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Genetic and Environmental Links between Self-Reports and Parent-Reports of Child Personality

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Genetic and Environmental Links between Self-Reports and Parent-Reports of Child Personality

by

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Dedication

This thesis is dedicated to my supportive and loving parents, Barry and Eva Savicki. Your lifelong sacrifices for me and unwavering belief in me are why I was not only able to be the first person in our family to go to college, but now earn an advanced degree. Thank you for your innumerable and invaluable gifts, both genetic and environmental.

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Abstract

Genetic and Environmental Links between Self-Reports and Parent-Reports of Child Personality

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Personality ratings have been consistently found to be reliable and moderately heritable, but interrater agreement between self- and other-report of personality are low-to-moderate, particularly in childhood samples. The current study aims to examine the agreement between child self-reports and parent-informant reports of Big Five personality traits using a genetically informative approach. Using data from a sample of 2756 (982 monozygotic) twins ages six to 21 from The Texas Twin Project, we find that agreement between parent ratings and child-self reports for all Big 5 personality traits are mediated by both genetic and non-shared environmental influences. Models incorporating dominant genetic effects rather than additive genetic effects alone proved to better fit the data. In these models, the effect of additive genetics was strongly reduced or eliminated altogether in favor of strong dominant genetic influences, suggesting that dominant genetic effects play a key role in parent and child ratings of personality and should be more widely incorporated into similar research. Additive genetic effects were observed in parent reports of child extraversion, agreeableness, and neuroticism, but not in any self-reported traits. Dominant genetic effects, however, were observed in parent and child reports of extraversion, openness, conscientiousness, and neuroticism, as well as parent reports of agreeableness. Non-environmental effects were strong for all Big 5 traits reported by children and parents. Contrast effects, while slight, were observed in parent and self-reports of extraversion as well as parent reports of conscientiousness and neuroticism.

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Introduction

Genetic influences have been shown to account for between 30 and 60 percent of interindividual differences in personality across the life course (Briley & Tucker-Drob, 2014; Bouchard, 2004; Loehlin, 1992). Although studies of child personality vary somewhat in the taxonomic structure on which their personality measures are based, it has been increasingly common to measure child personality using measures derived from a five-factor model of personality, the Big Five. These five personality factors are extraversion, conscientiousness, neuroticism, agreeableness, and openness to experiences (McCrae & John, 1992; John, Naumann, & Soto, 2008).

The Big Five were originally identified on the basis of a large body of factor analytic work in adult samples, and has been described as representing “an optimal balance between bandwidth (conceptual breadth), fidelity (descriptive specificity), and generalizability (across samples and measures)” (Soto & Tackett, 2015, p. 358). However, the specific patterns of associations among Big Five factor differs between child and adult samples, with, for example, stronger correlations between conscientiousness and openness in children compared to adults, particularly when reported on by parents and teachers (Soto & Tackett, 2015). The dependability of child self-reports of personality has also been a topic of inquiry (Shiner, 1998), with strong evidence that younger children are more likely to be systematically biased by response sets, such as acquiescence (i.e. yea-saying vs. nay-saying regardless of the content of the item), compared to older children, adolescents, and adults (Soto et al., 2008). Although procedures to correct for acquiescent responding exist, the question remains as to whether—even after such corrections are made—children have the capacity for introspection and self-appraisal necessary to accurately and reliability report on their psychological and behavioral repertoires.

Moderate correlations between child self-reports and parent-reports of personality suggest that children may indeed have the capacity to, at least to some extent, detect and report on the same systematic patterns of thinking, feeling, and behaving. Indeed, given that agreement between self- and informant-reports of personality are only moderate even in adult populations (Kandler, 2012; Rohrer et al., 2017; Vazire, 2010), the dependability of child reports should not be quickly dismissed. In the context of behavioral genetic studies of personality, in which multiple family members (e.g. twins and siblings) are rated on personality, a further issue concerns the question of assimilation and contrast effects. Assimilation refer to instances in which the personality characteristics of one child are assumed to apply to the second child in a sibling pair. Contrast effects refer to instances in which nuanced differences between siblings within a pair are evaluated as more dramatic than they truly are (Saudino et al., 1995). Indeed, such effects have been suggested as a potential explanation for the common finding that identical twins are judged to be more than twice as similar in their personality than are fraternal twins (Spinath & Angleitner, 1997). Identical twins are only twice as genetically similar as are fraternal twins (sharing 100% to 50% of their segregating alleles), so this finding is not plausible under an additive model of gene action. This finding, however, may also be explained by genetic effects working non-additively. For instance, Bouchard (2004) explains “genes for personality, in addition to simply adding or subtracting from the expression of a trait, work in a more complex manner, the expression of a relevant gene depending to some extent on the gene with which it is paired on a chromosome or on genes located on other chromosomes.”

Although correspondence between self- and informant-reports are typically only moderate, work in adults indicates that both reporters may pick on overlapping genetic sources of personality variation (Kandler, Riemann, Spinath, & Angleitner, 2010), particularly when the informant is more familiar with the target (Kandler, 2012). Genetic effects unique to informant-type may reflect systematical differences in access to genetically-influenced internal states, differences in the behavioral repertoires on which the judgements are made, and systematic biases, such as motivated appraisals. By examining self-other agreement discrepancy by trait between child twin pairs and their parents, the "other" with the most exposure to the subjects at the time of evaluation is providing the best available non-self-rater information (Kandler, Riemann, & Kämpfe, 2008).

Finally, correspondence between self- and parent-reports of personality may differ by trait. Cross-trait differences in how well each of the five personality factors can be observed by the self and by others and in their evaluativeness or social desirability may contribute to differences in the magnitude of correspondence of self and other reports. For example, it may be easier for others to match an individual's assessment of their extraversion because it can be socially observable, but neuroticism may have lower interrater agreement because it represents internal emotional states that are not often easy to perceive (John & Robins, 1993; Vazire, 2010). Indeed, although most people may believe that they know themselves better than anyone else could, research has shown that adults have "blind spots" in self-knowledge compared to peer reports due to a lack of feedback, an overwhelming amount of data and memories, as well as biases due to motivated cognitive processes to preserve a specific self-image (Vazire & Carlson, 2011). This may lead low visibility/high evaluativeness traits to evince lower interrater agreement than those that are both visible and less evaluative. To our knowledge, however, this question has not been addressed in childhood samples.

GOALS OF THE CURRENT STUDY

The goal of this project is to explore how well child self-reports and parent-informant reports of Big Five personality traits agree with one another at the phenotypic and behavior-genetic levels. Three initial model specifications (*AE*, *ACE*, and *ADE*) were fit for each of the Big Five traits. We also fit an elaboration of the *ADE* specification that allowed for sibling contrast effects. Based on past behavioral genetic research on personality (Turkheimer, Petterson, & Horn, 2014), we anticipated that the model accounting for dominant in addition to additive genetic effects (*ADE*) would better fit the data, as it provides more context for genetic contributions to personality.

We estimated the genetic and environmental sources of correspondence and differentiation between parent- and self-report were measures of each trait. We hypothesized that low visibility/high evaluativeness traits, such as agreeableness and neuroticism, will show the lowest self-parent correspondence. Extraversion, a high visibility trait, was expected to exhibit high self-parent agreement. We also expected that extraversion would potentially evince stronger contrast effects as a function of being more easily comparable across members of a twin pair than less visible traits. Similarly, we predicted that other high visibility traits, including openness to experiences and conscientiousness, would also have higher self-parent agreement in addition to stronger contrast effects.

Methods

PARTICIPANTS

All participants (*N* = 2756, 49.2% female) were twins ages 6.94 to 21.28 (*M* = 13.61, *SD* = 2.94) from Twin Brains and Risky Business subsets of The Texas Twin Study project (Harden, Tucker-Drob, & Tackett, 2013), a registry of school-aged twins in the Austin and Houston metropolitan areas. Twins are identified through public school records and contacted via mailing. Data were aggregated across participants from both in-lab studies and home-based survey studies. Within the sample, there were 491 monozygotic (identical) twin pairs (266 male, 225 female). Of the 887 dizygotic (fraternal, half as genetically similar) twin pairs, 222 were male, 241 were female, and 424 were opposite-sex. This included 44 sets of triplets, with each pair within the group of three siblings being treated as a twin set in comparisons (and, thusly, half-weighted in analyses to prevent doubly representing any individuals). The sample was racially diverse, including 61.91% of twins identifying as white, 20.50% as Hispanic, 10.55% black, 5.45% Asian, 0.53% Native American, and 1.07% identifying as "other."

MEASURES

Zygosity

Opposite-sex twin pairs were all classified as dizygotic. For same-sex twin pairs, zygosity was determined based on a latent class analysis (LCA; Muthén, 2004) of physical similarity ratings by research assistants (for in-lab participants), parents (for all participants with available parent survey data), and self-reports (for all in-lab participants over 14 years of age). Such methods for determining zygosity has been found to be over 99 percent accurate (Heath et al., 2003).

Personality

Each twin's personality was assessed by self and parent reports on versions of the Big Five Inventory (BFI; John, Naumann, & Soto, 2008) adapted for child participants. Of the 44 BFI items, eight index extraversion, 10 index openness to experiences, nine index agreeableness, nine index conscientiousness, and eight index neuroticism. Each item is presented as a statement, such as "is talkative" or "is a reliable worker", and is rated on a 5-point scale ranging from strongly disagree (1) to strongly agree (5). Scaled scores for each factor were ipsatized to control for individual differences in response sets, such as acquiescence and extreme responding, based on the means and standard deviations of responses as outlined by Soto et al. (2008).

ANALYSES

Four behavior genetic models comprising four factors of phenotypic variance were fit to extraversion, agreeableness, openness to experience, conscientiousness, and neuroticism results and assessed for goodness of fit. The four factors of phenotypic variance are additive genetic influences (*A*, 1.0 for monozygotic twins and 0.5 for dizygotic), dominant genetic effects (*D*), shared environmental influences (*C*), and non-shared environmental influences (*E*). The four models fit were (1) *AE*, only incorporating additive genetic influences which make genetically identical twins more similar and non-shared environment influences serving to differentiate twins regardless of genetic similarity; (2) *ACE*, incorporating shared environment influences as well, which serve to make twins more similar regardless of genetic similarity; (3) *ADE*, incorporating dominant genetic effects, which are non-additive; and (4) *ADE* with contrast, incorporating the differences in parent and self-ratings within twin pairs to account for comparison and contrast effects. Model fit was assessed via Chi-square test of model fit, root mean square error of approximation (RMSEA), Bentler's Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Akaike's Information Criterion (AIC), and the Bayesian Information Criterion (BIC).

[insert Figures 1 & 2]

Results

All structural equation modeling was completed in Mplus 7.4 (Muthén & Muthén, 2010). For triplets, each pair (triplets 1 and 2, 1 and 3, and 2 and 3) were treated as a twin set. As each member of a triplet set appeared in two pairs, triplet pairs were down-weighted by 0.5.

All models controlled for the effects of age, age^2, age^3, sex, and age×sex. Unstandardized coefficients are reported in Table 1.

[insert Table 1]

All ispatized self- and parent reports of the Big 5 personality traits were correlated in a matrix and are presented in table 4. Parent and self-reports of the same Big 5 traits were all moderately correlated and significant, with extraversion having the strongest correlation (r = .433, 95% CI [.399, .466]), followed by conscientiousness (r = .386, 95% CI [.350, .420]), openness (r = .370, 95% CI [.334, .405]), neuroticism (r = .309, 95% CI [.271, .346]), and agreeableness (r = .298, 95% CI [.260, .335]). Significant but slight correlations were also observed for nine non-congruent trait pairings: A_S with C_P (r = .153, 95% CI [.112, .193]), N_S with A_P (r = -.129, 95% CI [-.169, -.088]), A_S with N_P (r = -.115, 95% CI [-.156, -.074]), C_S with A_P (r = .091, 95% CI [.050, .131]), O_S with E_P (r = .079, 95% CI [.037, .119]), E_S with A_P (r = .064, 95% CI [.022, .105]), N_S with C_P (r = -.051, 95% CI [-.092, -.010]), E_S with N_P (r = -.049, 95% CI [-.090, -.007]), and E_S with O_P (r = .048, 95% CI [.007, .089]).

[insert Table 2]

Model Fit Comparisons

Model fits for the *AE*, *ACE*, *ADE*, and *ADE* with contrast models are reported in Table 1 for each of the five factors of personality. Model fit was assessed via Chi-square test of model fit, root mean square error of approximation (RMSEA), Bentler's Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Akaike's Information Criterion (AIC), and the Bayesian Information Criterion (BIC). In each case, the *ADE* model fit best, with accounting for contrast slightly increasing goodness of fit. The *ADE* contrast model relies on more restrictive assumptions, so it is unclear whether or not, in spite of slightly better fit results, that the contrast models qualitatively better suit the data.[1]

[insert Table 3]

MODEL RESULTS

All model results are presented in Table 4, but both *ADE* models (with and without contrast) are described below.

[insert Table 4]

Extraversion

In the *ADE* model without contrast, significant dominant genetic and non-shared environment influences were observed on parent and self-report as well as the Cholesky cross paths. In the model with contrast, these same influences were observed with the exception of dominant genetic effects on self-report and the addition of additive genetic effects on parent report as well as the Cholesky cross path. Negative contrast effects were observed for both parent and self-report.

[1] Unlike the rest of the Big Five contrast models, the Conscientiousness parent and self bivariate model did not initially converge. To assess the issue, two separate univariate models for parent and self-report were run. No contrast effects were observed in the self-model but were for the parent when the zero-value additive genetic effects (A) were omitted from the model. Upon removing A from parent in the bivariate ADE contrast model, convergence occurred under this constraint.

Openness to Experience

In both *ADE* models with and without contrast, significant dominant genetic and non-shared environment effects were observed on parent report and self-report. Additionally, non-shared environment influence was observed in the Cholesky cross path. In the model without contrast, dominant genetic effects were also observed in the Cholesky cross path. No significant contrast effects were observed in the contrast model.

Agreeableness

In both *ADE* models, strong non-shared environment effects were observed for parent report, self-report, and the Cholesky cross paths. Additionally, moderate dominant genetic effects were observed on parent report. In the model without contrast, additive genetic effects on parent report were observed as well. No significant contrast effects were found in the contrast model.

Conscientiousness

In the model without contrast as well as our work-around contrast model, significant dominant genetic and non-shared environmental effects were observed on parent report, self-report, and the Cholesky cross paths. The main difference between the models was in parent report, where the moderate dominant genetic effects and strong non-shared environmental effects observed in the model without contrast were observed to be more even (both moderately strong) in the model with contrast. A slight negative contrast effect was observed to be significant on parent report.

Neuroticism

In both models, significant non-shared environment effects were observed in parent report, self-report, and in the Cholesky cross paths. In the model without contrast, dominant genetic effects were observed in parent and self-report. In the contrast model, additive genetic effects were observed in parent report and dominant genetic effects were observed in the Cholesky cross path. A slight negative contrast effect was found to be significant in parent report.

Discussion

The goal of this study was to examine how self- and parent reports of personality correspond with one another in terms of genetic and environmental sources of covariance. Regarding interrater agreement, parent and self-reports of the same Big 5 traits were all moderately correlated and significant, with extraversion having the strongest correlation, followed by conscientiousness, openness, neuroticism, and agreeableness. These observed results from our child and adolescent sample align with the Vazire (2010)'s self-other knowledge asymmetry framework laid out for adults: high visibility/low evaluativeness traits such as extraversion are more likely to have interrater agreement than low visibility/high evaluativeness traits like neuroticism. Results from our behavior genetics models suggest that these phenotypic results' agreement is mediated by dominant genetic and non-shared environmental effects.

In our standard *ADE* model, which fit the data better than the *AE* or *ACE* models, additive genetic influences were observed for parent reports of agreeableness, but not any other traits nor in self-reports. Within the constraint of the *ADE* model with contrast, additive genetic influences were not found on twin self-reports of any trait. However, additive genetic influences were found to have a moderate significant relationship to parent reports of extraversion and a strong significant relationship to parent reports of neuroticism, as well as a negative significant influence on the extraversion Cholesky cross paths of parent on self-reports. In *AE* and *ACE* models, additive genetic effects are observed in parent and self-reports of all traits. These genetic effects seem to be better explained by dominant genetics, given the introduction of this constraint providing a better data fit in both the *ADE* models with and without contrast. As detailed in the results, strong significant dominant genetic effects were observed in both *ADE* models for parent and self-reports of nearly every trait, as well as influences on the Cholesky cross paths. Influences of non-shared environment on parent and self-reports of all traits were observed to be strong in all models. Modest but significant negative contrast effects were observed in parents' reports of twins' extraversion and neuroticism as well as twins' self-reports of extraversion. This aligned with our hypotheses regarding extraversion being more visible and thus more easy to compare. However, we were surprised by the contrast effects within the lower visibility trait of neuroticism, given our thought that if a trait is harder to judge in one person, it would be even harder to compare across two.

In summary, interrater agreement between parents and child self-reports of the Big 5 traits is best explained by dominant genetic and non-shared environmental influences, with the highest visibility trait of extraversion having strongest agreement but with highest risk of contrast effects.

LIMITATIONS AND FUTURE DIRECTIONS

This sample is large by standards of the current literature, but a replication of this study would be beneficial once more participants are measured; such a replication would be especially valuable in light of the fact that additive genetic influences on personality across traits observed in this sample (i.e., 0 to 40 percent) differs from that generally found elsewhere (i.e., 30 to 60 percent). However, this study incorporated dominant genetic effects as well as additive (using the *ADE* model), providing a more detailed picture of the genetic contributions to personality. The rare observed influence of additive genetics plus the observations of strong dominant genetic influences in both *ADE* models coupled with their superior fit to the data over *AE* and *ACE* models suggest that dominant genetic effects play a key role in parent and child ratings of personality. This strongly suggests *ADE* models should be more widely incorporated into similar research studies' analyses in favor of traditional *ACE* modeling.

As previous literature has found when measuring children (Soto & Tackett, 2015), our sample also revealed slight ($\pm.05 < r < \pm.15$) significant correlations between self- and parent ratings of non-congruent Big 5 trait pairings. However, our sample did not show the same overlap as Soto and Tackett, who found parent-child report correlations between openness and conscientiousness. This paper found significant positive correlations between self-reported agreeableness and parent-reported conscientiousness as well as parent-reported agreeableness and self-reported conscientiousness, self-reported openness and parent-reported extraversion as well as parent-reported openness and self-reported extraversion, and self-reported extraversion and parent-reported agreeableness. Significant negative correlations were observed between self-reported neuroticism and parent-reported agreeableness as well as parent-reported neuroticism and self-reported agreeableness, self-reported neuroticism and parent-reported conscientiousness, and self-reported extraversion and parent-reported neuroticism. These relationships suggest, as Soto and Tackett posited, that children are not ideal self-reporters.

Figures

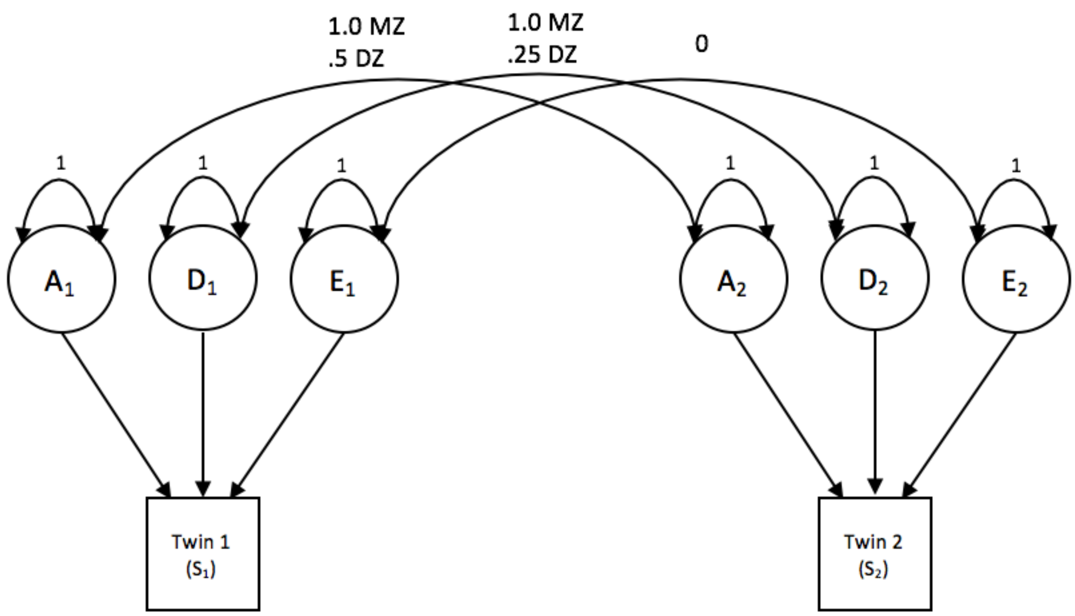

Figure 1: *ADE* Model

Path diagram of twin comparison with additive genetic (*A*), dominant genetic (*D*), and non-shared environment (*E*) model constraints. In an *ACE* model, shared (common) environment effects (*C*, 1.0 for both monozygotic and dizygotic twin pairs) are incorporated into the model constraint instead of dominant genetic effects. In an *AE* model, both *C* and *D* constraints are dropped and only additive genetic and non-shared environment effects are considered.

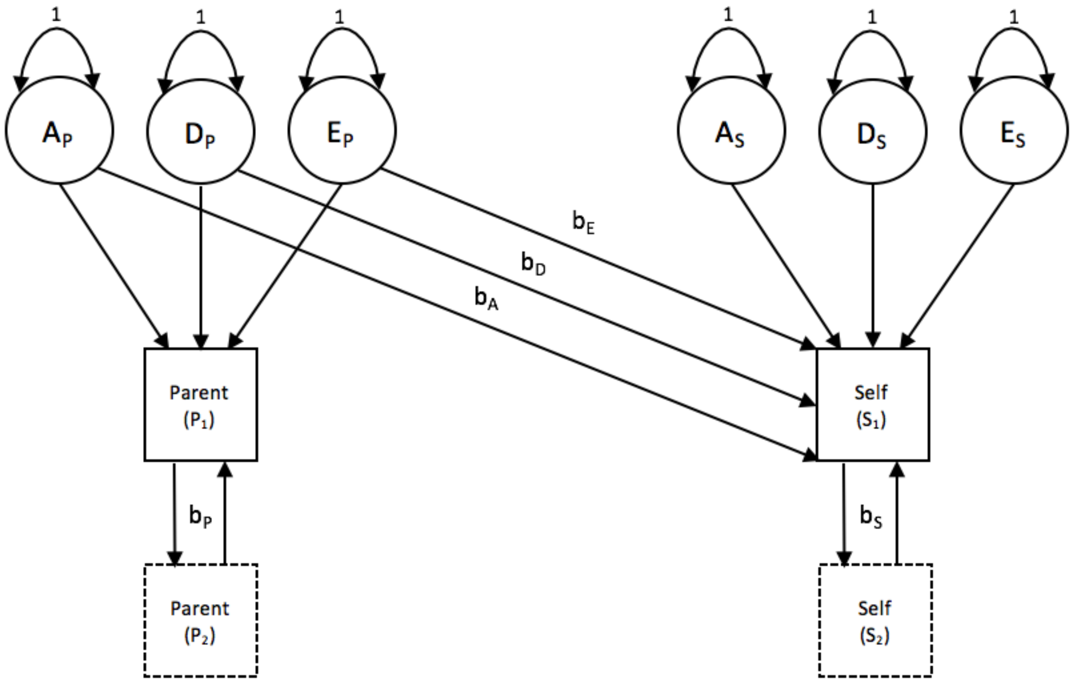

Figure 2: *ADE* Path diagram with Cholesky cross paths and between-twin contrast.

The additive genetic (*A*), dominant genetic (*D*) and non-shared environment (*E*) effects based on parent report (P) of twin 1 contrasted via Cholesky cross-paths model with twin 1's self-report (S). Additional contrast paths between the parent report of twin 1 and twin 2 (b_P) as well as between the unique self-reports of twin 1 and twin 2 (b_S) are shown with the twin 2 Cholesky path diagram implied.

Tables

	Age	Age^2	Age^3	Sex	Age × Sex
Extraversion					
Parent	-.010	**-.015**	**.001**	.001	.003
	(.019)	(.005)	(.000)	(.057)	(.010)
Self	**.214**	**-.049**	**.003**	-.108	.022
	(.057)	(.012)	(.001)	(.069)	(.012)
Openness					
Parent	-.010	-.010	.001	-.064	-.012
	(.031)	(.008)	(.001)	(.061)	(.011)
Self	**.118**	**-.031**	**.001**	**-.167**	.016
	(.058)	(.012)	(.001)	(.073)	(.012)
Agreeableness					
Parent	.014	-.009	.000	-.044	**.022**
	(.026)	(.007)	(.000)	(.054)	(.010)
Self	.063	**-.024**	**.002**	**-.142**	.015
	(.059)	(.012)	(.001)	(.068)	(.011)
Conscientiousness					
Parent	.021	-.004	.000	-.043	**-.027**
	(.026)	(.007)	(.000)	(.064)	(.011)
Self	.026	**-.029**	**.002**	**-.128**	.008
	(.051)	(.011)	(.001)	(.069)	(.011)
Neuroticism					
Parent	-.015	.004	.000	-.018	-.014
	(.032)	(.008)	(.001)	(.062)	(.012)
Self	-.036	.002	.000	-.027	**-.049**
	(.060)	(.012)	(.001)	(.072)	(.012)

Bold *for* p *< .05; standard errors in parentheses.*

Table 1: Unstandardized Coefficients of Age and Sex Effects in *ADE* model

Self \ Parent	Extraversion (E_P)	Openness (O_P)	Agreeableness (A_P)	Conscientiousness (C_P)	Neuroticism (N_P)
Extraversion (E_S)	.433***	.048*	.064**	-.005	-.049*
Openness (O_S)	.079***	.370***	.020	.000	-.015
Agreeableness (A_S)	.028	.002	.298***	.153***	-.115***
Conscientiousness (C_S)	.035	.040	.091***	.386***	-.036
Neuroticism (N_S)	-.027	.024	-.129***	-.051*	.309***

** for* p *< .05; ** for* p *< .005; *** for* p *< .0005*

Table 2: Big 5 Parent- and Self-Report Correlations Matrix

	Model	Chi^2	df	RMSEA	CFI	TLI	AIC	BIC
Extraversion	AE	179.331	84	.047	.855	.865	14110.018	14205.775
	ACE	172.926	81	.047	.860	.865	14116.018	14227.735
	ADE	146.323	81	.040	.900	.904	14084.880	14196.598
	ADE Contrast	101.635	79	.024	.965	.966	14040.642	14162.999
Openness	AE	101.486	84	.020	.972	.974	14122.457	14218.215
	ACE	97.861	81	.020	.973	.974	14128.457	14240.174
	ADE	83.634	81	.008	.996	.996	14110.480	14222.198
	ADE Contrast	83.007	79	.010	.994	.994	14113.346	14235.703
Agreeableness	AE	100.360	84	.020	.954	.957	14404.352	14500.110
	ACE	96.776	81	.020	.956	.957	14410.352	14522.070
	ADE	91.883	81	.016	.969	.970	14402.461	14514.179
	ADE Contrast	91.154	79	.017	.966	.966	14405.976	14528.333
Conscientiousness	AE	133.318	84	.034	.916	.922	14199.252	14295.010
	ACE	128.557	81	.034	.919	.922	14205.252	14316.969
	ADE	109.772	81	.027	.951	.953	14185.725	14297.442
	ADE Contrast	103.202	82	.023	.964	.966	14173.841	14280.239
Neuroticism	AE	136.249	84	.035	.884	.893	14400.335	14496.902
	ACE	131.383	81	.035	.889	.893	14406.335	14518.052
	ADE	121.983	81	.032	.909	.913	14392.213	14503.930
	ADE Contrast	117.259	79	.031	.915	.916	14391.097	14513.454

Table 3: Model Fit Comparison

	Model	Parent Report (p)			Unique Self Report (s)			Cholesky Cross Paths (b)			Contrast effects	
		Ap	Cp/Dp	Ep	As	Cs/Ds	Es	Ba	bc/bd	be	bp	bs
Extraversion	AE	**-.355**		**.924**	**.383**		**.767**	**-.371**		**.311**		
		(.076)		(.030)	(.081)		(.023)	(.089)		(.040)		
	ACE	**-.355**	.000	**.924**	**.383**	**.000**	**.767**	**-.371**	.000	**.311**		
		(.076)	(.000)	(.030)	(.081)	(.000)	(.023)	(.089)	(.000)	(.040)		
	ADE	-.018	**.510**	**.848**	.000	**.404**	**.739**	.041	**.457**	**.222**		
		(.361)	(.062)	(.036)	(.000)	(.202)	(.026)	(.848)	(.106)	(.045)		
	ADE	**.383**	**.698**	**.683**	.000	.000	**.687**	**-.308**	**.655**	**.174**	**-.155**	**-.069**
	Contrast	(.071)	(.044)	(.030)	(.000)	(.000)	(.029)	(.071)	(.042)	(.040)	(.023)	(.022)
Openness	AE	**.663**		**.725**	**.422**		**.802**	**.347**		**.156**		
		(.033)		(.030)	(.042)		(.021)	(.041)		(.036)		
	ACE	**.663**	**.000**	**.725**	**.422**	**.000**	**.802**	**.347**	.000	**.156**		
		(.033)	(.000)	(.030)	(.042)	(.000)	(.021)	(.041)	(.000)	(.036)		
	ADE	.155	**.687**	**.686**	.000	**.449**	**.782**	.180	**.313**	**.143**		
		(.300)	(.078)	(.031)	(.000)	(.069)	(.023)	(.335)	(.134)	(.038)		
	ADE	.464	**.596**	**.660**	.000	**.471**	**.777**	.285	.203	**.149**	-.039	-.007
	Contrast	(.363)	(.224)	(.043)	(.000)	(.065)	(.031)	(.190)	(.208)	(.038)	(.049)	(.024)
Agreeableness	AE	**.569**		**.818**	**.441**		**.832**	**.272**		**.168**		
		(.038)		(.027)	(.044)		(.022)	(.052)		(.039)		
	ACE	**.569**	.000	**.818**	**.441**	**.000**	**.832**	**.272**	.000	**.168**		
		(.038)	(.000)	(.027)	(.044)	(.000)	(.022)	(.052)	(.000)	(.039)		
	ADE	**.419**	**.409**	**.806**	.000	.309	**.808**	-.029	.469	**.140**		
		(.178)	(.208)	(.031)	(.000)	(.417)	(.025)	(.174)	(.272)	(.042)		
	ADE	.150	**.523**	**.825**	.000	.360	**.788**	-.249	.416	**.135**	.024	-.022
	Contrast	(.378)	(.103)	(.045)	(.001)	(.355)	(.048)	(.498)	(.416)	(.042)	(.032)	(.047)
Conscientiousness	AE	**-.429**		**.897**	**.387**		**.795**	**-.311**		**.285**		
		(.057)		(.028)	(.055)		(.023)	(.068)		(.036)		
	ACE	**.429**	**.000**	**.897**	**.387**	**.000**	**.795**	**-.311**	.000	**.285**		
		(.057)	(.000)	(.028)	(.055)	(.000)	(.023)	(.068)	(.000)	(.036)		
	ADE	.000	**.509**	**.855**	.000	**.436**	**.768**	.000	**.341**	**.252**		
		(.000)	(.052)	(.031)	(.000)	(.051)	(.025)	(.000)	(.062)	(.039)		
	ADE	—	**.656**	**.778**	.000	**.459**	**.769**	—	**.305**	**.254**	**-.070**	—
	Contrast		(.053)	(.034)	(.000)	(.043)	(.025)		(.049)	(.039)	(.023)	
Neuroticism	AE	**-.547**		**.835**	**.453**		**.801**	-.014		**.343**		
		(.049)		(.032)	(.043)		(.023)	(.061)		(.035)		
	ACE	**-.547**	.000	**.835**	**.453**	**.000**	**.801**	-.014	.000	**.343**		
		(.049)	(.000)	(.032)	(.043)	(.000)	(.023)	(.061)	(.000)	(.035)		
	ADE	.096	**.587**	**.802**	.000	**.512**	**.766**	-.025	.050	**.334**		
		(.848)	(.144)	(.031)	(.000)	(.043)	(.024)	(.215)	(.108)	(.039)		
	ADE	**.718**	.162	**.727**	.000	.000	**.733**	-.025	**.595**	**.309**	**-.091**	-.035
	Contrast	(.073)	(.171)	(.041)	(.000)	(.000)	(.034)	(.131)	(.062)	(.040)	(.037)	(.025)

Bold *for* p *< .05; standard errors in parentheses.*

Table 4: Standardized Parameter Estimates

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