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# Dynamic Associations among Socioeconomic Status (SES), Parenting Investments and Conscientiousness across Time and Generations

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## Abstract

Building on recommendations from several of the articles in the special section on conscientiousness in the June, 2014 issue of *Developmental Psychology*, the present study tested predictions from the interactionist model (IM) of socioeconomic influences on individual development. In an approach consistent with the idea of cumulative advantage, the model proposed that adolescent and child conscientiousness would be fostered by higher family SES and the parenting and material investments that SES promotes. The IM also predicted a transactional process in which adolescent conscientiousness would promote future socioeconomic success which, in turn, would foster greater adult conscientiousness. Analyses with a cohort of 347 adolescents followed for over 20 years were largely consistent with these predictions, although the findings suggested some modifications to the IM including the addition of a stronger direct role for family processes in eventual social and economic outcomes. Moreover, additional analyses with 282 of the children of these cohort members demonstrated that this same process was partially replicated in the next generation of children. The findings suggest reciprocal or transactional influences that promote conscientiousness and accumulating personal, economic and social advantages over time and generations.

## Keywords

Socioeconomic Status; Conscientiousness; Interactionist Model; Parenting Investments; Transition to Adulthood; Child Development

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In the 2014 special section on conscientiousness published in *Developmental Psychology*, Reiss, Eccles, and Nielsen (2014) noted that this personality trait significantly predicts a range of positive developmental outcomes during the adult years. Because of its apparent role in healthy development, several of the papers from the special section also note the importance of gaining a better understanding of the origins of conscientiousness and the ways in which it may be fostered or diminished across the life course (e.g., Costanzo, 2014; Conti & Heckman, 2014; Eisenberg, Duckworth, Spinrad, & Valiente, 2014; Friedman, Kern, Hampson, & Duckworth, 2014; Shanahan, Hill, Roberts, Eccles, & Friedman, 2014).

Simply put, the set of articles in the special section underscored the need for future study of both the antecedents and consequences of conscientiousness, including the important role that this personality trait appears to play in promoting social, emotional and physical well-being (see also Barrick & Mount, 1991; Bogg & Roberts, 2004; Kotov, Gamez, Schmidt, & Watson, 2010; Noftle & Robins, 2007; Poropat, 2009; and Steel, Schmidt, & Schultz, 2008). Better understanding of both the processes that lead to greater conscientiousness as well as the pathways through which this personality trait affects other domains of life could lead to the development of educational and intervention strategies that can help to improve individual health and well-being (Mroczek, 2014).

In response to the need for additional research on these issues, the present study investigates proposed origins and socioeconomic consequences of conscientiousness using data from a long-term study of adolescents and their families, the Family Transitions Project (FTP; see Conger, Neppl, & Scaramella in this issue of *Developmental Psychology*, in press). The cohort of adolescents in the FTP (the target or focal participants) have been followed for over 20 years and many of them now have families and children of their own. They provide an ideal population for examining specific antecedents of conscientiousness during adolescence, the relationship of adolescent conscientiousness with later life outcomes, and the linkages of these processes with the early emerging personality traits of the next generation of family members. To pursue these scientific aims, this research is guided by the *interactionist model* which places the development of personal characteristics within the context of the socioeconomic environment, family relationships, and reciprocal influences between them across time and generations (Conger, Conger, & Martin, 2010; Conger & Donnellan, 2007; Conger, Martin, Masarik, Widaman, & Donnellan, 2015).

## Conscientiousness: Definition, Antecedents and Consequences

Reiss and his colleagues (2014, p. 1305) define conscientiousness as individual behavior involving four primary characteristics: *orderliness, industriousness, self-control, and responsibility*. Thus, a highly conscientious person is likely to work hard, effectively manage emotions, be responsible in terms of both social and instrumental activities, and be well-organized. In addition to these characteristics, Roberts, Jackson, Fayard, Edmonds, & Meints (2009) indicate that highly conscientious people will also tend to be *rule-abiding*. Simply put, the conscientious individual demonstrates behavioral tendencies that are consonant with a life path that includes success in work and education, the avoidance of dangerous and deviant activities, commitment to conventional social relationships, and, perhaps, greater personal care and health maintenance. For example, an individual who works hard and behaves responsibly at school and on the job should have greater success in those settings than a person who does not demonstrate those attributes. A person who demonstrates reasonable self-regulation and does not become hostile or aggressive in social interactions should be more capable of developing close relationships than an individual who does not exercise adequate self-control in difficult or frustrating social situations. Finally, the orderly individual who attempts to follow the rules may be more likely to attend to medical and health priorities in a fashion that will promote physical well-being.

Previous research supports these expectations regarding the consequences of conscientiousness. For example, two recent reviews of empirical findings demonstrate that more conscientious individuals experience advantages across a wide swath of life domains (Friedman et al., 2014; Roberts, Lejuez, Krueger, Richards, & Hill, 2014). In terms of physical health, Friedman and his colleagues (2014) note that conscientiousness not only predicts healthier behaviors, such as refraining from tobacco use, but also longer life expectancy. The latter finding is especially important because it is an objective measure that is not contaminated by the high associations often found between self-reports of both personality characteristics (e.g., responses on a personality inventory) and self-reports of related outcomes (e.g., healthy behaviors). These types of findings provide strong support for the expectation that more compared to less conscientious individuals will experience greater physical health. In addition, conscientiousness also predicts greater educational and occupational success as well as marital stability (Roberts et al., 2014). Consistent with its definition, then, conscientiousness appears to promote benefits not only for physical health but also for instrumental and social success. Also important for the present study, personality assessments based on informant rather than self-ratings produce particularly robust associations with achievements in education and work (Connelly & Ones, 2010). This observation applies best for informants who are intimates of the person being rated. We employ this strategy for assessing conscientiousness in the current investigation.

In terms of antecedents, Eisenberg, Duckworth, Spinrad, and Valiente (2014) propose that the development of conscientiousness begins during early childhood as children acquire the skills and abilities to self-regulate their behaviors and emotions. Child self-regulation includes the capacity to focus or shift attention, activate or inhibit behavior as demanded by the situation, and to plan and/or adjust activities relative to social norms and goals. These authors suggest that self-regulation during childhood demonstrates continuity over time and leads directly to the core component of self-control in later conscientiousness. They also propose that self-regulation will lead to greater academic involvements which, in turn, promote the development of later conscientiousness. Especially important, they argue that the development of conscientiousness depends, at least in part, on parental behaviors that promote child self-control, consistent with a central hypothesis in the present investigation. Important support for this view comes from a study of more than 1,000 children by Vazsonyi and Huang (2010) who showed that self-control increases from early to middle childhood and that positive parenting predicts this developmental trajectory. With these ideas in mind, we turn to the theoretical model that guides the present investigation.

## The Interactionist Model (IM) of SES Influences on Personality Development

The IM provides a theoretical framework designed to improve understanding of the ways in which SES, family processes, and individual development are interrelated across time and generations. It fits well with recent papers suggesting that the development of conscientiousness should be studied over time, within family and broader environmental contexts, and with a focus on reciprocal dynamics between conscientiousness and changing social and economic conditions (Conti & Heckman, 2014; Costanzo, 2014; Shanahan et al., 2014; Reiss et al., 2014). Conger and his colleagues proposed the IM in an effort to reconcile evidence that SES both influences individual behavior (*the social causation*

*perspective*) and is influenced by individual behavior (*the social selection perspective*; see Conger & Donnellan, 2007; Conger et al., 2010; Conger et al., 2015). Specifically, the IM hypothesizes that the association between SES and human development involves an ongoing interplay between social causation and social selection. The model builds on theories which propose that individual development occurs as part of a dynamic interaction or transaction between individual characteristics and environmental conditions that are mutually influential over time (e.g., Magnusson & Stattin 1998; Sameroff, 2010). Although preliminary empirical tests of the model using data from the Family Transitions Project (FTP) have provided support for the hypothesized reciprocal process between individual development and SES (e.g., Martin et al., 2010; Schofield et al., 2011; Trentacosta et al., 2010), none of this earlier research has examined the adequacy of the model in relation to the development of conscientiousness.

In the current investigation we use all three generations of participants in the FTP [i.e., the G1 parents of the cohort of G2 adolescents and the oldest child (G3) of G2 after G2 reaches adulthood] to examine two different forms of the IM. In the first set of analyses we propose that G1 SES and parenting investments will affect the development of G2 conscientiousness during adolescence which, in turn, will affect G2 educational attainment, income and conscientiousness during the adult years. In the second set of analyses we extend the investigation to the G3 child and evaluate the degree to which the causal processes proposed by the IM carry forward to the next generation.

### From Adolescence to Adulthood (Model 1)

Figure 1 (model 1) illustrates the theory and the planned analyses for the first step in the present study. Although the IM usually involves both family stress processes expected to be exacerbated by low SES and family investment processes expected to be promoted by higher SES (Conger et al., 2010), in the present analyses we focus only on the investment pathways. We omitted the family stress component of the model for two reasons. First, we simply do not have enough participants to reliably estimate the parameters of the full model over several time periods and across three generations. Second, in the present analyses we were primarily concerned with the accumulation of personal and social advantages that accrue across time to children of higher SES as predicted by the IM and investment theory in economics (Conger & Donnellan, 2007; Mayer, 1997). Contrary to some earlier research on these issues (e.g., Martin et al., 2010), however, we do not treat income and education as separate indicators of a single SES construct; rather, we take into account the fact that in contemporary American society educational attainment is a particularly important driver of economic success (Straus, 2015). Notice also that we do not include either occupational or employment status as markers of SES because neither of these variables have proved to be significant predictors of parenting practices or child developmental outcomes net of income and education in our earlier tests of these processes (Conger et al., 2010). Thus, the version of the IM in Figure 1 begins with G1 education as the single exogenous variable. The model proposes a direct causal path from education to income such that G1 parents with higher levels of education are expected to generate greater family income over time. Although both of these measures were assessed in 1991 for the present analyses, completed education

occurred several years earlier for the G1 parents - long before the measure of family income during the past year.

As shown in Figure 1, the social causation part of the IM proposes two parental investment pathways that are expected to promote the development of adolescent conscientiousness. First, greater parent educational attainment is expected to increase a range of parenting investments in children. Consistent with earlier research, we expect that more highly educated parents will invest more time and energy in warmth, support, and effective management strategies with their children (e.g., Hoff, Laursen, & Tardif, 2002; Huston and Aronson, 2005; Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004). Second, the model proposes that families with greater incomes will make greater material investments in children (Bradley & Corwyn, 2002; Duncan & Magnuson, 2003; Linver, Brooks-Gunn, & Kohen, 2002; Mayer, 1997). These investments include: (a) parent stimulation of learning through support of advanced or specialized tutoring or training; (b) the provision of adequate food, housing, clothing, and medical care; and (c) living in a more economically advantaged neighborhood that fosters a child's development of the skills and abilities that foster conventional success. Several studies have generated findings consistent with these predictions from the IM and investment theory (see Conger et al., 2010; Gershoff, Aber, Raver, & Lennon, 2007).

Two key hypotheses in the present study involve the proposed positive pathways from parenting investments and material investments to adolescent conscientiousness (abbreviated as CON in Figures 1 through 4). The pathway from parenting to conscientiousness follows directly from the study by Vazsonyi and Huang (2010) who found that parental warmth and support predicted greater self-control, a key component of conscientiousness, from early childhood through the elementary school years. We extend their findings to adolescence. In addition, the model proposes that material investments in a child's skills and abilities, health and well-being, and social involvements better prepare them to develop goals and behaviors consistent with achieving conventional success. This line of argument follows from Bowles and Gintis (2002) who have proposed that parental SES promotes the development of personality characteristics that support industriousness and commitment which, in turn, likely help to explain intergenerational continuities in SES. Thus, G1 education and G1 income are expected to be indirectly related to later G2 education and income through parenting investments and G2 conscientiousness. However, because intergenerational continuities in SES tend to be quite robust, we predict that there will be direct as well as indirect pathways from G1 to G2 education and from G1 to G2 income.

The final step in model 1 involves the prediction of relative changes in G2 conscientiousness from adolescence to adulthood. Notice that the predicted pathways from G2 adolescent conscientiousness to G2 education and income in Figure 1 involve a nine year period of time, from approximately 18 to 27 years of age for the G2 cohort. These paths from personality to later markers of SES illustrate social selection effects in the IM. The model also predicts that adolescent conscientiousness will lead to greater educational and economic achievement by G2 during adulthood which, in turn, will predict relative increases in conscientiousness two years later, as illustrated by the direct paths from G2 education and income to G2 adult conscientiousness at an average age of around 29 years. Simply put, the

IM proposes that the educational and economic gains fostered by adolescent conscientiousness will reinforce this personality trait during the adult years. The model also proposes that G2 education will promote greater G2 income over time. Most of the G2 participants completed their educational efforts prior to 25 years of age, so it is reasonable to predict income during the past year from G2 education for this portion of the model. Finally, the direct path from G2 adolescent to adult conscientiousness in Figure 1 indicates our prediction that conscientiousness will demonstrate stability over time, consistent with earlier research and theory (see Roberts et al., 2014).

### Extending the Model to the G3 Child (Model 2)

Figure 2 illustrates predictions from the IM in the extension of the model to the G3 child (Model 2). Figure 2 includes an association between parenting and material investments; this association was omitted in Figure 1 for clarity of presentation. In later theoretical tests these two variables are correlated in all analyses. The paths in the model in Figure 2 from G2 education and income to parenting and material investments and then to G3 conscientiousness replicate the predictions made for G2 during adolescence (see Figure 1). Thus, the rationale for these analyses are the same as those for the adolescence portion of the model provided in Figure 1. In addition to these pathways from Model 1, we are able to account for important background variables that typically are not available in studies of just two generations.

First, we include in Model 2 G2 conscientiousness as an adolescent (1994) but not as an adult (2005). G2 personality during adolescence represents a time prior to when the G3 child was born. This strategy provides the most robust approach for drawing causal inferences regarding the association between G2 and G3 conscientiousness. We know, for example, that personality tends to change during the transition from adolescence to adulthood as youth take on adult responsibilities like full time work and raising children (e.g., Donnellan, Conger, & Burzette, 2007). Moreover, during in-home interviews participants in the FTP frequently reported that they became more focused, goal-oriented, and responsible after having a child. For these reasons any association between G2 and G3 personality during adulthood may reflect the influence of the child on the parent as much as the reverse and even indicate reciprocity in conscientious behaviors. This observation is especially true in the present study inasmuch as all of the G3 children were born prior to the time that we assessed G2 adult conscientiousness. It is because of this inherent ambiguity in interpreting causal direction between G2 adult conscientiousness and G3 conscientiousness that we do not include G2 adult conscientiousness in Model 2. However, we note that Model 2 proposes both possible genetic effects of G2 on G3 personality (the direct path) as well as social effects through direct and indirect influences of earlier G2 conscientiousness on education, income and parenting investments.

Second, we include G1 parenting and material investments as exogenous variables in the model because earlier research demonstrates continuity across generations in parenting behavior (see Conger, Belsky, & Capaldi, 2009). We predict that such continuities will be present in the current analyses; however, we also expect them to be partially mediated by G2 personality, education and income, as indicated in Figure 2. Finally, we do not include G1

education and income in this model because we assume that any effect they have on G3 conscientiousness will be indirect through the other pathways in the model. We test this assumption in the analyses to assure that it is correct. In the current study we test the full set of predictions from the IM as depicted in Figures 1 and 2.

## Method

### Participants and Procedures

Data for the present analyses come from the Family Transitions Project (FTP), a longitudinal study of a ninth grade cohort of 556 focal or target youth (G2, 52% female) from rural Iowa. The FTP began in 1991 with 451 cohort members from two-parent families and 105 from single-mother families. Because rural Iowa had an ethnic minority population of only about 1% at that time, all the participants were European Americans from primarily lower-middle and middle-class families. To be eligible for the project, families needed to include the G1 biological parent or parents of G2 and there had to be at least one close aged sibling of G2 who was also willing to participate in the study. In 1991 the youth averaged 15 years of age, mothers 39 years, and fathers 41 years. Median parent education was 13 years. More than 80% of the families agreed to participate in the study. Additional details regarding study design and recruitment can be found in Conger and Conger (2002).

As indicated in Figures 1 and 2, the present analyses begin in 1991. Participants were interviewed annually through 1995 (the first year after high school), except in 1993 when no in-person interviews took place. After the 1995 assessment, G2 participants were interviewed in alternating years, with a retention rate of around 90% through 2010, the final assessment period for the present investigation. In 2010 the G2 cohort was in its mid-thirties, almost as old as their parents at the beginning of the study. The initial years (1991–1994) of the research with the FTP focused on the G2 target's family of origin. During this period, interviewers visited each family in their home for approximately 2 hours on each of two occasions per year, except for 1993 when no in-home interviews were conducted. Each participant received approximately $10 per hour for compensation for their participation.

During the first home visit each year, each family member completed a set of questionnaires focusing on individual family member characteristics, family relationships, and other aspects of the broader family and community environment. During the second visit, which usually occurred within 2 weeks of the first, the family members were videotaped as they engaged in several structured interaction tasks. A trained interviewer began the videotaping session by asking each individual to complete a short questionnaire designed to identify issues of concern that led to disagreements within the family (e.g., responsibility for chores, recreational activities, use of money, etc.). The first task (Task 1) was designed in part to elicit information about parenting practices and lasted approximately 30 minutes. For this task, all participating family members gathered around a table and were given a set of cards that contained general questions about family life such as approaches to parenting, performance in school, household chores, and important family events. The family members were instructed to read the questions on the cards aloud and discuss their answers to the questions. During this and all other tasks, the interviewer left the room and went to another part of the house where s/he could not hear the discussion being videotaped. Task 2, which

lasted approximately 15 minutes, also involved all available family members. For this task, the interviewer selected three topics based on the questionnaires completed at the beginning of the visit. The family members were asked to discuss and to try to resolve the issue that they had identified as leading to the greatest conflict in their family. If they resolved this problem, they could go on to the second or even the third issue during the task. Information from these tasks is used in the present analyses.

Beginning in 1997, the oldest biological child (G3) of the G2 target was recruited for study. To be eligible for participation the G3 child had to be at least 18 months of age and the G2 target parent must have been in regular contact with the G3 child. G3 children were added to the study when they reached the eligible age. For that reason, new children were added each year of the study. Trained interviewers visited the G2 target and G3 child at home each year until 2005 and in alternating years thereafter. Data were collected from G2 targets and their G3 children, as well as from the romantic partners (married or cohabiting) of the G2 targets (if they had one), following procedures similar to those described for G2's family of origin. For these second generation families, 220 (78%) of the G2s were married, 28 (10%) were cohabiting, and 34 (12%) were single parents. The G2 target and participating romantic partner (when available) completed a series of questionnaires on parenting beliefs and behaviors, the characteristics of the G3 child, close relationships, and family social and economic circumstances.

During these annual visits, the G2 parents and G3 child also engaged in videotaped interaction tasks. G3 children aged 10 and older participated in separate, 20 minute discussion tasks with the G2 target and with their other parent – the G2 target's romantic partner when a second parent was in the home. These discussion tasks were nearly identical to the discussion task the G2 targets participated in with their G1 parents during adolescence (Task 1, described earlier). G3 children who were 8 or 9 years old completed the same discussion task but just with the G2 target. In addition the 8 and 9 year olds completed a 12 minute puzzle task separately with both G2 and the other parent when one was present. In the puzzle task, parents and G3 children were presented with a puzzle that was too difficult for children to complete alone. In brief, parents were instructed that children must complete the puzzle alone, but parents could provide any assistance necessary. Puzzles varied by age group so that the puzzle slightly exceeded the child's skill level. Finally, younger G3 children (ages 2–7) completed only the puzzle task separately with each parent. For these younger children the task lasted 5 minutes.

The current study uses data during the period from 1991 through 2010, when the G2 targets averaged 15 through 35 years of age. Because we used informant reports to measure conscientiousness, the analyses of model 1 are based on the 347 G2's living with a romantic partner in 2005. These partners provide informant reports by an individual who is well acquainted with G2, the type of relationship most likely to generate the most valid information by an informant (Connelly & Ones, 2010). Additionally, model 2 focuses on the third generation (G3) children's conscientiousness, and thus the sample for those analyses are restricted to the 282 families with assessments of the G3 child's conscientiousness in 2007, 2010, or both. For the G3s, we began assessing conscientiousness at 6 years of age; thus, G3 had to be 6 years old or older by 2010 to be in the present analyses. In 2010 the G3

children averaged 10.54 years old (SD = 3.21), 154 were male (54.5%), and 128 were female (45.4%).

### Measures

**G1 and G2 income and education**—G1 and G2 income were measured using an income-to-needs ratio. This measure was created by dividing the total family income for the past year by the U.S. Department of Health and Human Services poverty guidelines by family size. Family income included all wages, salaries, and other sources of income (e.g., self-employment income, farm net income, child support, and supplemental security income). *G1 education* was assessed using G1 mother's self-reports of years of schooling completed by 1991 in single-mother households, and an average of G1 mother's and father's self-reports of years of schooling completed by 1991 in two-parent families. *G2 education* was assessed using G2 target's self-reports of schooling completed by 2003 at an average age of 28 years (1= less than high school; 2 = high school degree/GED; 3 = degree from junior, vocational, or community college, or attended college but did not earn a 4-year degree; 4 = degree from 4-year college; 5 = Master's degree; and 6 = PhD or professional degree). *G1 income and education* were assessed during 1991 and *G2 income and education* were assessed during 2003.

**G1 and G2 parenting investments**—We used trained observer reports to generate three separate indicators for the G1 and G2 parenting investments latent construct. This variable estimates the degree to which the parent invests supportive and appropriate managerial behaviors in their child. G1 parenting investments were assessed in 1992 during the family discussion (Task 1) and family problem-solving task (Task 2) as described earlier. The G2 parenting investments were assessed in 2005 during the parent-child puzzle task and discussion tasks discussed earlier. All parenting behaviors were rated on a scale from 1 (*little evidence for the attribute in question*) to 9 (*a great deal of evidence for the attribute in question*) using the Iowa Family Interaction Rating Scales (IFIRS: Melby & Conger, 2001). In the case that a G1 father did not participate in 1992 (i.e., single mother-headed families), only G1 mother behaviors were used to estimate the parenting construct. In the case of G2 to G3 interactions, only G2 behaviors were used to estimate the latent variable if G2 did not have a spouse or cohabiting partner.

The first indicator for the parenting latent variable, *warm parenting*, is the average of four observer ratings: warmth-support (e.g., expressions of concern and support), listener responsiveness (e.g., attending to what the child has to say), prosocial behavior (e.g., being helpful and cooperative), and positive mood (e.g., demonstrations of positive behavior toward self and others). For G1 parenting, observer ratings of the mother's warm parenting ($a$ = .80) and the father's warm parenting ($a$ = .82) toward the target adolescent in 1992 during Task 1 were averaged to create the warm parenting indicator for G1. Observer ratings of the target's warm parenting ($a$ = .92) and the partner's warm parenting ($a$ = .92) toward their G3 child in 2005 during the puzzle and/or discussion tasks were averaged to create the warm parenting indicator for G2.

The second indicator of the parenting investments construct is *hostile parenting*, reverse coded so that a high score indicates low hostility. This indicator is the average of observer ratings of hostility (e.g., criticism and rejection), antisocial behavior (e.g., insensitivity or out-of-control behaviors), and angry coercion (e.g., manipulation or attempts to control another using anger) of the parent(s) toward their child. Observer ratings of the mother's hostile parenting ($a = .91$) and the father's hostile parenting ($a = .88$) in 1992 during Task 2 were averaged to create the G1 hostile parenting indicator. Because Task 2 was designed to exacerbate conflict and hostility between family members, it is especially appropriate for assessing these behaviors. Observer ratings of the target's hostile parenting ($a = .93$) and partner's hostile parenting ($a = .85$) toward the G3 child in 2005 during the puzzle and/or discussion tasks were averaged to create the G2 hostile parenting indicator.

The third indicator of the parenting investments construct is *harsh and inconsistent discipline* reverse coded so that a high score indicates less harsh and more consistent parental discipline. This indicator is the average of observer ratings of harsh discipline, inconsistent discipline, and consistent discipline. A parent who scores high on the indicator of parenting discipline consistently provides positive or negative contingencies for desired and undesired behaviors in a manner that is not harsh. Observer ratings of the mother's discipline ($a = .66$) and the father's discipline ($a = .59$) of the target adolescent in 1992 during Task 1 were averaged to create the parenting discipline indicator for G1. Observer ratings of the target's discipline ($a = .82$) and the partner's discipline ($a = .71$) of the G3 child in 2005 during the puzzle and/or discussion tasks were averaged to create the parenting discipline indicator for G2.

Correlations among the three indicators for G1 and G2 parenting investments ranged from .29 to .70 and all of them were positive and statistically significant ($p < .05$). In addition, confirmatory factor analyses of the constructs used in Models 1 and 2 showed adequate fit with the data suggesting that the parenting investment indicators load appropriately on that latent variable (see Tables 1 and 4). Finally, later analyses show similar predictive validity for the G1 and G2 parenting investments constructs providing further evidence that they work reasonably well for both generations of parents.

**G1 and G2 material investments—**We used a cumulative index strategy to create our measures of G1 and G2 parents' material investments in their children. Cumulative indices are based on the idea that individuals with dissimilar sets of risk and protective factors may still experience parallel outcomes, and thus, what is important is not whether a specific factor is present, but the number of risk and protective factors that are present (Rauer et al., 2008; Rutter, 1979). For this reason individual items in a cumulative index may or may not be correlated with one another. For example, in a risk index losing a job might not be correlated with having an automobile accident, but both items increase risk and belong in the index. Because these types of indices represent simple counts of oftentimes unrelated events, it is not appropriate to treat them as related indicators of a single latent construct.

This index approach predicts a linear relationship between risk and protective factors and outcomes: Individuals with more protective factors are more likely to experience positive outcomes than those with fewer protective factors; and thus, the index is described as

cumulative (Rauer et al., 2008). Cumulative indices involve identifying a set of risk or protective factors, dichotomizing each factor, and summing or averaging across the dichotomized indicators to create a continuous index for an individual (Rauer et al., 2008). Of course, because data are dichotomized there is a loss of information on the variability of each factor; however, it is advantageous over other approaches in capturing the accumulation of risk and protective factors for individuals and the variables are not required to be treated as independent when they may overlap substantially (Rauer et al., 2008). Thus, our approach to the parenting investments index is similar to strategies that Sameroff (Sameroff, 1998; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987) and Furstenburg (Furstenberg, Cook, Eccles, Elder, & Sameroff, 1999) have used to estimate cumulative risk indices.

In developing our index we kept in mind that the word "investments" is used somewhat differently for material compared to parenting investments. The parenting investments construct involves behaviors directly aimed at the child, like warmth, support, or disciplinary strategies. Material investments, on the other hand, oftentimes are a simple corollary of greater economic well-being, like living in a better neighborhood, which would likely occur whether one has a child or not. According to Mayer (1997, p. 7), this economic approach to parental investments includes "good housing near good neighbors and good schools, adequate medical care, and learning tools such as computers and books. All else being equal, families with more income can invest more in their children, so their children are more likely to succeed." We used items consistent with Mayer's definition to develop our measure of material investments. For the G1 measure, items were constructed by dichotomizing seven measures of G1 parents' material investments in their G2 child (extracurricular activities, parental aid during the transition to adulthood, parental aid with talents and skills, and four interviewer reported items assessing the family's living environment; see Appendix A for details on the G1 material investments index) so that the quarter of the sample reporting the least material investments was assigned to the low investments category (coded 0), and the remaining 75% of the sample was assigned to the high investments category (coded 1). This approach to establishing cut points is consistent with earlier research (e.g., Rauer et al., 2008) and assures that parents assigned to the "low investments" group are quite different on a given item from the majority of the families in the sample. These scores were averaged to generate the material investments index score for each family. Most measures did not allow for an exact 25% and 75% split, which resulted in from 20.1% to 31.3% of the sample being assigned to the low material investments category across different items. A brief description of each of the seven measures and the percentage of the sample in the high and low material investments groups for each item can be found in Appendix A.

For the index assessing the G2 parent's material investments in their G3 child, items were constructed by dichotomizing nine measures of parents' material investments in their G3 child (the neighborhood environment, adequate health insurance coverage, and 6 measures of the home environment including whether the residence was well maintained, well furnished, not cramped or crowded, the number of books in the home, the number of newspapers or magazines in the home, the number of items to promote learning and that the home was structurally sound). Notice that this measure does not include extracurricular activities because most of the G3 children were too young to participate in these types of activities. As for G1 material investments, the quarter of the sample reporting the least

material investments was assigned to the low investments category (coded 0), and the remaining 75% of the sample was assigned to the high investments category (coded 1). These scores were averaged to generate the material investments index score for each family. Most measures did not allow for an exact 25% and 75% split, which resulted in from 11.8% to 35.6% of the sample being assigned to low investments category across different items. A brief description of each of the nine measures and the percentage of the sample in the high and low G2 material investments groups for each item can be found in Appendix B.

**G2 adolescent, G2 adult, and G3 conscientiousness**—We used informant measures to assess G2 and G3 conscientiousness because informant ratings appear to be particularly robust correlates of social and economic success (Connelly & Ones, 2010; Roberts et al., 2014) which are central constructs in the IM (Figures 1 and 2). In 1994 G1 parents reported on the G2 adolescent's personality by completing a 33-item informant report of the Multidimensional Personality Questionnaire Scale (MPQ; e.g., Harkness, Tellegen, & Waller, 1995). Because the achievement and control lower-order scales from the MPQ demonstrate good convergent validity with the NEO conscientiousness factor (Church, 1994; Tellegen & Waller, 2008), we used parent reports on these MPQ subscales in 1994 to assess *G2 adolescent conscientiousness*. Individuals who score highly on the three items making up the achievement subscale set high standards for themselves, strive for excellence, enjoy hard work, like to take on challenging tasks, persist when there are obstacles in their lives, and do not give up when a project appears difficult ($\alpha = .82$ for mother report and $\alpha = .81$ for father report). Individuals who score highly on the three items which make up the control subscale are deliberate and careful, level headed and orderly, and like to have detailed plans before beginning new endeavors so they know what to expect and how to proceed ($\alpha = .72$ for mother report and $\alpha = .67$ for father report). Mother report and father report for each of the two subscales were averaged to create the two indicators of *G2 adolescent conscientiousness*.

*G2 adult conscientiousness* was assessed during 2005 using reports by G2's spouse or cohabiting partner on the Iowa Personality Questionnaire (IPQ), a reliable and well-validated personality measure in a survey research format (Donnellan, Conger, & Burzette, 2005). This short form measure assesses all of the lower-order MPQ subscales. Partners rated the targets on three items from the achievement subscale ($\alpha = .78$) and four items from the control subscale ($\alpha = .70$). As noted earlier for the MPQ, individuals who scored high on the achievement subscale are ambitious, hardworking, and like a challenge. Individuals who scored high on the control subscale are careful, finish one activity before starting another, are level-headed, and don't daydream. The two subscales were used as indicators of the *G2 adult conscientiousness* latent construct.

*G3 conscientiousness* was assessed in 2007 and 2010 using reports by the G2 target and the G2 target's spouse or cohabiting partner on the G3 child. Because the instructions for the IPQ and the MPQ ask the informant to rate an individual appropriate to that individual's age, the measure automatically adjusts for the fact that the G3s were younger than the G2s and that they varied in age. Using the IPQ, G2 targets and their partners rated their G3 child on the same three items from the IPQ achievement subscale and the same four items from the IPQ control subscale that were used to assess G2 adult conscientiousness. The G2 target ($\alpha$

= .76) and partner (α = .80) reports on the achievement subscale in 2007 were averaged with their reports on the achievement subscale in 2010 (α = .83 for G2 targets and α = .81 G2 partners) to create the first indicator for the *G3 conscientiousness* latent construct. The second of the two *G3 conscientiousness* latent construct indicators was created by averaging across the G2 target and partner reports on the control subscale in 2007 (α = .73 for G2 targets and α = .68 for partners) and 2010 (α = .70 for G2 targets and α = .67 for partners). To assure that this measure worked similarly for older and younger G3s, we split this group at the median on age and compared correlations between G3 conscientiousness and other measures in Model 2 for the older and younger groups. None of these correlations were significantly different for the older and younger G3s, providing further assurance that the IPQ works similarly for children of different ages.

### Data Analysis

All data analyses were conducted using MPlus 7.3 (Muthén & Muthén, 1998–2012). Because all longitudinal studies include some missing data, we used full information maximum likelihood (FIML) estimation. FIML provides more consistent, less biased estimates than ad hoc procedures for dealing with missing data such as listwise deletion, pairwise deletion, or imputation of means (Arbuckle, 1996; Schafer, 1997). Data analyses were first conducted in relation to Model 1 (the transition to adulthood, Figure 1) and then for Model 2 (the next generation, Figure 2). For each model, we first conducted a confirmatory factor analysis (CFA) to assure that the measurement strategy fit the data and to examine the zero-order correlations among the study variables. The CFA was followed by a structural equation model (SEM) to test the predicted pathways in the model. Each of the predicted paths (e.g., from G1 education to G1 parenting investments in Model 1) represents a theoretical hypothesis or proposition. Any of these paths that are not statistically significant will represent a rejection of that specific hypothesis in the IM and will be dropped from the final analyses for each model.

Equally important, paths that are not included in Models 1 and 2 also represent hypotheses or propositions in the IM. For example, in Model 1 there is no direct path from G1 education to G2 conscientiousness as an adolescent. Rather, the theory predicts that G1 education will affect adolescent conscientiousness only indirectly through G1 income, material investments and parenting investments. If the direct path from G1 education to G2 adolescent conscientiousness proves to be statistically significant, that finding would reject the IM hypothesis of only indirect effects. For that reason, after testing the SEMs for Models 1 and 2 as illustrated in Figures 1 and 2, we evaluate each omitted path one at a time to test these alternative hypotheses. Any of these paths that are statistically significant are added to the final analyses and we use the chi-square test to see whether the overall fit of the model improves with the additional paths in the equations. Finally, we test the significance of both direct and indirect effects (e.g., G1 education to G2 conscientiousness through parenting investments) in the model. These analyses complete the examination of the mediating pathways proposed in both Model 1 and 2.

Additionally, we used multiple group analyses (MGA) to test for possible G2 gender differences in the structural parameters in Models 1 and 2. We also tested for possible G3

gender differences in the paths predicting G3 conscientiousness in Model 2. For these MGA analyses, we used a Bonferroni correction to adjust our $p$ values for the large number of tests being performed. The results revealed no significant G2 or G3 gender differences and thus the results that follow are presented using the combined sample of G2 males and females and G3 children. For both the CFA and SEM analyses, we tested model fit in several ways. In these tests we adhered to conventional cutoff criteria for various indices: a comparative fit index (CFI) and Tucker-Lewis index (TLI) of .95 or more and a root mean squared error of approximation (RMSEA) value below .06 indicated adequate model fit (Hu & Bentler, 1999).

## Results

### Model 1: The Transition from Adolescence to Adulthood

Table 1 provides the results for the CFA of the measures used to evaluate model 1: the transition from adolescence to adulthood (see Figure 1). Parenting investments, conscientiousness during adolescence and conscientiousness during adulthood were estimated as latent variables with multiple indicators. As shown in Table 1, the standardized factor loadings for each of these latent variables were statistically significant and in the expected direction (e.g., the factor loadings for adolescent conscientious were .86 and .77). The other measures used to test model 1 were based on manifest variables (single indicators) and, thus, had factor loadings of 1.0 by default. The measurement model fit the data reasonably well (RMSEA = .060, CFI = .959) suggesting that it is consistent with the theoretical constructs included in Model 1. Table 2 provides the zero-order correlations based on the measures in the CFA. All of the correlations were statistically significant ($p$ < .05) and consistent with predictions from Model 1. For example, G1 and G2 income were positively related ($r$ = .16) as were G1 and G2 educational attainment ($r$ = .42). G1 parenting and material investments in 1992 predicted G2 conscientiousness in 1994 which, in turn, predicted G2 income and education nine years later. The full set of correlations suggests significant support for the predictions from the IM and the potential value of a formal test of the model.

We first estimated a structural equation model (SEM) corresponding to Model 1, Figure 1. This model fit the data less than optimally ($\chi 2$= 114.891, $df$=43, RMSEA = .069, CFI = .917). We then tested whether paths not suggested by the IM (e.g., the path from G1 education to G1 material investments) were significant, retaining significant paths and setting those that were not significant to zero, as described previously. As shown in Figure 3, this second SEM fit the data well ($\chi^2$= 77.790, df =41, RMSEA = .051, CFI = .957) and was a significant improvement in model fit over the SEM corresponding to the model depicted in Figure 1 ( $\chi$ = 37.101, $df$ = 2, $p$ < .000). The standardized regression coefficients indicated support for several hypothesized relationships and also produced some unexpected findings. As expected, G1 education predicted G1 income ($\beta$ = .26) and parenting investments ($\beta$ = .50) and G1 income predicted material investments ($\beta$ = .15). However, we also found significant relationships between G1 education and material investments and between G1 income and parenting investments. Thus, these separate markers of SES have associations with both types of G1 investments in their G2 children, albeit the magnitudes of

the paths are greater for education than for income. Also as expected, G1 education was directly related to G2 education (β = .19). However, this coefficient was less than half the zero order association between these variables (*r* = .42, Table 2), suggesting that intergenerational continuity in educational attainment is significantly mediated through other variables in the model. For income, the path from G1 to G2 was not statistically significant, suggesting that the significant zero order association between these variables (Table 2) was completely mediated through parenting investments, material investments, and adolescent conscientiousness.

As expected, the significant zero order associations between G1 education and adolescent conscientiousness and between G1 income and adolescent conscientiousness (Table 2) were not statistically significant in the SEM, consistent with the hypothesis that SES affects the development of adolescent conscientiousness through parenting and material investments. Both material and parenting investments were positively related to adolescent conscientiousness which, in turn, predicted G2 education and income during adulthood. Interestingly and not predicted by the model, G1 parenting investments also directly predicted later G2 education and G1 material investments directly predicted later G2 income. These unexpected findings suggest G1 parenting effects on later G2 SES above and beyond individual differences in conscientiousness. Both G2 education and income directly predicted G2 adult conscientiousness. Unexpectedly, adolescent conscientiousness did not directly predict adult conscientiousness after taking G2 educational attainment and income into account. This result indicates that the significant zero-order association between adolescent and adult conscientiousness (Table 2) is completely mediated by G2 education and income. Finally, the path from G2 education to G2 income replicated the finding for the G1 generation.

The final step in the analysis of Model 1 involved the decomposition of effects from earlier to later variables in the model. As shown in Table 3 and consistent with Model 1, G1 education had only indirect effects on G2 adolescent and adult conscientiousness (.252 and .155, *p* < .05, respectively*)* and income (.222, *p* < .05) and both direct (.186, *p* < .05) and indirect effects (.226, *p* < .05) on G2 education. G1 income only had indirect effects on G2 outcomes, inconsistent with the prediction of a direct effect from G1 to G2 income. G1 parenting had the predicted indirect effects on G2 income and adult conscientiousness but also had the unexpected direct effect on G2 education. G1 material investments had the expected indirect effects on G2 developmental outcomes but also the unexpected direct association with G2 income. Finally, G2 adolescent conscientiousness had the expected indirect effects on G2 income and adult conscientiousness but did not directly predict adult personality as predicted by Model 1. These decomposed effects are consistent with the SEM in Figure 3 and also demonstrate support for the mediated linkages proposed in Figure 1.

## Model 2: from G2 to G3 Conscientiousness

Table 4 provides the CFA findings for Model 2 which fit the data well (RMSEA = .015, CFI = .997). Factor loadings were statistically significant and in the expected directions (e.g., the loadings for G3 conscientiousness were .85 and .82). Table 5 contains the zero-order correlations among the variables for Model 2, all of which were statistically significant (*p*

< .05). The correlations were generally consistent with predictions from the IM (Figure 2). For example, G2 education predicted G2 income ($r$ = .49) and G2 parenting investments ($r$ = .32). Also important, G2 material and parenting investments predicted G3 conscientiousness. These results suggested the potential value of a formal test of the IM model in relation to G3 (Figure 2).

We next estimated the SEM corresponding to Model 2 (Figure 2), which fit the data adequately ($\chi$2= 91.337, df =67, RMSEA = .036, CFI = .975). Additional analyses following the same procedures described for Model 1 resulted in the SEM presented in Figure 4, which fit the data well ($\chi$2= 69.715, df =66, RMSEA = .014, CFI = .996) and produced a significant improvement in model fit ( $\chi$ = 21.662, $df$ = 1, $p$ < .000). This final SEM produced expected as well as unexpected findings. First, it is noteworthy that the portion of the model from G2 education and income to G3 conscientiousness is quite consistent with the findings for G1 and G2 during G2's adolescence. G2 education predicted G2 income ($\beta$ = .37), G2 parenting investments ($\beta$ = .14, $p$ < .05 with direction predicted as hypothesized by the IM), and G2 material investments ($\beta$ = .22). G2 income predicted material but not parenting investments and both parenting and material investments predicted G3 conscientiousness. Thus, there is a great deal of similarity in the findings for this portion of the model for both adolescents and young children.

Because we have adolescent data for G2 we are able to examine how the characteristics of G2 prior to parenthood might affect the development of the G3 child. First, the direct path from G2 to G3 conscientiousness was statistically significant as expected despite the fact that these measures were assessed 13 years apart and by entirely different study informants. We expect that this direct association may, to a significant degree, reflect genetic inheritance. In addition, G2 adolescent conscientiousness predicted social pathways - through G2 education, income, parenting investments, and material investments - that lead to G3 conscientiousness. Also important, G1 parenting investments directly predicted G2 parenting investments, as expected; however, there was no evidence of intergenerational continuity in material investments in the final model even though evidence for this type of continuity was present in the zero order correlations (Table 5). As for Model 1, G1 parenting investments directly predicted G2 education, suggesting a parenting effect not entirely accounted for by individual differences in conscientiousness. However, G1 material investments did not directly predict G2 income as it did in Model 1.

The final step in these analyses examined direct, indirect and total effects as we did for Model 1. The findings in Table 6 are quite consistent with the SEM demonstrating both support for theoretical predictions as well important but unexpected findings. Consistent with Model 2, for example, G1 parenting had no direct effect on G3 personality but a significant indirect relationship (.195, $p$ < .05) through the several mediating pathways in Model 2. G1 material investments also had this long term, mediated effect on G3 conscientiousness. And as predicted, G2 education and income had indirect or mediated effects on G3 conscientiousness but no direct effects. The most significant unexpected finding was that G2 adolescent conscientiousness had no indirect effect on G2 parenting investments. Thus, the significant indirect relationship between G2 and G3 conscientiousness occurred through pathways involving material investments not those

involving parenting investments. We consider the implications of the findings in the following discussion.

## Discussion

The present study addressed the suggestion by several researchers that conscientiousness likely develops as part of an ongoing reciprocal process involving transactions between the individual and broader social and economic environments (Costanzo, 2014; Conti & Heckman, 2014; Reiss et al., 2014; Shanahan et al., 2014). To our knowledge, this investigation is the first long term empirical study of this hypothesized transactional process. Using data involving three generations of participants in the Family Transitions Project (FTP), we employed the interactionist model (IM) of the relationship between individual development and social and economic circumstances to guide the research. The IM proposes that individual characteristics are significantly influenced by experiences in the family of origin and that, to a significant degree, these experiences are carried forward to later life by the personal traits and dispositions they affect (Conger & Donnellan, 2007; Conger et al., 2010). The IM hypothesizes that an ongoing dynamic develops between the individual and her environment that produces reciprocal or transactional influences across time and generations. Of particular interest in the present study were processes that produce cumulative developmental advantages over time as a product of higher SES in the family of origin. The results of the present analyses were consistent with many of the predictions from the IM both for Model 1 (the transition to adulthood) and for Model 2 (extension to the third generation). However, there also were unexpected findings which suggest that the theory may require specific modifications.

### Model 1: The Transition from Adolescence to Adulthood

**Findings consistent with the IM and cumulative advantage**—Figure 1 provides the predictions from the IM for this portion of the analyses. The SEM for Model 1 (Figure 3) provided significant support for the hypothesized pathways in the model. Significant zero-order associations between G1 income and education and G2 adolescent conscientiousness (Table 2) were entirely mediated or explained by parenting and material investments, as predicted by the IM. In turn, adolescent conscientiousness predicted later G2 education and income which, in turn, predicted adult conscientiousness. These results support the basic transactional process proposed by the IM in which social and economic characteristics in the family of origin are expected to affect the development of personality characteristics that influence adult success in terms of G2 education and income. Also consistent with the hypothesized transaction between the individual and the environment, G2 educational and economic achievements appear to reinforce conscientiousness as an adult, consistent with the notion of cumulating advantages across time. Thus, the present findings provide initial support for the hypothesis that conscientiousness develops, helps maintain and continues to be affected by the social and economic environment that surrounds the individual (e.g., Conti & Heckman, 2014; Reiss et al., 2014). Especially telling in terms of cumulative advantages, G1 education and income both had significant indirect effects on G2 adult conscientiousness 14 years later (Table 3).

**Inconsistent findings and possible modifications of the IM**—In addition to these expected findings, however, there were also a number of unexpected results. First, both G1 education and income were significantly related to both parenting and material investments. Our expectation that education would predict just parenting investments and that income would predict just material investments was not supported by the findings. Although this outcome might suggest that income and education could simply be combined into a single SES construct, we do not believe that would be appropriate. Consistent with many earlier studies (see Conger et al., 2010), parental education was much more predictive of parenting behaviors than income and this important difference would be lost if these measures were combined into a single latent variable. Second, the significant zero-order association between G1 and G2 income (Table 2) was no longer significant in the SEM, contrary to our expectations. We expect that this result occurred for two separate reasons. Specifically, G2 income was assessed at an average of around 27 years of age. At this age the G2s had not realized their income potential and were about a decade younger than when G1 income was measured. We suspect that intergenerational continuity in income would be stronger if we were able to measure G1 and G2 income at about the same time in the life course. In addition, income across generations generally demonstrates greater continuity if several years of income assessments are available for both generations (Bowles & Gintis, 2002). Because we were unable to do that in the current study, we have probably underestimated intergenerational continuity in income to some degree.

Another important and unexpected finding involved direct effects of G1 parenting and material investments on G2 education and income. Although the IM predicted that these dimensions of parenting investments would only affect later educational and economic success through their influence on the development of conscientiousness, the final results provided evidence that parenting investments in terms of warmth, support, and appropriate disciplinary practices also directly predicts G2 educational attainment. On the other hand, material investments in the form of adequate housing, living circumstances, and provision of learning opportunities also directly predicted G2 income. Thus, these results support the hypothesis that individual differences in conscientiousness play a significant role in later life achievements; however, earlier family experiences also appear to have an additive influence on adult SES after conscientiousness is taken into account (see Shanahan et al., 2014 for a review of similar predictions and findings). These results suggest that the IM needs to be modified to take these direct pathways to later educational and economic attainments into account.

Finally, the predicted path from adolescent to adult conscientiousness was not statistically significant in the final SEM even though the zero-order correlation was positive and significant (Table 2). This result is inconsistent with the normally robust continuity in personality characteristics across the transition from adolescence to adulthood (Donnellan, Conger, & Burzette, 2007). The most positive interpretation of this finding is that continuity in conscientiousness really does depend on its effects on the broader social and economic environment. We do not dismiss this possibility; however, we note that our estimate of continuity in personality is quite conservative, especially compared to measures based on self-reports of a single individual over time. We used informant ratings of personality which

have the advantage of being particularly robust predictors of later life experiences (Connelly & Ones, 2010). However, even the informants were different individuals in this study and although the adult and adolescent measures were both based on the MPQ, they involved slightly different response formats. For that reason our analysis may represent a lower bound estimate of continuity in conscientiousness and findings based on the exact same informants and measurement construction over time may have provided stronger evidence of stability. We note, however, that our zero-order estimate of stability in adolescent to adult conscientiousness ($r = .27$) was not remarkably different than the stabilities in self-reports for achievement ($r = .46$) and control ($r = .43$), the indicators for our latent construct, reported by Donnellan et al. (2007, Table 1) over a similar developmental period. Future research is needed on this issue.

### Model 2: from G2 to G3 Conscientiousness

**Findings consistent with the IM and cumulative advantage**—Figure 2 illustrates the predictions from the IM for Model 2. The results from the SEM (Figure 4) were quite consistent with these predictions. Especially important, the portion of the model from G2 education and income to G3 conscientiousness partially replicated the findings for G1 and G2 except that the path from G2 income to G2 parenting investments was not statistically significant. These results demonstrate a remarkable degree of consistency in the findings across two different generations and provide significant support for the IM predictions regarding SES and family influences on the origins of conscientiousness. Other aspects of the Model 2 findings also are consistent with Model 1, including the associations of G1 parenting and material investments with G2 adolescent conscientiousness and the direct effects of G2 conscientiousness on later educational and economic success. These consistencies are important given the slightly smaller and more restricted sample for the Model 2 analyses.

Also interesting, the relationship between G2 education and G2 parenting investments was positive and statistically significant only with direction predicted (a one-tailed test). We suspect that, in part, the magnitude of this path is smaller than the same path in Model 1 because in Model 2 we were able to take G1 parenting investments into account. That is, it is not only G2 educational attainment in Model 2 that predicted G2 parenting investments but also G2s history of parenting investments by her or his parents. This finding underscores the importance of having information about the family of origin in efforts to attain adequate understanding of the predictors of contemporary family interaction processes. Finally, the results demonstrated intergenerational continuity in conscientiousness, perhaps reflecting genetic as well as social influences in the IM. Indeed, the magnitude of the path coefficient from G2 to G3 conscientiousness approximates the expected heritability estimate from one parent to a child (Plomin, DeFries, Knopik, & Neiderhiser, 2013).

**Inconsistent findings and possible modifications of the IM**—In addition to the expected findings related to model 2, there were a few unexpected results that merit consideration. First, as in Model 1 there was a significant path from G1 parenting investments to G2 education, again suggesting the possible importance of social as well as individual difference influences on educational attainment. Second, we did not find the

expected intergenerational continuity in material investments. Perhaps material investments are primarily a function of current economic resources rather than a tendency of one generation to emulate the behaviors of a past generation. This interpretation makes sense in that a parent would be hard-pressed to provide material goods to a child when they do not have the economic resources to do so. Third, as in Model 1, G2 education predicted G2 material investments, again suggesting the importance of educational attainment in parenting processes. Most important, the decomposition of effects (Table 6) showed that G2 adolescent conscientiousness did not have a significant indirect effect on parenting investments, a result inconsistent with the predictions in Model 2. Indeed, the primary predictor of G2 parenting investments was G1 parenting investments. If these results hold in future research, they indicate that the IM needs to be modified such that earlier parenting history plays a greater direct role in producing cumulative advantages than originally proposed.

## Study Limitations and Final Conclusions

Despite strengths, such as the prospective longitudinal design and multiple informant approach to measurement, the present study has several noteworthy limitations that remain to be addressed in future research. First, the white families in the study come from rural areas in a single state and do not represent the ethnic and geographic diversity of the nation as a whole. Although this is a significant limitation, we would note that findings from the FTP involving family and individual response to socioeconomic conditions have tended to replicate in urban as well as rural populations and with minority as well as majority families (see Conger, Ebert-Wallace, Sun, Simons, McLoyd, & Brody, 2002; Conger et al., 2010). These earlier replications increase our confidence that the present findings may generalize as well. Second, as with any long term investigation, there was some attrition in the study cohort and the selection of G2s and G3s with informant reports of conscientiousness further truncated sample size. Nevertheless, we did all we could to maintain participation over a 20-year period of time. Third, it would have been ideal to have additional measures of conscientiousness for additional waves of data; however, we were limited to what was available in the data archive and unable to go back and change what had already been done. Fourth, the analyses were focused on a relatively small set of theoretical parameters and ignored some important issues, such as the role of personality in mate selection and family formation that future research should address. Finally, some measures that might have added information in the analyses, such as participant IQ, were not available in the data set. Again, this type of information will need to be pursued in future research.

Even with these limitations, however, we believe that the present analyses make a significant contribution to research and theory related to the life-course development of conscientiousness. Simply stated, the present analyses suggest a process of cumulative advantage in which higher family SES is associated with greater parental and material investments, higher levels of conscientiousness, and continuing advantage in the next generations of families – including greater conscientiousness of children in the third generation. The analyses also suggested, however, that the present form of the IM is too restricted and does not adequately address the continuing influence of family history on the future SES and family functioning of subsequent generations. The results showed that the development of conscientiousness plays an important role in the process of cumulative

advantage, but it does not primarily account for the influence of family processes on future socioeconomic success as suggested by the current form of the IM. Some but not all of the influence of earlier family advantage is carried forward by the development of conscientiousness which must be viewed as only part of the overall process.

## Appendix A: G1 Material Investments Index

Means and observed range of measures included in the material investment index and the percentage of the sample in the low material investment category.

| Measure of material investments | Mean | observed range | | % low investments |
|---|---|---|---|---|
| | | min. | max. | |
| 1. Extracurricular activities | 4.23 | 0 | 13 | 27.6 |
| 2. Parental aid during the transition to adulthood | 3.10 | 1.50 | 5.00 | 21.9 |
| 3. Parental aid with talents and skills | 3.27 | 1.43 | 4.79 | 24.1 |
| 4. Residence well maintained | 3.97 | 1 | 5 | 31.3 |
| 5. Books in home | 3.33 | 1 | 5 | 22.6 |
| 6. Newspapers or magazines in home | 3.34 | 1 | 5 | 22.0 |
| 7. Home is structurally sound | 4.32 | 1 | 5 | 20.1 |

1.  *Extracurricular activities* were assessed with target reports of the number of sports, school activities, and community activities they participated in. Scores ranged from 0 (no activities) to 13 activities during the past year.

2.  *Parental aid during the transition to* adulthood was assessed with mother and father reports on four items (e.g., "I don't know how I'll be able to manage if my children need a great deal of help as they start their lives as adults," and "I am afraid that helping my children get started as adults will take all of my resources"). Items were reverse coded so that higher scores represent more parental aid during the transition to adulthood. Mother and father reports were averaged to create this measure ($\alpha = .70$).

3.  *Parental aid with talents and skills* was assessed with mother and father reports on seven items indicating how frequently the parent was involved with the target's special talents or skills (e.g., "How often have you told him/her how to get better at these skills" and "How often have you signed the target child up for classes or programs to help him/her get better at these skills"). Items were scored so that higher scores indicate more parental involvement. Mother and father reports were averaged to create this measure ($\alpha = .79$).

*Items 4 through 7* were measured with interviewer reports assessing the family's living environment. Items were scored so that higher scores indicate a better home environment. Interviewers reported on four items indicating how well the home was maintained, the number of books in the home, the number of magazines or newspapers in the home, and the safety of the home.

## Appendix B: G2 Material Investments Index

Means and observed range of measures included in the material investment index and the percentage of the sample in the low material investment category.

| Measure of material investments | Mean | observed range | | % low investments |
|---|---|---|---|---|
| | | min. | max. | |
| 1. Neighborhood | 2.92 | 1 | 3 | 23.5 |
| 2. Health insurance | 4.18 | 1 | 5 | 19.0 |
| 3. Residence cramped or crowded | 3.88 | 1 | 5 | 34.5 |
| 4. Residence run down and not maintained | 4.00 | 1 | 5 | 30.0 |
| 5. Residence not well furnished | 3.89 | 1 | 5 | 35.6 |
| 6. Books in home | 3.61 | 1 | 5 | 11.8 |
| 7. Newspapers or magazines in home | 3.26 | 1 | 5 | 20.9 |
| 8. Home is structurally sound | 4.51 | 1 | 5 | 33.6 |
| 9. Items to promote learning present | 3.80 | 1 | 5 | 35.5 |

1.  *Neighborhood* was measured with G2 target and partner reports on 8 items assessing the family's neighborhood, with higher scores reflecting safer, more desirable neighborhoods. G2 target and partner reported on the degree to which litter, graffiti, vacant houses, public intoxication, drug selling, gang violence and prostitution were problems in their neighborhood.

2.  Health insurance was assessed using an average of targets and partners responses to "I am concerned because I cannot afford adequate health insurance." Response categories ranged from 1 = strongly agree to 5 = strongly disagree.

*Items 3 through 9* were measured with interviewer reports assessing the family's living environment. Items were scored so that higher scores indicate a better home environment. Interviewers reported on seven items indicating how cramped or crowded the residence was, how well it was maintained, how well it was furnished, the number of books in the home, the number of magazines or newspapers in the home, the safety of the home, and the number of items present to promote learning (e.g., computer, desks, etc.).

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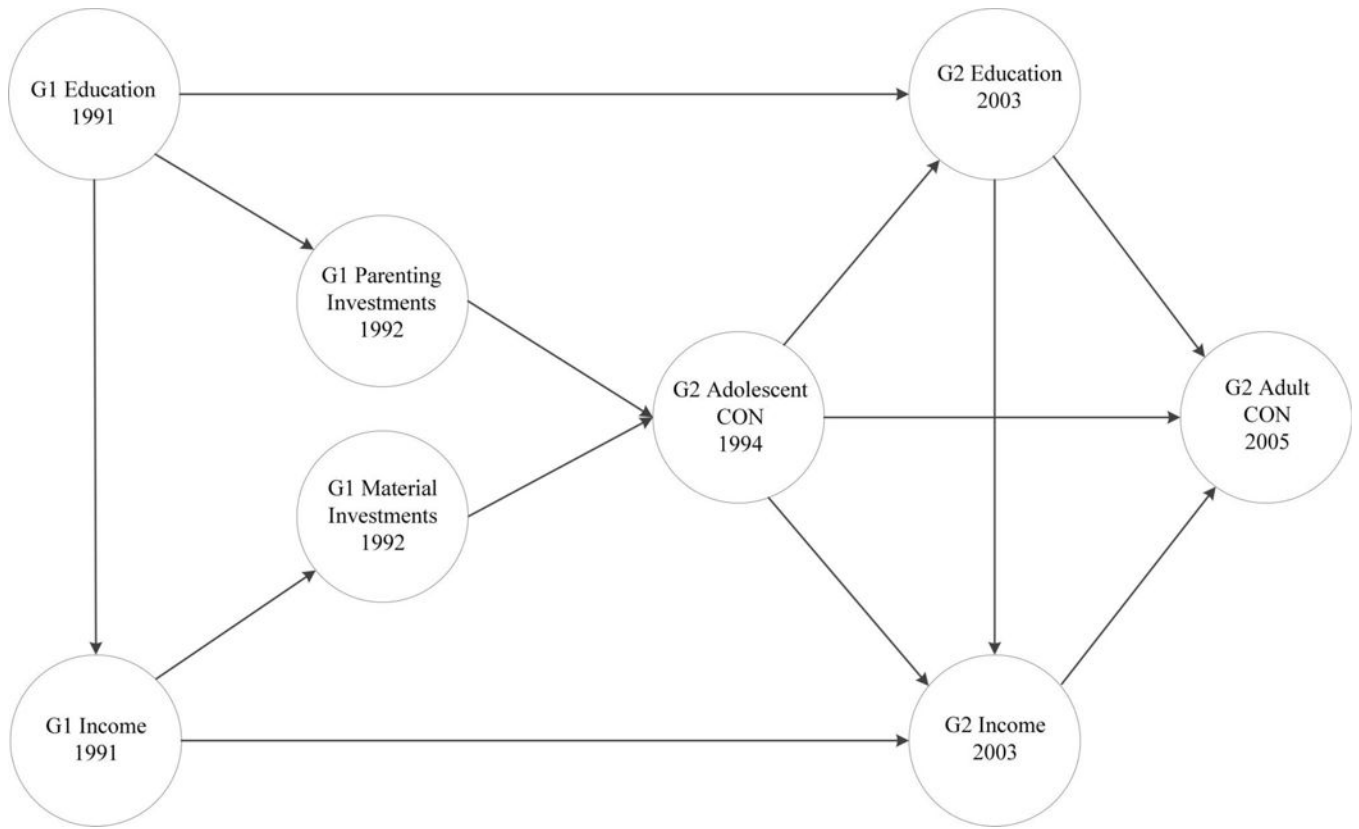
**Figure 1.**
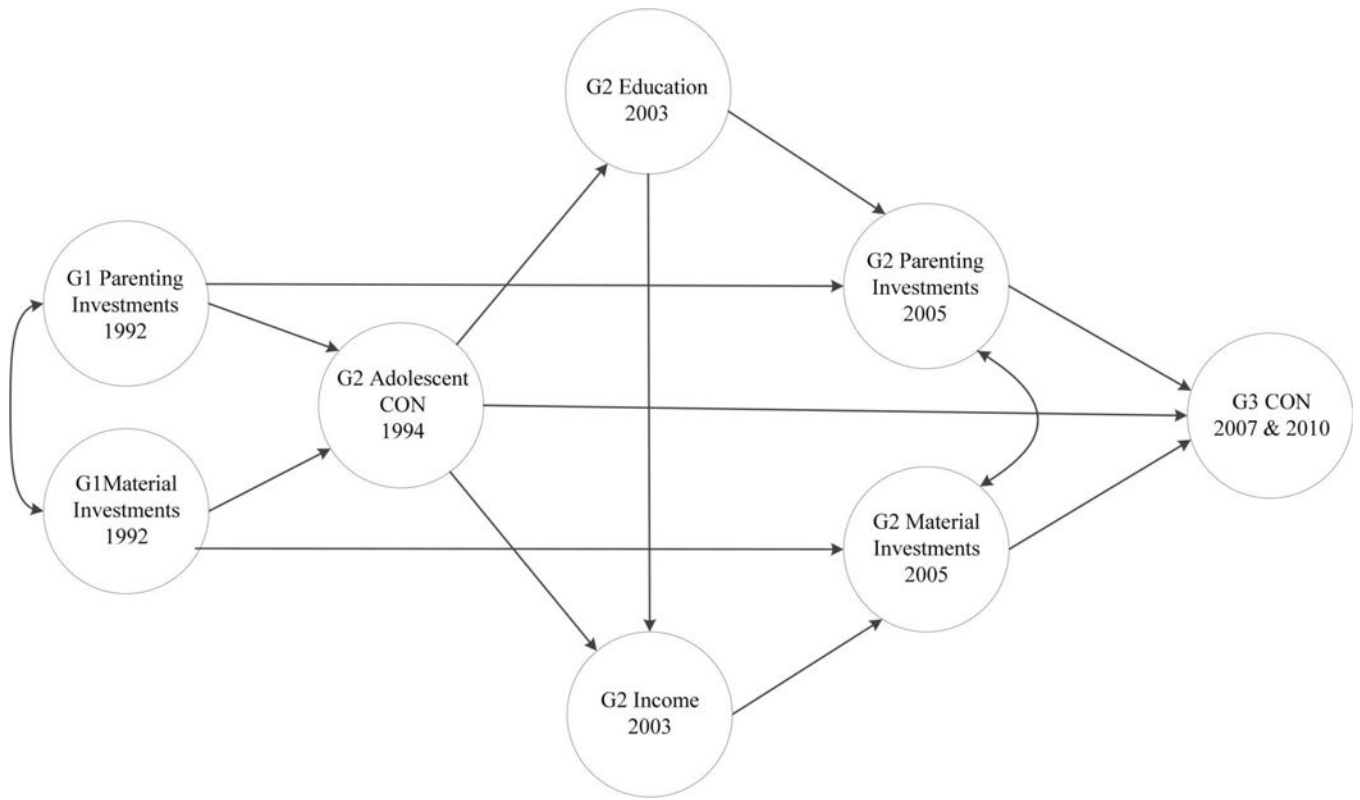IM for the transition from adolescence to adulthood.

**Figure 2.**
IM for G3 development of conscientiousness.

**Figure 3.**
Standardized estimates for Model 1 ($\chi^2$ = 77.790, $df$ = 41, RMSEA = .051, CFI = .957). *$p$
 .05 (two-tailed); +$p$  .05 (one-tailed). Dashed lines represent theorized pathways which
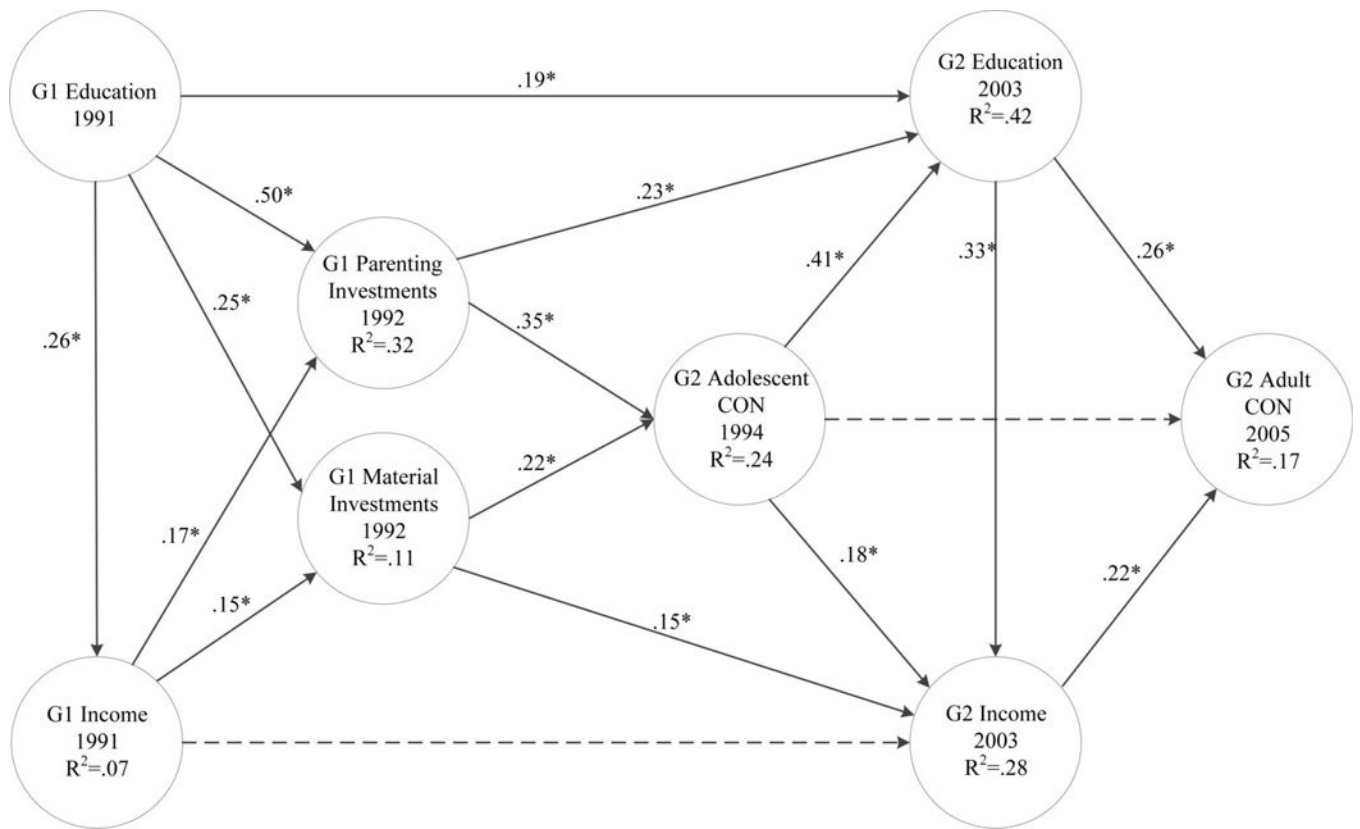were not significant and thus dropped from the model.

**Figure 4.**
Standardized estimates for Model 2 ($\chi^2$ = 69.715, $df$ = 66, RMSEA = .014, CFI = .996). *$p$
.05 (two-tailed); +$p$ .05 (one-tailed). Dashed lines represent theorized pathways which
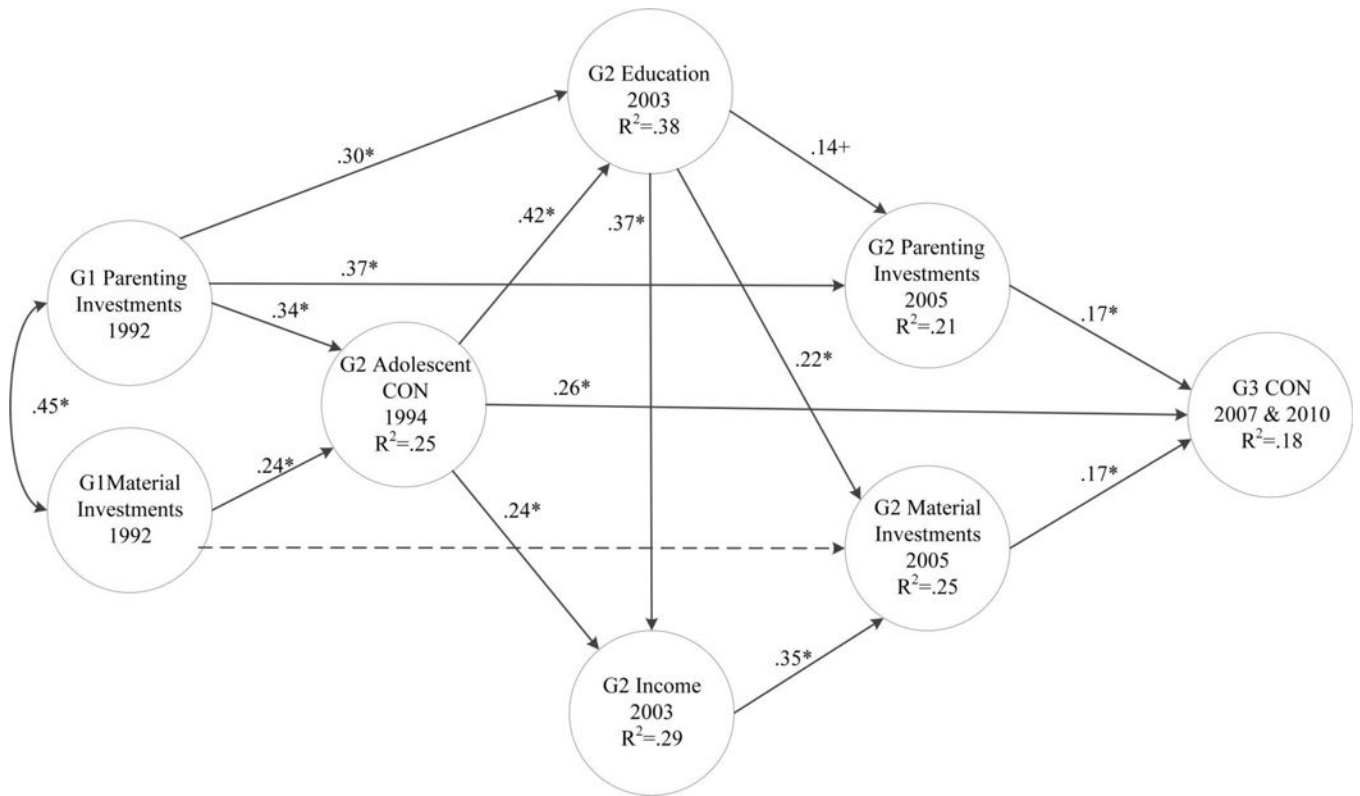were not significant and thus dropped from the model.

**Table 1**

Standardized Factor Loadings (FL) for Model 1 Latent Constructs (N = 347) from Confirmatory Factor Analysis ($\chi2$ = 64.811, df = 29, RMSEA = .060, CFI = .959)

| Construct | Item | FL |
|---|---|---|
| G1 Income 1991 | Income to needs ratio | 1.00 |
| G1 Education 1991 | Parent education (average) | 1.00 |
| G1 Material Investments 1992 | G1 material investments index | 1.00 |
| G1 Parenting Investments 1992 | Observed parent hostility | 0.55 |
| | Observed parent discipline | 0.55 |
| | Observed parent warmth | 0.59 |
| G2 Adolescent Conscientiousness 1994 (MPQ parent report of target) | Achievement | 0.86 |
| | Control | 0.77 |
| G2 Income 2003 | Income to needs ratio | 1.00 |
| G2 Education 2003 | Target education | 1.00 |
| G2 Adult Conscientiousness 2005 (IPQ partner report of target) | Achievement | 0.84 |
| | Control | 0.58 |

*Note.* All factor loadings were statistically significant (*p* .05; two-tailed).

Correlations among Model 1 Latent Variables ($N = 347$)

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1 G1 Income | 1.00 | | | | | | | |
| 2 G1 Education | 0.26 | 1.00 | | | | | | |
| 3 G1 Material Investments | 0.22 | 0.29 | 1.00 | | | | | |
| 4 G1 Parenting Investments | 0.27 | 0.52 | 0.42 | 1.00 | | | | |
| 5 G2 Adolescent Conscientiousness | 0.14 | 0.29 | 0.37 | 0.41 | 1.00 | | | |
| 6 G2 Income | 0.16 | 0.29 | 0.32 | 0.32 | 0.41 | 1.00 | | |
| 7 G2 Education | 0.23 | 0.42 | 0.33 | 0.47 | 0.56 | 0.48 | 1.00 | |
| 8 G2 Adult Conscientiousness | 0.18 | 0.20 | 0.28 | 0.22 | 0.27 | 0.34 | 0.33 | 1.00 |

*Note.* All correlations significant ($p$  .05; two-tailed).

**Table 3**

Decomposition of Effects for Model 1

| Predictor | Outcome | Total effect | Direct effect | Indirect effect |
|---|---|---|---|---|
| G1 Education | G2 Adolescent Conscientiousness | .252[*] | | .252[*] |
| | G2 Education | .413[*] | .186[*] | .226[*] |
| | G2 Income | .222[*] | | .222[*] |
| | G2 Adult Conscientiousness | .155[*] | | .155[*] |
| G1 Income | G2 Adolescent Conscientiousness | .092[*] | | .092[*] |
| | G2 Education | .076[*] | | .076[*] |
| | G2 Income | .064[*] | | .064[*] |
| | G2 Adult Conscientiousness | .034[*] | | .034[*] |
| G1 Parenting | G2 Education | .369[*] | .227[*] | .143[*] |
| | G2 Income | .183[*] | | .183[*] |
| | G2 Adult Conscientiousness | .136[*] | | .136[*] |
| G1 Material Investments | G2 Education | .089[*] | | .089[*] |
| | G2 Income | .215[*] | .146[*] | .068[*] |
| | G2 Adult Conscientiousness | .070[*] | | .070[*] |
| G2 Adolescent Conscientiousness | G2 Income | .314[*] | .181[*] | .134[*] |
| | G2 Adult Conscientiousness | .175[*] | | .175[*] |

[*]
*p* .05;

[+]
*p* .10

**Table 4**

Standardized Factor Loadings (FL) for Model 2 Latent Constructs (N = 282) from Confirmatory Factor Analysis ($\chi 2 = 56.286$, df = 53, RMSEA = .015, CFI = .997)

| Construct | Item | FL |
|---|---|---|
| G1 Material Investments 1992 | G1 material investments index | 1.00 |
| G1 Parenting Investments 1992 | Observed parent hostility | 0.61 |
| | Observed parent discipline | 0.51 |
| | Observed parent warmth | 0.58 |
| G2 Adolescent Conscientiousness 1994 (MPQ parent report of target) | Achievement | 0.87 |
| | Control | 0.77 |
| G2 Income 2003 | Income to needs ratio | 1.00 |
| G2 Education 2003 | Target education | 1.00 |
| G2 Material Investments 2005 | G2 material investments index | 1.00 |
| G2 Parenting Investments 2005 | Observed parent hostility | 0.93 |
| | Observed parent discipline | 0.76 |
| | Observed parent warmth | 0.57 |
| G3 Child Conscientiousness 2007/2010 (IPQ target/partner average report of G3 child) | Achievement | 0.85 |
| | Control | 0.82 |

*Note.* All factor loadings were statistically significant (*p* .05; two-tailed).

**Table 5**

Correlations among Model 2 Latent Variables ($N = 282$)

|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1 G1 Material Investments | 1.00 | | | | | | | |
| 2 G1 Parenting Investments | 0.43 | 1.00 | | | | | | |
| 3 G2 Adolescent Conscientiousness | 0.38 | 0.41 | 1.00 | | | | | |
| 4 G2 Income | 0.28 | 0.37 | 0.43 | 1.00 | | | | |
| 5 G2 Education | 0.34 | 0.47 | 0.55 | 0.49 | 1.00 | | | |
| 6 G2 Material Investments | 0.18 | 0.19 | 0.28 | 0.46 | 0.40 | 1.00 | | |
| 7 G2 Parenting Investments | 0.20 | 0.41 | 0.34 | 0.28 | 0.32 | 0.17 | 1.00 | |
| 8 G3 Conscientiousness | 0.25 | 0.22 | 0.34 | 0.32 | 0.28 | 0.27 | 0.27 | 1.00 |

*Note.* All correlations significant ($p$ .05; two-tailed).

**Table 6**

Decomposition of Effects for Model 2

| Predictor | Outcome | Total effect | Direct effect | Indirect effect |
|---|---|---|---|---|
| G1 Parenting | G2 Education | .418* | .281* | .137* |
| | G2 Income | .242* | | .242* |
| | G2 Parenting Investments | .428* | .365* | .063+ |
| | G2 Material Investments | .182* | | .182* |
| | G3 Conscientiousness | .195* | | .195* |
| G1 Material Investments | G2 Education | .103* | | .103* |
| | G2 Income | .095* | | .095* |
| | G2 Parenting Investments | .015 | | .015 |
| | G2 Material Investments | .056* | | .056* |
| | G3 Conscientiousness | .076* | | .076* |
| G2 Adolescent Conscientiousness | G2 Income | .392* | .237* | .155* |
| | G2 Parenting Investments | .060 | | .060 |
| | G2 Material Investments | .231* | | .231* |
| | G3 Conscientiousness | .311* | .261* | .050* |
| G2 Education | G2 Material Investments | .349* | .219* | .130* |
| | G3 Conscientiousness | .085* | | .085* |
| G2 Income | G3 Conscientiousness | .061* | | .061* |

*
$p$ .05;

+
$p$ .10