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Environmental Transmission of Career Interests Through a Genetic Lens: Understanding the Confounding Around Parental Occupation

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Understanding the Confounding Around Parental Occupation

by

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ABSTRACT

Previous research has established that parents can influence the career interests of their children through both their shared genetics and the household environment they create. However, most studies look at these parental influences in isolation either focusing on the environmental influences or the genetic influences. As such, the results of these studies fail to account for potential confounding in their results do to the nature of career interests. This study used a genetically informative twin sample to address the issue of shared genetics while looking at the measured environmental influence a parent's occupation has on their child's career interests. A sample of responses from 335 were gathered through an archival dataset and analyzed using ADCE variance decomposition. Results did not support the hypothesis that parental occupation interest categories would predict similar levels of interests in their children. Additionally, moderation analyses suggest there may be a small negative effect of children raised in a household with high conflict on taking on similar interests as their parent's occupations. Overall, the results found support the idea that parental occupation may not be a strong predictor of child career interests unlike what previous literature suggests. Contributions to the career interest literature as well as practical implications are discussed.

CHAPTER ONE: INTRODUCTION

Issues surrounding individual career choice have a longstanding research tradition in Industrial Organizational Psychology. Beginning after WWI, scientists began asking students to discover their own unique vocational tendencies (Miner, 1922). This can be seen as an early attempt to link personal interests to work related activities to understand how individual interests link to occupation choice. Continued research linking interest to occupations led to discoveries that interest congruence with an occupation can increase both distal work outcomes such as job performance (Nye et al., 2012, 2017; Van Iddekinge, Roth, et al., 2011) as well as proximal work outcomes such as motivation to lead (Bergner et al., 2019) and job knowledge (Van Iddekinge, Putka, et al., 2011). Additionally, interests show incremental validity for job performance above and beyond that of standardized cognitive ability tests and other non-cognitive ability measures (Nye et al., 2018).

Alongside this focus on the outcomes of career interests comes a desire to understand the mechanisms which lead to the formation of career interests. Much of this literature focuses on the influence of environmental factors on career interest development. One central environmental influence on career behaviors that has received much attention is parental influence, including parental occupation (Cenkseven-Önder et al., 2017; Dietrich & Kracke, 2009; Keller & Whiston, 2008; Piotrkowski & Stark, 1987). However much like any dispositional trait, career interests are heritable to some degree (Lykken et al., 1993; Moloney & Bouchard, 1991; cf. Vukasović & Bratko, 2015), suggesting a role for genetic predispositions on the development of career interests. As such, if studies of environmental factors on interest development fail to account for

potential genetic confounding, they are likely to overestimate the true *environmental* effects due to shared genes between parents and children. This paper aims to address this issue of genetic confounding in studies of parental influence on career interest development by examining relationships between parental occupation factors and their children's adult career interests in a genetically informative sample.

Contributions of the Current Study

Research on environmental and genetic influences on career interest development have developed largely separately (Hansen & Wiernik, 2018). Each of these literatures has important limitations. Research on environmental influences have considered a wide range of factors, including parental behaviors, peer behaviors, and early childhood and educational experiences (Hartung et al., 2005; Keller & Whiston, 2008; Piotrkowski & Stark, 1987). However, most studies examining environmental influences have failed to consider potential genetic influences. As noted above, interests are substantially heritable, with estimates from child twin studies suggesting that genetic differences account for 40–45% of the observed variance in interests (Lykken et al., 1993; Moloney & Bouchard, 1991). If environmental factors are also heritable and share genetic components with interests, purely phenotypic analyses will overestimate environmental influences due to genetic confounding (Harden & Koellinger, 2020). This threat to validity is especially likely to be present for parental influences on career interests (Fatimah et al., 2019).

On the other hand, behavioral genetic studies of career interests have tended to be limited to traditional ACE (additive genetic, common environmental, unique environmental) variance decomposition and have failed to measure specific environmental factors. This limits the utility

of these studies for understanding interest development and makes it difficult to integrate genetic studies with the broader interest development literature.

This study seeks to address these issues by including parental occupation characteristics as directly measured environmental variables within behavioral genetic models. Such analyses can clarify the meaning of estimated environmental variance components and increase the statistical power to estimate environmental influences beyond simple ACE variance decomposition (Purcell, 2002). Moreover, such models can also enhance purely environmental analyses by controlling for genetic confounding, providing clearer, less biased estimates of environmental effects. These enhanced behavioral genetic models have been used in other areas to clarify genetic and environmental influences on psychological characteristics, such as the influence of socioeconomic status on literacy (T. C. Bates et al., 2016; Figlio et al., 2017; Grasby et al., 2019).

In addition, I will further examine parental relationship quality as a moderator of parental occupation on interest development. Children observe from their parent's occupation to learn the types of roles they enjoy and do not enjoy (Piotrkowski & Stark, 1987). However, these perceptions are likely to be affected by a person's relationship with their parents. If children have negative relationship with their parents, they may be less likely to develop interests consistent with their parents' occupations, but a strong parental relationship may reinforce the environmental influence of parental occupation.

The results of this study have important theoretical and practical implications. Should environmental influences not show unique influence on the development of career interests after accounting for genetic confounding, current thinking about barriers to and supports for career interest development would need to be revised. On the other hand, if environmental influence of

parents' occupations on career choice are robust to genetic controls, this strengthens evidence supporting theoretical models that center parents in children's interest development. Results can further clarify potential avenues for intervention by career counselors and other actors to support children's interest development and exploration.

Literature Review and Hypothesis Development

Career Interests and Interest Development

Interests can be broadly defined as an "individual's characteristic patterns of preferences for certain work activities and work environments" (Hansen & Wiernik, 2018, p. 409). Much of the early work in vocational interests focused on categorizing work activities and work environments based on what individuals working in them found interesting. Holland's (1997) Theory of Vocational Personalities and Work Environments arose as a parsimonious way for interest researchers to describe a person's interest in broad categories of work activities. This theory groups work activities into six categories arranged in a circumplex or hexagonal structure: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (RIASEC) and describes a person's interest as their desire to perform activities in these categories (Holland, 1997). Occupations and work tasks are similarly described in terms of the degree to which they require activities in each category. This six-dimensional framework is widely used in career counseling and job analysis practice, as well as counseling, career, and personnel psychological research (Hansen & Wiernik, 2018). RIASEC-based interest measures are strong predictors of people's career choices (Hansen & Wiernik, 2018), as well as work an career outcomes, such as work performance and job and career satisfaction (Wiernik, 2016b; see also Hoff et al., 2020; Nye et al., 2012; Van Iddekinge, Roth, et al., 2011). In addition, interests tend to be highly stable after

early adulthood (18–21); meta-analytic stability estimates for the six RIASEC interest categories range from .54 to .67 depending on dimension and time interval (K. S. D. Low et al., 2005).

Research on the development and emergence of interests has focused on the effects of transactions between a person and their environment in reinforcing or reducing interest in dimensions of work activities (Wille & Fruyt, 2019). A dominant theoretical framework in this literature is social cognitive career theory (SCCT; Lent & Brown, 1996, 2019), an extension of Bandura's (1989) social cognitive theory. SCCT is a goal-oriented or cybernetic theory that describes how people select, strive toward, and change their career-related goals. The theory posits that individual's career interests and subsequent choice goals are directly influenced by two primary factors: self-efficacy and outcome expectations for work domains. Self-efficacy beliefs are a person's understanding of their own ability to perform certain tasks. These beliefs are thought to be dynamic and change with experience and depending on the type of performance required (Lent et al., 1994). Outcome expectations refer to a person's beliefs that pursuing a work domain will lead to valued outcomes (e.g., continued employment, satisfaction, work success, high pay, etc.). Outcome expectations are influenced by self-efficacy beliefs (if a person believes they lack capability, they are unlikely to expect positive outcomes), as well as other factors, such as social support for the career path, perception of employment opportunities, and labor market conditions (Lent et al., 1994). When a person believes they are capable of performing a career path and that doing so will lead to personally- and socially-valued outcomes, they are likely to develop interest in that area and pursue that career path. Meta-analytic evidence generally supports SCCT's predicted correlations of interests with domain self-efficacy and outcome expectations, with bivariate correlations in the range of .47–.78 (Lent et al., 2018; Lent & Brown, 2019; Sheu et al., 2010).

Parental Occupation as an Influence on Interest Development

Following SCCT, environmental factors are posited to primarily influence interests via either self-efficacy or outcome expectations (Lent & Brown, 2019). Experiences that signal a person's competence for a work domain or that pursuing that domain will lead to positive outcomes are likely to increase interest for that domain. However, an individual's self-efficacy beliefs are not solely founded by internal reflections on one's abilities, but they can also be developed through reflections on how similar others perform as well. These reflections then influence an individual's own self-efficacy beliefs by utilizing the similar other as a proxy for themselves should they attempt the same task (Lent et al., 1994).

One of the earliest previews children have into the workplace is through their parents as children pick up on and understand aspects of their parents' jobs from the way their parent's talk about their jobs or viewing their parents at work (Piotrkowski & Stark, 1987). These glimpses into their parent's work lives provide the child with information to develop their own ideas about their self-efficacy beliefs and outcome expectations. A parent coming home exhausted and complaining about the work they do would suggest to their child that the type of work their parent is engaged in would not lead to positive outcomes decreasing the chance of the child generating positive outcome expectations for that type of work. Meanwhile, watching a parental figure perform work tasks with ease would lead a child to developing positive self-efficacy beliefs about their ability to perform that same tasks due to the similarity they perceive between themselves and their parents (Lent et al., 1994).

These occupational previews parents provide allow the child to have a better understanding of the types of tasks required on-the-job. Understanding job-relevant task information is key in helping children understand if they fit with the job. Wiernik (2016a) found

that providing information about the characteristics of a job helps to increase student interests in realistic jobs that match a student's desired work interests but are not commonly advertised to students. Parents provide this type of job-related information through the work previews they give their children of their own careers. A key idea here is that parental occupations allow for students to develop self-efficacy beliefs for jobs they may not have been exposed to otherwise. Barak et al.'s (1991) study on the traditionality of mother's occupations supports the idea that parental occupations serve as a unique influence on their children's career interests. Children of mothers in non-traditional careers were less likely to endorse traditional gender-related occupational interests. This finding would suggest that the children viewed their mother's occupation and were able to develop unique self-efficacy beliefs and outcome expectations due to the new information their mother's occupation provided for their understanding of work.

Parental occupations can shape their children's self-efficacy beliefs and outcome expectations in ways other than providing a preview for an occupation. Parental activities that relate to specific occupations also allow for children to gain more information about the nature of those types of jobs. One study looking at this found that parents who engage their children in at-home activities that relate to specific careers like changing oil in a car or sewing develop their children's interest in these careers (Wong et al., 2011). These activities provide children with a chance to engage in career-related behaviors which allow them to understand how well they can perform these tasks and how positive the outcomes of their performance will be.

Additionally, the career interest literature supports the idea that it is not the specific occupation that influence the career interest development of children, but aspects of the occupations instead. Indeed, there tends to be a greater connection between the characteristics of the types of work that parents and children do rather than a direct connection between jobs (C.

W. Bates, 2015). The literature suggests that a child seeing what types of job roles or tasks their parents engage in provides information that they use to develop their own perceptions of what roles and activities they believe themselves capable of doing and will lead to positive outcomes. The increased interest in certain job roles is then expected to translate to an increased interest in choosing certain career paths over others. Specifically, ones that mirror the types of occupations their parents held.

Hypothesis 1: Characteristics of the parent's occupation will show a significant relationship with child interests such that child interests will reflect the interest categories of their parent's occupation and this relationship will not decrease once controlling for genetic factors.

Parents have the greatest influence on a child's environment as they are being raised. Children get their first look into the working world through their parents, and their attachment to their parents could influence the weight that children give to these early environmental influences. These types of environmental influences play a direct role in the development of a child's career interests. Furthermore, if a child grows up in a good home and has a good relationship with their parents these environmental influences could be stronger than if the child fails to develop a good relationship with their parents. The attachment of the child to the parent should reflect how much they see themselves in their parent and relate their parents' work interests to their own. A child growing up in a family climate they claim as highly cohesive, low in conflict, and considers themselves to have positive family relations should be more likely to adopt these self-efficacy beliefs and outcome expectations based on their parent's career. In addition to testing the parental occupations as a specific environmental factor to show a connection to their child's interests in addition to the unmeasured environmental variables

commonly modeled in genetically informative research, I will test the family climate as rated by the children in terms of cohesion, conflict, and family relations as a possible moderator to this environmental influence.

Hypothesis 2: Family climate moderates the relationship between environmental influences and child career interests such that children who rate their family climate as being negative will see an attenuation of the relationship of their parent's occupational characteristics on their occupation.

Genetic Confounding in Interest Development

As discussed above, a variety of environmental correlates of children's interest development have been identified. However, these studies are limited in that they rarely consider that parents affect their children's characteristics not only through their parenting behaviors, but also through their shared genetic material. A variety of studies provide evidence for the heritability of career interests (Carter, 1932; Lykken et al., 1993; Moloney & Bouchard, 1991; Roberts & Johansson, 1974; Vandenberg & Kelly, 1964). The consensus of these studies is that monozygotic twins are much more similar that dizygotic twins in their preferences for specific work-related activities as referenced by their intraclass correlations ranging from .38-.50. Additionally more recent work looking at the heritability of self-efficacy beliefs found that up to 75% of the variance in twins' self-efficacy beliefs could be explained by genetic factors (Waaktaar & Torgersen, 2013). As such, studies which only look at the influence of parental occupation on child career interests may overestimate the relationship due to the shared genetic information that we know contributes to career interests.

While there is strong evidence for the heritability of career interests this does not mean that an individual is predestined to have specific career interests, but rather that their genes will

provide one influence on the development of their career interests (Harden & Koellinger, 2020). A design which combines a measured environmental variable with a genetically informative sample allows for one to account for a unique environmental relationship while holding genetic similarity constant. This will allow me to address the possibility that parental occupations are related to child career outcomes solely through genetic components of career interests shared between parents and children (Kohler et al., 2011). Additionally this type of design has been commonly used in the social sciences to test other measured environmental variables like Socio-Economic Status while controlling for heritable traits such as intelligence (T. C. Bates et al., 2016; Grasby et al., 2019).

Research on vocational interests thus far understands that parents can influence their children's career development through both environmental and genetic factors. However, there have been few tests of both measured environmental influence and genetic effects on interest development in the same study. As such these two areas of career interests research remain unconnected. The focus of this study is to use a genetically informative sample alongside a measured environmental variable to understand the unique influence a parent's occupation has on the development of their career interests while taking into account the potential for genetic confounding.

CHAPTER 2: METHOD

Participants

This study uses data from the PAINT study collected by Filip De Fruyt, Bart Wille, and colleagues (K.-S. D. Low, 2009). The original data was collected in three waves with data collection starting in 1997–1998, a second wave of data being collected in 2000, and the final data collection occurring in 2015–2016. This study uses information from the third wave of the data collected in 2015–2016. After cleaning the data received from the original authors, this sample includes 335 participants, including 110 monozygotic twins with 61 twin pairs and 149 dizygotic twins with 89 twin pairs, as well as 76 non-twin siblings from only the third wave of data collection. The sample is majority female (62%), and a vast majority of the sample (95%) reported growing up in the same household as both biological parents. This sample is well-suited to investigating the current hypotheses because the twin design permits us to control for genetic confounding when estimating correlations between parent occupation and children's interests. Moreover, interests also show substantial age- and period-related mean changes (Bubany & Hansen, 2011; K.-S. D. Low, 2009), so it is important to consider a sample collected at the same time and same age, as was done in the PAINT study.

Measures

Zygosity

The zygosity of the twins was measured in the first wave of data collection, with verification during the third wave of data collection. Twins were coded as monozygotic or

dizygotic using a Questionnaire of Twins' Physical Resemblance or through STS (sequence tag site) profiling via oral swab. The dataset includes information on the time, place, and method through which zygosity data was collected.

Career Classification

Participants were asked to report their mother's, father's, and their own job titles in the third wave of data collection. These job titles were coded into O*NET occupational classification codes. After the closest O*NET occupation was determined, interest dimension relevance data for the occupation was extracted from the O*NET database. In cases where several O*NET occupations matched the participant's description, the interest values for matching occupations were averaged.

Position Classification Inventory

The Position Classification Inventory (Gottfredson & Holland, 1991) assess features of a person's specific job using RIASEC dimensions and acts as a measure of career choice. It consists of 84 items (13 per scale, 6 unscored) that assess the demands, skills, and personal styles or characteristics required by an occupation rated on 3-point scale. Participants completed the PCI during the third wave of data collection (α = .835).

Personal Globe Inventory

Participants also completed the short form of the Personal Globe Inventory (PGI-Short; Tracey, 2010) during the third wave of data collection (α = .931). The PGI-Short is a career interest inventory that asks participants to rate their level of interest and perceived competence in a variety of work activities. Items are rated on a 7-point Likert scale. Items can be scored according to several interest dimension taxonomies. For consistency with the occupational information from O*NET, I used the PGI-Short RIASEC scales for the current study. The results

of the interest subscale (α = .873) will be used as indicators of the participant's career interest while information from the competence subscales will not be used.

Family Composition and Climate

Participants were asked to describe their living situation with their parents growing up, the marital status of their parents, the composition of their family, as well as answer a 77-item Family Climate questionnaire in the Third Wave of data collection (α = .799) (Jansma & Coole, 1996). This questionnaire is a Dutch adaptation of the Family Environment Scale (Moos & Moos, 1976) and contains 7 subscales, Cohesion, Expressiveness, Conflict, Organization, Control, Norms, and Social Orientation. In addition to these scales a Family Relationship Index can be calculated using the Cohesion, Expressiveness, and Conflict subscale scores to give an overall understanding of how the individual views their family relationship. For purposes of this study, the Cohesion, Conflict, and Family Relationship Index will be used as moderators to test Hypothesis 2.

Analyses

Descriptive statistics and confidence intervals will be computed accounting for within-family dependency using methods described by Griffin and Gonzalez (1995).

Biometric Variance Component Analyses

As a baseline model, I decomposed variance in each interest scale using univariate ADCE models (M. Neale & Cardon, 2013). In an ADCE model, variation in observed (phenotypic) traits is decomposed into 4 components: additive (A) and non-additive (D) effects of genes, effects of common environmental factors (C; reflects environmental factors that cause members of the same household to be more similar), and effects of environmental factors that are unique to individuals (E;

reflects environmental factors that cause members of the same household to be *less* similar). A univariate ADCE model is shown in Figure 1.

I used the variance components parameterization of the ADCE model (M. C. Neale & Cardon, 1992). In this parameterization, the variances of the A, D, C, and E latent variables for each observed scale are estimated directly (similar to how latent variable variances and covariances are estimated in other structural equation models). Variance component parameterization has two advantages over the more common Cholesky parameterization (M. C. Neale & Cardon, 1992). First, it has more accurate Type I error rates. Second, it allows variance component estimates to be negative, which can indicate model misspecification. To identify the model, the cross-twin correlation between A factors is fixed to 1.0 for MZ twins and .50 for DZ twins, the cross-twin correlation between D factors is fixed to 1.0 for MZ twins and .25 for DZ twins, and the cross-twin correlation between C factors is fixed to 1.0 for all twins.

The full ADCE model cannot be estimated with samples of only MZ and DZ, so I estimated several submodels (ACE, ADE, AE) and compared them using the Akaike information criterion (AIC; Burnham & Anderson, 2004). I retained the models with valid solutions (non-negative variance components) and the best AIC values. All models were estimated using the *OpenMx* and *umx* packages in *R*.

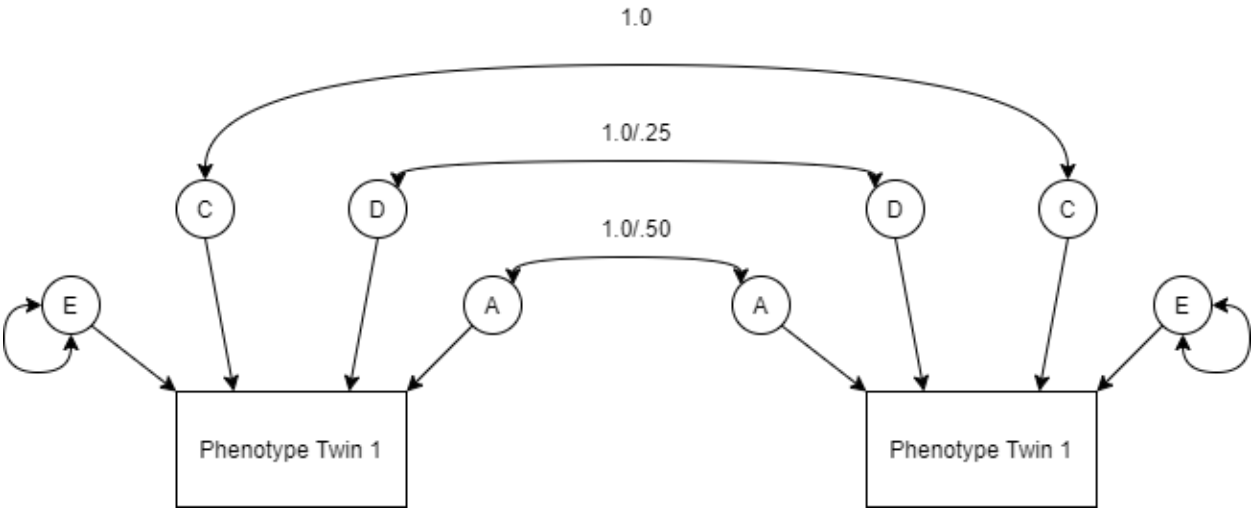

Figure 1: A conventional ADCE model

Impact of Parent Occupation

To assess the impact of parent occupation on child career interests, I will supplement the above ADCE models with additional measured variables.

First, I added the O*NET interest relevance value for each parent's occupation as a direct environmental predictor of twins' interest scores. Compared to a simple ACE variance decomposition, examining effects of directly measured environmental features has more power to detect environmental effects and also can identify specific important environmental factors rather than merely undifferentiated "environmental effects" (Purcell, 2002). This approach thus allowed me to estimate the effect of parent occupational characteristics on their children's adult career interests while removing confounding effects of shared genetic and common environmental factors within families. Given statistical power limitations, I did not include interaction terms between the measured environmental variables and the ADCE variance components. Following Hypothesis 1, I expected parent occupation O*NET scores to positively

predict offspring's interest in the same work domains after controlling for genetic and common environmental variance components.

In addition to estimating main effects of parent occupation on children's interests, I examined the moderating effects of children's relationship with their parents using the Family Climate scale. Following Hypothesis 2, I expect that the impact of parental occupation on offspring interests will be attenuated when the child had a negative relationship with the parent during childhood.

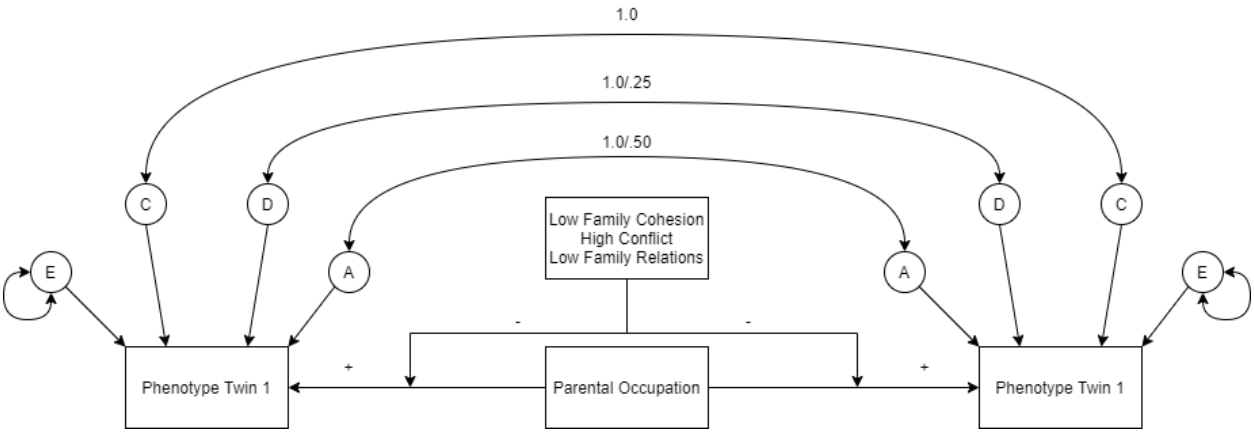

Figure 2: The full ACE model including parental occupation and family climate variables (cohesion, conflict, and family relations).

Supplemental Analyses

In addition to running the model predicting individual differences based on twin's interest scores on the Personal Globe Inventory (PGI), I ran the same analyses using participant's scores on the Position Classification Inventory (PCI) as the observed twin phenotype. Due to the age of the sample being around 18 at the time of data collection, the participants' occupational characteristics, as measured by the PCI, may not be as useful as indicators of their career interests. These positions may not reflect the desired career paths of the individuals. As such, this measure was included as a supplement to the main analysis which uses a more direct measure of the participant's career interests.

Due to the power concerns associated with my sample size, I also ran multilevel analyses to test my hypotheses. For these analyses, I ran multiple greater liner regression models predicting child interest with parental occupations, sex, and family cohesion as predictors. The equations were created such that twin characteristics like zygosity, interests, and the predictor variables were nested in the upper-level family grouping variable.

Table 1. *Descriptive Statistics of Study Variables for Full Study Sample*

Variable	Mean	SD	IQR	Range	Skewness	Kurtosis	N	N Missing
PGI Realistic Interest	2.99	1.39	2.25	[1.00, 6.75]	0.29	-0.71	335	0
PGI Investigative Interest	3.90	1.39	2.00	[1.00, 7.00]	-0.36	-0.67	335	0
PGI Artistic Interest	3.50	1.61	2.50	[1.00, 7.00]	0.08	-0.94	335	0
PGI Social Interest	3.97	1.14	1.58	[1.00, 6.50]	-0.30	-0.37	335	0
PGI Enterprising Interest	3.65	1.03	1.42	[1.00, 6.67]	-0.12	-0.03	335	0
PGI Conventional Interest	2.74	1.16	1.83	[1.00, 5.75]	0.41	-0.72	335	0
PCI Realistic	1.71	0.65	1.29	[1.00, 3.00]	0.50	-1.03	307	28
PCI Investigative	2.35	0.49	0.83	[1.00, 3.00]	-0.38	-0.80	307	28
PCI Artistic	1.74	0.57	0.86	[1.00, 3.00]	0.57	-0.65	307	28
PCI Social	2.62	0.39	0.71	[1.43, .300]	-0.90	-0.08	307	28
PCI Enterprising	2.06	0.39	0.43	[1.14, 3.00]	-0.06	-0.15	307	28
PCI Conventional	2.41	0.39	0.57	[1.29, 3.00]	-0.59	-0.16	307	28
Mother ONET R	2.77	1.71	3.00	[1.00, 7.00]	0.93	-0.34	295	40
Mother ONET I	3.22	1.98	4.00	[1.00. 7.00]	0.52	-1.16	295	40
Mother ONET A	2.56	1.41	2.67	[1.00, 6.00]	0.59	-1.04	295	40
Mother ONET S	5.01	1.97	4.00	[1.00, 7.00]	-0.44	-1.36	295	40
Mother ONET E	3.71	1.65	2.67	[1.33, 7.00]	0.63	-0.81	295	40
Mother ONET C	4.36	1.66	2.67	[1.67, 7.00]	0.46	-1.1	295	40
Father ONET R	3.73	1.71	4.00	[1.00, 7.00]	0.36	-1.23	309	26
Father ONET I	3.15	1.86	4.00	[1.00, 7.00]	0.86	-0.47	309	26
Father ONET A	2.17	1.39	1.34	[1.00, 6.67]	1.54	1.64	309	26
Father ONET S	3.37	1.98	3.00	[1.00, 7.00]	0.61	-0.85	309	26
Father ONET E	4.40	2.01	4.00	[1.00, 7.00]	0.05	-1.48	309	26
Father ONET C	4.50	1.47	2.34	[1.00, 7.00]	0.09	-0.84	309	26
Family Cohesion	7.63	2.37	2.00	[0, 11.00]	-1.18	1.22	317	18
Family Conflict	4.49	2.85	5.00	[0, 11.00]	0.42	-0.65	317	18
Family Relations	21.29	6.22	8.00	[2.00, 32.00]	-0.81	0.22	317	18

Table 2. *Intercorrelations of Study Variables*

Variable	1	2	3	4	5	6	7	8	9	10	11	12
PGI Realistic												
PGI Investigative	.46***											
PGI Artistic	0.16	.47***										
PGI Social	-0.12	0.14	.41***									
PGI Enterprising	.22*	0.13	0.12	.37***								
PGI Conventional	.67***	.34***	-0.006	-0.2	.37***							
PCI Realistic	.23*	0.15	0.0005	-0.02	-.23*	0.03						
PCI Investigative	.24**	.29***	0.005	-0.19	-0.003	.30***	0.14					
PCI Artistic	-0.16	0.04	.39***	.32***	-0.03	-.25**	-0.05	0.03				
PCI Social	-0.15	-0.03	0.08	.31***	0.12	-0.2	-0.04	0.04	.33***			
PCI Enterprising	-0.02	-0.05	-0.06	-0.06	0.23	0.16	-0.12	.23*	0.19	.44***		
PCI Conventional	0.21	0.1	-0.14	-0.07	0.16	.31***	0.15	.25**	-0.15	.23*	.40***	
Cohesion	-0.07	-0.05	-0.12	0.14	0.09	0.03	-0.01	0.11	0.01	0.19	0.08	0.16
Conflict	0.02	0.17	0.18	0.004	0.01	-0.04	0.06	0.04	-0.03	-0.08	0.03	-0.05
Family Relations	-0.08	-0.12	-0.13	0.12	0.08	0.03	-0.04	0.04	0.04	0.21	0.05	0.1
Mother ONET R	-0.02	-0.08	-0.007	0.11	-0.07	-0.07	0.1	-0.1	0.14	0.07	0.02	-0.03
Mother ONET I	0.19	0.16	0.07	-0.11	-0.03	0.11	0.15	0.11	-0.08	-0.07	-0.02	-0.002
Mother ONET A	-0.005	0.05	-0.001	-0.1	-0.03	0.03	0.08	0.1	-0.02	0.003	0.05	0.02
Mother ONET S	-0.02	0.03	0.02	-0.05	-0.08	-0.01	0.04	0.06	0.05	0.01	0.08	-0.02
Mother ONET E	-0.05	0.006	0.06	-0.06	0.1	0.03	0.05	-0.02	-0.12	-0.12	-0.06	-0.02
Mother ONET C	-0.01	-0.05	-0.06	0.04	0.1	0.02	0.04	-0.04	-0.04	-0.0005	-0.03	0.08
Father ONET R	-0.11	-0.1	-0.004	0.14	-0.07	-0.13	0.11	-0.06	-0.002	0.06	-0.03	0.03
Father ONET I	-0.006	0.1	0.18	0.11	0.17	0.02	-0.05	0.05	0.1	0.06	0.2	0.1
Father ONET A	0.03	0.11	0.01	0.03	0.1	0.05	-0.19	0.11	0.04	0.12	0.18	0.16
Father ONET S	0.19	0.1	0.02	-0.005	0.11	0.21	-0.1	0.04	0.006	-0.03	0.08	0.01
Father ONET E	0.04	0.07	0.03	-0.09	-0.01	0.04	-0.13	0.04	-0.06	-0.03	-0.13	-0.1
Father ONET C	-0.003	-0.06	-0.04	-0.17	-0.1	-0.02	-0.14	-0.04	-0.01	-0.09	-0.09	-0.07

Notes: *$p < .05$, **$p < .005$, ***$p < .001$

Table 2 (Continued). *Intercorrelations of Study Variables*

Variable	13	14	15	16	17	18	19	20	21	22	23	24	25	26
PGI Realistic														
PGI Investigative														
PGI Artistic														
PGI Social														
PGI Enterprising														
PGI Conventional														
PCI Realistic														
PCI Investigative														
PCI Artistic														
PCI Social														
PCI Enterprising														
PCI Conventional														
Cohesion														
Conflict	-.45***													
Family Relations	.85***	-.73***												
Mother ONET R	0.03	-0.05	0.04											
Mother ONET I	-0.02	-0.02	-0.01	0.12										
Mother ONET A	0.03	0.002	0.05	-.33***	.36***									
Mother ONET S	0.06	-0.07	0.09	-0.1	.34***	.71***								
Mother ONET E	0.02	0.04	0.02	-.47***	-.52***	-.37***	-.41***							
Mother ONET C	-0.08	0.05	-0.12	-.24**	-.59***	-.65***	-.69***	.50***						
Father ONET R	0.03	5E-04	0.04	.3***	-0.03	-0.12	-0.07	-0.13	-0.03					
Father ONET I	-0.01	0.1	-0.04	0.07	0.22	-0.02	0.05	-0.08	-0.1	0.12				
Father ONET A	0.009	0.05	-0.01	-0.22	0.05	0.18	0.12	0.02	-0.02	-.27***	.22*			
Father ONET S	-0.04	-0.07	-0.02	-0.17	0.13	0.07	0.15	-0.03	-0.02	-.53***	0.14	.34***		
Father ONET E	0.03	0.007	0.03	-0.22	-0.007	0.08	0.01	0.16	0.006	-.59***	-.43***	-0.09	0.05	
Father ONET C	-0.02	-0.03	-0.03	-0.03	-0.09	-0.14	-0.02	0.07	0.11	-0.2	-.28***	-.52***	-.26**	.29***

Notes: *$p < .05$, **$p < .005$, ***$p < .001$

CHAPTER 3: RESULTS

ADCE Model Results

First, I normalized the parental occupation information variables to range from 0 to 1. This scaling allows coefficients for the occupation variables to be interpreted as reflecting the difference between an occupation that strongly supports the interest dimension to one that strongly frustrates the interest dimension. I centered the sex variable for the twins around 0 with men being categorized as −0.5 and women being categorized as +0.5. This coding aided interpretation in interaction models; in these models, the estimated slope for a predictor reflects the mean slope across genders, and the slope for the interaction terms reflects the difference in slopes across genders. Additionally, the child interest variables were standardized before running the analyses.

ADCE Variance Decomposition

After cleaning and manipulating the variables, I estimated ACE, ADE, and AE models separately for each interest variable. For all variables, the AE model showed the best fit in terms of AIC and valid solutions, so this model was retained.

Variance decomposition results for AE models can be seen in Table 3. In general, the additive genetic effects (A) accounted for 22% to 46% of the variance in twin's interest scores with Investigative showing the lowest values and Social showing the highest. The unique environmental effects (E) represented a larger portion of the variance explained with the lowest

interest category, Social, attributing 54% of its variance to this aspect and the highest interest category, Investigative, attributing 78% of its variance to this aspect.

Table 3. *AE Variance Decomposition Results for Child Career Interests*

	A	95% CI	E	95% CI
R	0.329	[.087, .542]	0.671	[.458, .913]
I	0.218	[.000, .492]	0.782	[.508, 1.00]
A	0.416	[.175, .605]	0.584	[.392, .825]
S	0.456	[.204, .646]	0.544	[.354, .796]
E	0.381	[.127, .583]	0.619	[.417, .873]
C	0.269	[.034, .474]	0.731	[.526, .966]

Hypothesis 1

Main Effects of Parental Occupation

Next, I estimated models including the measured RIASEC occupational characteristic for both mother and father occupations. The results of these analyses can be found in Table 4. All models produced valid variance components indicating a lack of model misspecification. Results of this analysis did not support Hypothesis 1. Mother's occupations high in Realistic, β = -.091; 95% CI = [-.591, .414], Investigative, β = .436; 95% CI = [-.028, .898], Artistic, β = .091; 95% CI = [-.552, .741], Social, β = -.174; 95% CI = [-.597, .245], Enterprising, β = .096; 95% CI = [-.498, .691], and Conventional, β = -.202; 95% CI = [-.318, .727], interests showed no clear positive relationship with their child's career interests of the same category. The same null result was found for father's occupations high in Realistic, β = -.285; 95% CI = [-.702, .131], Investigative, β = .056; 95% CI = [-.418, .523], Artistic, β = .169; 95% CI = [-.584, .926], Social,

β = -.203; 95% CI = [-.644, .243], Enterprising, β = -.190; 95% CI = [-.641, .258], and Conventional, β = -.568; 95% CI = [-1.17, .025], interests.

There was not a clear positive relationship between parental occupation characteristics and child career interests as hypothesized. Many of the confidence intervals for these analyses spanned a wide range of values. For example, the true effect of a father having a highly Investigative job on the Investigative interest development of their child could be moderate negative effect, or a moderate positive effect. As such, when interpreting these confidence intervals, I cannot be certain about the size or direction of the true effect of parental occupations on their children's career interests.

Table 4. *AE Variance Decomposition Results testing the relationship between parents' occupational interest characteristics predicting their child's career interests*

	Mother Occ	95% CI	Father Occ	95% CI
R	-0.091	[-.591, .414]	-0.285	[-.702, .131]
I	0.436	[-0.028, .898]	0.056	[-.418, .523]
A	0.091	[-.552, .741]	0.169	[-.584, .926]
S	-0.174	[-.597, .245]	-0.203	[-.644, .243]
E	0.096	[-.498, .691]	-0.190	[-.641, .258]
C	0.202	[-.318, .727]	-0.568	[-1.17, .025]

*Note: Mother/Father Occ represents the O*NET RIASEC classifications for the mother and father's reported occupation*

Hypothesis 2

Moderation by Family Cohesion

To test Hypothesis 2, I estimated the above models once again while including one of the proposed family climate variables as a moderator in the model at a time. The first variable, family Cohesion, was expected to positively moderate the relationship between parental occupation characteristics on child career interests such that the interests of children in highly cohesive environments will be more likely to reflect their parent's occupational characteristics. Results for these analyses also did not fully support Hypothesis 2. Much like the previous analyses, the variance estimates across all six interest dimensions did not show a specific pattern of results. Given the width of the intervals around the estimated moderation effects a clear conclusion cannot be drawn. The true effect of cohesion on the relationship between parental occupation characteristics and child career interests was suggested to range between a moderate negative to a moderate positive effect. As such no support was found for the moderating effect of cohesion on the relationship between parent occupation and child career interests.

Table 5. *AE variance decomposition results for the moderating effect of cohesion on the relationship between mother's occupational characteristics predicting child career interests.*

	Occ	95% CI	Cohesion	95% CI	OccxCohesion	95% CI
R	-0.053	[-.603, .503]	0.005	[-.182, 193]	0.326	[-.363, 1.02]
I	0.435	[-.047, .915]	-0.055	[-.226, .122]	0.134	[-.33, .591]
A	0.157	[-.503, .825]	-0.055	[-.227, .117]	-0.009	[-.651, .633]
S	-0.259	[-.692, .17]	0.050	[-.149, .251]	0.037	[-.395, .47]
E	0.212	[-.395, .821]	0.008	[-.179, .193]	-0.407	[-.96, .145]
C	0.150	[-.385, .692]	0.114	[-.094, .322]	-0.267	[-.765, .231]

	Simple Slopes			
	Cohesion -1 SD	95% CI	Cohesion +1 SD	95% CI
R	-0.380	[-1.399, .639]	0.280	[-.426, .986]
I	0.300	[-.335, .955]	0.560	[-.101, 1.22]
A	0.170	[-.742, 1.08]	0.150	[-.767, 1.07]
S	-0.300	[-.919, .319]	-0.220	[-.812, .372]
E	0.620	[-.208, 1.45]	-0.200	[-.999, .599]
C	0.420	[-.293, 1.13]	-0.120	[-.861, .621]

Table 6. *AE variance decomposition results for the moderating effect of cohesion on the relationship between father's occupational characteristics predicting child career interests.*

	Occ	95% CI	Cohesion	95% CI	OccxCohesion	95% CI
R	-0.246	[-.676, .183]	-0.031	[-.179, .117]	0.015	[-.423, .457]
I	0.163	[-.329, .645]	-0.005	[-.165, .162]	-0.166	[-.695, .361]
A	0.166	[-.635, .972]	0.095	[-.098, .29]	0.560	[-.194, 1.313]
S	-0.199	[-.67, .277]	0.155	[0, .311]	-0.175	[-.581, .229]
E	-0.096	[-.578, .381]	-0.039	[-.255, .176]	0.065	[-.438, .571]
C	-0.518	[-1.145, .096]	0.025	[-.196, .246]	0.086	[-.569, .738]

Simple Slopes

	Cohesion -1 SD	95% CI	Cohesion +1 SD	95% CI
R	-0.260	[-.904, .384]	-0.240	[-.812, .332]
I	0.330	[-.388, 1.048]	-0.010	[-.0713, .693]
A	-0.390	[-1.51, .72]	0.730	[-.336, 1.796]
S	-0.020	[-.599, .559]	-0.380	[-1.04, .275]
E	-0.170	[-.924, .584]	-0.030	[-.651, .591]
C	-0.610	[-1.513, .294]	-0.430	[-1.31, .449]

Moderation by Family Conflict

I predicted children who rate their family conflict as high will be less likely to have interests that match their parent's occupations. This hypothesis was supported for two interest dimensions. When looking at the influence of conflict on the relationship between a mother's occupation's Realistic score and her children's Realistic interests, there did seems to be a significant interaction between the occupation and conflict, β = -.594, 95% CI = [-1.087, -.101]. Looking at the simple slopes for those reporting high and low conflict, it appears that those reporting low conflict, as categorized by scores 1 standard deviation below the mean, β = .49, 95% CI = [-.148, 1.13] were much more likely to be influenced by their parent's occupation than those who reported high conflict, as categorized by scores one standard deviation above the mean, β = -.46, 95% CI = [-1.468, .088]. Although the wide confidence interval precludes strong conclusions about the size of the interaction effect, there is evidence for a negative interaction.

A similar significant effect was found when looking at the interaction between the father's occupation's Artistic score and the reported Conflict on his children's Artistic interests, β = -1.052, 95% CI = [-1.875, -.228]. When looking at the simple slopes it appears that individuals who reported low conflict, β = 1.33, 95% CI = [.128, 2.53], were much more likely to take on social aspects from their father's occupation than those who reported high conflict, β = -.77, 95% CI = [-1.824, .284]. Again, the wide confidence intervals surrounding the interaction effect suggests an uncertainty about the size of the true effect of conflict on this relationship. However, the results suggest the direction of the relationship is negative.

Table 7. *AE variance decomposition results for the moderating effect of conflict on the relationship between mother's occupational characteristics predicting child career interests.*

	Occ	95% CI	Conflict	95% CI	OccxConflict	95% CI
R	-0.096	[-.616, .426]	-0.019	[-.171, .132]	-0.594	[-1.087, -.101]
I	0.425	[-.054, .902]	0.151	[-.10, .312]	-0.066	[-.536, .405]
A	0.142	[-.518, .809]	0.078	[-.093, .248]	-0.058	[-.705, .588]
S	-0.258	[-.686, .166]	0.039	[-.161, .238]	-0.230	[-.676, .221]
E	0.288	[-.327, .901]	-0.012	[-.184, .160]	0.427	[-.167, 1.017]
C	0.155	[-.383, .698]	-0.007	[-.203, .189]	0.010	[-.522, .543]

Simple Slopes

	Conflict -1 SD	95% CI	Conflict +1 SD	95% CI
R	0.490	[-.148, 1.13]	-0.690	[-1.468, .088]
I	0.500	[-.154, 1.154]	0.360	[-.314, 1.034]
A	0.200	[-.736, .1.136]	0.080	[-.817, .977]
S	-0.030	[-.628, .568]	-0.490	[-1.117, .137]
E	-0.140	[-.899, .619]	0.720	[-.204, 1.644]
C	0.140	[-.629, .909]	0.160	[-.574, .894]

Table 8. *AE variance decomposition results for the moderating effect of conflict on the relationship between father's occupational characteristics predicting child career interests.*

	Occ	95% CI	Conflict	95% CI	OccxConflict	95% CI
R	-0.269	[-.698, .16]	0.007	[-.142, .156]	-0.191	[-.615, .230]
I	0.133	[-.346, .606]	0.140	[-.012, .29]	0.107	[-.401, .615]
A	0.284	[-.501, 1.072]	-0.042	[-.240, .155]	-1.052	[-1.875, -.228]
S	-0.215	[-.684, .257]	-0.060	[-.206, .086]	-0.155	[-.574, .264]
E	-0.062	[-.535, .408]	-0.107	[-.313, .098]	0.350	[-.117, .82]
C	-0.597	[1.22, .015]	0.162	[-.07, .395]	-0.705	[-1.438, .028]

Simple Slopes

	Conflict -1 SD	95% CI	Conflict +1 SD	95% CI
R	-0.080	[-.661, .5006]	-0.460	[-1.072, .152]
I	0.020	[-.678, .718]	0.240	[-.439, .919]
A	1.330	[0.128, 2.531]	-0.770	[-1.824, .284]
S	-0.050	[-.673, .573]	-0.370	[-.995, .255]
E	-0.410	[-1.049, .229]	0.290	[-.389, .969]
C	0.100	[-.782, .982]	-1.300	[-2.31, -.29]

Moderation by Family Relations

The final interaction proposed by Hypothesis 2 expected a positive composite Family Relations variable to moderate the relationship between Parental Occupational Characteristics and child career interests such that participants reporting higher family relations would have career interests that more closely resembled their parent's occupation characteristics. This portion of hypothesis 2 was not supported. The range of possible values across all six interest categories for both parental occupations is too large to make clear conclusions about the moderating effect of composite Family Relations. The confidence intervals around the estimates suggest no clear understanding as the true effect could be either negative or positive and range in strength from very weak to very strong. The final proposed moderation in hypothesis two was not supported.

While there does seem to be evidence for negative effects in two cases, one should interpret these results with caution. Out of the total 36 interaction effects tested in this scenario only two were significant. Therefore, it is possible that the significant effects found for this moderation analysis were due to the greater chance of Type 1 errors when conducting multiple analyses. In general, the results indicate only weak support for hypothesis 2.

Table 9. *AE variance decomposition results for the moderating effect of family relations on the relationship between mother's occupational characteristics predicting child career interests.*

	Occ	95% CI	Relation	95% CI	OccxRelation	95% CI
R	-0.119	[-.653, .42]	0.008	[-.159, .176]	0.540	[-.016, 1.097]
I	0.421	[-.065, .902]	-0.117	[-.287, .052]	0.219	[-.242, .678]
A	0.161	[-.5, .829]	-0.054	[-.225, .116]	0.023	[-.602, .648]
S	-0.253	[-.686, .178]	0.068	[-.417, .425]	0.003	[-.417, .425]
E	0.269	[-.341, .882]	0.068	[-.109, .243]	-0.436	[-1.013, .144]
C	0.149	[-.385, .69]	0.107	[-.094, .308]	-0.283	[-.786, .219]

Simple Slopes

	Relation -1 SD	95% CI	Relation +1 SD	95% CI
R	-0.660	[-1.537, .217]	0.420	[-.217, 1.057]
I	0.200	[-.459, .859]	0.640	[-.0195, 1.299]
A	0.140	[-.781, 1.061]	0.180	[-.705, 1.065]
S	-0.250	[-.867, .367]	-0.250	[-.826, .326]
E	0.710	[-.185, 1.605]	-0.170	[-.938, .598]
C	0.430	[-.284, 1.143]	-0.130	[-.895, .615]

Table 10. *AE variance decomposition results for the moderating effect of family relations on the relationship between father's occupational characteristics predicting child career interests.*

	Occ	95% CI	Relation	95% CI	OccxRelation	95% CI
R	-0.257	[-.688, .174]	-0.054	[-.202, .095]	0.181	[-.256, .622]
I	0.147	[-.342, .627]	-0.074	[-.231, .083]	-0.132	[-.674, .409]
A	0.135	[-.658, .938]	0.073	[-.118, .263]	0.828	[.093, 1.564]
S	-0.165	[-.633, .310]	0.125	[-.031, .281]	0.069	[-.34, .479]
E	-0.075	[-.551, .397]	0.056	[-.165, .276]	-0.067	[-.563, .43]
C	-0.518	[-1.143, .097]	-0.010	[-.237, .217]	0.126	[-.55, .809]
			Simple Slopes			
			Relation -1 SD	95% CI	Relation +1 SD	95% CI
R			-0.440	[-1.085, .205]	-0.080	[-.652, .492]
I			0.280	[-.429, .989]	0.020	[-.704, .744]
A			-0.700	[-1.8, .4]	0.960	[-.084, 2.0]
S			-0.230	[-.813, .353]	-0.090	[-.742, .562]
E			-0.010	[-.739, .719]	-0.150	[-.779, .479]
C			-0.650	[-1.582, .281]	-0.390	[-1.28, .501]

Supplemental Analyses

Sex-Dependent Effects of Parental Occupation

In addition to the proposed analyses, I explored the interaction between sex and parental occupation to understand if there were sex-dependent effects on how children developed their interests from their parents. Previous research has shown that certain interests like Realistic interests have sex-dependent relationships such that mothers have a greater effect on their daughters' Realistic interests and fathers have a greater effect on their sons' Realistic interests (Wong et al., 2011). If sex does influence the way children take on career related interest information from their parent's occupation, I would expect to see women to have larger positive relationships between their interests and their mother's parental occupation scores than their father's parental occupation scores. A similar result is expected for the male participants and their father's occupation scores.

Results of these exploratory analyses yielded similarly vague results with no clear pattern for either sex. The confidence intervals across all interest categories ranged from suggesting a moderate negative true effect to a moderate positive true effect. There is not clear evidence from these results that children develop career interests that are more similar to the interest profile of the occupation of their parent of the same sex.

Table 11. *AE variance decomposition results for the moderating effect of sex on the relationship between mother's occupational characteristics predicting child career interests.*

	Occ	95% CI	OccxSex	95% CI
R	-0.232	[-.763, .303]	0.793	[-.222, 1.806]
I	0.469	[-0.014, .952]	-0.228	[-1.155, .699]
A	-0.121	[-.801, .561]	1.199	[-.116, 2.518]
S	-0.170	[-.611, .267]	-0.028	[-.856, .801]
E	0.208	[-.419, .836]	-0.672	[-1.858, .511]
C	0.267	[-.274, .815]	-0.420	[-1.478, .647]
	Simple Slopes			
	Male	95% CI	Female	95% CI
R	-0.625	[-1.47, .218]	0.793	[-.222, 1.806]
I	0.585	[-.166, 1.34]	0.355	[-.205, .915]
A	-0.720	[-1.807, .367]	0.480	[-.282, 1.242]
S	-0.155	[-.828, .518]	-0.185	[-.695, .325]
E	0.545	[-.435, 1.525]	-0.125	[-.832, .582]
C	0.480	[-.381, 1.341]	0.060	[-.569, .689]

Table 12. *AE variance decomposition results for the moderating effect of sex on the relationship between father's occupational characteristics predicting child career interests.*

	Occ	95% CI	OccxSex	95% CI
R	-0.304	[-.751, .145]	0.099	[-.789, .982]
I	0.042	[-.436, .513]	0.203	[-.715, 1.129]
A	0.174	[-.606, .951]	-0.041	[-1.519, 1.441]
S	-0.241	[-.694, .214]	0.334	[-.552, 1.219]
E	-0.253	[-.719,.211]	0.459	[-.445, 1.362]
C	-0.560	[-1.176, .047]	-0.069	[-1.237, 1.102]
	Simple Slopes			
	Male	95% CI	Female	95% CI
R	-0.350	[-1.085, .385]	-0.250	[-.742, .242]
I	-0.060	[-.755, .635]	0.140	[-.469, .749]
A	0.190	[-.998, 1.379]	0.150	[-.772, 1.072]
S	-0.405	[-1.1, .29]	-0.075	[-.628, .478]
E	-0.480	[-1.2, .243]	-0.020	[-.571, 531]
C	-0.525	[-1.44, .399]	-0.595	[-1.34, .147]

Cross-Domain Predictions

The main analyses of this study focused on the impact a single interest characteristic of a mother or father's occupation has on the development of that same interest in their child. While no clear support was found for this relationship, it could be possible that a parent's occupational characteristics influence their children's career interests more broadly rather than in a direct interest to interest path (C. W. Bates, 2015). A child may see their parent struggle in a highly Realistic job role and then develop interests in different types of work due to the pressure they see their parent deal with in that occupation.

To assess the possibility of cross-trait influences, I reran the original parent occupation ADCE model predicting children's interests, but this time I included each parental occupation interest category instead of just the corresponding one. The results of this analysis found similar results to the other analyses in this project such that the intervals around the effect provided little support for a particular direction or size for many of the effects.

Of these results, two significant results were found for mothers in highly Investigative occupations. There was a significant effect in predicting children's Realistic interests, $\beta = .586$; 95% CI = [.158, 1.01], and Social interests, $\beta = .48$; 95% CI = [-.916, -.05]. In both cases the intervals provide support for the directionality of these effects: a positive influence for Realistic and a negative influence for Social. The intervals for both effects are large enough that no real inference can be made about the size of the effect as it could range from a small effect to a large effect in both cases. No other mother occupational interest category showed significant results.

Table 13. *AE variance decomposition results testing the effect of all occupation interest categories of mother's occupations in predicting child career interest*

	R	95% CI	I	95% CI	A	95% CI	S	95% CI	E	95% CI	C	95% CI
R	-.09	[-.59, .41]	.59	[.16, 1.01]	.20	[-.40, .80]	-.13	[-.58, .31]	-.14	[-.69, .41]	-.09	[-.60, .41]
I	-.25	[-.78, .29]	.44	[-.03, .90]	.23	[-.42, .87]	.20	[-.26, .67]	.082	[-.52, .67]	-.32	[-.88, .22]
A	.09	[-.55, .74]	.14	[-.33, .61]	.09	[-.55, .74]	.02	[-.44, .49]	.30	[-.29, .89]	-.18	[-.74, .36]
S	.21	[-.28, .70]	-.48	[-.92, -.05]	-.31	[-.89, .27]	-.17	[-.60, .25]	-.23	[-.76, .32]	.24	[-.25, .72]
E	.10	[-.44, .65]	.09	[-.39, .56]	-.15	[-.81, .50]	-.35	[-.83, .12]	.10	[-.50, .69]	.30	[-.24, .85]
C	-.06	[-.58, .46]	.33	[-.12, .78]	-.12	[-.75, .50]	-.23	[-.68, .22]	.22	[-.35, .78]	.20	[-.32, .73]

When predicting across different interest categories, five significant results were found for different aspect of a father's occupational characteristics. Fathers in highly Realistic jobs significantly positively influenced their children's Social career interests, **β** = .561; 95% CI = [.137, .978] and negatively influenced their children's Investigative career interests, **β** = -.456; 95% CI = [-.891, -.018]. Likewise, those who held highly Investigative, **β** = .497; 95% CI = [.001, .992], and Artistic, **β** = .957; 95% CI = [.206, 1.71], occupations significantly positively influenced their children's Enterprising interests. Fathers in highly Social jobs significantly influenced two different interest categories in their children: Realistic, **β** = .551; 95% CI = [.133, .970], and Conventional **β** = .563; 95% CI = [.126, 1.002]. All but one of the significant relationships suggest that the true effect of these occupational categories in developing children's career interest are positive. The one negative significant result was found between fathers in Realistic occupations and their children's interest in Investigative careers. However, the wide intervals do not allow for a precise understanding of the size of the effect. Again, caution should be used when interpreting these results as the significant results could be due to the Type 1 error associated with such large sets analyses.

Table 14. *AE variance decomposition results testing the effect of all occupation interest categories of father's occupations in predicting child career interest*

	R	95% CI	I	95% CI	A	95% CI	S	95% CI	E	95% CI	C	95% CI
R	-.29	[-.70, .13]	-.11	[-.56, .33]	.57	[-.09, 1.24]	.55	[.13, .97]	-.02	[-.42, .38]	-.36	[-.93, .21]
I	-.46	[-.89, -.02]	.06	[-.42, .52]	.54	[-.17, 1.25]	.26	[-.19, .72]	.32	[-.09, .74]	-.11	[-.74, .50]
A	.29	[-.17, .77]	.42	[-.08, .91]	.17	[-.58, .93]	-.33	[-.82, .15]	-.08	[-.52, .37]	-.28	[-.91, .37]
S	.56	[.14, .98]	.32	[-.14, .77]	.43	[-.27, 1.1]	-.20	[-.64, .24]	-.38	[-.78, .03]	-.56	[-1.13, .026]
E	-.06	[-.54, .41]	.50	[.001, .99]	.96	[.21, 1.71]	.28	[-.20, .78]	-.19	[-.64, .26]	-.45	[-1.09, .19]
C	-.16	[-.60, .28]	.04	[-.42, .50]	.67	[-.03, 1.36]	.56	[.13, 1.002]	-.054	[-.47, .36]	-.57	[-1.17, .025]

Multilevel Analyses

Due to the large amount of power needed to run ADCE variance decomposition models, and the lack of power afforded by my sample, I also ran the occupational model using a multilevel modeling approach. This approach allows me to estimate the relationships between child career interests and our variables of interest based on membership in a specific zygosity category but loosens some of the power requirements. This approach may resolve some of the unclear patterns of results in my study due to lack of power.

The results of these multilevel analyses were extremely similar to the results of the variance decomposition models. Most of the estimates remained within the same range of values predicted by the original ADCE variance decomposition method. In one case, Mother's Investigative occupational characteristics predicting her children's investigative interests, the confidence interval tightened to indicate a direction of effect, $\beta = .43$ [.04, .81]. However, the lower bound of this confidence interval represents a near zero effect meaning interpretation of this result as significantly different than the previously found null result should be used sparingly. Results for the moderation analyses using multilevel modeling can be found in Appendix B.

Table 15. *Multilevel model results testing the effect of parent occupation interest categorization on child career interests*

	Mother Occ	CI	Father Occ	CI
R	-0.050	[-.450, .360]	-0.16	[-.480, .160]
I	0.430	[.040, .810]	0.25	[-.170, .660]
A	-0.010	[-.540, .510]	-0.01	[-.050, .963]
S	-0.140	[-.480, .20]	0.12	[-.220, .470]
E	0.250	[-.220, .240]	-0.09	[-.470, .290]
C	0.170	[-.250, .730]	-0.13	[-.590, .330]

Occupation Models with Position Classification Inventory

The PCI is a measure of career fit which indicates how much an individual feels their interests matches the interest profile of their job. In the case of this sample, who would be just entering their early career at the time of data collection, this measure would be a less accurate indicator of career interests as many of the participants may still be in entry level positions instead of established in their desired career. However, they were included to assess the match between individual's careers and their parents.

The results of this analysis mirror those of the other analyses done in this paper with unclear effects across interest categories and wide confidence intervals that do not give a clear indication of effect size or direction. Results of the moderation analyses using PCI can be found in Appendix A.

Table 16. *AE Variance Decomposition testing the effect of parent occupation interest categorization on child occupation interest congruence*

	Mother Occ	95% CI	Father Occ	95% CI
R	0.303	[-.268, .882]	0.258	[-.235, .750]
I	0.526	[.051, 1.006]	0.159	[-.328, .641]
A	-0.245	[-.957, .465]	0.037	[-.758, .465]
S	0.006	[-.490, .495]	-0.170	[-.622, .287]
E	-0.558	[-1.173, .070]	-0.730	[-1.16, -.031]
C	0.383	[-.134, .919]	-0.506	[-1.07, .059]

CHAPTER 4: DISCUSSION

Overall, the results of the various models failed to support the hypothesized relationships between parental occupation characteristics and child career interests. Hypothesis 1 posited there would be a positive relationship between parental occupation characteristics and the career interests of their children across all six RIASEC dimensions. The results of this analysis indicated no clear relationship between parental occupation characteristics and child career interests. In some cases, the effects were in the opposite of the hypothesized direction (e.g. mothers with highly Realistic and Social occupations negatively predicting their children's scores in those same interest categories). In all cases, the confidence intervals for the estimated effects were wide enough to fail to specify the direction or size of the true effect for these relationships.

In addition, I did not find conclusive support for Hypothesis 2 which expected familial Cohesion and composite Family Relations to positively moderate the relationship between parental occupation characteristics and child career interests and for familial Conflict to negatively moderate that relationship. Overall, the results failed to provide a specific pattern for the relationship between these variables with most of the confidence intervals indicating a wide range of possible true effect size values in both positive and negative directions.

There were two notable exceptions to this pattern as the interaction between reported family conflict and parental occupation characteristics. Mothers in highly Realistic occupations and fathers in highly Artistic occupations did have significant results in the hypothesized directions. These results suggest that children who reported being low in family conflict were

more likely to have interests that matched their parent occupation in these categories than those children who reported having higher family conflict. However, due to the large number of analyses present in these studies, there is an increased risk of Type 1 error in my results. As such these significant findings should be interpreted with caution.

Supplemental analyses were performed to examine some possible explanations for the lack of results in the main analyses. When comparing within sexes, no clear results were found suggesting that children's interests match the interest characteristics of their parent of the same sex. The potential explanation that there were sex dependent effects in the dataset was not supported.

Additional supplemental analyses testing if parental occupation interest characteristics influenced the development of their children's interests in other categories were also posited as a supplement to the main analyses of direct interest prediction. These analyses showed more significant results than the main analyses indicating that mothers in highly Investigative occupations had children with higher Realistic and lower Social interests. The occupational interest categories of the father's jobs in this sample showed a range of positive effects. Fathers with highly Realistic jobs had children with higher Social interests, fathers with highly Investigative and Artistic jobs had children with higher Enterprising interests, and fathers with highly Artistic jobs had children with higher Realistic and Social interests. The issue of non-specific confidence intervals remained in these analyses such that the true effect size was expected to range from a small to a large effect, but the direction of these effects remained clear.

The supplemental multilevel analyses conducted to address power related issues in the sample supplied results nearly identical to the results of the ADCE variance decomposition models. As such, the results from the ADCE models were used as the main basis for

interpretation since the difference between estimation methods was negligible. Additionally, the analyses which used a measure of child occupation interest categorization, the PCI, did not show significantly different results when compared to the analyses using a direct measure of twins' interests, the PGI.

The failure to find a significant influence of a measured environmental variable on a known genetic effect is not uncommon in the literature. Various twin studies on the heritability of cognitive ability that attempted to control for SES status in a method similar to the one I used in this paper failed to find significant interaction effects (T. C. Bates et al., 2016; Figlio et al., 2017; Grasby et al., 2019). These researchers conclude that there is no clear relationship between the environmental and genetic effects on their specific outcome indicating a need for deeper investigation into the properties that lead to the cognitive ability differences seen in some studies. Similarly, it appears that the relationship between genetic career interest similarity and parental occupation influence is not as clear cut.

The results of this study also replicate a finding from Bates et al. (2016) for a large significant effect of the unique environmental factors (E). In this study, I found large portions of the variance in twin interests due to the unique environment while the common environmental factors (C) did not improve the estimated model fit. The large amount of variance associated with unique environmental factors suggests there may be factors other than parental occupation that are more important for the development of twin interests. In this case, it may not be the twins' shared environment that supports their career growth as much as the unique experiences of each twin in regards to the barriers and benefits in the development of their self-efficacy beliefs (Lent et al., 1994). Experiences such as specific job-relevant task exposure and support for career decisions may not be shared among twins. In these cases, the unique career-relevant

experiences are the driving factor in their career interest development rather than the exposure to their parent's occupation.

The lack of clear findings for the interaction between family environment characteristics and career interest contradicts previous research suggesting that family environment does significantly influence the career interest development of children (Leong et al., 2004; McKenzie, 1982; Wong et al., 2011). One possible explanation for the discrepancy between the current study and previous work looking at these variables could be in the mechanism through which family environmental variables influence a child's self-efficacy beliefs. In this study, I measured family climate variables that would indicate the extent to which children would view their parent's as a similar other (Lent et al., 1994). In other studies, it was not the relationship between parents and children that predicted self-efficacy improvement, but specific behaviors parents enacted (Paloş & Drobot, 2010). This would suggest that parent's do not influence their children's career interests through acting as similar others but by providing career benefits and support in career decision making. In this case, a better family environment moderator would be the types of proactive career behaviors parents engage in with their children rather than the family environment.

The results of the cross-domain analyses comparing mother's occupational interest characteristics to their children's interests is consistent with the RIASEC theoretical model (Holland, 1997). Interests which are closer to each other in the hexagonal structure like Realistic and Investigative are more closely related than those on opposite ends of the hexagon like Realistic and Social (De Fruyt & Mervielde, 1999). As such, the finding that mothers in highly Investigative occupations were related with higher Realistic interest scores and lower Social

interest scores in their children supported the idea of adjacent and alternate traits in this theoretical framework.

While the cross-domain results for the mother's occupational categories suggested that children aligned themselves with their mother's occupational characteristics according to their similarity, the results for the father's occupation suggested children's aligned themselves in interest categories that are opposite in the RIASEC hexagonal structure (Holland, 1997). It appears that fathers' occupations had an effect that pushed their children's interests into opposite categories. One possible reason for this discrepancy could be in how children use the information they garner about their parent's occupation. Parents provide both barriers and benefits to the development of their children's self-efficacy beliefs which ultimately influence the types of activities they find interesting (Lent et al., 1994). A parent who comes home complaining about the hard manual labor they have to do in their job may influence the career efficacy beliefs of their child in the opposite direction where the child now feels they would be better suited for a more interactive social career. An additional explanation for why father's occupational interest categories reflected opposite RIASEC interest categories while mother's reflected adjacent categories could be that parents differ in the types of occupational information they provide to their children at home. Fathers may encourage their children to seek out skills that are dissimilar to their own thus encouraging their children to move into fields with opposite interests. Future research on the different methods parents use to discuss their occupations in the home could provide further insight into this finding.

Additionally, the results point towards occupational information not being the most clear indicator of child interest development. Previous research found that children pick up on job-related information from their parents' discussions of their jobs at home (Piotrkowski & Stark,

1987). The current findings suggest that parental occupation information alone may be too broad to have a direct influence on the career interests of their children. Other job-related characteristics may be more central to parents sharing job-related information. The heterogeneity in parental job satisfaction may be a better proxy for the types of career relevant information parents share with their children. A parent who is highly satisfied in their job will probably boast about their occupation which would benefit their children's self-efficacy beliefs regarding that career. The opposite side of this would be a highly unsatisfied parent complaining about their job which would serve as a barrier to their children's self-efficacy belief development. Future research should take into account other aspects of the parent's relationship with their occupation to further investigate how occupational information is transferred from parent to child.

Within the career interest literature broadly there is not a clear consensus on the effect of sex differences on the influence parents have in their children's career interest development. Support for gender effects has been found in the past but was limited in the types of interest categories that showed a gender effect and those that did not. Wong et al. (2011) found gender effects for Realistic and Investigative interests such that mothers high on the trait had daughters similarly high but not sons. The same relationship was also found for these two traits between fathers and their sons. In this case, the results were limited to two specific traits and, similarly to the current study, other interest categories showed no significant gender differences. One explanation for the null findings of gender effects in this study could be that occupational characteristic information is not what children are picking up from their parent's occupation. In one case, researchers found that the nontraditionally of a mother's career influenced the traditionality of her children's interests (Barak et al., 1991). This could mean that it is not the specific interest category of the parent's occupation that influences their children's career

interest, but the greater social role the occupation holds. If true, this is a possible explanation for why the null effect found when analyzing the relationship between parental occupation interest information and child career interests as moderated by gender.

This study utilized a sample of young adults in their late teens to mid-twenties which represents a unique time in the relationship between children and their parents. Children at this age may be trying to distance themselves from their parents and create their own identity. As such this sample may represent a group of individuals who are expressly trying to avoid being similar to their parents. Conversely, this age range also represents a time when individuals are both in the working world, but still connected to their parent's in the home. As such, one might expect the influence of the family to be larger at this stage since individuals have not had as many career-related experiences themselves and thus still have to rely on the information they gather from their parents to understand what types of activities they find interesting. Research has shown that interests tend to stabilize earlier than other traits like personality (K. S. D. Low et al., 2005). This stability sees the greatest increase around the time of this sample's data collection: ages 18-21.9. Future research looking into how age influences the relationship between parental occupation and child career interests could help give a better explanation of how children use their parent's occupational information across their lives.

Theoretical and Practical Implications

This study adds to the career interest literature by evaluating the influence of a specific measured environmental variable on the career interest development of children. The study's use of a genetically informative sample was a new contribution to the field at large which normally assesses genetic career interest influences or environmental career interest influences, but not at the same time. As such, this study gives a clearer picture of how parent's occupational

characteristics influences the career interests of their children beyond the genetic commonalities between parents and children that naturally lead them to have similar career interests (Lykken et al., 1993). Other studies which look to understand the influence parents have on their children's career interest would benefit from a similar approach to help address some of the known heritability in career interests that would naturally influence any comparison between parents and children's interests

One important future direction this study suggests for the career interest literature is the need to better understand the mechanism through which parents influence their children's career interests. Previously it was thought that children viewing parents work or talking about their occupations was enough to pass on interests-related information from parents to children (Piotrkowski & Stark, 1987). The results of this paper suggest that children may not pick up career-related information just from viewing their parents' occupational information alone, and may require specific parental behaviors to boost their self-efficacy beliefs in certain fields (Paloş & Drobot, 2010). As such, this study suggests that there are limits to the ways individuals pick up career information from their parents.

From a practical perspective, this study provides career counselors with information about how to best assist individuals looking for careers. The results of this study suggest that the unique environmental experiences of individuals have the largest influence on the development of their career interests over being exposed to specific occupations through their parents. As such, when giving career advice, career counselors should focus on the unique aspects of their client rather than look for other sources of career interest information from their family backgrounds.

Limitations

This study had several limitations which could have led to the failure to find significant results. As such, the results of the study should be interpreted with caution. The largest limitation in this study is the sample size. Other twin studies looking at measured environmental variables had thousands of twins within their sample (T. C. Bates et al., 2016; Figlio et al., 2017). The types of analyses commonly used to test twin-related hypotheses are very power intensive requiring large sample sizes to ensure accurate modeling. While all models in this study were able to produce valid solutions, my sample of just a few hundred twins severely limits my power to find significant effects.

Additionally, the occupations of the parents in my sample were skewed such that some interest categories had non-normal distributions. For example, most of the mothers in this sample had occupations that were very low in the Realistic category with a majority of the sample having a score of one for that interest category before standardization. I attempted to address this limitation by standardizing the variables, but the lack of variability in my sample could influence my ability to find significant results for my first hypothesis.

Another limitation is that all the information provided in the study is from self-reports of the participants. As such, parental occupation information could be misclassified if the children in this study did not provide an inaccurate job title for their parents' occupations. The measurement of family climate is likewise limited to a single perspective in the family rather than corroborated from reports of multiple family members.

Future Directions

Despite the null findings of this study, the results still provide implications for future research on the impact parents have on their children's career interests. Specifically, this study

indicates a need for researchers to look at the exact mechanism through which parents influence the career choices of their children. It may be that simply providing career relevant information in the form of talking about their work at home is not enough as it has previously been hypothesized (Piotrkowski & Stark, 1987). Future studies should compare directed parental behaviors with non-direct behaviors to understand the unique impact each has on a child's career interest development.

In addition, this study highlights the importance of unique environmental influences on the career interest development of children. More research is needed to understand how the wide variety of unique career-relevant influences impact the interest development of children. While this study suggests parental occupation information may not be a good predictor of children's career interests, future research could address other aspects of a parent's job such as the prestige of the occupation to address if these other factors of parental occupation have an influence on a child developing career interests similar to the interest profile of their parents' occupation.

Finally, this study highlights the lack of clear understanding of the sex effects associated with career interest development. Future research should look into whether parents of different sexes are more or less likely to engage in career-related behaviors with their children of the same sex. Studies utilizing same-sex and opposite-sex parents could be useful in discerning the effect parents and children sharing sex categories has on child interest development. Another factor commonly theorized to lead to gender effects, but rarely tested is time spent with children as it is expected that mothers spend more time with their children due to the different societal pressures put on mothers and fathers. Future studies could be done to see if children's career interest profiles are more similar to the parent that spends the most time with them.

Conclusion

This project attempted to understand the unique effect a parent's occupation has on the career interest development of their children. Through the use of a genetically informative sample, no support was found for the hypothesis that parent's occupational interest categories would positively predict their children's career interests. This study only found very limited support for family environment moderating this relationship. Future research could benefit from taking the combined environmental and genetic approach of this study while addressing some of the limitations such as small sample size and limited variability in occupations.

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APPENDICES

Appendix A Variance decomposition results for the Position Classification Inventory

Table A1. *AE variance decomposition results for the moderating effect of cohesion on the relationship between mother's occupational characteristics predicting child occupation interest congruence.*

	Occ	95% CI	Cohesion	95% CI	OccxCohesion	95% CI
R	0.390	[-.243, 1.036]	0.059	[-.154, .273]	-0.164	[-.962, .63]
I	0.515	[.014, 1.024]	0.175	[-.007, .36]	0.098	[-.397, .587]
A	-0.271	[-.991, .44]	0.020	[-.173, .21]	-0.401	[-1.112, .305]
S	-0.058	[-.565, .446]	0.206	[-.047, .457]	0.001	[-.552, .556]
E	-0.733	[-1.049, .197]	0.041	[-.151, .232]	-0.365	[-.936, .206]
C	0.429	[-.123, .996]	0.151	[-.059, .36]	-0.323	[-.852, .206]

Simple Slopes

	Cohesion -1 SD	95% CI	Cohesion +1 SD	95% CI
R	0.550	[-.644, 1.744]	0.230	[-.559, 1.019]
I	0.420	[-.294, 1.13]	0.620	[-.063, 1.303]
A	0.130	[-.8802, 1.14]	-0.670	[-1.656, .316]
S	-0.060	[-.857, .737]	-0.060	[-.745, .625]
E	-0.070	[-.915, .775]	-0.790	[-1.619, .0391]
C	0.750	[-.0278, 1.528]	0.110	[-.637, .857]

Table A2. *AE variance decomposition results for the moderating effect of cohesion on the relationship between father's occupational characteristics predicting child occupation interest congruence*

	Occ	95% CI	Cohesion	95% CI	OccxCohesion	95% CI
R	0.198	[-.315, .707]	0.067	[-.101, .236]	-0.360	[-.889, .173]
I	0.183	[-.327, .689]	0.220	[.056, .387]	0.091	[-.459, .641]
A	-0.341	[-1.142, .46]	0.135	[-.067, .337]	-0.085	[-.899, .73]
S	-0.100	[-.548, .351]	0.262	[.103, .421]	0.105	[-.315, .519]
E	-0.634	[-1.094, -.175]	0.042	[-.17, .255]	-0.102	[-.606, .397]
C	-0.430	[-1.026, .166]	0.143	[-.079, .366]	-0.205	[-.854, .444]

Simple Slopes

	Cohesion -1 SD	95% CI	Cohesion +1 SD	95% CI
R	0.560	[-.232, 1.352]	-0.160	[-.819, .499]
I	0.090	[-.663, .843]	0.270	[-.458, .998]
A	-0.260	[-1.456, .936]	-0.420	[-.899, .730]
S	-0.210	[-.788, .368]	0.010	[-.622, .642]
E	-0.530	[-1.27, .209]	-0.730	[-1.334, -.126]
C	-0.230	[-1.125, .665]	-0.630	[-1.486, .226]

Table A3. *AE variance decomposition results for the moderating effect of conflict on the relationship between mother's occupational characteristics predicting child occupation interest congruence*

	Occ	95% CI	Conflict	95% CI	OccxConflict	95% CI
R	0.444	[-.14, 1.037]	0.001	[-.171, .172]	0.452	[-.121, 1.025]
I	0.433	[-.06, .932]	0.161	[-.009, .33]	-0.414	[-.911, .088]
A	-0.252	[-.968, .456]	-0.093	[-.279, .095]	-0.101	[-.799, .598]
S	-0.078	[-.548, .424]	-0.204	[-.449, .04]	0.011	[-.516, .536]
E	-0.346	[-.969, .286]	-0.041	[-.216, .133]	0.481	[-.141, 1.093]
C	0.415	[-.136, .985]	-0.044	[-.24, .155]	0.300	[-.259, .861]

Simple Slopes

	Conflict -1 SD	95% CI	Conflict +1 SD	95% CI
R	-0.010	[-.747, .727]	0.890	[.004, 1.776]
I	0.840	[.163, 1.517]	0.020	[-.697, .737]
A	-0.150	[-1.156, .856]	-0.350	[-1.321, .621]
S	-0.090	[-.788, .608]	-0.070	[-.814, .674]
E	-0.830	[-1.609, -.0502]	0.130	[-.823, 1.083]
C	0.120	[-.677, .917]	0.720	[-.0499, 1.489]

Table A4. *AE variance decomposition results for the moderating effect of conflict on the relationship between father's occupational characteristics predicting child occupation interest congruence*

	Occ	95% CI	Conflict	95% CI	OccxConflict	95% CI
R	0.041	[-.412, .494]	-0.037	[.198, .125]	0.118	[-.332, .567]
I	0.163	[-.353, .676]	0.070	[-.096, .235]	-0.109	[-.661, .444]
A	-0.313	[-1.12, .494]	-0.139	[-.357, .079]	-0.254	[-1.158, .645]
S	-0.212	[-.658, .238]	-0.175	[-.33, -.021]	-0.460	[-.894, -.022]
E	-0.680	[-1.126, -.236]	0.120	[-.079, .316]	-0.289	[-.755, .184]
C	-0.444	[-1.045, .157]	-0.059	[-.301, .183]	0.137	[-.616, .889]

Simple Slopes

	Conflict -1 SD	95% CI	Conflict +1 SD	95% CI
R	-0.080	[-.6903, .5303]	0.160	[-.498, .818]
I	0.270	[-462, 1.002]	0.050	[-.71, .81]
A	-0.060	[-1.318, 1.198]	-0.560	[-1.698, .578]
S	0.250	[-.365, .865]	-0.670	[-1.29, -.0476]
E	-0.390	[-.998, .218]	-0.970	[-1.64, -.299]
C	-0.580	[-1.483, .323]	-0.300	[-1.302, .702]

Table A5. *AE variance decomposition results for the moderating effect of composite family relations on the relationship between mother's occupational characteristics predicting child occupation interest congruence*

	Occ	95% CI	Relations	95% CI	OccxRelations	95% CI
R	0.512	[-.097, 1.132]	-0.049	[-.235, .137]	-0.495	[-1.123, .13]
I	0.465	[-.3, .964]	-0.021	[-.196, .154]	0.467	[-.022, .948]
A	-0.264	[-.982, .444]	0.075	[-.110, .258]	-0.164	[-.842, .509]
S	-0.062	[-.56, .432]	0.282	[.44, .521]	-0.037	[-.533, .46]
E	-0.393	[-1.013, .239]	0.061	[-.115, .234]	-0.386	[-.978, .211]
C	0.421	[-.131, .986]	0.097	[-.103, .295]	-0.304	[-.826, .217]

Simple Slopes

	Relations -1 SD	95% CI	Relations +1 SD	95% CI
R	1.000	[.0043, 1.996]	0.020	[-.699, .739]
I	-0.010	[-.706, .686]	0.930	[.253, 1.607]
A	-0.100	[-1.098, .898]	-0.420	[-1.365, .525]
S	-0.020	[-.757, .717]	-0.100	[-.751, .551]
E	0.000	[-.911, .911]	-0.780	[-1.573, .0129]
C	0.720	[-.0344, 1.474]	0.120	[-.639, .879]

Table A6. *AE variance decomposition results for the moderating effect of composite family relations on the relationship between father's occupational characteristics predicting child occupation interest congruence*

	Occ	95% CI	Relations	95% CI	OccxRelations	95% CI
R	0.232	[-.282, .745]	0.008	[-.161, 177]	-0.389	[-.916, .14]
I	0.188	[-.324, .698]	0.070	[-.093, .234]	0.231	[-.334, .793]
A	-0.356	[-1.156, .444]	0.138	[-.054, .33]	-0.006	[-.758, .747]
S	-0.078	[-.513, .356]	0.295	[.143, .446]	0.297	[-.091, .685]
E	-0.664	[-1.12, -.21]	0.002	[-.211, .219]	0.064	[-.428, .547]
C	-0.433	[-1.028, .162]	0.172	[-.048, .392]	-0.499	[-1.158, .161]

Simple Slopes

	Relations -1 SD	95% CI	Relations +1 SD	95% CI
R	0.620	[-.169, 1.409]	-0.160	[-.821, .501]
I	-0.040	[-.799, .719]	0.420	[-.327, 1.167]
A	-0.350	[-1.494, .794]	-0.370	[-1.399, .659]
S	-0.380	[-.934, .174]	0.220	[-.381, .821]
E	-0.720	[-1.435, -.0048]	-0.600	[-1.202, .0019]
C	0.070	[-.816, .956]	-0.930	[-1.804, -0556]

Table A7. *AE variance decomposition results for the moderating effect of sex on the relationship between mother's occupational characteristics predicting child occupation interest congruence*

	Occ	95% CI	OccxSex	95% CI
R	0.411	[-.194, 1.019]	-0.628	[-1.81, .564]
I	0.490	[-.012, .994]	0.225	[-.753, 1.215]
A	-0.286	[-1.045, .471]	0.227	[-1.251, 1.714]
S	0.024	[-.489, .530]	-0.141	[-1.146, .861]
E	-0.618	[-1.263, .04]	0.379	[-.871, 1.632]
C	0.298	[-.250, .858]	0.550	[-.548, 1.676]

Simple Slopes

	Male	95% CI	Female	95% CI
R	0.725	[-.248, 1.698]	0.095	[-.59, .78]
I	0.375	[-.422, 1.17]	0.605	[.0285, 1.18]
A	-0.405	[-1.62, .814]	-0.175	[-1.02, .671]
S	0.090	[-.702, .882]	-0.050	[-.661, .561]
E	-0.810	[-1.83, .211]	-0.430	[-1.18, .317]
C	0.025	[-.863, .913]	0.575	[-.07, 1.22]

Table A8. *AE variance decomposition results for the moderating effect of sex on the relationship between father's occupational characteristics predicting child occupation interest congruence*

	Occ	95% CI	OccxSex	95% CI
R	0.245	[-.283, .769]	0.077	[-.951, 1.11]
I	0.203	[-.283, .687]	-0.653	[-1.603, .291]
A	0.287	[-.518, 1.092]	-1.912	[-3.504, -.32]
S	-0.143	[-.609, .329]	-0.217	[-1.15, .708]
E	-0.792	[-1.231, -.349]	0.481	[-.403, 1.347]
C	-0.465	[-1.041, .111]	-0.442	[-1.592, .709]

Simple Slopes

	Male	95% CI	Female	95% CI
R	0.200	[-.648, 1.048]	0.280	[-.308, .868]
I	0.525	[-.187, 1.237]	-0.125	[-.751, .501]
A	1.245	[-.012, 2.502]	-0.665	[-1.63, .3]
S	-0.030	[-.759, .699]	-0.250	[-.817, .317]
E	-1.030	[-1.72, -.34]	-0.550	[-1.08, -.021]
C	-0.240	[-1.12, .638]	-0.680	[-1.41, .0479]

Appendix B Multilevel Analysis results for the Personal Globe Inventory

Table B1. *Multilevel analysis results for the moderating effect of cohesion on the relationship between mother's occupational characteristics predicting child occupation interest congruence.*

	Occ	95% CI	Cohesion	95% CI	OccxCohesion	95% CI
R	-0.06	[-.47, .35]	-0.03	[-.15, .09]	0.15	[-.25, .55]
I	0.43	[.04, .81]	-0.01	[-.15, .12]	-0.05	[-.41, .31]
A	0.02	[-.51, .54]	-0.11	[-.25, .03]	-0.09	[-.61, .42]
S	-0.17	[-.51, .17]	0.12	[-.03, .27]	-0.02	[-.37, .33]
E	0.27	[-.20, .74]	0.09	[-.06, .24]	-0.26	[-.72, .20]
C	0.2	[-.23, .63]	0.12	[-.05, .29]	-0.16	[-.57, .24]
			Simple Slopes			
			Cohesion -1 SD	95% CI	Cohesion +1 SD	95% CI
R			-0.2	[-.8, .39]	0.09	[-.46, .64]
I			0.48	[-.05, 1.01]	0.37	[-.16, .90]
A			0.11	[-.65, .87]	-0.07	[-.79, .64]
S			-0.15	[-.66, .35]	-0.19	[-.66, .28]
E			0.53	[-.15, 1.21]	0.01	[-.62, .65]
C			0.37	[-.22, .96]	0.04	[-.56, .64]

Table B2. *Multilevel analysis results for the moderating effect of cohesion on the relationship between father's occupational characteristics predicting child occupation interest congruence.*

	Occ	95% CI	Cohesion	95% CI	OccxCohesion	95% CI
R	-0.18	[-.49, .14]	-0.007	[-.12, .11]	-0.2	[-.50, .09]
I	0.25	[-.16, .66]	-0.01	[-.14, .12]	-0.16	[-.59, .27]
A	0.007	[-.53, .55]	-0.17	[-.32, -.02]	-0.27	[-.8, .27]
S	0.11	[-.23, .45]	0.11	[0, .22]	-0.26	[-.56, .04]
E	-0.09	[-.47, .28]	0.04	[-.11, .19]	-0.03	[-.41, .34]
C	-0.15	[-.61, .32]	-0.05	[-.2, .11]	0.39	[-.11, .90]

	Simple Slopes			
	Cohesion -1 SD	95% CI	Cohesion +1 SD	95% CI
R	0.03	[-.4, .45]	-0.38	[-.83, .07]
I	0.41	[-.19, 1.01]	0.09	[-.5, .68]
A	0.27	[-.51, 1.06]	-0.26	[-1, .48]
S	0.37	[-.07, .80]	-0.15	[-.63, .32]
E	-0.06	[-.6, .49]	-0.13	[-.64, .39]
C	-0.54	[-1.24, .17]	0.24	[-.43, .92]

Table B3. *Multilevel analysis results for the moderating effect of conflict on the relationship between mother's occupational characteristics predicting child occupation interest congruence.*

	Occ	95% CI	Conflict	95% CI	OccxConflict	95% CI
R	-0.05	[-.45, .36]	0.03	[-.08, .14]	-0.1	[-.46, .25]
I	0.44	[.06, .82]	0.16	[.04, .28]	0.11	[-.24, .47]
A	0.005	[-.51, .52]	0.12	[-.01, .25]	-0.13	[-.62, .37]
S	-0.15	[-.49, .19]	-0.005	[-.16, .14]	-0.09	[-.42, .24]
E	0.24	[-.23, .72]	0.04	[-.09, .18]	0.02	[-.4, .45]
C	0.18	[-.25, .60]	0.009	[-.14, .16]	-0.08	[-.48, .32]

Simple Slopes

	Conflict -1 SD	95% CI	Conflict +1 SD	95% CI
R	0.06	[-.48, .6]	-0.15	[-.69, .4]
I	0.32	[-.2, .85]	0.55	[.03, 1.06]
A	0.13	[-.61, .87]	-0.12	[-.82, .58]
S	-0.06	[-.53, .41]	-0.24	[-.72, .24]
E	0.22	[-.42, .86]	0.26	[-.38, .91]
C	0.26	[-.34, .85]	0.1	[-.48, .68]

Table B4. *Multilevel analysis results for the moderating effect of conflict on the relationship between father's occupational characteristics predicting child occupation interest congruence.*

	Occ	95% CI	Conflict	95% CI	OccxConflict	95% CI
R	-0.17	[-.49, .15]	0.04	[-.08, .15]	0.04	[-.27, .34]
I	0.18	[-.22, .59]	0.16	[.04, .29]	0.07	[-.34, .48]
A	-0.02	[-.55, .51]	0.16	[.02, .29]	-0.13	[-.61, .35]
S	0.12	[-.22, .46]	-0.03	[-.14, .08]	-0.009	[-.32, .30]
E	-0.11	[-.48, .27]	-0.1	[-.24, .05]	0.46	[.1, .83]
C	-0.18	[-.64, .29]	0.11	[-.05, .28]	-0.45	[-.97, .07]

Simple Slopes

	Conflict -1 SD	95% CI	Conflict +1 SD	95% CI
R	-0.2	[-.66, .26]	-0.13	[-.56, .3]
I	0.11	[-.49, .72]	0.25	[-.3, .8]
A	0.11	[-.64, .86]	-0.15	[-.84, .53]
S	0.13	[-.34, .60]	0.11	[-.35, .57]
E	-0.57	[-1.1, -.03]	0.36	[-.16, .87]
C	0.28	[-.38, .94]	-0.63	[-1.37, .12]

Table B5. *Multilevel analysis results for the moderating effect of composite family relations on the relationship between mother's occupational characteristics predicting child occupation interest congruence.*

	Occ	95% CI	Relation	95% CI	OccxRelation	95% CI
R	-0.05	[-.46, .35]	-0.03	[-.15, .09]	0.19	[-.18, .56]
I	0.44	[.05, .82]	-0.11	[-.24, .03]	0.05	[-.30, .41]
A	0.03	[-.50, .55]	-0.11	[-.25, .03]	-0.05	[-.55, .45]
S	-0.18	[-.52, .17]	0.12	[-.03, .27]	-0.05	[-.39, .29]
E	0.27	[-.21, .74]	0.05	[-.09, .19]	-0.13	[-.59, .33]
C	0.19	[-.24, .62]	0.1	[-.06, .26]	-0.16	[-.57, .25]
			Simple Slopes			
			Relation -1 SD	95% CI	Relation +1 SD	95% CI
R			-0.24	[-.81, .32]	0.14	[-.40, .67]
I			0.38	[-.14, .90]	0.49	[-.04, 1.02]
A			0.08	[-.66, .82]	-0.02	[-.74, .69]
S			-0.12	[-.62, .37]	-0.23	[-.70, .25]
E			0.39	[-.30, 1.09]	0.14	[-.50, .77]
C			0.35	[-.22, .92]	0.03	[-.58, .65]

Table B6. *Multilevel analysis results for the moderating effect of composite family relations on the relationship between father's occupational characteristics predicting child occupation interest congruence.*

	Occ	95% CI	Relation	95% CI	OccxRelation	95% CI
R	-0.17	[-.49, .15]	-0.03	[-.15, .08]	-0.10	[-.39. .20]
I	0.22	[-.19, .63]	-0.10	[-.23, .03]	0.06	[-.50, .38]
A	-0.02	[-.55, .52]	-0.15	[-.29, -.01]	-0.02	[-.54, .49]
S	0.12	[-.22, .46]	0.08	[-.03, .19]	-0.07	[-.37, .22]
E	-0.09	[-.47. .28]	0.08	[-.07, .23]	-0.17	[-.54, .21]
C	-0.13	[-.60, .33]	-0.03	[-.19, .14]	0.19	[-.33, .71]

Simple Slopes

	Relation -1 SD	95% CI	Relation +1 SD	95% CI
R	-0.07	[-.49, .35]	-0.26	[-.72, .19]
I	0.28	[-.30, .87]	0.16	[-.46, .79]
A	0.01	[-.72, .74]	-0.04	[-.80, .72]
S	0.20	[-.24, .63]	0.05	[-.43, .52]
E	0.07	[-.46, .60]	-0.26	[-.79, .27]
C	-0.32	[-1.03, .38]	0.06	[-.64, .75]

Table B7. *Multilevel analysis results for the moderating effect of sex on the relationship between mother's occupational characteristics predicting child occupation interest congruence.*

	Occ	CI	Sex	CI	OccxSex	CI
R	-0.09	[-.5, .33]	-0.83	[-1.06, -.61]	0.34	[-.43, 1.12]
I	0.55	[.15, .94]	-0.09	[-.34, .16]	-0.87	[-1.59, -.16]
A	-0.080	[-.64, .47]	0.170	[-.08, .43]	0.410	[-.65, 1.46]
S	-0.150	[-.5, .2]	0.940	[.62, 1.25]	0.110	[-.52, .74]
E	0.290	[-.2, .79]	0.250	[-.01, .51]	-0.280	[-1.18, .62]
C	0.200	[-.25, .64]	-0.690	[-.98, -.41]	-0.130	[-.96, .70]

	Simple Slopes			
	Male	CI	Female	CI
R	-0.26	[-.89, .37]	0.09	[-.42, .6]
I	0.98	[.39, 1.58]	0.11	[.46, .645]
A	-0.29	[-1.18, .6]	0.12	[-.51, 75]
S	-0.21	[-.73, .31]	-0.1	[-.52, .32]
E	0.43	[-.32, 1.19]	0.15	[-.42, .72]
C	0.26	[-.43, .96]	0.13	[-.38, .64]

Table B7. *Multilevel analysis results for the moderating effect of sex on the relationship between father's occupational characteristics predicting child occupation interest congruence.*

	Occ	CI	Sex	CI	OccxSex	CI
R	-0.13	[-.46, .2]	-0.74	[-.97, -.51]	-0.22	[-.86, .42]
I	0.27	[-.15, .69]	-0.19	[-.43, .05]	-0.19	[-.97, .6]
A	0.030	[-.53, .6]	0.110	[-.17, .39]	-0.330	[-1.36, .71]
S	0.090	[-.26, .44]	0.990	[.76, 1.22]	0.250	[-.39, .88]
E	-0.140	[-.53, .26]	0.200	[-.11, .5]	0.300	[-.43, 1.03]
C	-0.100	[-.57, .37]	-0.590	[-.91, -.27]	-0.380	[-1.29, .53]

	Simple Slopes			
	Male	CI	Female	CI
R	-0.02	[-.54, .5]	-0.24	[-.64,.16]
I	0.36	[-.27, 1]	0.17	[-.34, .69]
A	0.2	[-.67, 1.06]	-0.13	[-.79, .53]
S	-0.03	[-.55, .49]	0.22	[-.2, .64]
E	-0.28	[-.44, .47]	0.01	[-.44, .47]
C	0.09	[-.62, .79]	-0.29	[-.9, .31]