, which may have attenuated the results. Third, the data were cross-sectional; we were thus unable to examine whether there were any bi-directional associations between personality and body weight, as has been shown in other samples (Sutin et al., 2013). Finally, as with any cross-cultural research, caution should also be used when interpreting the results of associations from different cultural contexts.

In sum, the present research suggests that the personality correlates of BMI in Asian populations differ somewhat from that of more Western samples; specifically, Conscientiousness was surprisingly unrelated to BMI. It has long been argued that behavior is the product of the interaction of personality with the environment. Culture may be one aspect of the environment that interacts with personality to produce different correlates across populations. More systematic investigations of the role of personality in health across cultures are needed to identify how culture shapes the expression of personality to predict important outcomes.

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References

Armon, G., Melamed, S., Shirom, A., Shapira, I., & Berliner, S. (2013). Personality traits and body weight measures: Concurrent and across-time associations. *European Journal of Personality, 27*, 398–408. http://dx.doi.org/10.1002/per.1902.

Brummett, B. H., Babyak, M. A., Williams, R. B., Barefoot, J. C., Costa, P. T., & Siegler, I. C. (2006). NEO personality domains and gender predict levels and trends in body mass index over 14 years during midlife. *Journal of Research in Personality, 40*, 222–236. http://dx.doi.org/10.1016/j.jrp.2004.12.002.

Chapman, B. P., Fiscella, K., Duberstein, P., Coletta, M., & Kawachi, I. (2009). Can the influence of childhood socioeconomic status on men's and women's adult body mass be explained by adult socioeconomic status or personality? Findings from a national sample. *Health Psychology, 28*, 419–427. http://dx.doi.org/10.1037/a0015212.

de Ridder, D., de Vet, E., Stok, M., Adriaanse, M., & de Wit, J. (2013). Obesity, overconsumption and self-regulation failure: The unsung role of eating appropriateness standards. *Health Psychology Review, 7*, 146–165. http://dx.doi.org/10.1080/17437199.2012.706987.

Friedman, H. S., Kern, M. L., Hampson, S. E., & Duckworth, A. L. (2014). A new life-span approach to conscientiousness and health: Combining the pieces of the causal puzzle. *Developmental Psychology, 50*, 1377–1389. http://dx.doi.org/10.1037/a0030373.

Hawks, S. R., Madanat, H. N., Merrill, R. M., Goudy, M. B., & Miyagawa, T. (2003). A cross-cultural analysis of 'motivation for eating' as a potential factor in the emergence of global obesity: Japan and the United States. *Health Promotion International, 18*, 153–162. http://dx.doi.org/10.1093/heapro/18.2.153.

Hetherington, M. M., Anderson, A. S., Norton, G. N., & Newson, L. (2006). Situational effects on meal intake: A comparison of eating alone and eating with others. *Physiology and Behavior, 88*, 498–505. http://dx.doi.org/10.1016/j.physbeh.2006.04.025.

Jokela, M., Hintsanen, M., Hakulinen, C., Batty, G. D., Nabi, H., Singh-Manoux, A., et al. (2013). Association of personality with the development and persistence of obesity: A meta-analysis based on individual-participant data. *Obesity Reviews, 14*, 315–323. http://dx.doi.org/10.1111/obr.12007.

Kakizaki, M., Kuriyama, S., Sato, Y., Shimazu, T., Matsuda-Ohmori, K., Nakaya, N., et al. (2008). Personality and body mass index: A cross-sectional analysis from the Miyagi Cohort Study. *Journal of Psychosomatic Research, 64*, 71–80. http://dx.doi.org/10.1016/j.jpsychores.2007.07.008.

Keller, C., & Siegrist, M. (2014). Does personality influence eating styles and food choices? Direct and indirect effects. *Appetite, 84C*, 128–138. http://dx.doi.org/10.1016/j.appet.2014.10.003.

Lachman, M. E., & Weaver, S. L. (1997). *Midlife Development Inventory (MIDI) personality scales: Scale construction and scoring.* Unpublished Technical Report. Brandeis University.

Lahti, M., Räikkönen, K., Lemola, S., Lahti, J., Heinonen, K., Kajantie, E., et al. (2013). Trajectories of physical growth and personality dimensions of the Five-Factor Model. *Journal of Personality and Social Psychology, 105*, 154–169. http://dx.doi.org/10.1037/a0032300.

Lin, W. P., Ma, J. J., Wang, L., & Wang, M. (2015). A double-edged sword: The moderating role of conscientiousness in the relationships between work stressors, psychological strain, and job performance. *Journal of Organizational Behavior, 36*, 91–111. http://dx.doi.org/10.1002/job.1949.

Magee, C. A., & Heaven, P. C. L. (2011). Big-Five personality factors, obesity and 2-year weight gain in Australian adults. *Journal of Research in Personality, 45*, 332–335. http://dx.doi.org/10.1016/j.jrp.2011.02.009.

Markus, H., Coe, C., Ryff, C., Karasawa, M., Kawakami, N., & Kitayama, S. (2014). *Survey of Midlife Development in Japan (MIDJA): Biomarker Project, 2009–2010. ICPSR34969-v1*. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor].

Mõttus, R., McNeill, G., Jia, X., Craig, L. C., Starr, J. M., & Deary, I. J. (2013). The associations between personality, diet and body mass index in older people. *Health Psychology, 32*, 353–360. http://dx.doi.org/10.1037/a0025537.

OECD (2013). *Overweight & obesity among adults Health at a Glance 2013: OECD Indicators*.

Ogden, C. L., Carroll, M. D., Kit, B. K., & Flegal, K. M. (2014). Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA, 311*, 806–814. http://dx.doi.org/10.1001/jama.2014.732.

Otonari, J., Nagano, J., Morita, M., Budhathoki, S., Tashiro, N., Toyomura, K., et al. (2012). Neuroticism and extraversion personality traits, health behaviours, and subjective well-being: The Fukuoka Study (Japan). *Quality of Life Research, 21*, 1847–1855. http://dx.doi.org/10.1007/s11136-011-0098-y.

Rozin, P., Fischler, C., Imada, S., Sarubin, A., & Wrzesniewski, A. (1999). Attitudes to food and the role of food in life in the U.S.A., Japan, Flemish Belgium and France: Possible implications for the diet-health debate. *Appetite, 33*, 163–180. http://dx.doi.org/10.1006/appe.1999.0244.

Saucier, G. (1994). Mini-markers: A brief version of Goldberg's unipolar big-five markers. *Journal of Personality Assessment, 63*, 506–516. http://dx.doi.org/10.1207/s15327752jpa6303_8.

Shim, U., Kim, H. N., Roh, S. J., Cho, N. H., Shin, C., Ryu, S., et al. (2014). Personality traits and body mass index in a Korean population. *PLoS One, 9*, e90516. http://dx.doi.org/10.1371/journal.pone.0090516.

Sutin, A. R., & Terracciano, A. (in press). Five factor model personality traits and the objective and subjective experience of body weight. *Journal of Personality*. http://dx.doi.org/10.1111/jopy.12143.

Sutin, A. R., Costa, P. T., Chan, W., Milaneschi, Y., Eaton, W. W., Zonderman, A. B., et al. (2013). I know not to, but I can't help it: Weight gain and changes in impulsivity-related personality traits. *Psychological Science, 24*, 1323–1328. http://dx.doi.org/10.1177/0956797612469212.

Sutin, A. R., Ferrucci, L., Zonderman, A. B., & Terracciano, A. (2011). Personality and obesity across the adult life span. *Journal of Personality and Social Psychology, 101*, 579. http://dx.doi.org/10.1037/a0024286.

Terracciano, A., Sutin, A. R., McCrae, R. R., Deiana, B., Ferrucci, L., Schlessinger, D., et al. (2009). Facets of personality linked to underweight and overweight. *Psychosomatic Medicine, 71*, 682–689. http://dx.doi.org/10.1097/PSY.0b013e3181a2925b.

Zhang, Y. X., Zhao, J. S., & Chu, Z. H. (2014). Prevalence of overweight and obesity among children and adolescents is associated with urbanization in Shandong, China. *International Journal of Cardiology, 176*, 1212–1213. http://dx.doi.org/10.1016/j.ijcard.2014.07.222.