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Table 1. Descriptive Statistics on Parent-Offspring Relationship Problems in Adolescence and Adulthood: Raw Variables

	M	*SD*	*Min*	*Max*
Age 18				
Conflict	22.41	6.30	12	48
Involvement	37.28	6.14	15	48
Parent regard for child	18.27	2.17	5	20
Child regard for parent	27.94	3.51	8	32
Age 25				
Mean of 6 Items	3.23	.55	1	4

NOTE: *M* = Mean, *SD* = Standard Deviation, *Min* = Minimum, *Max* = Maximum. While recoded into the same direction for all subsequent analyses, here conflict was coded such that a higher scored indicated more conflict, while for the involvement and regard scales, a higher scored indicated more involvement and regard. For the age 25 scale, a higher scored indicated more positive relationship quality prior to the recode. For all subsequent analyses, these scales/items were recoded so that a higher scored indicated a greater degree of parent-child relationship problems.

Table 2. Descriptive Statistics on EXT in Adolescence and Adulthood: Raw Variables

	M	*SD*	*Min*	*Max*	*% meeting Definite DSM IIIR Diagnosis**	*% meeting with 1 Clinical Symptom*
Age 18						
Adult Antisocial Behavior	.66	1.18	0	7	4.5	34.4
Nicotine Dependence	.74	1.57	0	7	15.1	22.9
Alcohol Dependence	.51	1.27	0	9	7.8	20.8
Illicit Drug Abuse/Dependence	.35	1.18	0	9	5.2	11.8
Age 25						
Adult Antisocial Behavior	1.10	1.18	0	8	4.8	66.5
Nicotine Dependence	1.11	1.74	0	7	22.2	35.6
Alcohol Dependence	.93	1.55	0	9	14.2	39.0
Illicit Drug Abuse/Dependence	.47	1.39	0	9	6.8	16.3

NOTE: *M* = Mean, *SD* = Standard Deviation, *Min* = Minimum, *Max* = Maximum, *EXT* = Externalizing Disorders. * a total of 4 symptoms were necessary to meet diagnosis for Adult Antisocial Behavior, 3 symptoms were necessary to meet nicotine, alcohol dependence, or illicit drug abuse/dependence.

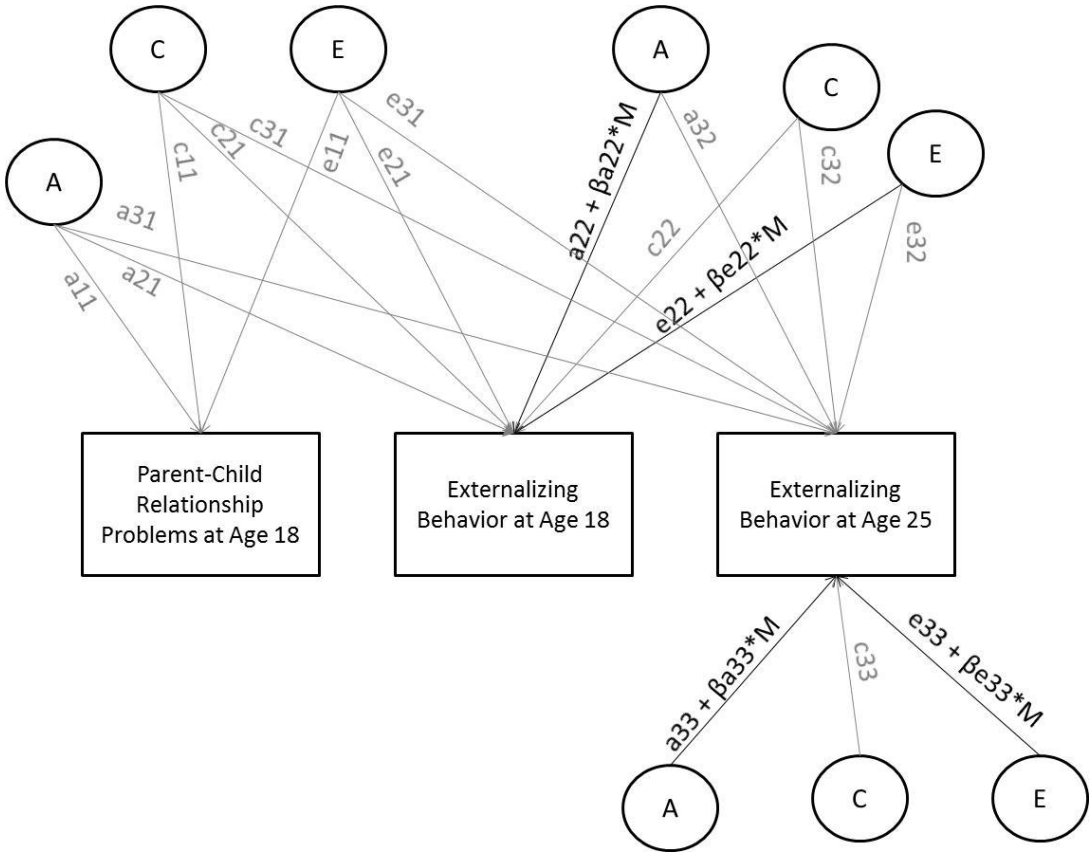

Figure 1. Trivariate Model of Gene-Environment Interplay. A refers to genetic influences, C refers to shared environmental influences, and E refers to nonshared environmental influences. Parameters a11, c11, e11 refer to the genetic and environmental influences on parent-child relationship problems at age 18. Parameters a21, c21, e21 refer to the genetic and environmental influences on parent-child relationship problems at age 18 in common with EXT at age 18. Parameters a22, c22, e22 refer to the unique genetic and environmental influences on EXT at age 18. Paths a31, a32, e32 refer to the genetic and environmental influences on parent-child relationship problems at age 18 in common with EXT at age 25 (above and beyond the common influences on parent-child relationship problems at age 18 and EXT at age 18). Paths a33, c33, e33 refer to the unique genetic and environmental influences on EXT at age 25. β describes the magnitude and direction of moderation effect, M indicates the level of the moderator. For clarity

of presentation, all paths with a tested moderator are denoted in black, all non-moderated paths are in gray. Moderated paths were tested based on the results of the cross-sectional, bivariate GxE tests at ages 18 and 25.

Other Supplementary Material

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```
!GxE  and rGE, testing unique AE moderation on EXT18 and EXT25
!variables entered as RQ18 -> EXT18 -> EXT25
!based on Purcell's (2002) GxE in context of rGE

Group1: Defines Matrices
Data Calc NGroups=3
Begin Matrices;
! GENETIC EFFECTS
A full 1 1 free !  cholesky elements for A, a11
B full 1 1 free ! a22
C full 1 1 free !a33
D full 1 1 free ! a21
E full 1 1 free !a31
F full 1 1 free !a32
G full 1 1 free    ! moderation on unique path a22
H full 1 1 free    ! moderation on unique path a33

! NONSHARED E
I full 1 1 free !  cholesky elements for E, e11
J full 1 1 free ! e22
K full 1 1 free !e33
L full 1 1 free ! e21
M full 1 1 free !e31
N full 1 1 free !e32
O full 1 1 free    ! moderation on unique path e22
P full 1 1 free    ! moderation on unique path e33

! SHARED E
Q full 1 1 free ! cholesky elements for C, c11
```

```
R full 1 1 free !c22
S full 1 1 free !c33
T full 1 1 free !c21
U full 1 1 free !c31
V full 1 1 free !c32

W full 1 3 free ! means (M, T)
X full 1 1   ! constant, 1/2
Y full 1 1   ! twin 1 moderator (definition variable)
Z full 1 1   ! twin 2 moderator (definition variable)

End Matrices;
Matrix X .5
Ma A 0.43 !a11 !BASED ON TRIVARIATE CHOLESKY
Ma B 0.67 !a22
Ma C 0.59 !a33
Ma D 0.16 !a21
Ma E 0.14 !a31
Ma F 0.46 !a32
Ma G 0.0
Ma H 0.0

Ma I 0.42 !e11
Ma J 0.28 !e22
Ma K 0.29 !e33
Ma L 0.04 !e21
Ma M 0.05 !e31
Ma N 0.07 !e21
Ma O 0.0
Ma P 0.0
```

```
Ma Q 0.16 !c11
Ma R 0.07 !c22
Ma S 0.04 !c33
Ma T 0.06 !c21
Ma U 0.05 !c31
Ma V 0.06 !c32
End

Group2: MZ
DATA NI=14
MISSING=-99
RE FILE=E:\MASTER DYAD nov 12.dat
LABEL ZYGOSITY IDFAMSEX
parchild_age17_TWA
EXT_age17log_TWA
parchild_age24_TWA
EXT_age24log_TWA
parchild_age17_TWB
EXT_age17log_TWB
parchild_age24_TWB
EXT_age24log_TWB
Rparchild_age17_TWA Rparchild_age17_TWB
Rparchild_age24_TWA Rparchild_age24_TWB

Select if ZYGOSITY = 1 /

Select
parchild_age17_TWA
EXT_age17log_TWA
```

```
EXT_age24log_TWA
parchild_age17_TWB
EXT_age17log_TWB
EXT_age24log_TWB
Rparchild_age17_TWA
Rparchild_age17_TWB /

Definition Rparchild_age17_TWA Rparchild_age17_TWB/

Matrices= Group 1
Means  W | W  /
CO      (A*A    | A*D   | A*E   _ A*D   | (B+G*Y)*(B+G*Y) + (D*D)      | B*F   _      A*E     | B*F    | (C+H*Y)*(C+H*Y) + (F*F) + (E*E)) +
        (Q*Q    | Q*T   | Q*U   _Q*T    | (R*R) + (T*T)                | V*R   _      Q*U     | V*R    | (S*S) + (V*V) + (U*U)) +
        (I*I    | I*L   | I*M   _I*L    | (J+O*Y)*(J+O*Y) + (L*L)      | N*J   _      I*M     | N*J    | (K+P*Y)*(K+P*Y) + (N*N) + (M*M))
        |
        (A*A    | A*D   | A*E   _ A*D   | (B+G*Y)*(B+G*Z) + (D*D)      | B*F   _      A*E     | B*F    | (C+H*Y)*(C+H*Z) + (F*F) + (E*E)) +
        (Q*Q    | Q*T   | Q*U   _Q*T    | (R*R) + (T*T)                | V*R   _      Q*U     | V*R    | (S*S) + (V*V) + (U*U))
        _
        (A*A    | A*D   | A*E   _ A*D   | (B+G*Y)*(B+G*Z) + (D*D)      | B*F   _      A*E     | B*F    | (C+H*Y)*(C+H*Z) + (F*F) + (E*E)) +
        (Q*Q    | Q*T   | Q*U   _Q*T    | (R*R) + (T*T)                | V*R   _      Q*U     | V*R    | (S*S) + (V*V) + (U*U))
        |
        (A*A    | A*D   | A*E   _ A*D   | (B+G*Y)*(B+G*Z) + (D*D)      | B*F   _      A*E     | B*F    | (C+H*Y)*(C+H*Z) + (F*F) + (E*E)) +
        (Q*Q    | Q*T   | Q*U   _Q*T    | (R*R) + (T*T)                | V*R   _      Q*U     | V*R    | (S*S) + (V*V) + (U*U)) +
        (I*I    | I*L   | I*M   _I*L    | (J+O*Z)*(J+O*Z) + (L*L)      | N*J   _      I*M     | N*J    | (K+P*Z)*(K+P*Z) + (N*N) + (M*M))
/
Specify Y -1
Specify Z -2
Options NO_Output
Options RS
End
```

```
Group3: DZ
DATA NI=14
MISSING=-99
RE FILE=E:\MASTER DYAD nov 12.dat
LABEL ZYGOSITY IDFAMSEX
parchild_age17_TWA
EXT_age17log_TWA
parchild_age24_TWA
EXT_age24log_TWA
parchild_age17_TWB
EXT_age17log_TWB
parchild_age24_TWB
EXT_age24log_TWB
Rparchild_age17_TWA Rparchild_age17_TWB
Rparchild_age24_TWA Rparchild_age24_TWB

Select if ZYGOSITY = 1 /

Select
parchild_age17_TWA
EXT_age17log_TWA
EXT_age24log_TWA
parchild_age17_TWB
EXT_age17log_TWB
EXT_age24log_TWB
Rparchild_age17_TWA
Rparchild_age17_TWB /
```

```
Definition Rparchild_age17_TWA Rparchild_age17_TWB/

Matrices= Group 1
Means  W | W  /
CO      (A*A    | A*D   | A*E   _ A*D   | (B+G*Y)*(B+G*Y) + (D*D)      | B*F   _      A*E     | B*F    | (C+H*Y)*(C+H*Y) + (F*F) + (E*E)) +
        (Q*Q    | Q*T   | Q*U   _Q*T    | (R*R) + (T*T)                | V*R   _      Q*U     | V*R    | (S*S) + (V*V) + (U*U)) +
        (I*I    | I*L   | I*M   _I*L    | (J+O*Y)*(J+O*Y) + (L*L)      | N*J   _      I*M     | N*J    | (K+P*Y)*(K+P*Y) + (N*N) + (M*M))
        |
        X@(A*A| A*D   | A*E   _ A*D   | (B+G*Y)*(B+G*Z) + (D*D)      | B*F   _      A*E     | B*F    | (C+H*Y)*(C+H*Z) + (F*F) + (E*E)) +
        (Q*Q    | Q*T   | Q*U   _Q*T    | (R*R) + (T*T)                | V*R   _      Q*U     | V*R    | (S*S) + (V*V) + (U*U))
        _
        X@(A*A| A*D   | A*E   _ A*D   | (B+G*Y)*(B+G*Z) + (D*D)      | B*F   _      A*E     | B*F    | (C+H*Y)*(C+H*Z) + (F*F) + (E*E)) +
        (Q*Q    | Q*T   | Q*U   _Q*T    | (R*R) + (T*T)                | V*R   _      Q*U     | V*R    | (S*S) + (V*V) + (U*U))
        |
        (A*A    | A*D   | A*E   _ A*D   | (B+G*Y)*(B+G*Z) + (D*D)      | B*F   _      A*E     | B*F    | (C+H*Y)*(C+H*Z) + (F*F) + (E*E)) +
        (Q*Q    | Q*T   | Q*U   _Q*T    | (R*R) + (T*T)                | V*R   _      Q*U     | V*R    | (S*S) + (V*V) + (U*U)) +
        (I*I    | I*L   | I*M   _I*L    | (J+O*Z)*(J+O*Z) + (L*L)      | N*J   _      I*M     | N*J    | (K+P*Z)*(K+P*Z) + (N*N) + (M*M))
/
Specify Y -1
Specify Z -2
Options NO_Output
Options RS
End
```