

## What Drives Adult Personality Development? A Comparison of Theoretical Perspectives and Empirical Evidence

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*Abstract:* Increasing numbers of empirical studies provide compelling evidence that personality traits change across the entire lifespan. What initiates this continuing personality development and how does this development proceed? In this paper, we compare six theoretical perspectives that offer testable predictions about why personality develops the way it does and identify limitations and potentials of these perspectives by reviewing how they hold up against the empirical evidence. While all of these perspectives have received some empirical support, there is only little direct evidence for propositions put forward by the five-factor theory of personality and the theory of genotype → environment effects. In contrast, the neo-socioanalytic theory appears to offer a comprehensive framework that fits the empirical findings and allows the integration of other, more specialized, perspectives that focus on specific aspects of personality development like the role of time, systematic differences between categories of social roles or the active partake of the person himself or herself. We draw conclusions on the likely driving factors for adult personality development and identify avenues for future research. Copyright © 2014 European Association of Personality Psychology

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Personality changes across the entire lifespan. Several theoretical perspectives have been offered regarding normative changes and individual differences in change that propose causes and processes of personality development (e.g. Caspi & Moffitt, 1993; Denissen, van Aken, Penke, & Wood, 2013; McCrae & Costa, 2008; Ormel, Riese, & Rosmalen, 2012; Roberts & Wood, 2006; Scarr & McCartney, 1983). Many empirical studies have also examined the patterns and potential sources of personality development (for meta-analytic summaries, see Roberts & DelVecchio, 2000, and Roberts, Walton, & Viechtbauer, 2006). This burgeoning work has considerably advanced our understanding of adult personality development in recent years.

However, these multifaceted theoretical perspectives and empirical studies come with at least five limitations for the ongoing scientific debate. First, a comparison of theoretical perspectives on adult personality development is complicated

by differing terminology. Second, the empirical underpinnings of many perspectives are unsatisfactory. For example, different perspectives offer apparently conflicting hypotheses, although there is empirical support for all of them. This is partly because the different theoretical perspectives have often not been formulated sufficiently precisely to allow for direct comparisons. Third, some empirical findings are not in line with any of the propositions put forward to date. Fourth, several aspects of theoretical perspectives on adult personality development still remain untested. Fifth, in some areas, we currently lack good methods to distinguish among the theoretical propositions.

Given the increasing interest in adult personality development and the numerous attempts to explain how and why personality develops throughout adulthood, we believe that the scientific debate will benefit from a review and outlook on this topic. Before providing a review of current perspectives, we first introduce some basic concepts related to personality development. We then introduce and compare six theoretical perspectives with respect to their implications and empirical evidence. Based on this review, we aim to point out avenues for future research.

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## BASIC CONCEPTS RELATED TO PERSONALITY DEVELOPMENT

Despite varying terminology, the perspectives share some key concepts. In the following, we briefly introduce these concepts and highlight the terminology we use for them.

### Personality characteristics and development

At the heart of research on personality development is the observation that individuals differ systematically from each other on several characteristics. These personality characteristics describe individual differences in thoughts, feelings and behaviours that are relatively stable across situations and over time (e.g. McCrae & Costa, 2008; Roberts, Wood, & Caspi, 2008). In this article, we primarily focus on personality in terms of the Big Five trait taxonomy (emotional stability, extraversion, openness to experience, agreeableness and conscientiousness; John & Srivastava, 1999) as a consensual model. This taxonomy is generally seen as a set of core dimensions that is useful to describe individual differences in personality economically (see Kandler, Zimmermann, & McAdams, 2014, for a more fine-grained conceptualization of personality).

The imperfect temporal stability of personality traits suggests the possibility of changes within or across people over periods of time. We understand personality development here in terms of systematic changes in personality traits that are relatively enduring (i.e. last for several months and years; for a critical discussion of the role of time in research on personality development, see Luhmann, Orth, Specht, Kandler, & Lucas, 2014). The term 'personality development', as used in this paper, is mute with regard to direction of change. This means that personality development is not necessarily positive change due to functional adjustment, growth or maturation (for definitions, see Staudinger & Kunzmann, 2005).

### Biological and environmental factors

The different theoretical perspectives on personality development almost invariably recognize biological and environmental factors as driving factors for change but differ in the relative strengths they assign to these factors. Biological factors are primarily considered in terms of genes and brain structure (McCrae & Costa, 2008; Scarr & McCartney, 1983), physiological mechanisms (Roberts & Wood, 2006) and physiological substrates of basic needs (McAdams & Pals, 2006). Some biological factors are stable (e.g. one's DNA). Other biological influences (e.g. gene expression and hormonal processes) are malleable and can change across the lifespan because of age-related maturation and degeneration processes, and environmental influences (e.g. stressors and toxics; Roberts & Jackson, 2008; see also McCrae & Costa, 2008). Thus, biological factors may be stable or changing and, moreover, may differ in direct responsiveness to external environmental circumstances.

Environmental factors as included in most perspectives comprise external influences like life events and cultural

norms (McCrae & Costa, 2008), social roles (Caspi & Moffitt, 1993; Roberts & Wood, 2006), society/culture (McAdams & Pals, 2006; Roberts & Wood, 2006) and the actions of people surrounding an individual (Reitz, Zimmermann, Hutteman, Specht, & Neyer, 2014). Environmental factors may represent short-term or long-term influences that may have mutable or lasting influences on personality traits. The stability of environmental factors may, among other influencing variables, depend on age and zeitgeist, resulting in differences across age groups and birth cohorts (e.g. Caspi, 1987; Smits, Dolan, Vorst, Wicherts, & Timmerman, 2011).

Biological and environmental mechanisms are often related (Johnson, 2007). This is true on both the ontogenetic and the phylogenetic levels. On the ontogenetic level, genes are molecular units that code for the production of proteins, for which various nutrients necessarily must be obtained from the environment. Similarly, environmental experiences can affect the expression of certain genes via epigenetic processes, and individuals might actively use genetically influenced characteristics to select or change their environments (i.e. *niche picking*; Scarr & McCartney, 1983). On the phylogenetic level, genotypes might have evolved that prepare individuals to react with certain responses to environmental cues. In particular, continuous environmental pressures are likely to have contributed to evolved genetically influenced physiological and psychological adaptations to solve survival and reproduction problems. For example, it has been argued that humans have evolved a need for social inclusion as a solution to recurrent environmental challenges that favoured collaboration in groups (Baumeister & Leary, 1995).

### Two main approaches to capture personality change

Personality can change in diverse ways. Mean-level change reflects the level of change (i.e. increase or decrease) in a single personality trait that takes place in a group of people over time. We use this term to refer to average change observed in same-aged individuals, which has often been labelled normative change as it reflects a general age trend (Denissen, van Aken, & Roberts, 2011; Roberts et al., 2008). As such, this term refers to average differences in personality *across* age.

Clearly, not everyone conforms to these average patterns. Individual differences in personality change *within* age groups over time has generally been quantified in two ways: (1) Correlations in trait scores over time reflect degree of stability and change across time in the relative standings (i.e. ranks) of individuals on single traits within a group of people (cf. Denissen et al., 2011; Roberts et al., 2008), and (2) slope variances from latent growth curve or latent difference models capture individual differences in change trajectories. These two types of change are often interrelated but not equivalent. For example, individual differences in intra-individual trajectories are present when variance increases or decreases over time without the necessity of rank-order change. Conversely, rank-order change may be present without systematic (linear, quadratic, cubic etc.) intra-individual trajectories.

## THEORETICAL PERSPECTIVES ON ADULT PERSONALITY DEVELOPMENT

In the following, we review prominent perspectives on adult personality development and evaluate and compare their relative abilities to account for the available data and the questions they leave open. We focus on perspectives that provide explanations for stability and/or change with regard to mean levels of traits and individual differences in change. For brevity, we do not discuss theories of stability and/or change of personality characteristics beyond the Big Five (e.g. cognitive ability, goals or life stories; Baltes, 1987; Heckhausen, Wrosch, & Schulz, 2010; McAdams & Olson, 2010), nor theoretical approaches that focus on personality development before adulthood (e.g. Rothbart, 2007) or pathological aspects of personality development (e.g. Lenzenweger, 1999).

The perspectives can be arranged roughly along a dimension of focus on biologically versus environmentally based influences. We start with perspectives that focus on the impact of biological factors on personality stability and change, namely the five-factor theory of personality (McCrae & Costa, 2008) and the theory of genotype → environment effects (Scarr & McCartney, 1983). Subsequently, we introduce the dynamic equilibrium model that emphasizes biological factors as primary sources of stability and environmental factors as primary sources of change (Headey & Wearing, 1989; Ormel *et al.*, 2012). We move on to perspectives that focus on how environmental factors influence personality stability and change in adulthood. These include the paradoxical theory of personality coherence (Caspi & Moffitt, 1993) and the neo-socioanalytic theory (Roberts & Wood, 2006). Finally, we review a perspective of personality development that highlights self-regulation as the most important driving force of personality development, irrespective of its origin in environmental or biological factors (Denissen *et al.*, 2013).

### Five-factor theory of personality

In the centre of the five-factor theory of McCrae and Costa (2008) lies the differentiation between *basic tendencies* and *characteristic adaptations*. Basic tendencies are conceived as solely influenced by biological factors (i.e. *biological bases*), which include genetic factors and brain structure. In this perspective, the basic tendencies are the Big Five and their facets. Characteristic adaptations include, for example, a person's self-concept, habits, attitudes and roles. These are conceived as influenced by the basic tendencies and the environment (i.e. *external influences*). As noted earlier, we focus on basic tendencies (Big Five) in the present review.

Because of their biological origins, the Big Five are considered to be largely consistent across cultures, changing environments and most of the adult lifespan. According to this perspective, personality development is mainly 'determined by biological maturation, not by life experiences' (McCrae & Costa, 2008, p. 167), that is, by intrinsic biological processes perhaps analogous to physical changes of puberty. In terms of mean-level change, this assumption might be reconciled with evolutionary life history theory (Kaplan & Gangestad, 2005), which proposed (among other

things) that the lifespans of many organisms follow predictable sequences of key developmental and reproductive events, including physical and sexual maturation and behavioural investment in mating and parenting. Linking patterns of decreasing mean levels of extraversion and openness and increasing mean levels of agreeableness and conscientiousness, McCrae *et al.* (2000, p. 183) have, for example, speculated that 'high levels of Extraversion and Openness to Experience might be useful in finding a mate, whereas higher Agreeableness and Conscientiousness might be more important for raising a family'.

Five-factor theory originally claimed that the intrinsic developmental processes of the Big Five are largely completed around the age of 30 years (*developmental postulate*, McCrae & Costa, 2008; Terracciano, Costa, & McCrae, 2006). Effects of life experiences were limited to rare cases that affect the biological bases, for instance, through severe brain injuries. While it is the core of five-factor theory that stability and change in the Big Five are caused by biological processes, McCrae and Costa (2008) acknowledge the possibility of environmental influences or a person's agency on *characteristic adaptations* that 'inevitably vary tremendously across cultures, families, and portions of the lifespan' (p. 164).

### Theory of genotype → environment effects

In their theory of genotype → environment effects, Scarr and McCartney (1983; see also Scarr, 1992; for a precursor, see Plomin, DeFries, & Loehlin, 1977) propose that personality development is driven by an individual's genotype (i.e. the individual's unique genetic make-up) that affects personality directly as well as indirectly via its effects on life experiences. Specifically, genotypes impact environments via passive mechanisms (i.e. parents transmit genes influencing personality to their children and provide family environments that are correlated with their similar genetic make-ups), evocative mechanisms (i.e. an individual's genetically influenced behaviour evokes specific environmental responses) and active mechanisms (i.e. individuals seek or create environments in accordance with their genotypes).<sup>1</sup>

With regard to adult personality development, the theory of genotype → environment effects, just as the five-factor theory of personality, focuses on genetic influences on personality. However, Scarr and McCartney 'do not think that development is precoded in the genes and merely emerges with maturation' (1983; p. 425). Contrary to the five-factor theory, they propose that personality development is also prompted by the environment, particularly by the behavioural demands of the environments that have been actively selected. Life experiences are not considered as independent influences on personality development as long as they occur within a 'normal range' (p. 429). Rather, life experiences act as mediators between genetic factors and personality, because 'environments provide a range of opportunities for development' (Scarr, 1993, p. 1336).

<sup>1</sup>This perspective was formulated with particular attention on childhood. However, this perspective also informs adult personality development as, from this view, active genotype → environment effects are proposed to be most relevant for personality development after childhood and evocative mechanisms to be important throughout the entire life span (Scarr & McCartney, 1983).

### Dynamic equilibrium model

Originating in research on subjective well-being (Headey & Wearing, 1989; see also Headey, 2006), the idea of a dynamic equilibrium (or set point) has recently been adapted to explain stability and change in personality (Ormel et al., 2012; see also Fraley & Roberts, 2005, and Luhmann et al., 2014). From this perspective, personality differences are highly, although not perfectly, stable due to stable individual differences in genetically influenced set points. An individual's personality trait is expected to fluctuate around a person-specific level in response to changes in environmental circumstances. That is, when confronted with major life experiences, personality traits change temporarily; but in the long run, they return to their person-specific set points. However, in cases of far-reaching life experiences (that remain to be specified), the set point might be permanently altered.

This perspective proposes, similar to the five-factor theory of personality, that personality trait levels are person specific, stable over the long term and intrinsic (i.e. largely biologically driven). Contrary to the five-factor theory, proponents of this model acknowledge that personality traits have changing components, affected by life experiences. This hypothesis is also different from the theory of genotype → environment effects because these environmental experiences and circumstances are not necessarily genetically influenced.

### Paradoxical theory of personality coherence

A perspective with a stronger focus on how environmental factors may influence personality stability and change has been proposed by Caspi and Moffitt (1993). They argue that individual trait differences originating from genetic influences are most likely to manifest in times of changing environmental circumstances. Perhaps paradoxically, this appears to suggest high stability in times of change. However, they differentiate between two kinds of changing circumstances. Specifically, they propose different responses when entering into new environments depending on availability of information about how to behave adaptively. When pressure to behave is strong but information about role-appropriate behaviour is limited, Caspi and Moffitt suggest that pre-existing individual differences will be accentuated (*accentuation hypothesis*).

In contrast, personality change is, according to Caspi and Moffitt (1993), initiated when individuals transition into new and demanding environments in which pre-existing behaviour is no longer adaptive and in which clear information about how to behave adaptively is available (*change hypothesis*). In opposition to the aforementioned theories, changes in personality traits are specifically thought to be driven by social role expectations and social pressures that call upon individuals to behave in particular ways.

### Neo-socioanalytic theory

The neo-socioanalytic theory (Roberts & Wood, 2006; see Caspi, 1987, for a precursor) similarly emphasizes the strong

impacts of social roles on personality. This perspective is based on a topographical model considering personality traits (e.g. Big Five personality traits) as well as personality characteristics in a broader sense (i.e. motives and values, abilities and narratives). These units of analysis are thought to be interrelated and to be influenced by genes via physiological mechanisms. It is further proposed that personality is reflected in identity (i.e. self-reports) and reputations (i.e. observer reports) that are influenced by age-graded social roles (i.e. status and belongingness roles), society and culture.

The neo-socioanalytic theory posits that personality may change in reaction to the environment throughout the lifespan (i.e. *plasticity principle*) and that investment in age-graded social roles is a driving factor for personality development (i.e. *social investment principle*). Stability in personality is considered to be a result of a commitment to an increasingly developed identity (i.e. *identity development principle*), consistent social roles (i.e. *role continuity principle*) and similar to Scarr and McCartney's (1983) conception of genotype → environment effects, experiences that deepen the personality traits that led to those experiences in the first place (i.e. *corresponsive principle*).

### Theory of self-regulated personality change

Recently, Denissen and colleagues (2013) developed a self-regulation perspective on how personality change takes place. In this perspective, personality is conceptualized as functional behaviours directed towards *reference values*, which can be established by personal goals or social norms, but also by physiologically based hedonic preferences. This perspective differentiates between two types of reference values. In primary self-regulation, reference values refer to desired environmental features (e.g. absence of physical dangers). In secondary regulation, reference values refer to one's own behaviour in these situations (e.g. acting in a self-assured manner). Self-regulation is considered both effortful and difficult, so it requires investment of both personal and social resources. Yet, by executing the same regulatory behaviours over and over again, new behaviours become more automatized and less effortful, and ultimately result in changes in trait levels.

The regulatory perspective explains personality stability through stable reference values. There is consistent evidence, reviewed by Kandler et al. (2014), indicating that motivational constructs like interests show stability similar to that of core personality traits. Of course, one prerequisite for this is that people have sufficient regulatory resources to realize these reference values. Conversely, personality trait change can occur with changes in *reference values*, affecting mean levels if the changes apply to an entire age group (e.g. age norms) or rank-order changes if they apply differently to individuals. A second route to personality change is via changes in self-regulation capacity, although the direction of change depends on a number of factors. If such changes affect most people in a similar way (e.g. if most people learn from experience), this would produce mean-level change in those reference values that are broadly shared by individuals (e.g. social conventions). By comparison, if some people

increase or decrease in self-regulation resources more than others (e.g. because they suffer from declines in brain substrates responsible for the inhibition of undesirable behaviours in old age), rank-order changes can occur, depending on the type of reference value and/or an individual's relative success at attaining it, relative to other individuals in the population.

### Summary

The perspectives on adult personality development reviewed earlier agree that personality can be shaped by biological as well as environmental factors. However, they clearly propose different processes and focus on these two sources of influence on personality to differing degrees. On a general level, the first three of the reviewed perspectives focus on biologically rooted influences: They make the prediction that the environment usually does not directly affect personality traits (cf. five-factor theory of personality), that effects of the environment on personality are usually genetically driven (cf. theory of genotype → environment effects) or that environmental influences are usually only temporary (cf. equilibrium model). In contrast, two of the reviewed perspectives focus on how environment affects personality traits: by providing social roles in which people invest (cf. neo-socioanalytic theory), at least when there are clear role scripts about how to behave adaptively (cf. paradoxical theory of personality coherence). Finally, the regulatory perspective on personality development is silent on the biological or environmental origins of personality change but highlights how shifting reference values and the ability to reach them may be involved in changes in personality.

Apart from their different focus on biological and environmental factors, none of these perspectives is comprehensive but each offers explanations for specific aspects of personality development in detail (e.g. normative development vs individual differences in development), while largely ignoring other aspects. We discuss this in more detail later. In the following, we examine how the premises of the reviewed perspectives on adult personality development hold up to the empirical evidence. First, we review empirical findings for mean-level changes (i.e. normative age trends). Second, we review empirical findings for rank-order changes as well as individual differences in intra-individual trends over time.

### MEAN-LEVEL CHANGE IN PERSONALITY

We start our review with a summary of findings on general patterns of mean-level change. We then proceed with comparison of the described perspectives with empirical evidence.

#### Patterns of mean-level change

A meta-analysis of longitudinal studies of mean-level changes (Roberts *et al.*, 2006) found that emotional stability increased until middle adulthood (from 18 to 40 years and from 50 to 60 years) and then remained stable. Conscientiousness increased in young and middle adulthood (22 to 50 years), but information for older age groups was limited in this meta-analysis.

More recent studies using data of large and nationally representative samples suggest stability or further increases in conscientiousness in older adulthood (Lucas & Donnellan, 2011; Specht, Egloff, & Schmukle, 2011; Wortmann, Lucas, & Donnellan, 2012). Agreeableness remained at a stable level until age 50. Little information on stability in this trait was available for individuals in later adulthood in that meta-analysis, but recent studies suggest increases in old age (Lucas & Donnellan, 2011; Specht *et al.*, 2011; but see also different trajectories in Möttus, Johnson, Starr, & Deary, 2012; Soto, John, Gosling, & Potter, 2011; Wortmann *et al.*, 2012).

This multi-trait developmental pattern showing increases in emotional stability, conscientiousness and agreeableness has sometimes been labelled personality maturation (cf. *maturity principle*; Roberts & Wood, 2006) because increases in these traits seem to be functional for mastering developmental tasks important in executing adult responsibilities (see also Hutteman, Hennecke, Orth, Reitz, & Specht, 2014). Digman (1997) and DeYoung (2006) found that these three traits can be subsumed under a higher-order factor (labelled *socialization* or *stability*), which reflects the common variance of these traits.

With regard to extraversion, the meta-analysis by Roberts and colleagues (2006) found two facets with distinct developmental patterns: Social vitality slightly increased in emerging adulthood (from 18 to 22 years) and slightly decreased later on (from 22 to 30 and from 60 to 70 years with periods of stability in between). In contrast, social dominance increased strongly until age 40 when it reached stability (there were little data for this trait after age 50). Finally, openness to experience showed a curvilinear pattern, with increases in emerging adulthood (from 18 to 22 years) and decreases in older adulthood (from 60 to 70 years and stability in the period in between). Even though information for some age groups was limited, this pattern is similar to findings from the aforementioned more recent studies (Lucas & Donnellan, 2011; Specht *et al.*, 2011; Wortmann *et al.*, 2012). Extraversion and openness have been suggested to form a second higher-order factor (labelled *personal growth*, Digman, 1997, or *plasticity*, DeYoung, 2006), again reflecting variance common to these traits but not to the other three traits.

In summary, results suggest that there are mean-level age trends across all of adulthood and old age. However, the strongest age trends occur before the age of 30 years and after the age of 60 years (see also Hutteman *et al.*, 2014).

### Comparison of theoretical perspectives with empirical evidence

We now evaluate the six perspectives in light of the empirical evidence by reviewing (1) studies of biological factors as sources of mean-level change (emphasized by five-factor theory and theory of genotype → environment effects), (2) studies of life experiences as sources of mean-level change (emphasized by the dynamic equilibrium model and neo-socioanalytic theory) and (3) important moderators of mean-level change (as proposed by the theory of self-regulated

personality change and the paradoxical theory of personality coherence).

#### *Biological factors as sources of mean-level change*

The five-factor theory of personality (McCrae & Costa, 2008) does not posit a concrete direction of the developmental trajectory but rather states that personality development is fixed in human genes as a result of evolution. This comes with propositions of (1) high stability of levels of personality traits after age 30, (2) high heritability of personality traits and developmental patterns, and (3) high consistency of age trends in mean levels of personality across cultures.

Consistently, studies have found that even though there is personality development across the whole lifespan, the personalities of adolescents' and young adults under age 30 seem to be particularly susceptible to change (e.g. Soto et al., 2011). Even though McCrae and Costa acknowledge that there might be some personality change after age 30, they propose extensive personality stability across middle and old adulthood (see also McCrae et al., 1999, 2000). Recent cross-sectional and longitudinal studies suggest, in contrast, that age trends in old age are of comparable strength to those in young adulthood, suggesting that an inverted U-shaped stability trajectory may be more accurate (e.g. Lucas & Donnellan, 2011; Specht et al., 2011). Although direct evidence on genetic or biological influences on normative age trends is lacking, indirect empirical support for biological consistency comes from cross-cultural studies that have shown high resemblance of cross-sectional age differences in diverse cultures (e.g. McCrae et al., 1999, 2000; Möttus et al., 2012). However, contradicting five-factor theory, there are also systematic cross-cultural differences in age trends on personality that can be linked to the normative durations of education in the respective countries (Bleidorn et al., 2013).

The theory of genotype → environment effects (Scarr & McCartney, 1983) suggests similar levels of stability but attributes them to coordinated genetic and environmental influences, resulting in similar empirical support. However, although this perspective proposes that 'the course of development is a function of genetically controlled maturational sequences' (p. 426), it also acknowledges that 'the rate of maturation can be affected by some environmental circumstances' (p. 426). Such a proposal is consistent with developmental research following life history theory. For example, all girls reach menarche at some age, but the exact timing of this biological event is affected by environmental factors, such as early life stress and/or parental absence (Belsky, Steinberg, & Draper, 1991). This is in line with the aforementioned cross-cultural findings of Bleidorn et al. (2013) that suggest age trends in the same directions across cultures, although at different rates.

#### *Life experiences as sources of mean-level change*

In contrast to the two perspectives just mentioned, the dynamic equilibrium model (Headey & Wearing, 1989; Ormel et al., 2012) specifies that changes in personality traits are exclusively affected by life experiences and not by intrinsic (or genetic) factors. Even though this perspective makes no direct propositions on mean-level changes in personality, one

could hypothesize on the basis of this model that if a large proportion of individuals were confronted with similarly personality-impacting major life experiences at similar ages, mean-level changes in personality over this age range would result (this idea is reminiscent of the developmental tasks that are discussed by Hutteman et al., 2014). However, this perspective is hardly falsifiable as there is a lack of concrete predictions on which life experiences lead to lasting changes in personality and which lead to only temporary changes.

Similar to the dynamic equilibrium model, the neo-socioanalytic theory (Roberts & Wood, 2006) posits that environmental changes shape personality development. However, it defines environmental changes more broadly. It particularly emphasizes the impact of adoption of normative, age-graded social roles such as those at work and in social networks (e.g. family and friendships). These are typically adopted by many within similar age ranges. Examples include entrance into formal schooling, taking up employment and beginning romantic relationships. Several studies that compared individuals who experienced such normative transitions to others who did not had results consistent with the notion that age-graded social roles are associated with normative development in the direction of personality maturation. For example, Specht et al. (2011) found that age-graded changes in the work context were associated with personality changes. Specifically, individuals who entered their first jobs, relative to those of the same age who did not, increased in conscientiousness, while individuals who retired decreased in conscientiousness (see also Denissen, Asendorpf, & van Aken, 2008). These observations mirror mean-level changes found in these age groups and may reflect general patterns of functional personality development during working life (e.g. Judge, Higgins, Thoresen, & Barrick, 1999), in which entrance into work increases environmental demands for conscientiousness and retirement reduces them (this latter referred to as *la dolce vita effect*; Marsh, Nagengast, & Morin, 2013).

With regard to roles in social networks, Neyer and Lehnart (2007; for similar results, see also Lehnart, Neyer, & Eccles, 2010; Neyer & Asendorpf, 2001) found that beginning the first romantic relationship led to increases in emotional stability, extraversion and self-esteem, and to decreases in shyness. Again, this social role change, typically occurring in adolescence or young adulthood, led to changes in personality that mirror normative age trends. However, other social role changes seem to be less in line with predictions of neo-socioanalytic theory. For example, Specht et al. (2011) found that marrying led to decreases in extraversion, openness and agreeableness, and that birth of a child led to decreases in conscientiousness. These social role changes typically occur in people in mid-twenties and thirties, and the associated personality changes do not appear to mirror normative personality changes found in this age period.

#### *Important moderators of mean-level change*

Desirability of traits and self-regulatory resources may explain why there are mean-level changes in some but not other traits or for some but not other people: Social roles that translate into changes in the desirability or relative advantages of characteristics of the environment and/or the person himself or herself

play decisive roles in personality development according to the regulatory theory (Denissen *et al.*, 2013). It thereby offers an explanation for the mean-level increases in agreeableness, conscientiousness and emotional stability, as these are more uniformly rewarded by society and therefore may more readily be valued by individuals. Extraversion and openness to experience, in contrast, are not uniformly valued, so this perspective suggests that they should not show clear-cut changes in mean-level development (Wood & Wortman, 2012). Less desirable personality changes (e.g. decreases in conscientiousness) might, in this view, be due to either depletion of self-regulatory resources or adoption of reference values that are deemed undesirable by the broader society but desirable by particular social niches (e.g. gangs).

Another potential moderator influencing the environmental impact on normative personality development is differences among (categories of) social roles as proposed by the paradoxical theory of personality coherence (Caspi & Moffitt, 1993). Mean-level changes in personality should occur if most individuals are confronted at similar ages with the same social roles that clearly ask for specific sets of behaviours. In this case, most individuals should adapt to these explicit role demands (e.g. in working life; Specht *et al.*, 2011). However, if these role demands are only placed on some, or if there is no clear behavioural script for how to behave adaptively, there should be no universal (i.e. normative) personality change (e.g. in family life). With regard to this differentiation, more research is needed on whether social role changes indeed come along with more or less clear role demands and whether these cause more or less pronounced mean-level changes in personality (Neyer, Mund, Zimmermann, & Wrzus, 2013). For example, most people enter some form of employment in early adulthood, but behavioural demands may vary considerably from job to job.

## INDIVIDUAL DIFFERENCES IN PERSONALITY CHANGE

Mean-level changes in personality as described earlier reflect average developmental trends of same-aged individuals. However, not all individuals change alike, resulting in individual differences in change as reflected in lack of rank-order stability and variance in individual trajectories.

### Patterns of individual differences in personality change

Results of a meta-analysis of longitudinal studies of rank-order stability found increases across young and middle adulthood (i.e. increasing from a yearly average of .51 at age 18 to .75 in the fifties), which peaked around age 50 (Roberts & DelVecchio, 2000). This developmental trend of increasing stability has been referred to as the *cumulative continuity principle* (Roberts & Wood, 2006). However, another meta-analysis found that, after age 50, stability decreased again (Ardelt, 2000). Recent large-scale analyses suggested that this inverted U-shaped function applies to all Big Five personality traits (but there are somewhat mixed findings for conscientiousness), with turning points between ages

40 and 60, depending on trait domain (Lucas & Donnellan, 2011; Specht *et al.*, 2011; Wortmann *et al.*, 2012).

The extent of individual differences in personality change depends on the time interval between assessments (Fraley & Roberts, 2005). That is, with longer assessment intervals, the individual slope variance typically increases and the rank-order stability typically decreases. However, even though rank-order stability declines with increasing measurement intervals, rank-order stability does not approach zero but a positive non-zero asymptote (Conley, 1984; Fraley & Roberts, 2005; Kuster & Orth, 2013; Terracciano *et al.*, 2006); thus, there seems to be some degree of stability even across very long intervals.

### Comparison of theoretical perspectives with empirical evidence

In the following, we evaluate the six perspectives in light of the empirical evidence on individual differences in change by reviewing (1) studies on biological factors as sources of individual differences in change (emphasized by five-factor theory and theory of genotype → environment effects), (2) important mediators for individual differences in change (as also proposed by these perspectives), (3) studies on life experiences as sources of individual differences in change (emphasized by the dynamic equilibrium model, neo-socioanalytic theory, theory of self-regulated personality change and paradoxical theory of personality coherence) and (4) evidence for the corresponsive principle (which is part of the neo-socioanalytic theory, the paradoxical theory of personality coherence and the theory of genotype → environment effects).

#### *Biological factors as sources of individual differences in change*

In line with five-factor theory, individual differences in changes are much more common in young adulthood before age 30 than in middle adulthood (Roberts & DelVecchio, 2000; Terracciano *et al.*, 2006; Terracciano, McCrae, & Costa, 2010). However, individual differences in change appear to be as strong in old age as in young adulthood (Ardelt, 2000). Moreover, even during middle adulthood, when rank-order stability is highest, it is far from complete. Hence, empirical data suggest more change than the five-factor theory predicts.

Support for a genetic basis of individual differences in personality change comes from a twin study finding that genetic factors explained substantial variance in intra-individual slopes in traits associated with personality maturation (i.e. emotional stability, agreeableness and conscientiousness; Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2009). Contrary to five-factor theory, about half the variance in these traits and most variance in intra-individual slopes in the other two Big Five traits (i.e. openness and extraversion) were not attributable to genetic influences (Bleidorn *et al.*, 2009; see also Hopwood *et al.*, 2011).

Moreover, results of longitudinal twin studies of personality traits suggest that rather than contributing to individual differences in personality change, genetic factors primarily contribute to stability of individual differences over the lifespan. There is one exception: In young adulthood, changes in rank ordering appear to be influenced by genetic factors (Blonigen, Carlson,

Hicks, Krueger, & Iacono, 2008; Bratko & Butkovic, 2007; McGue, Bacon, & Lykken, 1993; Viken, Rose, Kaprio, & Koskenvuo, 1994). However, contrary to propositions of the five-factor theory, rank-order changes seem to be primarily due to environmental influences. In fact, environmental influences on personality differences seem to increase and to become more stable during adult lifespan because of accumulating individual life experiences that shape personality traits permanently (Kandler et al., 2010; Viken et al., 1994; for a review, see Bleidorn, Kandler, & Caspi, 2014). That is, environmental variance tends to proportionally increase, and thus, heritability tends to decrease for personality traits across time (Kandler, 2012; McCartney, Harris, & Bernieri, 1990). The latter does not only contradict the intrinsic maturation hypothesis of the five-factor theory but also the most straightforward interpretation of the theory of accumulating (active) genotype → environment effects, which predict increases in heritability.

#### *Important mediators of the processes of individual differences in change*

Five-factor theory proposes that if there are environmental influences on personality changes, these should be mediated via biological pathways that occur only through rare and very powerful influences such as severe cortical injuries, psychotropic medications or psychotherapy of mentally ill patients (McCrae & Costa, 2008). This perspective thereby neglects potential influences of normal range, relatively commonly occurring life experiences. It remains an important avenue for future research to identify the specific biological processes that translate environmental changes into changes in deep-seated personality traits.

The theory of genotype → environment effects (Scarr & McCartney, 1983) suggests that life experiences mediate the impact of genetic factors on personality. Thus, one's (genetically influenced) personality influences what kind of life events one experiences, which in turn may cause personality change. A longitudinal study of twins disentangled genetic and environmental influences on the occurrence of life experiences and their influences on personality (Kandler, Bleidorn, Riemann, Angleitner, & Spinath, 2012). In this study, occurrence of life events was partly due to genetic influences and, to a stronger degree, due to non-shared environmental influences. The occurrence of life events could, in part, be predicted by personality traits (all  $r_s < .30$ ), and this relation was attributable to genetic differences. In turn, influences of life events on personality traits were primarily environmentally mediated (i.e. independent of the genetic make-up of individuals). This supports the proposition that life experiences do not occur completely randomly, but are often shaped or selected based on an individual's genetically influenced personality. However, effects of life experiences on personality traits seem to be largely independent of genetic influences and this contradicts assumptions of the theory of genotype → environment effects (see also Riese et al., 2014).

#### *Life experiences as sources of individual differences in change*

As mentioned earlier, a number of longitudinal studies that tested the influences of life experiences on personality

beyond selection effects (i.e. effects that lead people to experience these events in the first place) found that individuals who experienced specific life events had developmental trajectories that differed from those who did not experience these events (e.g. Denissen, Ulfers, Lüdtke, Muck, & Gerstorf, in press; Hutteman et al., 2014; Jackson, Thoenes, Jonkmann, Lüdtke, & Trautwein, 2012; Lüdtke, Roberts, Trautwein, & Nagy, 2011; Reitz, Motti-Stefanidi, & Asendorpf, 2013; Specht et al., 2011; Zimmermann & Neyer, 2013), supporting perspectives that emphasize the impact of life experiences as sources of individual differences in change. However, most of the revealed influences on personality development tended to be small when controlling for age (see also Allemand, Gomez, & Jackson, 2010; Costa, Herbst, McCrae, & Siegler, 2000), suggesting that changes in personality that can be traced back to experience of life events beyond general age trends are of limited impact.

The neo-socioanalytic theory (Roberts & Wood, 2006) and the dynamic equilibrium model (Ormel et al., 2012) both emphasize the influence of environmental factors on personality change. They differ, however, with respect to the proposed durations of these changes. Whereas the dynamic equilibrium theory proposes that personality changes generally reverse as the level of a personality trait returns to its genetically determined set point, the neo-socioanalytic theory proposes that change in personality should endure for as long as an individual holds the same social role and as long as the associated role expectations remain similar (cf. *role continuity principle*, Roberts & Wood, 2006). From this perspective, individual differences in personality development should occur if individuals differ in the extents of their investment in social roles or in the social roles in which they invest (which might also be due to genetic differences). For example, personalities of women who elect to be full-time mothers should change differently than those of career women, partly because they invest in social roles that impose different demands. Compounding this, empirical studies found that personality traits of individuals who strongly invest in specific social roles concurrently differ from those of people who invest little in these roles (e.g. Lodi-Smith & Roberts, 2007). Longitudinal studies found that increases in achievement behaviour, one indicator of role investment, concurrently came along with increases in trait conscientiousness (Bleidorn, 2012), that social engagement in old age led to increases in conscientiousness and that, contrary to theoretical predictions, personal investments in children led to decreases in agreeableness (Lodi-Smith & Roberts, 2012).

From the self-regulation perspective (Denissen et al., 2013), rank-order stability of personality traits should be highest during periods of high self-regulation ability because this ability allows individuals to adapt or maintain behaviour to conform successfully to their stable reference values (e.g. desired levels of personality traits or associated behaviours, like public-speaking skills). Conversely, when individuals face high stress levels or breakdown in regulatory abilities when others do not, individual differences in personality change should be more prevalent (assuming constant reference values). Greater variability in self-regulatory capacity seems especially likely at the beginning and end of the human lifespan, when regulatory resources might build up and deteriorate at different rates



(e.g. because of individual differences in brain atrophy in old age; von Hippel, 2007). This is consistent with data from Lucas and Donnellan (2011) and Specht *et al.* (2011), which found curvilinear patterns of rank-order changes, with greater rank-order change in both the youngest and the oldest age groups.

The paradoxical theory of personality coherence suggests that rank-order stability of personality traits during and following normative life transitions depends on whether the new roles have clear scripts about how to behave adaptively. Large rank-order changes should occur if individuals of one age group are confronted with different social roles that each require clear but quite distinct behavioural scripts. In this case, individuals are expected to adapt to the different role demands, resulting in strong individual differences in intra-individual change. Instead, few changes with time would be expected if individuals remain in stable social roles (irrespective of whether these social roles differ or not; see also *role continuity principle*, Roberts & Wood, 2006) or if individuals collectively enter new social roles that offer no clear information about how to behave adaptively. However, it remains a topic for future research to test this idea empirically.

#### *Empirical underpinnings of the corresponive principle*

The corresponive principle is part of the neo-socioanalytic theory (Roberts & Wood, 2006), the paradoxical theory of personality coherence (Caspi & Moffitt, 1993) and the theory of genotype → environment effects (Scarr & McCartney, 1983). It proposes that individuals seek life experiences or invest in social roles that in turn strengthen the personality traits that influenced the selection of those experiences and roles resulting in stabilized rank orders of individuals on those traits. Thus, both selection and socialization influence the same personality trait. Support for this hypothesis comes from research that found corresponiveness in work experiences and personality development in young adulthood (Roberts, Caspi, & Moffitt, 2003).

Other studies found corresponiveness in some traits but not in others. For example, Jackson, Thoemmes, and colleagues (2012) found that more agreeable young German men were more likely to attend civilian community service instead of military training and that they increased in agreeableness more strongly than those who attended military training (in addition, there were selection effects for neuroticism and openness without corresponive socialization). Zimmermann and Neyer (2013) found corresponiveness for openness in individuals who stayed abroad for longer periods (but not for short-term stays and not for the other four traits). Finally, Denissen *et al.* (in press) found corresponive effects between personality and vocational change mainly for openness and extraversion but not for other Big Five traits.

In sum, there are several studies showing that traits that select individuals into specific environments increase because of the resulting experiences (see also Jonkmann, Thoemmes, Lüdtke, & Trautwein, 2014; Kandler *et al.*, 2012; Le, Donnellan, & Conger, 2014; Lüdtke *et al.*, 2011). However, whether selection and socialization effects more often occur in specific life phases (e.g. *niche picking* in younger ages), with respect to particular life roles, and on the same trait (instead

of on different traits) remain open questions for future meta-analytic research.

## FUTURE DIRECTIONS

Researchers interested in adult personality development are faced with many theoretical predictions that, as reviewed earlier, still need to be tested. Furthermore, they are confronted with empirical findings that still need to be explained. In the following, we will discuss future directions for what is, in our opinion, most essential to study to understand why (or why not) personality changes across the adult lifespan. Specifically, we will highlight potential research paths to understanding the processes by which biological and environmental sources (and their interplay) as well as the active self may drive personality change.

### Understanding personality development in old age

Much remains to be investigated with regard to personality development in old age. Empirical data on biological influences on personality development in this age group are lacking, as is information on social role changes, even though this age period is characterized by diverse age trends that are similar in strength to those in young adulthood. Future research might identify life events and social role changes or other sources of change that impact personality development in old age. Changes in health might play key roles in this regard (Berg & Johansson, 2014; Human *et al.*, 2013; Magee, Heaven, & Miller, 2013; Möttus, Johnson, *et al.*, 2012; Mroczek & Spiro, 2003; Takahashi, Edmonds, Jackson, & Roberts, 2013). Health declines might impact individual personality in similar ways (resulting in mean-level changes), but people differ on when health declines begin to emerge (resulting in rank-order changes). Indeed, research using distance to death rather than chronological age to predict changes in personality found this to lead to more clearly interpretable developmental patterns (e.g. Gerstorf, Ram, Lindenberger, & Smith, 2013). Also, studies are needed that provide information on which diseases affect personality directly (e.g. diagnosis of diabetes or cancer or onset of dementia; Mendelsohn, Dakof, & Skaff, 1995; Roberts, Walton, & Bogg, 2005) and indirectly such as by changing life evaluations and goals (e.g. Carstensen, 2006; Heckhausen *et al.*, 2010). It remains an important task for further research to provide theoretical perspectives suitable to explain personality development in this age group and to test them empirically.

### Understanding mediators of personality change

#### *How do biological and environmental sources drive personality change?*

Genetic factors are key influences on stability and change of personality. As outlined in detail by Bleidorn *et al.* (2014), studies designed to estimate genetic influences on individual differences in personality change (in particular twin studies) have to include measures of potentially influential environmental factors (e.g. social roles, normative life transitions or

major individual life events). This approach is promising as it allows for more complete models of reality by examining influences of both nature and nurture, as well as their interplay.

In addition, interdisciplinary research teams including experts in the fields of psychology, biology, medicine and neuroscience should collaborate in testing which biological processes translate genetic and other biologically based influences (e.g. disease induced) as well as environmentally based influences into personality change. Research that aims to identify concrete alleles, hormones or cortical activities that influence personality is still in its infancy (for constraints in linking heritability with molecular genetics, see Johnson, Penke, & Spinath, 2011), as is research on the impacts of changes in gene expression (for initial attempts, see, e.g., Bernhardt, 1997; for a recent overview, see Eaton et al., 2012). However, as long as there remains a lack of studies that can relate changes in gene expression to personality development, it is not possible to directly test the hypothesis of intrinsic maturation.

Also, much more information is needed on which environmental changes impact different aspects of personality development via which mechanisms. As discussed in detail by Luhmann et al. (2014), more information is needed on the impacts of major life experiences and the temporal progressions of the resulting personality changes (see also Jackson & Allemand, 2014, on longitudinal methods for such research questions). This would provide information on whether environmental influences are enduring or temporary and abrupt or gradual. Thus, combining advantages of large-scale panel studies (e.g. large sample size and national representativeness) with more fine-grained short-term studies in subsamples (e.g. using experience sampling) is a promising avenue for future research and would provide information on both macro-processes and micro-processes of personality development.

Research on meaningful categorizations of social roles and major life events, which come along with more or less clear (changes in) role demands, might offer insights into systematic differences in how situations impact personality. For example, there seem to be strong effects of normative social role changes in the work context that initiate personality change as described by the maturity principle, but it seems less the case that normative changes in the family context influence mean-level age trends in personality. Role demands might be apparent in some cases when individuals use trial-and-error methods to adapt gradually to new roles. More common than that, as put forward by Reitz et al. (2014), social relationship partners might offer feedback on role-appropriate behaviour. Thus, individuals might be more or less sensitive to behavioural feedback or might have more or less access to important feedback that facilitates role adaptation. Future research might therefore examine whether individuals with larger social networks, more direct interactions with relationship partners or more accurate perceptive skills differ in personality development. Also, new life experiences often take place in social contexts (e.g. by selection of or changes in relationship partners; Neyer et al., 2013); thus, co-development in personality among relationship partners, family members or peer groups might be another means through which personality development proceeds

(e.g. Giletta et al., 2011; Rammstedt, Spinath, Richter, & Schupp, 2013; see also Back et al., 2011, for how personality and relationship development are interwoven).

As explicated earlier, some personality changes appear to take place in reaction to developmental tasks associated with particular times in the lifespan (see e.g. Roberts & Wood, 2006). In young adulthood, the main focuses are on establishing social and financial/career roles independent of parents, whereas the main challenge in middle adulthood is to maintain these roles and in old age to adjust to losses (for a detailed overview, see Hutteman et al., 2014). Thus, it is not only personality that is changing, but there are also systematic changes in environments and in life experiences across the life course. It seems that in young and middle adulthood, a high proportion of life events are positively valued and controllable (e.g. moving together with a partner, starting a family and building a career). Later on, new life experiences may be fewer and less positive and controllable (e.g. physical impairment and deaths of close others; for other examples, see Holmes & Rahe, 1967; Kandler et al., 2012; Martin & Smyer, 1990; Specht et al., 2011). More research is needed to clarify systematic differences in these age-related life events that may reflect different degrees and kinds of pressure for change.

Related to this, societal changes have resulted in shifts in timings of normative developmental tasks. According to the theory of emerging adulthood (Arnett, 2000), societal shifts in recent decades have led to prolonged periods of exploration for individuals in their late teens through twenties: Today's (Western, industrialized) 20-year-old is most likely not yet married, let alone with children, but is rather pursuing higher education or starting a career (Arnett, 2004; for recent cross-cultural findings, see Bleidorn et al., 2013), and even many 35-year-olds have yet to start their families. In middle adulthood, many previously rather rare life events have become commonplace. For example, increasing numbers of adults are getting divorced, increasing the chances of remarriage and childbirth later in life (see Staudinger & Bluck, 2001, for detailed information on midlife development). For these individuals, life events that for many are normative in early adulthood might reoccur in middle adulthood. Future studies might investigate to what degree reoccurrence of events later in life impacts personality development beyond personality effects that led to these experiences and to what degree these influences differ from the first occurrences of these events.

Furthermore, cross-cultural comparisons might offer information on the universality of personality development by providing information on whether personality development is attenuated or amplified in different cultures. For example, countries and cultures differ in strictness of social norms (tight vs loose cultures; Gelfand et al., 2011). In line with the reasoning of the neo-socioanalytic theory (Roberts & Wood, 2006) and paradoxical theory (Caspi & Moffitt, 1993), developmental influences should be attenuated in cultures that exert less strict social role demands and should be amplified in cultures with strong pressure to behave in certain ways. In contrast, if personality development is precoded in genes in a way that was evolutionarily functional, then cultural differences in more or less strict role demands should not impact personality development.

*How do individuals actively shape their personalities?*

While the ‘self’ should not be perceived as an entity independent from the biological and environmental influences discussed earlier, it can be viewed as a more proximal cause of personality development. The notion of the person as an agent of his or her life implies that individuals do not play passive roles in development but can and do actively shape their own personalities (McAdams & Olson, 2010; see also Denissen *et al.*, 2013; Scarr & McCartney, 1983). As proposed by Haase, Heckhausen, and Wrosch (2013), interest in active regulation of the self (instead of environmental circumstances) might be particularly common in old age (ironically, despite evidence of possibly reduced capacity for it). Possibly illustrating this, Smith and Freund (2002) observed in a sample of elderly people that changes in the self were highly desired. They found that out of six domains of hopes for the future, more than half of a sample of oldest-old named hopes related to attaining desired personality characteristics, and these were more frequently expressed than hopes in domains like health or social relationships. It therefore remains an interesting avenue for future research to examine whether these hopes translate into actual changes in personality traits (for perspectives on how self-regulation changes in old age, see Denissen *et al.*, 2013; Gerstorf & Ram, 2009; Hennecke & Freund, 2010; von Hippel, 2007).

Hennecke, Bleidorn, Denissen, and Wood (2014) introduce three aligned preconditions for self-induced personality development: Individuals should (1) wish to change their personalities, (2) feel and be competent to do so, and (3) turn self-regulated changes into new habits. It is plausible that this developmental process first leads to behavioural changes in one life domain to meet specific goals there, in particular if individuals did not plan to change their personalities comprehensively but focused on very specific behaviours that they aimed to change. If change in one life domain pays off for an individual, the changes may be expressed in other life domains (*cf.* Roberts & Jackson, 2008). First evidence that active personality development is indeed possible comes from studies showing that personality can be changed by interventions (Jackson, Hill, Payne, Roberts, & Stine-Morrow, 2012; Magidson, Roberts, Collado-Rodriguez, & Lejuez, 2014). Analysing such self-induced changes requires enriched study designs with information beyond self-reports to validate that these changes are not illusionary.

**Understanding personality development in its entirety**

Personality subsumes several characteristics beyond the Big Five personality traits (Kandler *et al.*, 2014). Thus, developmental trajectories of other personality characteristics like self-esteem (Orth, Robins, & Widaman, 2012; Orth, Trzesniewski, & Robins, 2010; Robins & Trzesniewski, 2005), perceived control (Infurna, Ram, & Gerstorf, 2013; Specht, Egloff, & Schmukle, 2013a), goals (Bleidorn *et al.*, 2010; Ebner, Freund, & Baltes, 2006; Lüdtke, Trautwein, & Husemann, 2009) and values (Bardi, Buchanan, Goodwin, Slabu, & Robinson, 2014) might offer promising information on how, why and via which processes Big Five personality traits change in adulthood.

Also, research on personality change beyond mean-level and rank-order changes is needed to arrive at a complete understanding of how personality develops. For instance, Ozer (1986) distinguished 12 basic types of consistency, six of which describe personality consistency across time. He considered different developmental patterns across situations (Nofhle & Fleeson, 2010) that might inform us about how personality development proceeds and developmental patterns across several traits at times that might inform us about changes in personality as a whole. Although there have been some studies on other types of change, for example change in personality profiles (*e.g.* Bleidorn, Kandler, Riemann, Angleitner, & Spinath, 2012; Klimstra, Luyckx, Hale, Goossens, & Meeus, 2010; Terracciano *et al.*, 2010) or personality type memberships (Specht, Luhmann, & Geiser, *in press*), personality extremity (*i.e.* deviations from average values on multiple personality traits at a time; Van den Akker *et al.*, 2013), and correlated changes in multiple traits (*e.g.* Klimstra, Bleidorn, Asendorpf, van Aken, & Denissen, 2013; Specht, Egloff, & Schmukle, 2013b), most studies on personality change have focused on mean-level and rank-order changes in individual traits examined one at a time.

Also, measures of personality beyond self-report are needed to capture changes more validly and to disentangle changes in individual self-concept (or illusion of changes) from personality change. Behavioural observations (for an overview, see Furr, 2009), indirect/implicit tests (Back, Schmukle, & Egloff, 2009) and other’s reports (Vazire, 2010) might be useful for those future research directions, as they can lead to divergent conclusions (*e.g.* Jackson *et al.*, 2009; Watson & Humrichouse, 2006).

**CONCLUDING REMARKS**

Personality development is a lifelong phenomenon. It is influenced by a multitude of factors that directly, indirectly and in transaction with each other shape who we are and who we become. Attempts to understand this overwhelming complexity have sometimes resulted in mono-causal attributions of personality development as the result of either nature *or* nurture, but both perspectives oversimplify reality. Conversely, models that integrate the effects of nature *and* nurture as well as their interrelation bear the risk of being too complex to allow for precise and testable predictions of how personality will develop. Here, we reviewed and compared several theoretical perspectives that have been developed to go beyond these simplified explanations and to specify exact predictions that can be empirically tested.

All the perspectives received empirical support—some more than others—and they are by no means mutually exclusive, but there are several similarities across perspectives. The five-factor theory of personality, formulated in the zeitgeist of the person–situation debate (*e.g.* Mischel, 1968), is of historical value as it emphasizes high stability in individual characteristics and thereby inspired numerous studies assessing the degree of actual stability as well as genetic sources of stability and change in personality. However, as reviewed earlier, most of these empirical studies have called into question the predictions put forward

by five-factor theory as well as by the theory of genotype → environment effects. Contrary to their predictions, *changes* in personality seem to be influenced by more than just biological factors. Nevertheless, an important contribution of the theory of genotype → environment effects remains in pointing out that differences in environmental experiences can be genetically influenced. The neo-socioanalytic theory, in contrast, emphasizes the roles of environmental factors for stability and change, but still struggles to explain the oftentimes small, lacking or even opposing effects of life experiences on personality development. In our view, integrating these perspectives with ideas put forward by perspectives that focus on specific aspects of personality development, namely time (e.g. dynamic equilibrium model) and role scripts (e.g. paradoxical theory of personality coherence), and that posit active involvement of the person himself or herself (e.g. theory of self-regulated personality change) is a promising path to explaining why personality changes the way it does.

Importantly, such an integrative theory needs to be falsifiable, a requirement still not met by most theories and study designs. As one illustrative example, consider the role of environmental factors for personality change. Most of the theoretical perspectives we reviewed here acknowledge that changes in life circumstances (i.e. life events) may cause personality change but lack predictions about which specific events cause changes in specific traits as well as predictions about the strengths and durations of these effects (cf. Luhmann et al., 2014). Consequently, this kind of hypothesis would be ‘confirmed’ by any study that finds a statistically significant change in at least one personality trait in response to at least one life event for at least the duration of the study, making it almost impossible to falsify. Hence, one of the central challenges for the field is to develop an integrative theory that is as specific as possible in terms of for whom, when and in which situations different proposed developmental processes are expected.

In sum, personality development occurs throughout adulthood, with times of comparatively high stability (i.e. middle adulthood) and times of comparatively strong changes (i.e. young and old age). Causes for stability and change in personality are manifold, and the importance of these causes seems to differ across the life course; for example, genetic factors and social role changes seem to be particularly influential with regard to personality change in young adulthood but less so in old age. However, much more research is needed to tackle one of the key questions within personality psychology: What drives adult personality development.

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