

Development of vocational interests in adulthood

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Vocational interests are typically defined in work, organizational and career psychology as *relatively stable* individual differences that influence behavior through preferences for certain work activities and work environments (e.g., Van Iddekinge, Roth, Putka, & Lanivich, 2011). This definition highlights that the assumption of within-person stability is central to the way vocational interests are traditionally conceptualized in the literature, and this perspective goes back to the early years of interest research. In essence, today's view on adult vocational interests is one in which individual differences in the stability of these constructs are conceived as a confounding factor. The question is, however, whether this view on vocational interests as stable entities is truly accurate given the lack of attention for adult interest development in the past (Low, Yoon, Roberts, & Rounds, 2005). Although the word *relatively* in the definition above implies that interests can change, the emphasis in the psychological literature has been on interest stability, resulting in relatively little theory and scarce empirical research on adult interest development. In this chapter, we review the extant literature on adult interest development and take this discussion one step further by framing it in the context of a transactional perspective on person-environment fit.

We begin by defining interest development in terms of five different indicators of stability or change. Based on this framework, we present some of the most important and recent empirical findings concerning interest development in adulthood, with particular attention on longitudinal research projects addressing this topic. Next, the social cognitive model of career interests (Lent, Brown, & Hackett, 1994) is reviewed as an existing theoretical framework that may help to understand the process of *how* individuals, young and old, may acquire and cultivate interests in specific vocational fields. In an attempt to take the discussion of adult interest development one

step further, especially regarding *direction* of adult interest development, we elaborate on this topic from the perspective of a transactional perspective on person-environment fit. Finally, at the backdrop of this chapter some considerations are presented concerning the relevance and practical implications of adult interest development in the 21st century labor market.

Defining Interest Development

At the beginning of this chapter, it is relevant to point out that interest “development” should not be confused with interest “change”. By *development*, we broadly mean *the process of how constructs, in particular vocational interests, evolve over time*. This concept of evolution covers both change and stability over time, as is indicated by the different indicators of development outlined below. Specifically, we distinguish between five different operationalizations of interest development that (i) either address the stability of interest dimensions separately or focus on entire interest profiles, (ii) provide information on interest development either at the group level or for individuals separately, and (iii) define development either in absolute or in relative terms.

1. *Rank-order stability*. Continuity and change in psychological constructs, and vocational interests in particular, are most commonly expressed in terms of correlations between scale scores between two time-points. This rank-order stability or change refers to individuals’ relative standings within a group over time. The higher this test-retest correlation, the greater the likelihood that an individual will occupy the same position in the group ranking across time. This index is also referred to as relative stability or change.

2. *Profile stability*. Whereas rank-order stability addressed the development of one single interest domain, profile stability refers to change in the full profile of interest scale scores over time. Studies on the components of profiles and their stability have a long history in the

psychological literature, possibly beginning with Cronbach and Gleser (1953) and, since that time, vocational and I/O psychologists have been studying the stability of profiles. In the personality literature, this index is also referred to as ipsative stability (Caspi & Roberts, 1999; De Fruyt et al., 2006) and “person-centered continuity” (Caspi & Roberts, 2001, p. 52) given that it addresses the stability of the configuration of personality traits within individuals. Concern for ipsative stability or change was inaugurated in personality psychology by Block (1971), who believed that it more adequately captured the integrated functioning of traits within the individual. Specifically, small changes in the relative balance of dispositions might lead to large changes in behavior, and the same might apply to vocational interests. This method enables description of how much one person’s profile is like another profile he or she produces at a later point in time. One means of assessing this aspect of development is to use intraindividual profile correlations which focus on the relative invariant ordering (i.e., shape) of an individual’s scale scores at different times. When warranted, individual-level estimates of profile stability can also be aggregated to a higher-order or group-level estimate. In addition, there are also two indices available that take into account the absolute differences in profiles in addition to the relative order differences generated by profile correlations. The profile difference index (Cronbach & Gleser, 1953) is the sum of squared differences of the individual’s scores across the two time periods. This index can be used with any set of scale scores but is most appropriate for scales adhering to a simple structure. In contrast, the profile clarity index proposed by Tracey and Robins (2005) uses the circumplex structure of the RIASEC scales. Interest clarity was defined as the vector length of RIASEC scores plotted in a two-dimensional interest space. Difference in profile clarity over time represents both absolute and relative stability of a profile across time.

3. *Structural stability.* One of the attractive features of vocational interest models, such as Holland’s RIASEC model, is that the included interest dimensions are not supposed to be

independent, but rather demonstrate a well-specified pattern of interrelations that describe their (dis)similarity. Using the Holland model as the most well-known example, the six RIASEC dimensions are theoretically expected to adhere to a specific interest structure. For instance, there is now evidence that RIASEC interests, as measured by the 2005 Strong Interest Inventory (Donnay, Morris, Schaubhut, & Thompson, 2005), can be structured according to a circular RIASEC ordering (Kantamneni, 2014). The issue of structural continuity addresses the degree to which this pattern of interrelations between interest dimensions (i.e., the covariance structure) remains stable across time. Structural models of vocational interests and, hence, change and stability interest structures, can be tested with a range of techniques (see also Darcy & Tracey, 2007; Gupta, Tracey, & Gore, 2008; Low & Rounds, 2007) providing information on relative as well as absolute development. Although structural validity (at one point in time) and structural stability (across time) may appear as abstract theoretical notions with little immediate practical relevance, they are of great importance for at least two good reasons. First, structural stability is the foundation of any research on continuity and change because it establishes whether the *same construct* is being measured at different time points (Little, 1997). Without structural continuity, comparing vocational interests or other constructs across time is, by definition, a pointless endeavor because of the risk of comparing apples and oranges. Second, the most promising practical implications that are derived from interest theory actually depend on this assumption of structural validity of the RIASEC model. For example, in light of the new meta-analytic evidence regarding the criterion validity of vocational interest fit, it has also been suggested that organizations can assess applicants' interests and hire those individuals that will fit best with the job they are applying for (Nye, Su, Rounds, & Drasgow, 2012). Importantly, however, this and other examples of person-environment matching strongly depends on (the validity of) a predefined (e.g., hexagonal or circular) interest structure.

4. *Mean-level change.* Mean-level change refers to a group's increases or decreases on different interest dimensions over time. If groups of people demonstrate consistent mean-level changes over a certain age period, then it can be argued that interests undergo normative growth or decline that are consequences of maturational or historical processes shared by most of the members of a population (Low & Rounds, 2007). Note that in the absence of structural stability, changes in mean-level interest scores across time are difficult to interpret because the meaning of these constructs may have shifted over time. In other words, changes can only be unambiguously interpreted as a reflection of a developmental process when longitudinal measurement invariance or equivalence can be established (e.g., Allemand, Zimprich, & Hertzog, 2007; Little, 1997).

5. *Individual differences in change.* Whereas mean-level change focusses on gains or losses on interest dimensions averaged across the entire group, individual differences in change or 'individual-level change' refers to the gains or losses (or lack thereof) in absolute levels of an interest dimension that an individual experiences over time (Nesselroade, 1991). The existence of individual differences in change has not received much (or any) attention in earlier reviews on interest development (e.g., Low & Rounds, 2007; Swanson, 1999). Nevertheless, it is exactly this type of change that we should be considering when talking about the interest development of individuals and how this may relate to individual career decisions. In the broader personality literature, this concept of individual differences in change has received considerably more attention, and is even regarded as a "cornerstone of lifespan-development theory", placed "front and center in the study of personality development" (Roberts & Mroczek, 2008, p. 33). These important individual-level changes may be masked in an analysis of mean-level continuity, because equal numbers of individuals may increase or decrease on a trait (or interest dimension), resulting in no change for the entire group (De Fruyt et al., 2006). The optimal way to track this type of interest change is to gather multiple (i.e., more than two) assessments over time and apply

growth-modeling techniques to estimate individual differences in change over time. Additionally, it can be tested whether idiosyncratic life and/or career experiences are associated with these changes in vocational interests. Unlike recent advances in the personality literature on this topic (e.g., Hudson, Roberts, & Lodi-Smith, 2012; Le, Donnellan, & Conger, 2014), research on adult vocational interests has until now largely overlooked this possibility of individual differences in change. This is problematic from a theoretical (see further in this chapter) as well as from a practical point in view, since studies in the personality domain have pointed out that even relatively modest changes in traits may have significant consequences for individuals' lives. The same may be true for changes in interests and the effects on people's careers.

The overview above indicates that talking about interest development has a totally different meaning depending on the specific indicator that is used to map change or stability. Table 1 compares these five indices of interest development on three dimensions: (1) whether the index provides information on the development of interest dimensions separately or at the level of the entire interest profile, (2) whether the index represents an individual or a group-level statistic, and (3) whether the index informs about absolute or relative changes. The last column in Table 1 also lists some of the more frequently used analytical techniques to address each development index.

Table 1

Similarities and differences between different development indicators

Indicator	Interest dimensions or profiles?	Individual or group statistic?	Absolute or relative development?	Analytical technique
1. Rank-order	dimensions	group	relative	Test-retest correlation
2. Profile	profile	individual, but can be aggregated to group-level	Relative and absolute	Intraindividual Q correlation (relative) / Profile difference index (absolute) / Profile clarity index (relative and absolute)
3. Structural	profile	group	Relative and absolute	Exploratory or confirmatory factor analysis / Correspondence Index
4. Mean-level	dimensions	group	absolute	Repeated measures analyses of variance / Growth curve modeling
5. Individual-level	dimensions	individual	absolute	Growth curve modeling

Findings on Interest Development

To date, most of the research findings concerning the development of vocational interests during adulthood come from early test developers interested in the relative stability of interest scores across time. Qualitative reviews of these longitudinal test-retest studies (e.g., Campbell, 1971; Swanson, 1999) converge on the conclusion that interests show remarkably high levels of relative stability. Hereby, stability typically increases with subjects' age at first testing, whereas stability is lower the longer the time interval between test and retest (Johansson & Campbell, 1971).

Complementing these earlier findings, Low, Yoon, Roberts, and Rounds (2005) conducted a meta-analysis investigating rank-order and profile stability of vocational interests from early adolescence (age 12) to middle adulthood (age 40), summarizing the results of 66 longitudinal studies with test-retest intervals greater than or equal to 1 year. The first of their findings that deserves attention does not relate to vocational interest development itself, but rather to the literature search that preceded this meta-analysis. Specifically, these authors had to conclude that there is a striking lack of studies retesting vocational interests in adulthood. The vast majority of studies in this meta-analysis included participants in the adolescent (51.3%) or the college (40.5%) age groups. By contrast, only 7.8% of the studies examined interests after age 21. The general picture of interest development that emerged from synthesizing these studies was that rank-order and profile stabilities of vocational interests change very little during the greater part of adolescence. It was during the college years (i.e., ages 18-21.9) that interest stability increased dramatically from its previous estimates of about .55 to .67. After that, findings suggested interest stability plateaus for the remainder of the next two decades. The authors concluded that vocational interests were highly stable across all age categories, but that the

stability estimates were insufficiently high to warrant the conclusion that no change occurred in adulthood.

A study by Wille, Tracey, Feys and De Fruyt (2014) considered various indicators of vocational interest development in a sample of Belgian college alumni that was followed across the first third of their professional careers. Participants ($n=167$) completed a Holland RIASEC interest measure just before entering the labor market and then 15 years later when their careers had unfolded. For both assessment points (i.e., age 22 and age 37), the authors assessed the structural validity of Holland's circular RIASEC model using the Correspondence Index (CI, Hubert & Arabie, 1987), which provides a normalized descriptive index of the extent to which the hypothesized ordering of RIASEC types is met by a correlation matrix among RIASEC scales (Rounds, Tracey, & Hubert, 1992). The advantage of using the CI for this purpose is that the resulting estimate of this model-data fit can be compared to meta-analytically derived benchmarks (Rounds & Tracey, 1996) of $CI = .70$ for U.S. samples and measures and $CI = .48$ for international contexts. The results for the Belgian longitudinal sample demonstrated to be similar to the U.S. benchmark, with CI values of .69 and .72 for interest assessments at time 1 and time 2 respectively. When changes in structure were derived from differences in the CI at both time points (e.g., Low & Rounds, 2007), Wille and colleagues found that, as individuals grew older and became more advanced in their careers, interest scores tended to adhere more to Holland's circumplex structure, which is consistent with developmental trends observed in younger age categories (e.g., Tracey, Robbins, & Hofsess, 2005). For the study of adult interest development this is important because it indicates that it indeed makes sense to compare interest scores across different points in time; that we can be relatively sure that we are comparing the same constructs over time. From a more applied perspective, this evidence for increases in

structural validity informs us that the necessary assumptions for widely used applications on interest congruence, are indeed met.

Wille and colleagues (2014) further reported rank-order stabilities and mean-level changes for the six RIASEC interest dimensions separately (see Table 2). There was a relatively high degree of rank-order stability in interest scores over the 15-year period, with an average test-retest correlation across interest dimensions of .51. However, at the same time there was quite some variation in rank-order consistency across interest types, with Enterprising interests in particular demonstrating the greatest potential for relative changes ($r = .37$). In addition, these authors also observed several mean-level changes in interest scores over time that temper the claim of absolute stability of interests in adulthood. Albeit modest, significant mean-level decreases were observed in Realistic, Investigative, Artistic, and Social interests.

Low and colleagues (2005) also compared the results from their meta-analyses on interest stability with those reported by Roberts and DelVecchio (2000) on personality trait stability. Their conclusion was that vocational interests were markedly more stable than personality traits from ages 12 to 29. It was only until the second half of young adulthood (i.e., 30-40 years) that the rank-order stability estimates of both constructs converged at about .62. The longitudinal college alumni sample studied by Wille and colleagues (Wille & De Fruyt, 2014; Wille et al., 2014) extends these findings by offering a more direct and detailed comparison of change and stability estimates for vocational interest and personality trait data that were collected in the *same sample* and across the *same period of time*. The results of this analysis, summarized in Table 2, indicate that RIASEC interests were generally less stable compared to Big Five personality traits, with average test-retest correlations of .51 and .62 respectively. Two exceptions are noteworthy. First, of all six interest types, only Realistic interests were more stable compared to the average

stability of Big Five personality traits. Second, of all Big Five traits, only Conscientiousness was less stable compared to the average stability of the interest types.

Table 2

Test-retest correlations (r) and mean-level changes (d) of RIASEC dimensions (interests and occupations) and Big Five personality traits

	Interests		Occupations (O*NET)	
	Rank-order (r)	Mean-level (d)	Rank-order (r)	Mean-level (d)
Realistic	.76	-.14	.51	.00
Investigative	.51	-.28	.33	.00
Artistic	.50	-.24	.40	-.07
Social	.49	-.39	.53	.01
Enterprising	.37	.02	.31	.18
Conventional	.43	.14	.22	.01
Average	.51	-	.38	-
Neuroticism	.65	-.48	-	-
Extraversion	.69	-.09	-	-
Openness to Experience	.67	-.42	-	-
Agreeableness	.60	.21	-	-
Conscientiousness	.48	.54	-	-
Average	.62	-	-	-

The evaluation of mean-level stability in adulthood is much more common for personality traits compared to vocational interests. This can be explained by the fact that there is no convincing theoretical rationale to explain mean –level changes in adult vocational interests, whereas normative changes in adult personality traits (e.g., increases in Agreeableness, Conscientiousness, and Emotional Stability; Roberts, Walton, & Viechtbauer, 2006) can easily be understood from a functional perspective in the sense that normative trait changes reflect a developmental process toward maturity (Hogan & Roberts, 2004). An unpublished study by Donnay, Thompson, Morris, and Schaubhut (August, 2004) demonstrated significant but modest age differences in RIASEC interest scores. Unfortunately, the cross-sectional nature of these data

did not enable to determine whether any of the observed age differences were actually due to interests *changing* over time. The longitudinal project by Wille and colleagues is particularly informative in this regard because a cohort of young professionals is tracked over a significant and meaningful period of time. Moreover, this same sample of college alumni also provided scores on Big Five personality traits at the beginning of their career and 15 years later, which allows a unique comparison of mean-level changes in interests and traits in the same sample and across the same time interval. For instance, prior research has converged on a relatively robust picture of personality – interest associations (e.g., between trait Openness and Investigative interests; Barrick, Mount, & Gupta, 2003; Larson, Rottinghaus, & Borgen, 2002), implying that, should there be normative changes in personality traits in the direction of greater maturity, then related vocational interests should probably also evolve in the same direction. As can be seen in Table 2, Wille and colleagues found some support for this hypothesis. For example, normative decreases in Openness to Experience were accompanied by decreases in Investigative and Artistic interests, and the increases in Conventional interests seems to be in line with the normative increase in Conscientiousness. One particular finding that contradicts this hypothesis is that despite people’s mean-level increases in Agreeableness, their preferences for Social activities decreased.

An interesting question is also whether normative changes in interest scores might reflect changes in experienced work environments. The study by Wille and colleagues sheds some light on this by keeping track of occupational characteristics across the entire time period as well. For this purpose, participants’ O*NET job titles and the accompanying RIASEC scores were registered at the very beginning of the career as well as 15 years later. The results shown in Table 2 indicate that, similarly as for interests, participants’ RIASEC occupation scores simultaneously demonstrated both change and stability across the first third of their career. With an average rank-

order stability of .38, the results suggested that occupational characteristics describing first jobs were moderately to strongly predictive for occupations as assessed 15 years later. This means for instance that those who started off in jobs with a strong Realistic component were significantly and substantially more likely to occupy a Realistic job 15 years later. Interestingly, only two of the six RIASEC occupation dimensions demonstrated significant mean-level changes over time: On average, occupations became slightly less Artistic ($d = -.07$) and slightly more Enterprising ($d = .18$) over time. This pattern of results suggests that there is no clear evidence for normative shifts in vocational interests that are also reflected in normative shifts in occupational characteristics over the same period of time.

However, one important shortcoming of the research presented above is that these findings say little or nothing about changes in vocational interests at the individual level. As a matter of fact, there is a glaring lack of research on individual changes in interests as adults progress in their careers, leaving a number of fundamental questions virtually unanswered. For instance, what happens to an individual's interest levels when he or she embarks on a new career? If there are any significant effects, how stable are these? Also, to what extent can someone learn to appreciate aspects of an occupation that do not fit with one's initial preferences? To answer these pertinent questions, longitudinal studies increasingly need to consider individual-level changes in vocational interests, comparable to recent trends in research on adult personality development. For example, Wille and De Fruyt (2014) demonstrated that people choosing Conventional occupations at the beginning of the career not only scored lower on Openness to Experience at the moment of their job choice, but they also decreased in Openness over time as they persisted in this occupation. In a similar way, research could start to consider the effects of occupational choices and experiences on individuals' personal patterns of interest development.

Theoretical Perspectives on Adult Interest Development

Existing theory on vocational interest development mainly attempts to explain how young children and adolescents gradually gain interest in academic or vocational fields, without much consideration of how these interests further develop once people have entered the workforce. This chapter discusses two theoretical perspectives that may shed light on the issue of adult interest development. First, we review the social cognitive model of interest development (Lent et al., 1994) as a theoretical framework that offers one explanation for *how* individuals gradually gain interest in certain fields of activity. Although the model is primarily intended to explain interest development up until late adolescence or early adulthood, at the same time it is assumed that this process repeats itself continuously over the lifespan, with the only difference that adult interest development requires more compelling experiences to provoke thorough change in basic interest patterns. Additionally, we aim to broaden theory of adult interest development by discussing this topic within the context of a transactional perspective on person-environment fit. This second part deals with the *direction* of interest development rather than with underlying mechanisms, and departs from the assumption that personal and career-related development are fundamentally intertwined through a set of person-environment (P-E) fit dynamics.

The Social Cognitive Model of Interest Development

Figure 1 illustrates the sociocognitive determinants of career interests and the processes through which interests promote career-related activity involvement and skill acquisition. Central to this perspective is the idea that people form enduring interests in activities in which they view themselves to be efficacious and in which they anticipate positive outcomes (paths 1 and 2 in Figure 1). This does not necessarily mean that people need to be good at something right from the

start in order to develop further interest, but at least there needs to be the belief that they can learn how to effectively master the activity in such a way that it brings them feelings of fulfillment. These self-efficacy beliefs and outcome expectations themselves are the result of a complex and enduring process of repeated exposure (both directly and vicariously), activity engagement, modeling, and feedback from important others (Lent et al., 1994). These different types of input to self-efficacy beliefs and outcome expectations illustrate that interest development is not restricted to childhood or adolescence. For instance, people may grow up in a commercial environment such as a family business and may gradually grow into the sales profession through observing their parents and even participating in this process at young age. However, the model also allows people to come into contact with certain interest fields at a later age. People may learn through their interactions with peers that they are gifted negotiators and have good persuasion skills. Or people may find themselves in a new professional environment which suddenly challenges them to practice skills such as persuasion and negotiation; skills that they did not need so much in the past. When people embrace these talents and become aware of the benefits, both extrinsic and intrinsic, that they may bring them, this may lead them to develop an interest in professional activities such as sales and building a career in this direction.

The model further illustrates how these interests can lead to intentions or goals for further activity exposure (path 3), which increase the likelihood of subsequent task selection and practice (path 4). Activity involvement or practice, in turn, produces particular performance attainments (path 5) (e.g., successes and failures), resulting in the revision of self-efficacy and outcome expectancy estimates (path 6). This feedback loop from performance to self-efficacy and outcome expectations is important because it highlights the reciprocal nature of the associations between these constructs. Note that when the social cognitive model is presented as a developmental and causal model, self-efficacy and outcome expectations are used to predict interests, and interests

are then used as a predictor of career-related behaviors. A number of empirical studies have supported the social cognitive model of placing self-efficacy before interests (Lent, Brown, & Hackett, 1994, 2000) but other studies by Tracey (2002) and Nauta, Kahn, Angell and Cantarelli (2002) suggest that the interest-efficacy links are reciprocal. In summary, there is discussion about the exact temporal ordering of these processes (see for instance Armstrong and Vogel, 2009) and this can only be resolved when additional longitudinal studies become available to further examine the interest-efficacy association from a developmental perspective.

The model further specifies that outcome expectation will also partly be determined by self-efficacy (path 7); this is because people presumably expect to achieve desirable outcomes in activities at which they view themselves to be efficacious (Bandura, 1986). Further, people's goals for activity development are formed partly indirectly, through their interest in these activities, and partly directly (path 8) because of the rewards (both extrinsic and intrinsic) that they anticipate. In a similar vein, outcome expectations may also contribute directly to activity choices (path 9).

With regard to the various types of outcome expectations, the model predicts that self-evaluative outcomes, such as anticipated self-satisfaction (Bandura, 1986), play a particularly influential role in interest development. Specifically, it is assumed that mastery of challenging tasks stimulates positive self-evaluation; the anticipation of additional mastery and self-satisfaction helps sustain task engagement, leading to skill development, and the growth of interest in activities that may have originally held little intrinsic allure (Lent et al., 1994). Like outcome expectations, self-efficacy perceptions are also assumed to have direct effects on activity goals and choices (paths 10 and 11). Finally, because of their role in helping persons to interpret, organize and apply their skills, self-efficacy beliefs are also seen as contributing directly to one's performance accomplishments (path 12).

Although social cognitive theory especially narrows down on how children and adolescents form a sense of their efficacy in particular tasks and acquire certain expectations about the outcomes of their performance, it is relatively easy to translate this to an adult context. Over the course of their career, people's work environments expose them to a wide array of activities that can fall within and outside their current interest fields. They also observe or hear about others performing various occupational tasks. Further, they are differentially reinforced for pursuing certain activities, some of which they might not have considered pursuing themselves. The specific interactions between working adults and their occupational experiences, with potential implications for interest development, are discussed in greater detail below.

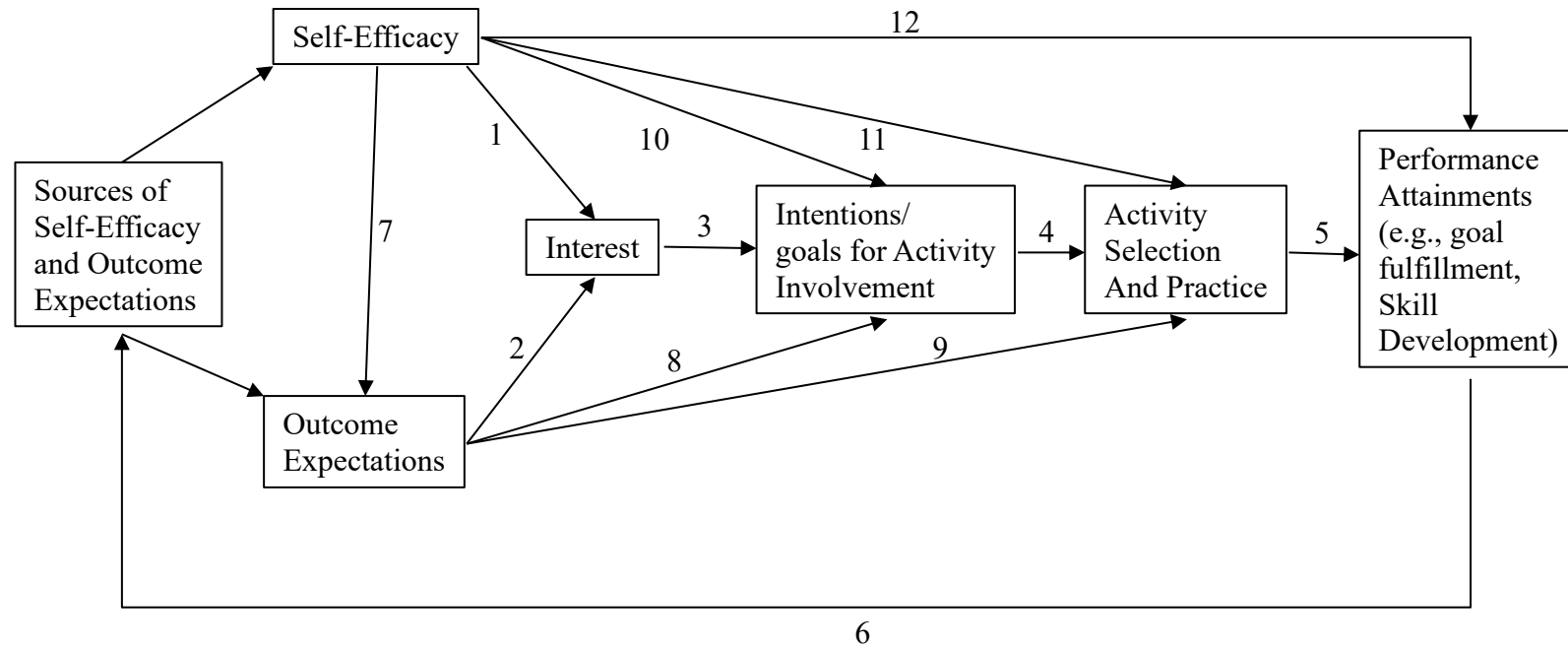


Figure 1. The social cognitive model of how basic career interests develop over time. Adopted from Lent, Brown, and Hackett, 1994.

Interest Development from a Transactional Perspective on Person-Environment Fit

The social cognitive model of interest development illustrates the process of *how* interests can grow through individuals' experiences interacting with their environment. A different but equally important set of questions relate to the *direction* of adults' interest development. Assuming that there is room for individual differences in interest stability and change, how do adult workers select interest domains in which they want to specialize further? What are the triggers, internal and external, that may drive adults to deepen their current interests or to start exploring and developing alternative preference fields? In this section, we aim to shed some light on this complex issue by framing individual interest development in the broader context of a transactional perspective on person-environment fit (see Figure 2). Specifically, we see interest development as one element of personal development over the life course, and we particularly hypothesize that personal development is in continuous transaction with career development through a series of fit dynamics. This transactional model of P-E fit combines elements from interest theory (Holland, 1985), gravitation theory (Schneider, Goldstein, & Smith, 1995; Wilk, Desmarais, & Sackett, 1995), socialization theory (Frese, 1982), work adjustment theory (Dawis & Lofquist, 1984), and frameworks of personality development at work (e.g., Roberts, 2006; Woods, Lievens, De Fruyt, & Wille, 2013).

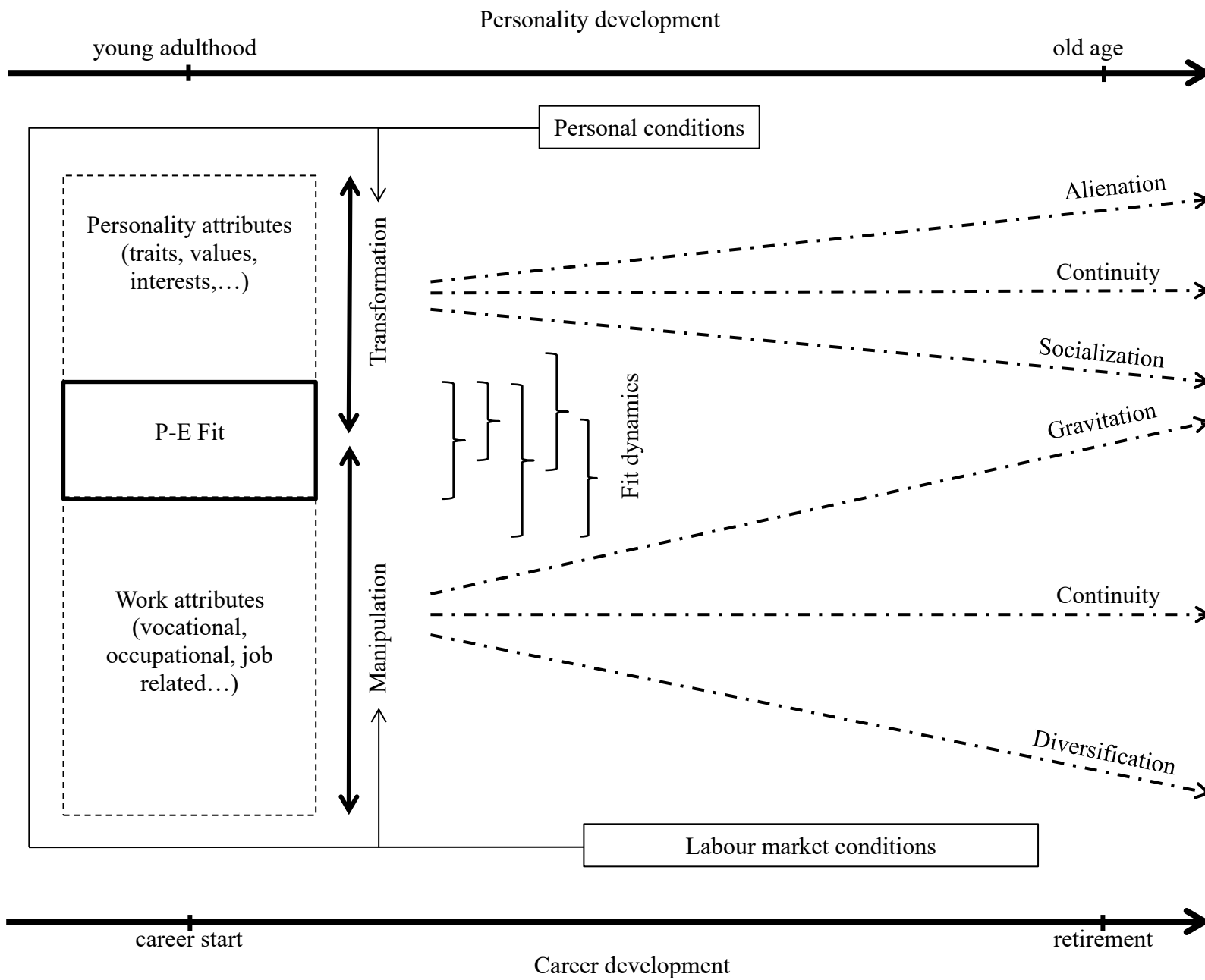


Figure 2. The transactional perspective on person-environment fit.

Fit as an individual level development goal

Theory on development or growth often departs from the (implicit) assumption that this process should lead to some kind of an ideal end point. For instance, theory on personality trait development now more or less converges on the idea that people's personality evolves toward greater maturity (Roberts & Wood, 2006), and that this normative pattern of adult trait development is largely driven by social role investment (e.g., in work, marriage, or parental roles). In addition to these normative personality developmental changes, there is also room for individual differences in change and stability, and these are theorized to be the result of idiosyncratic experiences that people encounter in each of these roles (e.g., specific job characteristics, see Le et al., 2014; Roberts, Caspi, & Moffitt, 2003). In our perspective, adult interest development is much more an individual-level process compared to adult personality trait development. This is because there is no such thing as a normative end result of interest development. Instead, we define the functionality of adult interest development solely at the individual level, and this is where the notion of person-environment fit comes to the fore.

Person-Environment (P-E) fit or congruence can be broadly described as the degree of commensurability between an individual's personal attributes and his or her environment (Low & Rounds, 2007). Much of the work on P-E fit in Industrial/Organizational Psychology and Human Resources Management has been done from the perspective of Schneider's (1987) ASA-model, which suggests that people are *Attracted* to organizations with personal features similar to their own; that organizations will *Select* those people with personal features that resemble their own; and finally that people will be motivated to leave (*Attrition*) organizations that prove to be incompatible with their personal characteristics (see for instance Smith, 2008). The supposed result of this ASA-cycle is increased homogeneity or fit between people and their environments at the organizational level. Building on Roberts' (2006) ASTMA model to describe the reciprocal

processes between personality traits and work in particular, our transactional model of P-E fit supplements the ASA-cycle with two additional mechanisms that refer to the dynamic qualities of personal and work-related attributes respectively: Transformation and manipulation.

As illustrated in Figure 2, P-E fit in this view refers to a certain level of correspondence between personal attributes on one hand and environmental characteristics on the other. Personal attributes include traits, but also interests, values, goals, etc. At the side of the environment, characteristics can be described and analyzed at varying levels of specificity including vocational, occupational, and job or task-related features.. This degree of correspondence, represented by the intersection of personal and work-related attributes, has two defining characteristics in our view. First, P-E fit is essentially dynamic in nature, with the ability to increase as well as decrease over time. This is where our model is different from Schneider's (1987) ASA-cycle which only predicts increases in fit over time. In our view, fit represents the outcome of the continuously evolving transaction between personal and career development. As people and their careers evolve over time, the degree of correspondence between personal and work-related attributes will either grow, shrink, or remain constant (see further). Most authors agree that P-E fit is indeed a dynamic process that unfolds over time (Tracey, 2007). For instance, French, Rodgers, and Cobb (1974) and Caplan (1987) describe P-E fit as an adjustment process where fit is the dynamic result of continuous attempts to alter person and environment characteristics. Along the same line, Holland (1997) described congruence as a *long-term* (p. 4) and *interactive* (p. 12) process, with mutual effects of interests and environments on each other. Nevertheless, remarkably little research has addressed the dynamics of congruence across time in adulthood. One notable exception is the 15-year longitudinal study by Wille, Tracey, Feys, and De Fruyt (2014) who failed to identify absolute (i.e., mean-level) increases in interest-occupation congruence across

time. In this respect, more research is needed on the individual-level trajectories of P-E congruence, its antecedents, and its consequences.

The second elementary feature of P-E fit in the proposed transactional model is that congruence is considered to be inherently beneficial, for both the individual and the environment. For the individual, the assets of working in fitting environments are illustrated by higher levels of well-being and satisfaction (Assouline & Meir, 1987; Tsabari, Tziner, & Meir, 2005). Having fitting employees is also advantageous for the environment, given that they tend to perform better (Nye et al., 2012) and that they will demonstrate less deviant behavior (Iliescu, Ispas, Sulea, & Ilie, 2015). The basic idea is that people feel good in environments that -at least to a certain extent- are congruent with their personal attributes. Note that we do not make any assumption about the specific level of congruence that is optimal, nor do we hypothesize that more (congruence) is necessarily better. The transactional model of P-E fit does stipulate that congruence acts as an incentive, meaning that people are motivated to pursue and/or maintain a certain level of fit over time. This means that they will be attracted to environments with fitting features and that they will try to get themselves selected into these environments, much in line with Schneider's (1987) and Roberts' (2006) models. Further, our definition and representation of fit as the degree of overlap between personal and work-related attributes also illustrates that the evolution of fit over time results from two simultaneous and dynamic forces: Manipulation and transformation. Before explaining them in greater detail, it is already relevant to point out two fundamental features that characterize these basic forces. A first feature is that they can be either self-initiated or they can be driven by external conditions. Although I/O Psychology and Organizational Behavior typically focus on the personal factors that drive work-related behaviors and attitudes, developmental approaches cannot be blind to the impact that external conditions have on these behaviors and attitudes. In this regard, our interpretations of manipulation and

transformation are also different from Roberts' (2006) approach where manipulation is exclusively self-initiated and transformation can only refer to changes in personal characteristics that make them more aligned with the work environment. As a second feature, these dynamic forces impacting fit can either enhance P-E fit or they can lead to decreasing fit. Although there is a lot of support from multiple areas of psychology that individuals do various things to increase fit with their environment over time, the same literature indicates that for various reasons, a substantial number of people also face a situation of misfit at least some of the time during their careers. Our developmental framework attempts to take this reality into account by hypothesizing on both the causes and consequences (for interest development) that follow from misfit. Finally, as can also be seen from Figure 2, it is assumed that there is generally a greater possibility for work-related characteristics to change over time compared to the rather limited room for manoeuvre for personal attributes.

The interplay between manipulation and transformation

Manipulation in this model refers to possible changes in work-related characteristics made by individuals over time. It is a fundamental assumption in P-E fit theory that people actively shape their environment in order to make it more congruent with their personal characteristics. In Figure 2, this process of *gravitation* is illustrated by an upward shift in work-related attributes in the direction of the personal attributes, thus increasing the intersection of both sets of constructs (provided that personal attributes remain unchanged). In this regard, vocational interest development is an iterative process of increasing fit between the person and the environment as individuals choose activities and prune their social networks to conform with their identities, motives, goals, and values (Low & Rounds, 2007). In other words, people 'pic their niches' (Scarr & McCartney, 1983)—aligning their environments with their interests such that the

environmental press is in the direction of maintaining the direction of their interests. Evidence for this gravitational path comes from research showing that people who change jobs frequently switch to ones that are more congruent with their personalities (Oleski & Subich, 1996). Furthermore, Wille and colleagues (2014), tracking people's interests and occupations across the first third of their career, identified an increase in congruence from interests at time 1 with occupation at time 1 to interests at time 1 to occupation at time 2, thus indicating that individuals shifted jobs over time to better fit with their initial interests. This is consistent with the gravitational hypothesis, which states that people gradually and continually evolve towards better fitting environments (Wilk et al., 1995). It is unclear how exactly gravitational processes impact vocational interest development. Does gravitation lead to absolute increases in fitting interest levels? Does this have any consequences for the shape of the entire interest profile of people (e.g., Is there increased interest differentiation?). Future research is needed to shed light on these unresolved questions.

Still under the umbrella of manipulation, but in the opposite direction of gravitation, there may also be *diversification*: People may decide to or may be forced to change their work environment away from their personal characteristics. This process is illustrated in Figure 2 by a downward shift in work-related attributes moving away from the personal attributes, thus diminishing the amount of overlap between both sets of attributes. It is unrealistic to expect career moves to be solely inspired by a desire for increased P-E fit alone. Instead, it may be both personal considerations and labor market conditions that may encourage or force people to engage in diversification and there is research in the turnover literature (e.g., Hulin, Roznowski, & Hachiya, 1985), on job search behaviors (e.g., Saks & Ashforthh, 2002), and on underemployment (e.g., McKee-Ryan & Harvey, 2011) to support this. Personal motives may either reflect deliberate choices, personal necessities, or a combination of both. To give a couple

of examples, people may be motivated to switch to less fitting jobs because of financial reasons (i.e., higher compensation), better work/life conditions (e.g., choosing a job that is intrinsically less satisfying but that is closer to home), or health-related reasons (e.g., deciding to take a step back and/or to change direction after the experience of a burnout). In addition, diversification may also be driven by specific labor market conditions. For instance, young people searching for a first job may be forced to consider less fitting occupations because of a shortage of jobs in certain industries or interest fields. Regardless of the reasons why people get involved in work environments with attributes that diverge from their personal attributes, the case of diversification represents a crucial challenge in terms of personal attribute development. Applying this to interest development in particular, the question is whether involvement in less fitting occupations may also cause interests to change over time and, if yes, under which conditions? As can be derived from Figure 2, in the case of diversification, the only way in which people can restore their level of P-E fit is by gradually adjusting their personal attributes in such a way that these are more closely aligned with their new work-related attributes.

Before delving deeper into the possibility of change in personal attributes, it is worth pointing out that the transactional model of P-E fit also leaves the door open for stability or *continuity* in work-related attributes over time. Despite ongoing changes in the career landscape in the direction of greater mobility and flexibility (Arthur, Khapova, & Wilderom, 2005), a significant number of individuals still experience long periods of status quo. For example, Wille and De Fruyt (2014) observed that almost one third (32.3%) of the college alumni that were followed over time reported exactly the same job title in 2010 compared to 15 years earlier. When job titles were categorized based on the first letter of their O*NET RIASEC letter code, 45.4% demonstrated continuity in occupations held (i.e., retained the same primary RIASEC letter in their job code over time). Finally, acknowledging stability in work-related attributes,

next to changes in these attributes, is also relevant to better understand several aspects of personal development. Specifically, this stability in environmental characteristics has been identified as one of the capital forces behind continuity in personal attributes (Roberts & Wood, 2006).

In addition to work environments developing over time, the transactional model also considers change and continuity in personal attributes as a mechanism steering P-E fit. This development of personal attributes, including vocational interests, is represented in the transactional perspective by a second dynamic force referred to as *transformation* (see Figure 2). In his framework on personality development and organizational behavior, Roberts (2006) uses the notion of transformation to exclusively refer to development in personality traits that happens in reaction to work-related characteristics. Our current conceptualization of transformation is broader than that in the sense that we also consider development in personal attributes that is not necessarily instigated by our work-related experiences. For instance, there is evidence that personality trait development in adulthood is also influenced by factors such as the experience of disease (Sutin, Zonderman, Ferrucci, & Terracciano, 2013), challenges that result from the parent role (Jokela, Kivimaki, Elovainio, & Keltikangas-Jarvinen, 2009; van Scheppingen et al., 2016), and changes in relationship status (e.g., finding a partner or breaking up; Specht, Egloff, & Schmukle, 2011). In sum, we find it relevant to also pay attention to development in personal attributes that may not directly originate from work experiences, but that may pose crucial challenges for people's career development anyway.

Socialization happens when individuals work on themselves, consciously or unconsciously, to better align their personal attributes with existing or new work-related attributes. Similar to the definition of socialization in the organizational literature (e.g., Bauer, Bodner, Erdogan, Truxillo, & Tucker, 2007), this personal development can either be self-

initiated or not. Different than organizational socialization, however, is that the current conceptualization is not restricted to influences at the organizational level (e.g., to conform with an organization's culture), but also acknowledges occupational pressures (e.g., to conform with values, beliefs, and norms associated with a particular type of work). The goal of socialization is, hence, to gradually acquire (when it is self-initiated) or install (when it is initiated externally) the attributes that are regarded as appropriate and desirable in the respective setting (see also Schneider, 1987). In line with this, socialization is represented in our model by the downward path of personal attributes in the direction of the work-related attributes, thus enhancing the level of correspondence between both sets. Socialization may be happening for school leavers entering the world of work and embarking on a new career path. For instance, imagine a young adult choosing the profession of police officer. Holding the personal attributes that fit this profession is highly important for functioning as a police officer and being happy in this occupation. Police officers who do not hold the attributes (e.g., values; Bardi, Buchanan, Goodwin, Slabu, & Robinson, 2014) that fit the profession may find it hard to perform their duty under difficult conditions, such as arresting people who try to resist. Hence, although a certain level of fit will probably be ensured by processes of self-selection that affect the choice to become a police officer, there is also high potential for socialization as a way to improve fit over time. For instance, police recruits receive formal training and close mentoring by experienced officers, both of which are likely to be significant sources of socialization (Cable & Parsons, 2001; Chatman, 1991). Research on socialization effects has mainly focused on changes in personality traits in response to work-related experiences (e.g., Denissen, Ulferts, Luedtke, Muck, & Gerstorf, 2014; Hudson et al., 2012; Le et al., 2014; Wille & De Fruyt, 2014), and much of this work has relied on Roberts and colleagues' corresponive principle (Caspi, Roberts, & Shiner, 2005; Roberts et al., 2003). Accordingly, life experiences accentuate those personal characteristics prospectively

associated with those life experiences in the first place. There is existing support for the corresponive principle when considering personality development in the workplace. For instance, earlier research has demonstrated that college alumni who score lower on Openness tend to prefer Conventional work environments at the start of their career, and these Conventional work characteristics in turn also predict changes in this trait over time (Wille & De Fruyt, 2014). Work experiences do not impinge themselves on people in a random fashion; rather, it appears that a work environment facilitates the development of traits that are functional in that specific work role. Interestingly, Holland (1997) suggested that similar processes should also exist for vocational interests when he talks about “secondary effects” in his theory of vocational personalities (p. 47). Accordingly, people do not only gravitate toward more fitting environments over time, but at the same time they are assumed to deepen the interests -and associated traits and motives- that got them selected into these environments in the first place. This combination of gravitation and socialization should result in vast increases in P-E fit over time, as is illustrated in Figure 2. As a scarce empirical illustration of such interest socialization processes, Meir and Navon (1992) found newly-employed bank tellers to converge toward a Conventional interest profile after half a year of employment, with the tellers’ level of congruence being highly associated with their performance evaluation.

It may be clear that much remains to be learned about interest socialization in adulthood. Particularly pertinent questions relate for example to the possibility of interest change as a reaction to drastic career switches, which can either be self-initiated or involuntary. Specifically, people switching jobs across interest fields may face the need to adjust to a new set of work-related attributes that appeal to personal attributes that may have remained underdeveloped until then. The advantages of considering the transactional approach to P-E fit in this context is that it provides researchers and counselors with a shared language to describe the mechanisms that are

involved, and that it also allows specific predictions. Specifically, the case described above would be an example of potential *socialization* effects following *diversification*, and the hypothesis would be that the result of these two forces acting jointly would be stability in P-E fit across time. In the case that people do not succeed in adjusting to these changing work-related attributes -in Figure 2 this is indicated by continuity in personal attributes- this would mean a reduction in P-E fit over time.

Opposite to socialization, the model also allows personal attributes to move away from work-related attributes. The term *alienation* was chosen to highlight the process by which people lose touch with their current work environment as their interests develop over time. Applying this to interest development, alienation implies that people can lose interest in the type of work that they perform, and this diminished interest may or may not be accompanied by growing preferences for different kinds of work-related experiences, causing a shift in occupational preferences. Despite its obvious relevance from an applied perspective, this issue of alienation has not yet been systematically studied and to date very little is known about this phenomenon. Possible causes of alienation could be a lack of perceived challenge and variation, causing people to bore out (e.g., “*I have experienced everything there is to experience in this profession*”). In terms of outcomes, people may recognize an ongoing process of alienation by indicators such as a loss of intrinsic motivation in the work they perform and lower levels of engagement (e.g., being less motivated to ‘go the extra mile’). When it occurs, and people’s interests cannot be rekindled anymore, the transactional model prescribes gravitation towards new work-related environments in order to make sure that personal and work attributes remain aligned and a desirable level of P-E fit is secured or restored.

Finally, it is important to note that the outlined developmental paths in this transactional model (i.e., continuity, alienation, socialization, gravitation, and diversification) are hypothesized

to be discontinuous, as indicated by the dotted lines, meaning that people can switch between paths, depending on the specific challenges or ‘anchor points’ that they encounter along their professional and personal development. The model is intended to give a broad overview of the different ways in which personal attributes, including vocational interests, can interact with aspects from our career development. In this regard, the transactional perspective complements rather than substitutes existing theoretical frameworks, such as the social cognitive model discussed earlier. Specifically, whenever the transactional model hypothesizes interest change, be it socialization or alienation, the underlying mechanisms described by the social cognitive model will come into play.

The Time is Now: Challenges for Adult Interest Development in the 21st Century

In this final section, the topic of adult interest development is discussed within the context of some prominent changes in the career landscape. We specifically highlight three recent evolutions that each present a set of challenges that relate directly to interest development: Increased flexibility, working at older age, and competitive workforces.

Increased Worker Flexibility

The theoretical perspectives covered in this chapter both describe interest development as the result of an interactive process between a person and his or her (work) environment. This emphasis on environmental influences could be one of the underlying reasons why interest change has received relatively little attention in the past: The traditional career was assumed to be largely linear and predictable, with little room for drastic changes in work-related attributes. This is in contrast with the idea of a boundaryless career (Arthur & Rousseau, 1996), which puts more emphasis on mobility and flexibility. For instance, whereas career success used to be mainly an issue of securing a specific career and succeeding in climbing the corporate ladder, being

successful today involves being marketable or ‘employable’, which includes demonstrating ability and flexibility to learn on the job, to adapt to professional structures, and to prepare for future challenges (De Fruyt, Wille, & John, 2015). More than in the past, people are expected to navigate their careers and to explore different directions, which -along the way- also exposes them to a variety of experiences from different interest fields. We hypothesize that 21st century workers are challenged now to reappraise their career paths more frequently, which may stimulate the processes of interest development described above. The idea here is that increased flexibility and mobility may enable people to come upon interest fields that they had not considered earlier. Just as theory on personality development suggests that environmental stability is one of the important forces driving personality stability (e.g., Roberts & Wood, 2006), the same is true for interest development. It is only when people have the chance to -or, in certain cases, are pushed towards- new environments that they may start to develop new self-efficacy beliefs and growing interests. While prior research has typically considered interests as *predictors* of turnover (see for instance Van Iddekinge et al., 2011) and career mobility (e.g., Wille, De Fruyt, & Feys, 2010), more research is needed on the effects of job and career mobility on the development of interests over time.

Working at Older Age

Next to increased flexibility, the aging of the workforce is also a growing concern for organizations of the 21st century. For instance, studies on the projected retirement of older workers suggest that more than half of the organizations expect to experience a worker shortage as a result of Baby Boomers retiring (Mermin, Johnson, & Toder, 2008). If we want to motivate older workers to remain active in the labor market, at least two challenges need to be tackled that directly relate to interest development. First, we will need to prevent older workers from boring

out or from alienating from work in other ways. Second, when older workers can no longer cope with the demanding (e.g., physical) requirements accompanying work in certain (e.g., Realistic) industries, they will need assistance in reorienting them towards different but more fitting work environments (i.e., diversification). Further, as the demographics of the workforce change, employers will be increasingly confronted with potential cohort and/or generational differences in personal attributes and vocational interests among their age-diverse staff. For instance, Twenge (2001) found more recent birth cohorts to be more assertive and describing themselves as having higher leadership abilities compared to the self-descriptions of earlier birth cohorts (Twenge, Campbell, & Gentile, 2012). Along the same line, Bubany and Hansen (2011) demonstrated an overall increase in Enterprising and Social interests among more recent birth cohorts. It should be noted, however, that the association between age, birth cohort, and vocational interests are still poorly understood and that more research on this topic is warranted before drawing firm conclusions (Leuty & Hansen, 2014). Nevertheless, the issue of people working at later ages, in collaboration with people from younger cohorts and generations, poses a second set of challenges with particular relevance to the topic of adult interest development.

Competitive Workforces Through Interventions

Finally, in order to meet the challenges that nations face of remaining competitive with other scientifically and technologically advanced countries, much emphasis is now placed on the production of more postsecondary and advanced degrees in the Science, Technology, Engineering and Math (STEM) fields, as well as on promoting professional careers in these interest domains. Over the past decades, various strategies have been devised and implemented to address the challenges having to do with the quality, quantity and diversity of the STEM educational pipeline. At the postsecondary level in particular, STEM intervention programs

(SIPs) have emerged as a means to foster, support, and sustain the interest of students in STEM. Although research on the actual efficacy of these programs is still limited, there is some evidence that suggests that these interventions might indeed be successful, at least in middle-school adolescents (Turner & Lapan, 2005) and college students (Luzzo, Hasper, Albert, Bibby, & Martinelli, 1999). Moreover, the active ingredients of these interventions seem to be in line with theoretical perspectives on interest development, such as the social cognitive model outlined earlier. Specifically, a key element in increasing interests consists of increasing self-efficacy expectations, and these are relatively easily manipulated through intervention (e.g., Betz & Schifano, 2000). It remains to be examined, however, to which extent such interventions may help to affect the interests of more mature adults, whose interest profiles are more crystalized.

Practical Implications of Adult Development in Interests

Early investigations of interest development were mainly concerned with demonstrating continuity in interests over time, because this would facilitate the use and acceptance of interest inventories in applied settings such as counseling and selection. The evidence that emerged recently, demonstrating predictive validity of interest scales for various performance indicators, further supported the utility of interest assessment. So, when delving deeper into the issue of interest change, are we undermining this recent optimism concerning the role of interests in applied settings? After all, changes in, for instance, the rank-order of interest scores could be associated with relative changes in associated performance scores. In other words, should interests prove to be highly volatile, then single-shot interest assessments in the selection process would prove to be of little value for predicting future performance.

The extant knowledge on adult interest development offers no reasons to be pessimistic in this regard. Although a lot still remains to be learned in this field, it is safe to conclude from this literature that, just like other individual differences such as values, personality traits and cognitive abilities, adult interests show sufficiently high levels of continuity to make predictive claims. This is backed-up by (a) longitudinal studies demonstrating moderate-to-high levels of stability in interests across different development indicators (see above), (b) studies demonstrating a substantial heritable component in interests (e.g., Kandler, Bleidorn, Riemann, Angleitner, & Spinath, 2011), and (c) studies integrating interests in a nomological network of relatively stable cognitive (e.g., Paessler, Beinicke, & Hell, 2015) and noncognitive (e.g., Mount, Barrick, Scullen, & Rounds, 2005) individual differences that are successfully used in assessment practice.

Conclusion

In the beginning of interest scholarship, there was mainly concern about the permanence of interests, because this would be a crucial factor in the acceptance and predictive validity of the newly developed interest measures. What we now know from the literature is that vocational interests are indeed relatively stable across adulthood, but that there is at the same time room for change. Unfortunately, this “dynamic quality” (Low et al., 2005, p. 727) of adult vocational interests has to date received little attention, and thus remains poorly understood. The current chapter attempted to integrate the available findings and theory relevant to adult interest development, and broadened the discussion of this topic by framing it in the context of a transactional perspective on person-environment fit. We should not be afraid of interest discontinuity; nor should we treat it as error. Instead, we need to put more effort in trying to better understand interest change at the individual level, its causes, and consequences. As was

outlined above, it can be expected that recent changes in the career landscape, combined with expected transitions in labor force demographics, will further underline the need to pay more attention to adult interest development.

References

- Allemand, M., Zimprich, D., & Hertzog, C. (2007). Cross-sectional age differences and longitudinal age changes of personality in middle adulthood and old age. *Journal of Personality, 75*(2), 323-358. doi:10.1111/j.1467-6494.2006.00441.x
- Armstrong, P. I., & Vogel, D. L. (2009). Interpreting the interest-efficacy association from a RIASEC perspective. *Journal of Counseling Psychology, 56*(3), 392-407. doi:10.1037/a0016407
- Arthur, M. B., Khapova, S. N., & Wilderom, C. P. M. (2005). Career success in a boundaryless career world. *Journal of Organizational Behavior, 26*(2), 177-202. doi:10.1002/job.290
- Arthur, M. B., & Rousseau, D. M. (1996). Introduction: The boundaryless career as a new employment principle. In M. B. Arthur & D. M. Rousseau (Eds.), *The boundaryless career: A new employment principle for a new organizational era* (pp. 3-20). New York: Oxford University Press.
- Assouline, M., & Meir, E. I. (1987). Meta-analysis of the relationship between congruence and well-being measures. *Journal of Vocational Behavior, 31*(3), 319-332.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bardi, A., Buchanan, K. E., Goodwin, R., Slabu, L., & Robinson, M. (2014). Value stability and change during self-chosen life transitions: Self-selection versus socialization effects. *Journal of Personality and Social Psychology, 106*(1), 131-147. doi:10.1037/a0034818
- Barrick, M. R., Mount, M. K., & Gupta, R. (2003). Meta-analysis of the relationship between the five-factor model of personality and Holland's occupational types. *Personnel Psychology, 56*(1), 45-74. doi:10.1111/j.1744-6570.2003.tb00143.x

- Bauer, T. N., Bodner, T., Erdogan, B., Truxillo, D. M., & Tucker, J. S. (2007). Newcomer adjustment during organizational socialization: A meta-analytic review of antecedents, outcomes, and methods. *Journal of Applied Psychology, 92*(3), 707-721.
doi:10.1037/0021-9010.92.3.707
- Betz, N. E., & Schifano, R. S. (2000). Evaluation of an intervention to increase realistic self-efficacy and interests in college women. *Journal of Vocational Behavior, 56*(1), 35-52.
doi:10.1006/jvbe.1999.1690
- Biesanz, J. C., West, S. G., & Kwok, O. M. (2003). Personality over time: Methodological approaches to the study of short-term and long-term development and change. *Journal of Personality, 71*(6), 905-941. doi:10.1111/1467-6494.7106002
- Block, J. (1971). *Lives through time*. Berkeley, CA: Bancroft Books.
- Bubany, S. T., & Hansen, J.-I. C. (2011). Birth cohort change in the vocational interests of female and male college students. *Journal of Vocational Behavior, 78*(1), 59-67.
doi:10.1016/j.jvb.2010.08.002
- Cable, D. M., & Parsons, C. K. (2001). Socialization tactics and person-organization fit. *Personnel Psychology, 54*(1), 1-23. doi:10.1111/j.1744-6570.2001.tb00083.x
- Campbell, D. P. (1971). *Handbook for the Strong Vocational Interest Blank*. Stanford, CA: Stanford University Press.
- Caplan, R. D. (1987). Person-environment fit theory and organizations: Commensurate dimensions, time perspectives, and mechanisms. *Journal of Vocational Behavior, 31*(3), 248-267. doi:10.1016/0001-8791(87)90042-x
- Caspi, A., & Roberts, B. W. (1999). Personality and continuity and change across the life course. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (pp. 300-326). New York: Guilford Press.

- Caspi, A., & Roberts, B. W. (2001). Personality development across the life course: The argument for change and continuity. *Psychological Inquiry*, 12(2), 49-66.
- Caspi, A., Roberts, B. W., & Shiner, R. L. (2005). Personality development: Stability and change. *Annual Review of Psychology*, 56, 453-484. doi:10.1146/annurev.psych.090902.141913
- Chatman, J. A. (1991). Matching people and organizations: Selection and socialization in public accounting firms. *Administrative Science Quarterly*, 36(3), 459-484.
doi:10.2307/2393204
- Cronbach, L. J., & Gleser, G. C. (1953). Assessing similarity between profiles. *Psychological Bulletin*, 50, 456-473. doi:10.1037/h0057173
- Darcy, M. U. A., & Tracey, T. J. G. (2007). Circumplex structure of Holland's RIASEC interests across gender and time. *Journal of Counseling Psychology*, 54(1), 17-31.
doi:10.1037/022-0167.54.1.17
- Dawis, R. V., & Lofquist, L. H. (1984). *A psychological theory of work adjustment*. Minneapolis: University of Minnesota Press.
- De Fruyt, F., Bartels, M., Van Leeuwen, K. G., De Clercq, B., Decuyper, M., & Mervielde, I. (2006). Five types of personality continuity in childhood and adolescence. *Journal of Personality and Social Psychology*, 91(3), 538-552. doi:10.1037/0022-3514.91.3.538
- De Fruyt, F., Wille, B., & John, O. P. (2015). Employability in the 21st century: Complex (interactive) problem solving and other essential skills. *Industrial and Organizational Psychology: Perspectives on Science and Practice*, 8, 276-281.
- Denissen, J. J. A., Ulferts, H., Luedtke, O., Muck, P. M., & Gerstorf, D. (2014). Longitudinal transactions between personality and occupational roles: A large and heterogeneous study of job beginners, stayers, and changers. *Developmental Psychology*, 50(7), 1931-1942.
doi:10.1037/a0036994

- Donnay, D. A. C., Morris, M. L., Schaubhut, N. A., & Thompson, R. C. (2005). *Strong Interest Inventory Manual (Revised Ed.)*. Palo Alto, CA: Consulting Psychologists Press.
- Donnay, D. A. C., Thompson, R. C., Morris, M. A., & Schaubhut, N. (August, 2004). *Exploring age and gender differences in vocational interests*. Poster presented at the Annual Convention of the American Psychological Association. Honolulu, HI.
- French, J. R. P., Rodgers, W., & Cobb, S. (1974). Adjustment as person-environment fit. In G. V. Coelho, D. A. Hamburg, & J. E. Adams (Eds.), *Coping and adaptation*. New York: Basic Books.
- Frese, M. (1982). Occupational socialization and psychological development: An underemphasized research perspective in industrial psychology. *Journal of Occupational Psychology*, 55(3), 209-224.
- Gupta, S., Tracey, T. J. G., & Gore, P. A., Jr. (2008). Structural examination of RIASEC scales in high school students: Variation across ethnicity and method. *Journal of Vocational Behavior*, 72(1), 1-13. doi:10.1016/j.jvb.2007.10.013
- Hogan, R., & Roberts, B. W. (2004). A socioanalytic model of maturity. *Journal of Career Assessment*, 12(2), 207-217. doi:10.1177/1069072703255882
- Holland, J. L. (1985). *Making vocational choices: A theory of vocational personalities and work environments* (2nd ed.). Odessa, FL: Psychological Assessment Resources, Inc.
- Holland, J. L. (1997). *Making vocational choices: A theory of vocational personalities and work environments* (3rd ed.). Odessa, FL: Psychological Assessment Resources, Inc.
- Hubert, L., & Arabie, P. (1987). Evaluating order hypotheses within proximity matrices. *Psychological Bulletin*, 102(1), 172-178. doi:10.1037/0033-2909.102.1.172

- Hudson, N. W., Roberts, B. W., & Lodi-Smith, J. (2012). Personality trait development and social investment in work. *Journal of Research in Personality*, 46(3), 334-344.
doi:10.1016/j.jrp.2012.03.002
- Hulin, C. L., Roznowski, M., & Hachiya, D. (1985). Alternative opportunities and withdrawal decisions: Empirical and theoretical discrepancies and an integration. *Psychological Bulletin*, 97(2), 233.
- Iliescu, D., Ispas, D., Sulea, C., & Ilie, A. (2015). Vocational fit and counterproductive work behaviors: A self-regulation perspective. *Journal of Applied Psychology*, 100(1), 21-39.
doi:10.1037/a0036652
- Johansson, C. B., & Campbell, D. P. (1971). Stability of Strong Vocational Interest Blank for men. *Journal of Applied Psychology*, 55(1), 34-&. doi:10.1037/h0030627
- Jokela, M., Kivimäki, M., Elovainio, M., & Keltikangas-Järvinen, L. (2009). Personality and having children: A two-way relationship. *Journal of Personality and Social Psychology*, 96(1), 218-230. doi:10.1037/a0014058
- Kandler, C., Bleidorn, W., Riemann, R., Angleitner, A., & Spinath, F. M. (2011). The genetic links between the Big Five personality traits and general interest domains. *Personality and Social Psychology Bulletin*, 37, 1633-1643. doi:10.1177/0146167211414275
- Kantamneni, N. (2014). Vocational interest structures for Asian Americans, Middle-Eastern Americans and Native Americans on the 2005 Strong Interest Inventory. *Journal of Vocational Behavior*, 84(2), 133-141. doi:10.1016/j.jvb.2013.11.003
- Larson, L. M., Rottinghaus, P. J., & Borgen, F. H. (2002). Meta-analyses of big six interests and big five personality factors. *Journal of Vocational Behavior*, 61(2), 217-239.
doi:10.1006/jvbe.2001.1854

- Le, K., Donnellan, M. B., & Conger, R. (2014). Personality development at work: Workplace conditions, personality changes, and the corresponive principle. *Journal of Personality*, 82(1), 44-56. doi:10.1111/jopy.12032
- Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior*, 45(1), 79-122.
- Lent, R. W., Brown, S. D., & Hackett, G. (2000). Contextual supports and barriers to career choice: a social cognitive analysis. *Journal of Counseling Psychology*, 47(1), 36-49. doi:10.1037//0022-0167.47.1.36
- Leuty, M. E., & Hansen, J.-I. C. (2014). Teasing apart the relations between age, birth cohort, and vocational interests. *Journal of Counseling Psychology*, 61(2), 289-298. doi:10.1037/a0035341
- Little, T. D. (1997). Mean and covariance structures (MACS) analyses of cross-cultural data: Practical and theoretical issues. *Multivariate Behavioral Research*, 32, 53-76. doi:10.1207/s15327906mbr3201_3
- Low, K. S. D., & Rounds, J. (2007). Interest change and continuity from early adolescence to middle adulthood. *International Journal for Educational and Vocational Guidance*, 7(1), 23-36.
- Low, K. S. D., Yoon, M. J., Roberts, B. W., & Rounds, J. (2005). The stability of vocational interests from early adolescence to middle adulthood: A quantitative review of longitudinal studies. *Psychological Bulletin*, 131(5), 713-737.
- Luzzo, D. A., Hasper, P., Albert, K. A., Bibby, M. A., & Martinelli, E. A. (1999). Effects of self-efficacy-enhancing interventions on the math/science self-efficacy and career interests,

- goals, and actions of career undecided college students. *Journal of Counseling Psychology*, 46(2), 233-243. doi:10.1037/0022-0167.46.2.233
- McKee-Ryan, F. M., & Harvey, J. (2011). "I have a job, but...": A review of underemployment. *Journal of Management*, 37(4), 962-996.
- Meir, E. I., & Navon, M. (1992). A longitudinal examination of congruence hypotheses. *Journal of Vocational Behavior*, 41(1), 35-47. doi:10.1016/0001-8791(92)90037-z
- Mermin, G. B. T., Johnson, R. W., & Toder, E. J. (2008). *Will employers want aging boomers?* Washington, DC: Urban Institute Retrieved from http://www.in.gov/icw/files/aging_boomers.pdf.
- Mount, M. K., Barrick, M. R., Scullen, S. M., & Rounds, J. (2005). Higher-order dimensions of the big five personality traits and the big six vocational interest types. *Personnel Psychology*, 58, 447-478.
- Nauta, M. M., Kahn, J. H., Angell, J. W., & Cantarelli, E. A. (2002). Identifying the antecedent in the relation between career interests and self-efficacy: Is it one, the other, or both? *Journal of Counseling Psychology*, 49(3), 290-301. doi:10.1037//0022-0167.49.3.290
- Nesselroade, J. R. (1991). The warp and woof of the developmental fabric. In R. Downs, L. Liben & D. S. Palermo (Eds.), *Visions of aesthetics, the environment, and development: The legacy of Joachim F. Wohwill* (pp. 213-240). Hillsdale, NJ: Erlbaum.
- Nye, C. D., Su, R., Rounds, J., & Drasgow, F. (2012). Vocational interests and performance: A quantitative summary of over 60 years of research. *Perspectives on Psychological Science*, 7(4), 384-403. doi:10.1177/1745691612449021
- Oleski, D., & Subich, L. M. (1996). Congruence and career change in employed adults. *Journal of Vocational Behavior*, 49(3), 221-229. doi:10.1006/jvbe.1996.0041

- Paessler, K., Beinicke, A., & Hell, B. (2015). Interests and intelligence: A meta-analysis. *Intelligence*, 50, 30-51. doi:10.1016/j.intell.2015.02.001
- Roberts, B. W. (2006). Personality development and organizational behavior. *Research in Organizational Behavior*, 27, 1-40. doi:10.1016/S0191-3085(06)27001-1
- Roberts, B. W., Caspi, A., & Moffitt, T. E. (2003). Work experiences and personality development in young adulthood. *Journal of Personality and Social Psychology*, 84(3), 582-593. doi:10.1037/0022-3514.84.3.582
- Roberts, B. W., & DelVecchio, W. F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. *Psychological Bulletin*, 126(1), 3-25. doi:10.1037/0033-2909.126.1.3
- Roberts, B. W., & Mroczek, D. (2008). Personality trait change in adulthood. *Current Directions in Psychological Science*, 17(1), 31-35. doi:10.1111/j.1467-8721.2008.00543.x
- Roberts, B. W., Walton, K. E., & Viechtbauer, W. (2006). Patterns of mean-level change in personality traits across the life course: A meta-analysis of longitudinal studies. *Psychological Bulletin*, 132(1), 1-25. doi:10.1037/0033-2909.132.1.1
- Roberts, B. W., & Wood, D. (2006). Personality development in the context of the neo-socioanalytic model of personality. In D. K. Mroczek & T. D. Little (Eds.), *Handbook of personality development* (pp. 11-39). Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Rounds, J., & Tracey, T. J. (1996). Cross-cultural structural equivalence of RIASEC models and measures. *Journal of Counseling Psychology*, 43(3), 310-329. doi:10.1037/0022-0167.43.3.310

- Rounds, J., Tracey, T. J., & Hubert, L. (1992). Methods for evaluating vocational interest structural hypotheses. *Journal of Vocational Behavior*, 40(2), 239-259. doi:10.1016/0001-8791(92)90073-9
- Saks, A. M., & Ashforth, B. E. (2002). Is job search related to employment quality? It all depends on the fit. *Journal of applied Psychology*, 87, 646-654.
- Scarr, S., & McCartney, K. (1983). How people make their own environments: A theory of genotype-environment effects. *Child Development*, 54(2), 424-435. doi:10.1111/j.1467-8624.1983.tb03884.x
- Schneider, B. (1987). The people make the place. *Personnel Psychology*, 40(3), 437-453. doi:10.1111/j.1744-6570.1987.tb00609.x
- Schneider, B., Goldstein, H. W., & Smith, D. B. (1995). The ASA framework: An update. *Personnel Psychology*, 48(4), 747-773. doi:10.1111/j.1744-6570.1995.tb01780.x
- Smith, D. B. (Ed.) (2008). *The People Make the Place: Dynamic Linkages Between Individuals and Organizations*. New York: Lawrence Erlbaum Associates.
- Specht, J., Egloff, B., & Schmukle, S. C. (2011). Stability and change of personality across the life course: The impact of age and major life events on mean-level and rank-order stability of the big five. *Journal of Personality and Social Psychology*, 101(4), 862-882. doi:10.1037/a0024950
- Sutin, A. R., Zonderman, A. B., Ferrucci, L., & Terracciano, A. (2013). Personality traits and chronic disease: Implications for adult personality development. *Journals of Gerontology Series B-Psychological Sciences and Social Sciences*, 68(6), 912-920. doi:10.1093/geronb/gbt036

- Swanson, J. L. (1999). Stability and change in vocational interests. In M. L. Savickas & A. R. Spokane (Eds.), *Vocational interests: Meaning, measurement, and counseling use* (1st ed., pp. 135-161). Palo Alto, CA: Davies-Black Publishing.
- Tracey, T. J. G. (2002). Development of interests and competency beliefs: A 1-year longitudinal study of fifth- to eighth-grade students using the ICA-R and structural equation modeling. *Journal of Counseling Psychology, 49*(2), 148-163. doi:10.1037//0022-0167.49.2.148
- Tracey, T. J. G. (2007). Moderators of the interest congruence-occupational outcome relation. *International Journal for Educational and Vocational Guidance, 7*, 37-45.
doi:10.1007/s10775-006-9111-3
- Tracey, T. J. G., & Robbins, S. B. (2005). Stability of interests across ethnicity and gender: A longitudinal examination of grades 8 through 12. *Journal of Vocational Behavior, 67*, 335-364. doi:10.1016/j.jvb.2004.11.003
- Tracey, T. J. G., Robbins, S. B., & Hofsess, C. D. (2005). Stability and change in interests: A longitudinal study of adolescents from grades 8 through 12. *Journal of Vocational Behavior, 66*(1), 1-25. doi:10.1016/j.jvb.2003.11.002
- Tsabari, O., Tziner, A., & Meir, E. I. (2005). Updated meta-analysis on the relationship between congruence and satisfaction. *Journal of Career Assessment, 13*(2), 216-232.
doi:10.1177/1069072704273165
- Turner, S. L., & Lapan, R. T. (2005). Evaluation of an intervention to increase non-traditional career interests and career-related self-efficacy among middle-school adolescents. *Journal of Vocational Behavior, 66*(3), 516-531. doi:10.1016/j.jvb.2004.02.005
- Twenge, J. M. (2001). Changes in women's assertiveness in response to status and roles: A cross-temporal meta-analysis, 1931-1993. *Journal of Personality and Social Psychology, 81*(1), 133-145. doi:10.1037//0022-3514.81.1.133

- Twenge, J. M., Campbell, W. K., & Gentile, B. (2012). Generational increases in agentic self-evaluations among American college students, 1966-2009. *Self and Identity*, 11(4), 409-427. doi:10.1080/15298868.2011.576820
- Van Iddekinge, C. H., Roth, P. L., Putka, D. J., & Lanivich, S. E. (2011). Are you interested? A meta-analysis of relations between vocational interests and employee performance and turnover. *Journal of Applied Psychology*, 96(6), 1167-1194. doi:10.1037/a0024343
- van Scheppingen, M. A., Jackson, J. J., Specht, J., Hutteman, R., Denissen, J. J. A., & Bleidorn, W. (2016). Personality trait development during the transition to parenthood: A test of Social Investment Theory. *Social Psychological and Personality Science*, 7(5), 452-462. doi:10.1177/1948550616630032
- Wilk, S. L., Desmarais, L. B., & Sackett, P. R. (1995). Gravitation to jobs commensurate with ability: Longitudinal and cross-sectional tests. *Journal of Applied Psychology*, 80(1), 79-85. doi:10.1037/0021-9010.80.1.79
- Wille, B., & De Fruyt, F. (2014). Vocations as a source of identity: Reciprocal relations between big five personality traits and RIASEC characteristics over 15 Years. *Journal of Applied Psychology*, 99(2), 262-281. doi:10.1037/a0034917
- Wille, B., De Fruyt, F., & Feys, M. (2010). Vocational interests and big five traits as predictors of job instability. *Journal of Vocational Behavior*, 76, 547-558. doi:10.1016/j.jvb.2010.01.007
- Wille, B., Tracey, T. J. G., Feys, M., & De Fruyt, F. (2014). A longitudinal and multi-method examination of interest-occupation congruence within and across time. *Journal of Vocational Behavior*, 84(1), 59-73. doi:10.1016/j.jvb.2013.12.001

Woods, S. A., Lievens, F., De Fruyt, F., & Wille, B. (2013). Personality across working life: The longitudinal and reciprocal influences of personality on work. *Journal of Organizational Behavior*, 34, 7-25. doi:10.1002/job.1863