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## How Our Work Influences Who We Are: Testing a Theory of Vocational and Personality Development over Fifty Years

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### Abstract

This study examines the developmental influences of occupational environments on personality traits from childhood to adulthood. We test aspects of a theory of vocational and personality development, proposing that traits develop in response to work experience following *corresponsive and noncorresponsive* mechanisms. We describe these pathways in the context of situations of vocational gravitation and inhabitation. In a sample from the Hawaii personality and health cohort ( $N = 596$ ), we examined associations of childhood and adulthood personality traits, with occupational environments profiled on the RIASEC model. Mediations tests confirmed that work influenced personality development from childhood to adulthood for Openness/Intellect. We observed multiple reactivity effects of occupation environments on adulthood traits that were not associated with corresponding selection effects.

### Keywords

Personality Development; Personality Trait Change; Vocational Development; Corresponsive Mechanism; Big Five; Holland RIASEC; Person-Environment Fit; Trait Activation

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Research on the role of personality traits at work has had an enormous impact on theory and practice in the field of industrial, work, and organizational psychology. Over the years,

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Address for Correspondence: Professor Stephen A. Woods PhD, Work, Organization and Management Group, University of Liverpool Management School, University of Liverpool, Chatham Street, Liverpool, L69 3BX, UK, Stephen.A.Woods@Liverpool.ac.uk. All authors contributed to the conceptualization of ideas in this paper, the first author led on writing of the paper, with the second and third authors also contributing. Data collection was led by the second and third authors at the Oregon Research Institute. The first and second author undertook data analyses.

Data from the Hawaii Personality Health and Cohort represent sensitive individual information collected as part of an ongoing longitudinal study. Portions of the data have been archived through NACDA and are available to researchers under a restricted use agreement. To protect participant confidentiality and anonymity, some sensitive data are not made publicly available. Enquiries should be directed to the second author at the Oregon Research Institute.

This study was not pre-registered in an institutional registry.

significant evidence has accumulated for the effects of personality traits on, among other criteria, job performance, leadership behavior, vocational interests and choices, job attitudes, and counterproductive behavior at work. The progress of personality trait research in IWO psychology has been facilitated by the Big Five model of personality traits (Extraversion, Agreeableness, Conscientiousness, Emotional Stability and Openness/Intellect), which has permitted research findings to accumulate around a common framework. This research has typically treated the Big Five traits as stable predictor variables.

In recent years, however, research in the broader domain of personality psychology has demonstrated that personality traits develop and change in predictable ways across the life course (Roberts, Robins, Caspi & Trzesniewski, 2003; Roberts, Walton, & Viechtbauer, 2006; Roberts & DelVecchio, 2000; Edmonds, Jackson, Fayard, & Roberts, 2008; Wille & DeFruyt, 2014; Woods, Wille, Wu, Lievens & De Fruyt, 2019). In addition, there is a growing literature on the reciprocal relations between personality traits and work (for reviews, see Woods et al., 2019 & Woods, Lievens, De Fruyt & Wille, 2013). However, there remain important unanswered theoretical questions about the “how’s and why’s” behind personality development due to work-related experiences. In particular, prior research and theory has frequently explained personality development and change at work through the corresponive mechanism (Roberts, Caspi & Moffitt, 2003). In this mechanism, the reciprocal interplay of traits and environments in the process of personality development rests on a key assumption that people select into certain trait-*consistent* environments, and that those traits are subsequently developed, reinforced and strengthened by experience of the environment. Yet, there are many developmental effects that are noncorresponive, which are not currently explained clearly by theory (Roberts & Nickel, in press).

In this paper, we argue that a more encompassing and comprehensive model is needed to explain how vocational experiences exert influence on traits through people’s careers. To this end, we develop a broader theoretical model concerning the pathways and mechanisms by which vocation-related experiences influence personality development and change. Our key premise is that a more comprehensive model of personality development and change should deal with normative personality development, and change prompted by unique experiences of environments that could be a *fit* but also *misfit* with a person’s traits, where traits *may* or *may not* have selected people into those environments. This broader perspective of vocational and personality development builds on and extends previous theories of vocational gravitation and attraction (e.g. Holland, 1997; Woods & Hampson, 2010; Schneider, 1984), personality trait activation and development (e.g. Tett & Burnett, 2003; Woods, Lievens, De Fruyt & Wille, 2013; Roberts, Caspi & Moffitt et al., 2003), and work adjustment (Dawis & Lofquist, 1984).

To test the proposed pathways and mechanisms of this model we rely on the Hawaii Personality and Health Cohort. This unique dataset permits us to explore trait change over a longer period than in any previous study, with early childhood personality traits measured at ages 6–12, and adulthood personality traits measured around 50 years later.

## Work and Personality Change: Processes and Mechanisms

Although in organizational research, traits have traditionally been viewed as stable, more recent evidence has steadily accumulated that personality traits both affect and are affected by work experiences (for a review, see Woods et al., 2013). The processes by which personality develops over time can be separated into two types. The first type describes normative trait development, conceptually exemplified by social investment theory (Roberts, Wood & Smith., 2005; Roberts, Wood & Caspi, 2008), which posits that predictable patterns of personality development accompany aging as people engage in social institutions such as education, the labor market, and marriage/long-term relationships. Social investment might comprise actual investment of time and effort (e.g. in the work domain, attendance at work) or psychological investments (e.g. investment and commitment in components of the work domain, relevant to self-narratives and identity; Lodi-Smith & Roberts, 2007). Both forms of investment predict trait development. For example, psychological investments in family and work domains are predictive of traits reflecting greater functional maturity (i.e. higher Agreeableness, Conscientiousness and Emotional Stability; Lodi-Smith & Roberts, 2007; Woods et al., 2013).

Conversely, the second type of mechanism explaining personality development focuses on change that occurs for individual persons as a result of their *unique* life experiences. For example, Ludtke, Roberts, Trautwein, and Nagy (2011) examined the impact of life events on trait development reporting evidence that traits of the Big Five predicted experiences of positive and negative life events in meaningful ways and were correspondingly developed in response to those events. In the work arena, research into this mechanism has focused on specific occupational experiences and their effects on personality traits. For example, Wille et al. (2012) examined the impact of engaging in particular career roles (maker, expert, presenter, guide, director, and inspirator) after graduation from college. While engagement in career roles generally stimulated growth consistent with maturation effects, some career roles were predictive of meaningful personality change that ran counter to typical trait maturation. Specifically, Wille, Beyers & De Fruyt (2012) found that participation in roles of director and inspirator early on in the career attenuated normative increases, and even promoted decreases, in Agreeableness, thereby contradicting social investment theory logic.

Theorizing about how people develop in response to the unique experience of work has frequently relied on the corresponsive principle. According to the corresponsive principle (Roberts, Caspi, & Moffitt, 2003), reciprocal influences of work on personality proceed through the mechanisms of selectivity and corresponsive reactivity. That is, personality traits lead people to select themselves into particular work environments (selectivity), which in turn reinforce, deepen, and strengthen those same (i.e., corresponding) traits (reactivity). A central assumption in the corresponsive mechanism is that personality trait development happens in environments that fit with the traits that selected people in those environments in the first place. So, for example, a person high on Openness/Intellect is naturally curious and open to new ideas, and therefore selects a job environment that fits those traits (e.g. research or creative work). By working in that environment, their Openness/Intellect is further deepened and strengthened (i.e., they become even more open and intellectual). The traits that develop in response to occupational experiences, according to this process, are the same

ones that led the person to enter the environment. So, environment selectivity and reactivity effects apply to corresponding traits.

The corresponsive principle has been tested in a number of studies examining reciprocal effects of personality and work experiences. Roberts, Caspi and Moffitt. (2003) found that of the 91 change coefficients they examined, 83% represented corresponsive change. For example, traits related to Agency at age 18 predicted occupational resource power (the extent to which people's jobs afforded them power over others) at age 26, which in turn increased Agency traits still further. Le et al. (2014) explored the impact of various work conditions (Fit, Self-Determination, Ease, Material Benefits, Safety/Quality, and Income) on change in personality traits. To test the corresponsive principle, they examined whether associations between traits and conditions corresponded to changes in those traits over an eleven-year period. They found that 20 out of 24 change findings (83%) conformed to the corresponsive principle.

Recognizing the need to integrate this literature with vocational development literatures more widely, Wille and De Fruyt (2014) examined personality change resulting from work through the lens of the Big Five personality model and the Holland RIASEC model of occupational environments (Realistic, Investigative, Artistic, Social, Enterprising, Conventional; Holland, 1997). In a sample of college graduates tracked over a fifteen-year period, Wille and DeFruyt (2014) showed that experience of particular Holland occupational environments was associated with changes in the Big Five. They proposed that the Big Five would lead to selection into specific occupations, which would subsequently lead to corresponsive reactivity effects. They also proposed that selection effects would influence correlated change and prediction of RIASEC environment change from the Big Five.

Although their hypotheses were framed around the corresponsive principle, they found only one such effect: lower Openness/Intellect was associated with more Conventional work environments, which in turn was associated with accelerated normative decreases in Openness/Intellect over the 15 years. However, they reported multiple other associations indicative of reactivity effects that occurred without corresponding selection effects (e.g., participation in Realistic work environments was associated with stronger increases in Agreeableness and Conscientiousness, and stronger decreases in Neuroticism). As a key conclusion, they stated that aspects of the work environment appeared to influence personality trait change irrespective of whether those same traits selected people into those environments initially. Such effects might therefore be described as “noncorresponsive” personality development.

## A Theory of Vocational and Personality Development

We propose that a more complete theory of personality development and work can be constructed by examining trait change through the lens of person-environment fit. In organizational psychology, person-environment fit may be conceptualized in a number of ways, to represent the compatibility of a person with their vocation (PV fit), their job (PJ fit), their organization (PO fit), and their team or group of coworkers (PG fit) (Lauver & Kristoff-Brown, 2001; Kristoff, 1996). Our focus on personality traits and occupation environments

in the present study relates most clearly to person-vocation fit. Accordingly, we propose a theory of vocational and personality development (VPD; Figure 1) that explains personality development through the course of working life in response to vocational experiences of fit and misfit. We frame our theory around processes of work adjustment (Dawis & Lofquist, 1984) and trait activation (Tett & Burnett, 2003).

The theory of work adjustment (Dawis & Lofquist, 1984; Dawis, 2005) has at its heart, the concept of a state of correspondence between individual and environment characteristics, similar to the concept of PE fit. The theory posits that correspondence results in more positive outcomes (e.g. Judge, 1994; Rounds, Dawis & Lofquist, 1987), and that it is achieved through a series of adjustments to both individual and environment characteristics. One, termed activity, represents effort to change aspects of the environment, most recently explicated in the literature on job crafting, which examines how employees proactively craft their jobs to fit their individual needs (Wreszniewski & Dutton, 2001). The second, termed reactivity, describes change in individuals acting on themselves in response to their environment, by, for example, acquiring new skills (Dawis, 2005) or adjusting their values or interests (Wille & De Fruyt, 2014). Change in the person by this theory therefore serves to strengthen correspondence, and weaken *dis*correspondence (Dawis, 2005).

We integrate the theory of work adjustment with principles of trait activation (e.g. Trait Activation Theory, TAT; Tett & Burnett, 2003). In these theories, the process of reciprocal activation and development plays out such that traits are activated in response to particular situational cues. In short, we propose that trait activation and the theory of work adjustment logically give rise to trait development and change, directed towards greater person-environment fit. This development may proceed through both corresponsive, and noncorresponsive pathways. Adopting these theoretical mechanisms, we propose that development plays out under two vocational situations, which we respectively term vocational gravitation and vocational inhabitation.

### **Vocational gravitation.**

The corresponsive principle that is the dominant mechanism in prior theorizing and research in this domain, deals with situations when traits lead to selection into an environment where there is good fit. This process has also been termed *vocational gravitation* (Judge, Higgins, Thoresen & Barrick, 1999; Woods & Hampson, 2010). According to Holland's person-environment fit theory of occupational choice (1997), people gravitate towards work environments that correspond to their vocational interests, and make vocational choices based on their perceptions of the degree to which work environments match their interests. Research has confirmed that Holland's six RIASEC interest dimensions (Realistic, Investigative, Artistic, Social, Enterprising and Conventional) predict current and prospective occupational choices (Hansen & Campbell, 1985; Hansen & Dik, 2005; Donnay & Borgen, 1996). Much research has also examined the associations of the Big Five with the RIASEC dimensions (e.g. see Larson, Rottinghaus and Borgen, 2002; De Fruyt and Mervielde, 1999; Barrick, Mount & Gupta, 2003), and demonstrated the prospective associations of traits on later life occupation choices in independent cohort samples (Judge et al., 1999; Woods & Hampson, 2010). In this developmental pathway, traits from an early

age set people on a course by encouraging the formation of vocational interests, skills and competencies (see Woods & Hampson, 2010; Woods et al., 2013), leading to trait-consistent vocational choices and decisions. Experience of trait-consistent work environments reinforces and deepens personality traits, represented in corresponsive personality development.

### **Vocational inhabitation.**

A second condition by contrast, represents situations where a person is working in a particular environment, but may not have gravitated to or selected that environment as a result of their preferences or personality traits. Put simply they are present in an environment, even though personality traits did not necessarily push them towards it. This situation might be termed *vocational inhabitation*.

It is critical to acknowledge that working life experiences are seldom dependent on preference and individual choice alone. External forces (e.g., socialization; socio-economic opportunity; uncontrollable life events; organizational contexts) all exert impact on vocational choices and decisions. A person may therefore find it necessary to work in an occupation that is not a natural fit to their traits. It would not be accurate to say that they *gravitated* to their occupation because of their personality traits, only that they are present in (or inhabit) that occupation.

Under such conditions of misfit, certain situations and job demands may require people to express behavior that runs counter to their personality traits, motivated in part by the consequent attainment of the benefits of work. We propose that for people in these circumstances, the demands of the work situation inhibit the expression of trait-consistent behavior, prompting a need for development (e.g. Simmering, Colquitt, Noe & Porter, 2003), and that people rather adjust (i.e. consistent with the theory of work adjustment) their actions to reflect job-relevant behavior. Over time, repeated activation of job-relevant behavior in place of trait-consistent behavior, and its consequent reinforcement and strengthening, may result in long-term changes to personality traits serving to weaken person-environment misfit (or discordance). The role of behavior in personality development was demonstrated by Hudson, Briley, Chopik and Derringer (2018), who found that interventions designed to promote behavior change resulted in predictable trait change over time. Similar mechanisms have been proposed in the context of health promoting behavior (Chapman, Hampson & Clarkin, 2014).

This part of our theoretical model serves to explain observation of noncorresponsive reactivity effects, which may occur because aspects of the environment that were not necessarily salient for selecting a person into an environment, become salient for trait development once a person inhabits it. In such situations, although factors other than personality may determine *vocational inhabitation*, the occupational environment (represented in its profile of RIASEC characteristics) may nevertheless be rather consistent and prompt adjustment of specific traits for all persons within that occupation. This process could theoretically proceed even if those persons a) were diverse in terms of their traits when entering the occupation, and b) likely entered the occupation for a variety of different reasons, other than *gravitation*. In sum, an occupation environment may prompt adjustment

in a similar way for all persons within it, even though the causes of vocational inhabitation may be different between persons<sup>1</sup>. This novel reasoning provides an explanation as to why noncorresponsive reactivity effects are frequently reported in empirical studies (e.g. Wille & De Fruyt, 2014; Bleidorn et al., 2013).

## The Present Study

In the present study, we examined whether reciprocal influences of personality and occupational environment features proceeded in both corresponsive and noncorresponsive ways, testing our theory with data from the Hawaii Personality and Health Cohort. The focus of our empirical tests was on the impact of occupational environments examined through the lens of Holland's RIASEC framework (Holland, 1958; 1997), on personality trait development over a 50-year period. RIASEC characteristics of occupational environments are an effective framework for examining the development pathways in our model. There is evidence of gravitation or selection effects (Woods and Hampson, 2010), and precedent for application in studies of the reciprocal effects of personality and work (Wille & De Fruyt, 2014).

Data collected from the Hawaii cohort at three time points are included in our analyses. These comprise measurements of the Big Five in childhood (age 6–12; T1), and in adulthood (in 2013; T3 in the present study). In between the two adulthood measurements of personality, the cohort reported their occupations (around 2005; T2). Conceptually, this permits examination of the role of occupations in trait development in the from childhood to adulthood. No study to date has permitted examination of the trait development effects in response to work factors over such a substantive period of the lifespan.

On the basis of our VPD model, we argue that throughout the career span, personality development plays out along the pathways of vocational gravitation and inhabitation. With respect to vocational gravitation, we propose that personality traits promote gravitation to certain RIASEC characteristics, and that those environments in turn also act as cues to activate and therefore develop and strengthen personality traits. In sum, we propose that certain traits from childhood to adulthood are linked with RIASEC environments through a corresponsive process, such that *traits that select people into occupational environments are strengthened and developed further by experience of those environments*. This proposition relies on observation of selection effects (correlations of childhood traits with occupation environments). Empirically, this may be tested where selection effects are observed, by examining whether the associations of trait measurements over time are explained in part by experience of particular occupational environments. We hypothesize that:

H1: Where childhood traits are correlated with RIASEC occupational environments, environments mediate the relationship of personality traits measured in childhood and adulthood.

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<sup>1</sup>For example this may reflect a situation where personality is not the main driver of gravitation to occupations; whilst for some individuals occupation choice might reflect traits, for others it may rather be external factors. The net effect is that no gravitation effect would be observed at the group-level.

With respect to vocational inhabitation, we propose that irrespective of whether selection effects are observed from childhood traits to occupation environments, the experience of RIASEC characteristics of occupations will serve to influence traits in adulthood in predictable ways. That is, we expect that reactivity effects from occupation environment (measured at T2) to adulthood traits (measured at T3) will be observed whether or not traits led people to gravitate to the occupation. Put differently, reactivity represents the effects of environments on adulthood traits, after controlling for effects of childhood traits. We focus our hypotheses on the key relationships between the Big Five and the RIASEC framework (Openness/Intellect with Investigative and Artistic; Conscientiousness with Conventional; Agreeableness with Social; Extraversion with Enterprising and Social). We hypothesize that:

H2: Investigative and Artistic occupational environments will be associated with Openness/Intellect in adulthood.

H3: Conventional environments be associated with Conscientiousness in adulthood.

H4: Social environments will be associated with Extraversion and Agreeableness in adulthood.

H5: Enterprising environments will be associated with Extraversion in adulthood.

## Method

### Participants and Procedure

Participants were members of the Hawaii Personality and Health cohort. This cohort comprises over 2,000 children from entire elementary school classrooms on the Hawaiian islands of Oahu and Kauai who underwent a personality assessment conducted by their elementary school teachers over 40 years ago. Since 1998, 2,017 (83%) of 2,418 original members of this cohort have been located and 1,387 (73% of those located and still alive) have consented to participate in further studies (further details of location and recruitment, see Hampson et al., 2001). As adults, participants have completed one or more of six mailed questionnaires (Q1 –Q6) since 1999, and 830 participants have attended a half-day medical and psychological examination at the research clinic in Hawaii at mean age 51 years. The present sample was limited to the 597 who provided information about their current or most recent occupation(s) on Q3. The sample reflected the gender ratio of the original childhood cohort with near equal numbers of men ( $n = 293$ ) and women ( $n = 298$ ), and the ethnic diversity of the Hawaiian population (42% Japanese Americans, 18% European Americans, 17% Native or part Native Hawaiians, 8% Filipino Americans, 6% Chinese Americans, and 9% of other ethnicities). The present participants differed from the remainder of the childhood cohort by being slightly more conscientious as children ( $t(2401) = 5.01, p < .05, d = .24$ ), and also more agreeable ( $t(2401) = 1.97, p < .05, d = .09$ ), but differences on the other childhood Big Five were not statistically significant.

Our analyses draw on data collected at three time points. T1 measurements comprise the trait assessments at childhood, at which the average age of children was 10 years. T2 comprises the occupations data collected at Q3, at which the average age of cohort survey respondents was 50 years. T3 comprises the adulthood personality ratings collected on Q6, at which the average age of survey respondents was 58 years.



## Measures

**Childhood personality traits.**—The teacher assessments of childhood personality traits were conducted in 1965 or 1967 when participants were in grades 1, 2, 5 or 6 and between the ages of 6 and 12 years. Teachers rank-ordered the students in their classrooms on each of 43–49 personality attributes, which included 39 common variables, derived from attributes used by Cattell and Coan (1957), using a fixed nine-step quasi-normal distribution. Definitions for each attribute were developed by focus groups of teachers (e.g., “Persevering: Keeps at his/her work until it is completed; sees a job through despite difficulties, painstaking and thorough”). In one of the earliest demonstrations of the Big Five, Goldberg (2001) demonstrated that these assessments yielded a five-factor structure. Childhood Big Five scores were extracted as orthogonal factor scores using all available items. Alpha reliabilities for these factor scores were obtained using the method described by Ten Berge and Hofstee (1999). The mean reliabilities across subgroups (based on the particular combination of traits that were assessed) were as follows: .75 (Extraversion), .62 (Agreeableness), .77 (Conscientiousness), .68 (Emotional Stability), and .60 (Openness/Intellect) (Edmonds, Goldberg, Hampson, & Barckley, 2013). The validity of these childhood measures as predictors of adult outcomes has been demonstrated in previous studies (e.g., Edmonds et al., 2013; Hampson, Edmonds, Goldberg, Dubanoski, & Hiller, 2013; Hampson, Goldberg, Vogt, & Dubanoski, 2006; Hampson, Goldberg, Vogt, & Dubanoski, 2007; Woods & Hampson, 2010).

**Adult personality traits assessed by self-report.**—Participants completed the 44-item Big Five Inventory (BFI; John & Srivastava, 1999) in Q6, which began in 2013. In each case, participants rated the self-descriptiveness of each item (1 = *very inaccurate*, 5 = *very accurate*). Alpha reliabilities for this measure for the Hawaii cohort in Q6 are as follows: .84 for Extraversion, .78 for Agreeableness, .77 for Conscientiousness, .82 for Emotional Stability, and .82 for Intellect/Openness/Intellect, (Edmonds et al., 2013). The raw scores were converted into factor scores (mean of 0 and standard deviation of 1).

**Current or previous occupation.**—Beginning in 2005, participants were invited to complete Q3 which included a list of 26 occupation categories with specific examples (e.g., Artist [painter, musician, interior designer]). Participants were asked “If you are employed (or self-employed), how would you describe your job? If you are retired, what did you do before you retired?”

**Creating individual RIASEC profiles.**—RIASEC profiles were derived by a two-step process. First, the occupations listed on Q3 were matched to occupations on the O\*NET database (O\*NET Resource Center, 2003), which gives ratings on each of the RIASEC dimensions for each occupation. Six scores, one for each RIASEC dimension, ranging from 1 = *highly uncharacteristic of this job*, to 7 = *highly characteristic of this job* are provided for each occupation. The validity of the ratings has been established in previous studies (Eggerth, Bowles, Tunick, & Andrew, 2005; Rounds, Smith, Hubert, Lewis, & Rivkin, 1999), and these ratings have been used in past structural studies of Holland’s RIASEC model (Deng, Armstrong, & Rounds, 2007). These scores were used to create RIASEC profiles for each of the occupations listed on Q3 (excluding the military for which no

RIASEC ratings are available). A more detailed description of this first step is provided by Woods and Hampson (2010).

In the second step, the RIASEC ratings for occupations were used to construct RIASEC profiles for each participant. For participants who checked only one occupation category (354), their RIASEC profile corresponded to that occupation's RIASEC ratings from O\*NET records. Where participants checked two or more occupation categories on the survey (156 checked two, and 77 checked three), their RIASEC profile was constructed by averaging scores across each RIASEC dimension for each occupation they selected. A list of the survey categories and corresponding RIASEC profiles is shown in Woods and Hampson (2010). Descriptive statistics for these RIASEC ratings are shown in Table 1.

## Results

### Corresponsive Development Effects: Vocational Gravitation

Selection (personality trait – vocation environment) and reactivity (vocation environment – personality trait) effects were evaluated by estimating zero order correlations. We began by examining the correlations between childhood Big Five traits and RIASEC dimensions at T2 (Table 2).

We found significant selection effects for childhood Openness/Intellect and Conscientiousness. Childhood Openness/Intellect was associated with Investigative ( $r = .12$ ,  $p < .05$ ) and Artistic ( $r = .12$ ,  $p < .05$ ) work environments in adulthood, and negatively with Conventional work environments ( $r = -.08$ ,  $p < .05$ ). Childhood Conscientiousness was associated with all RIASEC dimensions in adulthood.

We next tested for corresponsive effects associated with these selection effects for Openness/Intellect and Conscientiousness (hypotheses 1). Mediation effects were tested by estimating the indirect effect of the child trait on the adult trait through the RIASEC dimension. As the sampling distribution of the indirect path is typically non-normal, we used a bootstrapped resampling method in PROCESS (Hayes, 2013) to estimate the indirect paths and also bootstrapped 95% confidence intervals on these paths. So, we created path models where each RIASEC dimension operated as a mediator of the association between the personality trait in childhood and the same trait in adulthood and estimated the indirect effect of the child trait on the adult trait. This model is depicted in Figure 2, with the corresponsive mechanism confirmed through observation of indirect effects through paths A and B. Openness/Intellect demonstrated corresponsive effects via two RIASEC dimensions. For jobs characterized as Investigative, we found that the association between childhood Openness/Intellect and the same trait in adulthood was mediated by Investigative job characteristics ( $\beta = .02$ , 95% CI [.00, .03]). We found a similar mediation effect for Artistic jobs, such that Artistic job characteristics mediated the association between childhood and adult Openness/Intellect ( $\beta = .01$ , 95% CI [.00, .03]). We found no further mediation effects. Therefore, we found support for hypothesis 1 in respect of Openness/Intellect in our data.

### **Noncorresponsive Development Effects: Vocational Inhabitation**

Hypotheses 2 to 5 predicted that vocational environments would be associated with adulthood traits (i.e. reactivity effects would be observed) irrespective of whether selection effects of childhood traits were observed. On the basis of the absence of selection effects, correlations of RIASEC environment scores with adulthood personality traits may be assumed to represent unique explained variance in traits in later life beyond that explained by childhood personality. That is, the effects represent generalized change or growth in personality occurring regardless of initial elevation on respective traits in the analyses. However, for completeness, we tested these effects in two ways. Firstly, through the computation of correlations between RIASEC and adulthood traits (i.e. path B in figure 2). Secondly, through regression in which the respective childhood trait was entered alongside the RIASEC dimension as a control (i.e. in figure 2, path B controlling for path C). The betas from these tests are also shown in Table 2. This analytic approach to examining change over time has been used in other domains of applied psychology (see. e.g. Dierdorff, Surface & Brown, 2010; Shiner, Masten, & Roberts 2003; Woods, Patterson, Koczwara & Sofat, 2016).

Hypothesis 2 (Artistic and Investigative environments predicting Openness/Intellect) was confirmed (although in respect of hypothesis 1, this finding was associated with a significant corresponsive developmental effect). Hypothesis 3 was not confirmed. There was no correlation between Conventional environments and adulthood Conscientiousness. Hypothesis 4 was confirmed. Social vocation environments were associated with higher Extraversion ( $r = .11, p < .05$ ) and Agreeableness ( $r = .11, p < .05$ ), and also lower Neuroticism ( $r = -.12, p < .05$ ). Hypothesis 5 was not confirmed. Enterprising environments were not associated with Extraversion in adulthood. Outside our hypotheses, we also observed three other reactivity effects. Realistic vocational environments were associated with lower Agreeableness ( $r = -.11, p < .05$ ). Artistic vocational environments were also predictive of higher Agreeableness ( $r = .13, p < .05$ ). Conventional work environments were negatively associated with adult levels of Openness/Intellect ( $r = -.15, p < .05$ ).

### **Discussion**

In this study, we developed a theoretical model of vocational and personality development, which proposed mechanisms to explain the interplay of personality traits and work. We tested aspects of this theory in the context of Holland RIASEC model of vocational environments, examining the prospective relations of childhood and adulthood personality, and occupational environments in ways consistent with our model.

### **Development Effects for Personality and Occupational Environments: Vocational Gravitation and Inhabitation**

Our VPD model proposes that a person's occupational environment is a function of their traits and external factors, which exert their effects to a greater or lesser extent for different people. The process by which personality traits lead to entry into occupational environments (selection) is referred to as vocational gravitation: Traits influence the development of preferences, skills, and competencies for particular kinds of work, which lead them to

gravitate to specific occupational environments (Woods & Hampson, 2010). Our VPD model proposes that environments exert reactivity effects on personality traits reflecting processes of trait activation (Tett & Burnett, 2003; Tett & Guterman, 2000), and work adjustment (Dawis & Lofquist, 1984), directed towards greater person-environment fit. With respect to trait activation, personality traits are activated in response to work environment cues, and through repeated activation, reinforced, deepened, and developed.

However, our VPD model represents further advances in research on personality change by interpreting these observed selection and reactivity effects specifically in situations of both person-environment *fit* and *misfit*. Following previous theorizing in this area (e.g., Roberts et al, 2003; Woods et al., 2013, Woods et al., 2019) we proposed that under conditions of trait-occupation fit, trait selection and reactivity effects are linked through a corresponsive mechanism; that is, the same traits that select people into environments are developed in response to those environments. This explanation holds especially for interpreting reactivity effects resulting from vocational gravitation.

To test for these developmental pathways (hypothesis 1), we examined the mediation effects of occupational environments on relationships between repeated measures of the Big Five. Our analyses also confirmed this corresponsive process for Openness/Intellect with Investigative and Artistic in childhood. Children higher on Openness/Intellect (i.e. more curious and imaginative) were more likely to work in highly Investigative and Artistic environments, and experience of those environments was correspondingly associated with higher adulthood Openness/Intellect.

However, we did not observe corresponsive effects for any other of the Big Five dimensions for which selection effects were observed. This finding is informative for understanding the corresponsive mechanism. In our VPD model, we include the process of adjustment directed in a way that serves to strengthen PE fit. This mechanism requires activation of traits, and it is possible that persistent activation of traits does not necessarily follow from selection effects. This possibility, combined with our theoretical explanations, might help to refine understanding of the corresponsive process to more clearly guide prediction of corresponsive development.

Our VPD model also recognizes that people may inhabit occupations for reasons other than gravitation (we term this situation vocational inhabitation) and that in such circumstances, the theory of work adjustment proposes that if adjustments cannot be made to the environment, people can develop to better fit the environment. Where occupational environments activate a personality trait, the expression of which would run counter to the requirements of the situation, trait behavior is inhibited and replaced with situationally consistent behavior. Repeated expression of this behavior at work over time, we propose, leads to personality development consistent with the direction of the new behavior. For example, if a person low on Extraversion works in an occupation that requires interpersonal contact with others (e.g. a Social vocations), we propose that performance of the job requirements over many years would serve to increase Extraversion.

Testing this in our data involved observing the reactivity effects of occupational environments on adulthood traits that did not correspond to selection effects from childhood traits to occupational environments. In addition to the observed effects of Openness/Intellect, our analyses also confirmed hypothesis 4 (that Social environments would predict higher Extraversion and Agreeableness in adulthood). Whilst hypotheses 3 and 5 were not confirmed, we also observed three significant correlations of environments and traits. Of these, the negative effects of Realistic with Agreeableness and Conventional with Openness/Intellect are conceptually sensible. Realistic environments are associated more strongly with working with *things* rather than *people* (Prediger, 1982) and a negative association with Agreeableness is consistent with this definition. Conventional environments are associated with working with concrete rather than abstract concepts (Woods & Hampson, 2010) and in this context, a negative association with Openness/Intellect is also rationally reasonable.

In summary, the meaningful pattern of observed correlations in our data, notwithstanding that some of our hypotheses were not confirmed, offer some support nevertheless for our propositions. In these data, experience of vocational environments did indeed exert reactivity effects that were not associated with selection effects. Moreover, these associations did appear to show environments predicting salient personality traits (following trait activation theory) and in directions that indicate adjustment to greater fit to environment demands (following the theory of work adjustment).

### Theoretical Implications

Collectively, the findings were informative for our theoretical model. For Investigative, and Artistic environments, and focusing on the development pathways from childhood to adulthood, we can reason that there are dual personality development processes playing out. The corresponsive mechanism appears to explain personality development effects for Openness/Intellect in our data. We observed indirect pathways from childhood to adulthood Openness/Intellect, indicating that these environments do explain in part the stability of Openness/Intellect through working life. Where people select into environments through the process of vocational gravitation, and thus fit the environment well, corresponsive trait development is observed in our data.

However, we also observe personality development under conditions of misfit, as proposed in our theory (e.g., noncorresponsive reactivity). This finding supports our proposition that vocational inhabitation arising for reasons other than gravitation, may nevertheless be accompanied by trait development, explainable through theories of trait activation and work adjustment. An additional notable observation in this respect, underlining the importance of work experience for personality development, is that occupational environment characteristics (i.e., the RIASEC dimensions) were approximately equivalent predictors of adulthood Openness/Intellect compared to childhood Openness/Intellect. For some of the reactivity effects observed, occupations were a stronger predictor of adulthood traits than were childhood traits. In the case of Agreeableness for example, a better estimate of trait level in mid-life could be obtained by looking at people's employment experience rather than their childhood traits.

With respect to previous theorizing, our findings are consistent with the propositions of emergent theorizing in the area of personality development at work. For example, the Demands-Affordances TrAnsactional (DATA) Model (Woods, Wille, Wu, Lievens & De Fruyt, 2019) proposes that development at work is toward greater PE fit at multiple levels (fit to job, vocation, group and organization. Our findings are especially relevant to the vocational level. The DATA model describes a transactional process triggered by the activation of traits in response to work demands, and then motivated by the attainment of work rewards, operated to achieve fit between traits and demands through processes of adjustment. Our findings provide new evidence of this theorized process playing out across working life as people's traits adjust to the demands of vocations (e.g. the association of investigative and artistic environments with adulthood Openness/Intellect, or experience of social environments with higher Extraversion in adulthood).

Similarly in the TESSERA (Triggering Situations, Expectation, State/State Expressions, ReActions) model, (Wrzus & Roberts, 2017) trait change is proposed to as a consequence of accumulated micro-transactions with the work environment. This provides further explanation of how day-to-day interactions with the work environment, experienced across many years in our sample, lead to the development of traits. Our findings and our vocational and personality development theoretical propositions add to this emerging consensus on the central processes of work-related sources of personality development, growth and change in adulthood.

### Future Directions

The Hawaii data provide a valuable look at developmental transactions between developing personality traits over the life course and work experiences. This allowed us to test hypotheses supporting the VPD model. Under the perspective that personality traits are fixed predictors, the developmental effects we have described would be completely overlooked. We have demonstrated both corresponive and noncorresponive effects and addressed questions about the conditions under which each type of developmental transaction is likely to occur (i.e. person-environment fit and misfit).

The presence of corresponive and noncorresponive effects suggests that the selection of work environments is important with respect to long term personality development, something that those entering the workforce may be unlikely to consider. As such, our work has bearing on how individuals might approach important career decisions and suggests that more longitudinal research focusing on this question is needed. Just as the personality trait as predictor model provides valuable insights in the role of personality traits as predictors of work satisfaction and job performance, the VPD model provides a framework for considering these questions developmentally over time. We propose three main directions for future research.

First, the role of vocational interests in the pathway from traits to occupations could be tested directly. The RIASEC framework has been instrumental in understanding of longitudinal relations of personality and occupational environments (e.g. Judge et al., 1999; Woods & Hampson, 2010). However, the role of interests alongside traits and RIASEC occupation characteristics could further elaborate the processes of vocational and personality

development. For example, do interests affect the extent to which people change in response to their work experiences, and do they likewise develop overtime? Future research could address this question and serve as an important replication of our findings.

Second, it is possible that job satisfaction is linked to the processes of personality development across working life (see Woods et al., 2013). For example, where development occurs to address personality-environment misfit, it is logical to expect that changes in satisfaction accompany the development. Changes in satisfaction might therefore be considered markers of effective work adjustment, contributing to long term development and change. The role of these criterion variables in personality development over time is critical to establish in theory.

Third, future studies could examine the processes of vocational and personality development over different developmental periods of life. Our study has examined such processes over a long span of working life. However, this does not necessarily imply that trait development occurs only over a long period of time. It could be interesting for example to examine relationships between vocational characteristics and traits as people enter an occupation for the first time, and in the first few years as they specialize (e.g. Woods, Patterson, Kocwara & Wille, 2016). This would also enable some intriguing follow up questions from our study to be tested. For example, does trait elevation on certain dimensions upon entering an occupation influence the trajectory of development. High Agreeableness might promote conformity to fit the environment, or high Openness/Intellect might lead people to be more flexible in their adjustment. Moreover, a more direct appraisal of personal circumstances could be included to better understand the extent to which people have options for job or occupation change. Volitional engagement with the occupational environment (versus engagement that is necessitated through limited alternatives) could also be influential in trait development trajectories.

### **Applied Implications**

Alongside the research and theoretical implications, our study also has applied implications for practitioners who use personality assessment for a variety of purposes in organizations. For example, in the case of vocational guidance, practitioners typically assess interests and personality traits in order to facilitate matching people to careers or occupations, implicitly treating the individual differences side as fixed, and the occupational side as variable. Our findings suggest that this approach may need to be modified slightly such that vocational advisers consider not only occupations that fit individual preferences, but also the ways in which clients could approach personal development for a career for occupations that they would like to do, but which may be inconsistent in some way with their traits.

No discussion of the applications of personality trait assessment in organizations would be complete without considering personnel selection. In this respect, again our findings combine with the increasing evidence of personality development and change during working life to open up new lines of discussion about the practice of personality assessment for selection. For example, when assessing the fit of a person's traits and competencies to job requirements it is often the case that there are gaps between the individual and ideal profile. Greater understanding of how and when traits might be developed through

interventions and work experiences could help practitioners to properly weight the importance of these gaps and training need areas and recommend appropriate development activities. Our findings add substantially to the emergent evidence base that would justify such an approach.

### Limitations and Strengths

One methodological limitation of our study concerns the endorsement of multiple jobs by some participants. This may have led to regression to the mean for RIASEC profiles of those participants resulting from averaging of the RIASEC scores of multiple jobs. Our sample is also based on a multi-ethnic cohort in Hawaii, and although Holland's model has been researched in the Hawaii context previously (Oliver & Waehler, 2005), it will be important to replicate these findings in other cultures and samples to add confidence regarding the generalizability of our results.

Conceptually, we acknowledge that our dataset does not include vocational interest data, which means that the role of interest development in the mechanisms linking personality in childhood and adulthood, and occupational choice could not be tested. More broadly, we acknowledge that our focus on the RIASEC model is just one way to conceptualize job characteristics that might influence trait development, and so there remain important unexamined factors beyond our study.

We also acknowledge that our propositions of the role of PE fit are based upon the conceptual fit of the RIASEC environments with the Big Five rather than on a direct measure of subjective perceptions of fit. The inclusion of a measure of perceived fit in future extensions or replications would bolster our theoretical propositions still further.

In measurement terms, it would have been ideal to have used similar measures for personality in childhood and adulthood. All longitudinal data sets spanning long intervals necessarily depend on the measurement tools of the day. While using similar instruments in childhood and 40 years later in adulthood has merits in terms of face validity, no study to date has demonstrated strict levels of measurement invariance in personality over such a long interval spanning childhood and adulthood. This limitation remains a challenge for future work using more recently developed measurement instruments.

Notwithstanding these limitations, our study has notable strengths. First, we are unaware of any other dataset that would permit examination of personality developmental processes across all of the Big Five in the context of vocational and occupational variables over such a long period of time, and indeed from early childhood. The Hawaii personality and health cohort dataset is unique in this respect. Secondly, although we above highlight that there are factors unmeasured in our study that may influence personality development, our presentation of VPD model provides a clear framework for future studies to build on our findings to establish a full understanding of vocational factors that do and do not impact on trait development over time.



## Concluding Remarks

In this study, we examined the role of occupational environments in the developmental trajectories of traits from childhood to adulthood. We observed that gravitation to occupations did, in the case of Openness/Intellect, result in corresponsive development effects. However, we also observed multiple reactivity effects that did not correspond to selection effects based on childhood traits. The pathways of vocational lives are complex and unique and our observations underline the importance of work in how traits develop and change through people's lives. For whatever reasons people inhabit vocations and occupational environments, the experiences that are accumulated within them may determine the trajectory of trait development. Our vocations may not always reflect who we *were* in the past, but may still influence who we *are* in the future.

## Acknowledgements

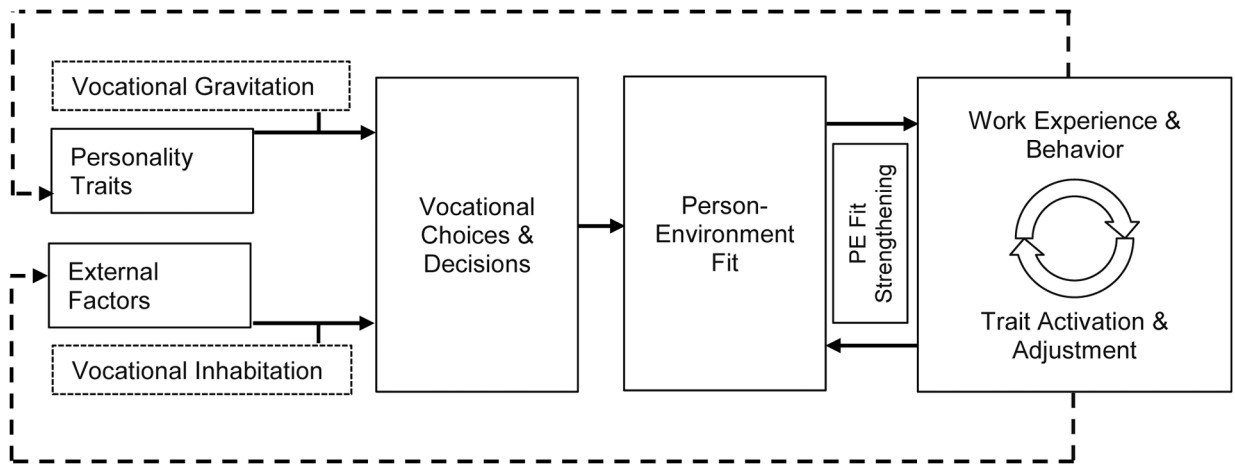
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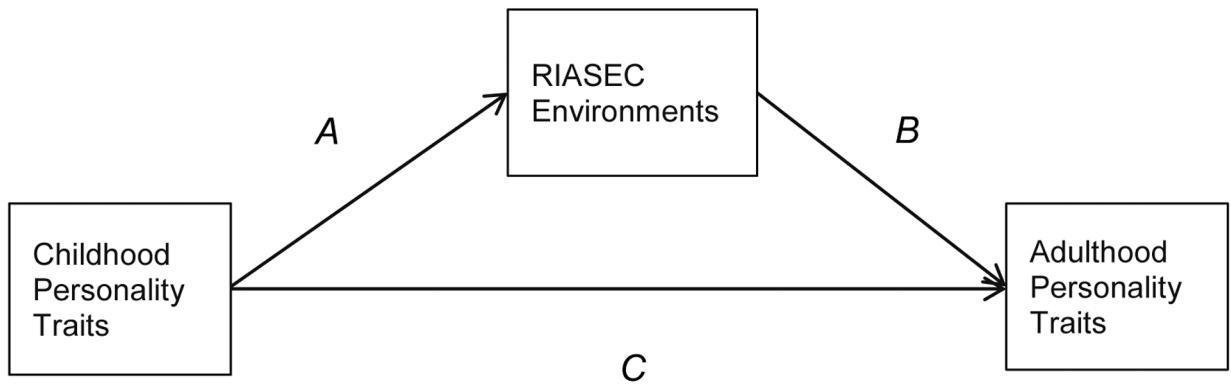
**Figure 1.**  
A model of vocational and personality development (VPD theory).

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**Figure 2.**  
Path model illustrating a test of mediation to test corresponive effects for personality via RIASEC job characteristics.  
Selectivity Effect = Path A; Reactivity Effect = Path B, controlling for Path C;  
Corresponive Effect = Indirect effect through Paths A and B.

**Table 1.**

Descriptive statistics for RIASEC dimension profiles of jobs held by participants.

	Mean	SD	1	2	3	4	5
1. Realistic	4.03	1.47					
2. Investigative	3.32	1.17	-.20 *				
3. Artistic	2.76	1.04	-.42 *	.54 *			
4. Social	3.95	1.51	-.71 *	.40 *	.67 *		
5. Enterprising	4.16	1.38	-.67 *	-.17 *	.02	.32 *	
6. Conventional	4.41	1.10	-.60 *	-.23 *	-.31 *	.05	.48 *

N = 597;

\* p &lt; 0.01

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**Table 2**

Correlations Between Big Five Personality Dimensions Measured in Childhood and Adulthood with RIASEC Coded Job Characteristics

	<b>R</b>	<b>I</b>	<b>A</b>	<b>S</b>	<b>E</b>	<b>c</b>						
<b>Childhood Personality</b>												
Extraversion	.01	-.02	-.05	-.02	.02	.00						
Agreeableness	-.02	-.05	.04	.02	.05	.01						
Conscientiousness	<b>-.22</b>	<b>.10</b>	<b>.11</b>	<b>.17</b>	<b>.10</b>	<b>.17</b>						
Neuroticism	.02	-.04	.02	.03	.02	-.05						
Openness/Intellect	-.05	<b>.12</b>	<b>.12</b>	.07	.04	<b>-.08</b>						
<b>Adulthood Personality</b>												
Extraversion	-.07	-.07	-.04	-.03	.01	.02	<b>.11</b>	<b>.10</b>	.08	.08	-.03	-.02
Agreeableness	<b>-.11</b>	<b>-.11</b>	-.05	-.04	<b>.13</b>	<b>.12</b>	<b>.11</b>	<b>.11</b>	-.01	-.00	.03	.03
Conscientiousness	-.05	-.03	.02	.01	.02	.02	.07	.06	.06	.05	-.00	-.02
Neuroticism	.06	.06	-.05	-.06	-.09	-.09	<b>-.12</b>	<b>-.12</b>	-.01	-.00	-.05	-.04
Openness/Intellect	-.06	<b>-.05</b>	<b>.20</b>	<b>.18</b>	<b>.20</b>	<b>.18</b>	.08	.05	.09	.09	<b>-.15</b>	<b>-.13</b>

Note.  $n = 591$  for Childhood;  $n = 449$  for Adulthood.

R = Realistic, I = Investigative, A = Artistic, S = Social, E = Enterprising, C = Conventional, BFI = Big Five Inventory.

Effect sizes in bold are significant at the  $p < .05$  level. Effects in *italics* are betas controlling for the effects of respective childhood Big Five traits.