



**University of  
Zurich**<sup>UZH</sup>

**Zurich Open Repository and  
Archive**

University of Zurich  
Main Library  
Strickhofstrasse 39  
CH-8057 Zurich  
[www.zora.uzh.ch](http://www.zora.uzh.ch)

---

Year: 2017

---

**Personality assessment in daily life: A roadmap for future personality  
development research**

Allemand, Mathias ; Mehl, Matthias R

Posted at the Zurich Open Repository and Archive, University of Zurich

ZORA URL: <https://doi.org/10.5167/uzh-145606>

Book Section

Accepted Version

Originally published at:

Allemand, Mathias; Mehl, Matthias R (2017). Personality assessment in daily life: A roadmap for future personality development research. In: Specht, Jule. Personality development across the lifespan. London: Academic Press, 437-454.

Running title: PERSONALITY ASSESSMENT IN DAILY LIFE

Personality Assessment in Daily Life: A Roadmap for Future  
Personality Development Research

Mathias Allemand

University of Zurich

Matthias R. Mehl

University of Arizona

**Will appear in J. Specht (Ed.), *Personality Development Across the Lifespan*.**

**San Diego: Elsevier.**

Author's information

Mathias Allemand, University of Zurich, URPP “Dynamics of Healthy Aging” & Department of Psychology, e-mail: [m.allemand@psychologie.uzh.ch](mailto:m.allemand@psychologie.uzh.ch); phone: +41 44 635 34 12

Matthias R. Mehl, University of Arizona, Department of Psychology & Department of Communication, e-mail: [mehl@email.arizona.edu](mailto:mehl@email.arizona.edu); phone: +1 (520) 626-2374

### Summary

Personality can be assessed from multiple perspectives using various methods in laboratory settings and daily life contexts. The goal of this chapter is to discuss personality assessment in daily life as a complement to traditional assessment methods in the field of personality development. The first part of the chapter emphasizes the relevance of studying personality change processes under real-life and real-time conditions. The second part focuses on conceptualizing personality traits and their state manifestations as units of analysis. The third part discusses personality in contexts and distinguishes different levels of person and context specificity that may have important implications for the assessment. The fourth part gives a non-technical overview about selected methods for assessing personality manifestations and change processes in everyday life and discusses psychological and technological assessment advances to provide valuable personality data. The final part presents future directions for the field of personality development.

**Key words:** Personality assessment; personality traits; personality processes; daily experience and behavior; online behavior; environment and life contexts; real-life and real-time; ambulatory assessment; electronically activated recorder; smartphone sensing

## INTRODUCTION

Research in the field of personality development has shown that personality can change and continues to change in adulthood into old age (see McAdams & Olson, 2010; Roberts, Wood, & Caspi, 2008 for reviews). Changes in personality are typically accompanied by individual differences in change, implying that people differ in the direction and the amount or patterns of change as they move through adulthood (Allemand, Zimprich, & Martin, 2008; Roberts & Mroczek, 2008). These unique patterns of change may reflect the result of specific life experiences and events, exposure to diverse or varying environmental contexts, and a variety of adaptive processes and behaviors that people use in everyday life to maintain well-being and health. Regardless of individual differences in change, some general patterns of change have been consistently observed in previous research. For example, people tend to become more socially dominant (a facet of extraversion with attributes that are linked to self-confidence and independence), more agreeable and more conscientious, and less neurotic as they move through adulthood (Roberts, Walton, & Viechtbauer, 2006). These changes are often viewed as positive trends, given that higher levels of agreeableness and conscientiousness and lower levels of neuroticism are associated with desirable outcomes, such as greater success in work and family and better health and longevity (Roberts, Kuncel, Shiner, Caspi, & Goldberg, 2007). Research has also shown that both level and change of personality can predict greater success in work and family, and better health and longevity (Allemand, Steiger, & Fend, 2015; Mroczek & Spiro, 2007; Steiger, Allemand, Robins, & Fend, 2014).

Personality development is one of the most growing fields of research in personality science. But there is still a lot to be learned about the ways in which personality processes are assembled and unfold over time. One of the greatest challenges for future research refers to personality assessment, as the majority of previous research on personality development relied almost exclusively on self-report methods (e.g., questionnaires, interviews) to assess

personality and to capture change (Baumeister, Vohs, & Funder, 2007). Although self-reports represent a popular and cheap way in terms of time and costs of obtaining data and are reliable and valid assessment tools, the field of personality development would strongly profit from using multiple methods, such as combining self-report methods with observer ratings and partner reports, physiological assessment, behavioral and cognitive experiments, and daily life assessment paradigms. This is also important with respect to age-fair personality assessment, as young children and very old adults with functional impairments may not provide reliable self-reports.

A particular valuable approach is to assess personality processes outside the laboratory directly within people's natural environments (Reis & Gosling, 2010; Wrzus & Mehl, 2015; see Mehl & Conner, 2012 for a comprehensive review). Such a real-world assessment approach would help to capture the way in which lives are lived and experienced in their natural settings, in (close to) real time, and on repeated occasions, to better understand the processes underlying personality change and stability over time. What exactly does it mean in daily life to become more socially dominant, agreeable and conscientious, and less neurotic? How are personality changes manifested in daily life? What are the underlying processes that promote change or maintain stability? Do self-reported changes in personality reflect changes of perceptions and representations or do they also reflect actual and observable behavior changes? How can personality change processes be assessed or tracked in daily life as they occur? These questions call for research using daily life assessment paradigms. The goal of this chapter is thus to emphasize the relevance of assessing personality in daily life and to give a nontechnical overview of psychological and technological assessment advances that may provide novel and complementary assessment perspectives for the field of personality development.

## **CONCEPTUALIZING PERSONALITY**

Personality can be conceptualized from multiple perspectives that may have differential implications for personality assessment in daily life. For example, McAdams (2013, 2015) offers a conceptual framework with three different albeit related standpoints or perspectives from which personality can be understood. Each standpoint focuses on unique units of analysis of personality. The first standpoint refers to personality characteristics that describe how people as social actors typically behave on the social stage of life, and encompasses personality characteristics such as traits, skills, and social roles. The second standpoint refers to characteristics that describe people as motivated agents and includes motivational characteristics such as personal goals, motives, values, and envisioned projects. The third standpoint conceptualizes people as autobiographical authors who narrate life stories as aspects of personality. Life narratives are the key units of analysis from this perspective. To assess constructs related to the three standpoints, researchers typically use a different set of methods such as self-reports and observer reports to assess traits and interview methods to assess life stories.

A real-world assessment approach would be particularly suited to capture the ways in which individuals behave as social actors on the social stage of life and how these behavioral patterns change over time. This chapter therefore focuses on the assessment of personality traits and especially their state manifestations in daily life as units of analysis. Personality traits are defined as relatively enduring tendencies for certain behaviors and experiences including thoughts and feelings (e.g., Roberts, 2009). Traits describe the most basic and general dimensions upon which individuals are typically perceived to differ. These individual differences are organized within the prominent conceptual framework of the Big Five dimensions (John, Naumann, & Soto, 2008).

In general, personality traits are thought to be relatively stable over time, and thus reflect slow developmental processes. Assessing personality thus requires repeated assessments over longer periods of time to capture the long-term developmental processes. In

contrast, the state manifestations of traits or how people behave in a given moment are more dynamic and fluctuating over shorter time periods. Unlike traits, states reflect dynamic processes of personality that show temporary changes in response to internal aspects such as motives and goals and external situations such as stress in a given situation or real-life context (Fleeson, 2001; Hooker & McAdams, 2003). States reflect the ways how individuals think, feel, or behave in a given situation, and thus reflect the manifestations of the traits. They are transient and involve change and variability over short periods of time. Assessing personality processes requires intensive, multiple repeated assessments over short periods of time to capture the short-term dynamics in daily life and the fluctuations over short time intervals. Such an approach provides information about the underlying processes of change or maintenance as they occur in addition to longer developmental change processes (Nofle & Fleeson, 2010, 2015).

### **CONTEXTUALIZING PERSONALITY**

Just as it is important to consider multiple perspectives on personality, it is important to consider personality in different life contexts and to assess personality at different levels of specificity. The appropriate level of specificity is important with respect to the assessment of contextualized personality constructs, as broader constructs such as the Big Five traits are typically less contextualized (Heller, Watson, Komar, Min, & Perunovic, 2007; Roberts, 2007; Roberts & Pomerantz, 2004). Only assessing constructs at a broad level may fail to capture the nuances present when evaluating specific life contexts or given situations. For example, when broad constructs are assessed, narrower facets that are correlated with criteria in the opposite directions may cancel each other out and mitigate the correlation with the criterion (Paunonen, 1998). In addition, the narrow personality characteristics associated with a broader personality trait have been shown to be negatively correlated, positively correlated, or not correlated at all with an outcome variable (Wood, Nye, & Saucier, 2010), a point that would be obscured by looking at the trait only at the broader level.

The appropriate breadth of personality assessment is important from a developmental perspective, as it may moderate age trends. For example, research has begun to investigate how age differences and age-related changes in the broad Big Five traits coincide with age differences and changes in narrower traits, or facet traits, that compose those domains (Jackson et al., 2009; Terracciano, McCrae, Brant, & Costa, 2005). Indeed, a recent study found that related but distinguishable facet traits within each broad trait domain show distinct age trends (Soto, John, Gosling, & Potter, 2011). These examples point to the need of using both broad and narrow measures of personality. If domain-specific personality aspects show identical or nearly identical chronological age and/or time trends, then a more generalized measure of personality would be sufficient to capture all of the important information about age differences in personality. If, however, domain-specific personality shows different age and/or time trends, then research is needed at the narrow level to achieve a full understanding of personality across adulthood.

Within personality development there is a theoretical hierarchy of changeability, such that some attributes of personality such as the state manifestations of traits like discrete thoughts, feelings, and behaviors are assumed to be more contextualized, more changeable and variable, and more responsive to external and internal influences compared to broad and enduring personality traits. Several conceptualizations of personality make a distinction between different levels of specificity (e.g., Roberts & Pomerantz, 2004; Roberts & Jackson, 2008; Rosenberg, 1998; Wood & Roberts, 2006). For example, Roberts and Pomerantz' (2004) model includes three levels of person and contextual breadth ranging from narrow to broad levels. At the narrowest level, discrete trait-related thoughts, feelings, and behaviors (i.e., state manifestations of traits) may be more changeable than midlevel constructs such as habits or generalized emotional experiences, or broad constructs such as personality traits. Similarly, the proximal situation at the narrowest level is more changeable than the organizational climate at the medium level or the culture and geographic regions at the broad



level. The level of discrete trait-related thoughts, feelings, and behaviors can be seen as the most dynamic as it reflects the ways how people think, feel, or behave in a given situation or daily life context. It is believed that person and situation constructs are at the broad level more general and enduring and at the narrow level more specific and passing or changeable due to specific circumstances and life contexts.

This chapter focuses primarily on the assessment of the state manifestations of personality traits in everyday life, because assessment at this level of specificity can provide more information about natural life contexts and social settings. The daily life contexts are the stages in which the development of each individual takes place. That is, individuals are embedded in dynamic daily social environments that create opportunities and constraints for individual developmental pathways. Thus the ultimate goal of personality (change) assessment must be to understand “what people actually do, think, and feel in the various contexts of their lives” (Funder, 2001, p. 213).

### **ASSESSING PERSONALITY IN DAILY LIFE CONTEXTS**

With a few notable exceptions, existing longitudinal personality development studies covering years or decades relied most exclusively on single method assessment approaches based on self-reports or observer ratings. As such, improving and expanding personality assessment methods is one of the most important tasks necessary for creating a sustainable future for the field of personality development. Moreover, assessing personality processes in real-life contexts is an important avenue for the field of personality development for several reasons (cf. Wilhelm, Perrez, & Pawlik, 2012). First, assessing personality in daily life helps to better understand how people think, feel and behave, and how changes in thoughts, feelings and behaviors are manifested in everyday life and not only in the laboratory or with respect to retrospective or generalized responses in self-report questionnaires. Hence, collecting real-world evidence of people’s unique everyday contexts, behaviors, resources, and ways of regulating the ongoing demands and challenges of daily life, well-being and health would

help to better understand the ways in which personality processes are assembled and unfold in natural settings, close to real time, and on repeated occasions. It would also help to better describe, explain and predict the essential underlying processes and determinants of change and stability over time. Hence, a real-life assessment approach would increase ecological validity as the extent to which research findings on personality development such as increases in conscientiousness would generalize to settings typical of everyday life.

Second, assessing personality in daily life deals with the concern of the validity of retrospective or generalized responses obtained with questionnaires or interviews. Self-reports and interview methods are often biased by memory processes and cognitive heuristics, and they leave open the possibility that people respond on the basis of what they consider typical or socially desirable (Schwarz, 2012). Data captured in real-time tend to be less susceptible to such recall processes and memory distortions.

Third, assessing personality processes in real-life contexts requires repeated assessments for each person to better understand intraindividual variation of experience and behavior across unrestrained real-life conditions. Personality processes typically occur within people over time, but they also happen across people. Within-individual approaches may reveal different answers than between-individual approaches, because personality variables may vary across individuals for different reasons than why they may vary within individuals across repeated measurement occasions (Molenaar & Campbell, 2009). Both approaches are important. The between-individual variation reflects human individuality, whereas the within-individual variation may give important information about the experiences, behaviors and processes of individuals' lives (Mroczek, Spiro, & Almeida, 2003). Importantly, age-fairness in personality assessment is most immediately concerned with the nature of between-individual variability; however, within-person processes can also be operating differentially at the measurement level across different age groups.

Finally, innovations and emerging technological developments in sensor-enabled technologies, especially smartphones, create new opportunities for the assessment of personality in daily life and provide valuable data for the field of personality development (Intille, 2012; Mehl & Conner, 2012; Miller, 2012).

### **Ambulatory Assessment of Daily Experiences and Perceptions**

Ambulatory assessment is a powerful modern methodology that encompasses a wide range of methods to study people in their real-life contexts, including momentary self-reports by means of the experience-sampling method (ESM; Conner, Tennen, Flesson, & Barrett, 2009; Hektner, Schmidt, & Csikszentmihalyi, 2007), ecological momentary assessment (EMA; Shiffman, Stone, & Hufford, 2008), the diary method (Bolger, Davis, & Rafaeli, 2003; Nezlek, 2012), observational methods (e.g., audio or video recording, activity monitoring), and physiological methods (e.g., assessment of cardiac and respiratory activity using physiological sensors; Trull & Ebner-Priemer, 2013, 2014). Several specific research tools are available to assess thoughts and feelings on a moment-to-moment basis in daily life (see Wrzus & Mehl, 2015 for a review).

The key idea behind ambulatory self-report assessments is to collect in-the-moment or close-to-the-moment subjective data directly from people in their daily lives. Typically, people are asked repeatedly (e.g., five times per day) over a period of time (e.g., a week) to report on their current thoughts and feelings. These momentary questions typically refer to location (e.g., Where are you now?), social environment (e.g., With whom are you now?), activity (e.g., What are you currently doing?), and experiences (e.g., How are you feeling right now?). These momentary questions provide a snapshot of what is going on in people's lives at the time at which they are asked to report. A major technological and practical advance in this area has been the transition from paper-and-pencil assessments to time-stamped, digital data. Time-stamped digital data provide powerful means to handle otherwise common problems such as back-filling (i.e., completing a number of assessments

retrospectively at a later, convenient time) and have given researchers important control over the assessment process. Finally, ambulatory self-report assessments allow for a relatively fine-grained assessment of within-person (personality) states and behaviors (Fleeson, 2004).

Despite the benefits of ambulatory self-report assessment, it is important to consider potential challenges such as acceptability, compliance, privacy concerns, and ethical issues (e.g., Trull & Ebner-Priemer, 2013). For example, older adults may have some reservations against the use of technology or may not feel fully comfortable with certain electronic devices; on the other hand, children, for example, may have good general technology curiosity and acceptance but the use of specific electronic devices may pose challenges (e.g., carrying a smartphone with them throughout the day, attaching a wearable camera that stays in a good place). Other factors such as user-friendliness, burden of the assessment protocol, length of assessment period, and privacy concerns may also affect compliance. It is important thus to address potential challenges to provide age-fair personality assessments and to increase the compliance.

One way in which momentary self-reports have been creatively and successfully used in personality development research is to track the distribution of Big-Five personality states in time, space, and people (e.g., Fleeson, 2001; Fleeson & Gallagher, 2009). In Fleeson's research on traits as density distributions of states, participants report on the extent to which, over the last half hour, they have acted in Big-Five relevant ways (e.g., talkative, cooperative, irritable, hardworking). In an application of this model to personality development, Nofle and Fleeson (2010) found (in a cross-sectional study) clear age related patterns in daily expressed agreeableness, neuroticism, extraversion, and conscientiousness. The trends derived from the moment-to-moment Big Five state levels mirrored in direction the trends obtained from participants' (global) Big Five self-reports, providing important behavioral confirmation of findings derived from personality scales (Nofle & Fleeson, 2015). Interestingly and importantly, the effect size for the moment-to-moment derived trajectories exceeded the effect

size derived for the global trait questionnaire suggesting that cognitive mechanisms involved in personality survey responses (e.g., the stabilization of self-concept) may actually lead to an underestimation of actual personality change. Therefore, the field of personality development would strongly benefit from using multiple methods of assessment in general and incorporating momentary self-reports in particular. The systematic incorporation of momentary self-reports would also allow personality development researchers to better understand the environmental contexts in which personality development unfolds (Bleidorn, 2015).

### **Ambulatory Assessment of Daily Behavior**

Several assessment methods exist to assess behaviors in naturalistic settings (see Wrzus & Mehl, 2015 for a review). On the one hand, ambulatory assessment methods described above can be easily used to sample everyday behavior including self-reported momentary social interactions and activities. As mentioned, this approach has proven successful for studying personality development from the perspective of traits as density distributions of states (Nofle & Fleeson, 2010). On the other hand, studying momentary personality-related behaviors through the lens of participants' self-perceptions still renders their responses subject to important self-report limitations such as impression management, self-deception, and, simply, the lack of conscious awareness (e.g., automatic behavioral expressions such as sighing or swearing; Robbins et al., 2011; Robbins, Mehl, Holleran, & Kasle, 2011). Observational methods can help circumvent these limitations. While behaviors can be relatively easily observed in the laboratory using video or sound recordings, the assessment of behaviors is much more difficult in daily life contexts (Wrzus & Mehl, 2015). Novel and innovative assessment methodologies based on mobile and sensor technologies are being developed to directly and unobtrusively track people's behaviors in their natural, spontaneous contexts of daily life using perceptual- and physical-sensor data (e.g., audio, video, location, and movement information; Mehl & Connor, 2012; Trull & Ebner-Priemer,

2013, 2014). Despite existing challenges including acceptability of technology, privacy concerns, and ethical issues (e.g., Trull & Ebner-Priemer, 2013), observational methods would be particularly well suited to track behaviors of people who cannot provide reliable self-reports such as young children and perhaps very old adults with severe impairments, given that the concrete handling of electronic devices is feasible in everyday life.

Ambulatory behavioral assessment reflects a particularly important supplementary methodology for personality development research beyond self-reports and observer reports. Personality changes as captured with self-reports may primarily reflect changes in a person's self-concept that do not necessarily reflect actual behavioral changes in everyday life. As such, observations of behaviors may reflect related albeit distinct sources of information about personality development and change processes and may provide personality information over and above the classical assessment methods.

**Sound.** One innovative assessment method is to collect auditory data (e.g., ambient sound) using portable audio recorders to assess personality and to track personality change processes over time. The electronically activated recorder (EAR; Mehl, Pennebaker, Crow, Dabbs, & Price, 2001) is a behavioral observation method that unobtrusively samples acoustic observations of people's momentary objective social interactions and environments within the natural flow of their lives (Mehl & Robbins, 2012). The EAR is a modified portable audio device (e.g., app on the smartphone) that registers thin slices of daily social interactions randomly or in a given order throughout the day. In tracking moment-to-moment ambient sounds, the EAR yields acoustic logs of the social behaviors and interactions as they naturally unfold. In sampling only a fraction of the time, it makes large naturalistic observation studies feasible and protects people's privacy, yielding enough sound bites to derive both reliable and valid data on people's habitual behavior patterns. The EAR is minimally bothersome for participants, and a large number of studies support its feasibility, reliability, validity, and utility (Mehl & Holleran, 2007; Mehl, Vazire, Ramírez-Esparza, Slatcher, & Pennebaker,

2007; Mehl, Robbins, & Deters, 2012). It has been used to investigate a number of interpersonally sensitive topics (e.g., Bollich, Doris, Vazire, Raison, Jackson, & Mehl, 2016) and has proven reliable in age groups from young adulthood to old age.

The brief snippets of recorded ambient sounds can be coded for a broad range of aspects of people's moment-to-moment social environments including their locations (e.g., at home, at a restaurant, outside), activities (e.g., listening to music, watching TV, eating), and interactions (e.g., alone, on the phone, with partner), and social interactions including content (e.g., health, food, politics), style (e.g., emotion words, past vs. present tense, swearing), and emotional expression (e.g., laughing, crying, arguing) using a validated coding scheme, the Social Environment Coding of Sound Inventory (SECSI; Mehl & Robbins, 2012; Mehl & Pennebaker, 2003). Everyday sounds like speech and music can also be informative with respect to communication behaviors (Kraus & Slater, 2016). As such, the EAR method provides highly naturalistic, experientially vivid, and psychologically rich information about behaviors and contexts in daily life. Moreover, collecting auditory data may be a particularly useful assessment method with young children and very old adults, given that the audio recording does not provide a practical problem (Alisic, Barrett, Bowles, Conroy, & Mehl, 2016). An alternative approach to portable devices is to use room microphones.

Importantly, for the field of personality development, just like with Nofle and Fleeson's (2010) experience sampling study, it is possible for personality information derived from behavioral observation and personality information derived from traditional personality scales to yield discrepant information. In this regard, Ramirez-Esparza, Mehl, Alvarez-Bermudez and Pennebaker (2009) used the EAR to study self-reported and behaviorally expressed personality in American and Mexican participants. Interestingly, they found that whereas American participants self-reported being more extraverted and sociable than Mexican participants, Mexican participants spent significantly more time interacting with others and socializing (as recorded by the EAR). In fact, American participants scored

significantly higher on the Big Five Inventory item „I consider myself to be a person who is talkative“ but Mexican participants spent 9%, or almost a quarter, more time talking to others (43.2% vs. 34.3%). This study suggests considerable potential gain when self-report measures, that primarily tap into aspects of a person’s self-concept, are complemented with observational measures, that primarily tap into aspects of displayed behavior (an important source of a person’s reputation) allowing together for a comprehensive assessment of the person from the inside and outside (Vazire, 2010).

**Sight.** A second assessment method is to collect visual data (e.g., video recordings, images/photos) using portable video recorders. For example, the Narrative Clip ([getnarrative.com](http://getnarrative.com)) is a recently developed behavioral observation method that collects visual data of people’s momentary social interactions and environments. It is a small, wearable device that captures time-stamped and geo-located images or video recordings according to a predetermined interval (e.g., every 30 sec). As such, it can provide unobtrusive insight into naturally occurring person-situation interactions. The video recordings or images/photos can be coded for aspects of participants’ social environments and interactions (Mannay, 2016; Ray & Smith, 2012). The newly developed taxonomy of major dimensions of situational characteristics (the situational eight DIAMONDS, Rauthmann et al., 2014) can be used to code visual data. Photographs and visual methods hold great promise for tracking personality processes and change over time as well as accessing multiple levels of personality specificity. The assessment of visual data may represent a method that is particularly useful to track people who cannot or are unable to respond to self-report questions (Doherty et al., 2013). Naturally, capturing visual data also brings with it unique ethical challenges but researchers are working on ways to address them (Kelly et al., 2013).

**Smell.** A third assessment method is to collect olfactory data (e.g., body odors), because smell is an important sense in social interactions and may provide individual and contextual information. For example, the sense of smell can prime the experience of pleasure,



can warn of danger, help identify suitable mates, locate food, or detect predators. Preliminary research findings demonstrated that some personality traits can be recognized using olfactory cues (i.e., body odor) and that olfaction supplements auditory and visual cues, contributing to the first impression accuracy of certain personality traits (Sorokowska, 2013; Sorokowska, Sorokowski, & Szmajke, 2012). Moreover, several technological tools are being developed to sample (body) odors. For example, the electrochemical nose (e-nose or micro nose) is an artificial olfaction device to sample, recognize, identify, and compare odors. Whether this assessment method provides reliable and valid personality information over and above other classical and modern assessment approaches is a task for future empirical research.

**Smartphone sensing.** Recent technological advances (e.g., mobile technology, wearable sensor technology) in the field of computer science and the rapid growth in popularity of the use of various electronic devices in daily life has led to unlimited possibilities for personality science, especially for the assessment of state manifestations of personality traits in daily life (Intille, 2012; Mehl & Conner, 2012; Miller, 2012; Yarkoni, 2012). Mobile sensing systems and wearable devices are powerful and innovative methods for understanding people's life contexts, activities, behaviors, and social networks (Sazonov & Neuman, 2014; Schmid Mast, Gatica-Perez, Frauendorfer, Nguyen, & Choudhury, 2015). These systems can be used to sense social interaction behavior via ubiquitous computing devices followed by an automated extraction of verbal and nonverbal behavioral information with computational models and algorithms. For more information, including a critical discussion of the potentials and obstacles of current mobile sensing platforms, see Wrzus and Mehl (2015) and Harari et al. (in press).

### **Assessing Daily Online Behavior**

An interesting domain of life that has only recently emerged is virtual daily behavior that refers to social behaviors and interactions on the Internet (Gosling & Mason, 2015). An Internet-based assessment method is to collect verbal behavioral data, including emailing,

chatting, tweeting, blogging, and posting. For example, differences in the ways in which people use words (e.g., pronouns such as “I” and “we”) have been found to carry a lot of psychological information (Pennebaker, Mehl, & Niederhoffer, 2003). Therefore, an interesting approach to assess online behavior is to sample virtual language behavior (e.g., verbal expressions and communications) and to conduct linguistic analyses using modern text analysis program such as the Linguistic Inquiry and Word Count (LIWC2015; Pennebaker, Booth, Boyd, & Francis, 2015).

Another novel assessment method is to use social networking sites such as Facebook to observe behavior in naturalistic online settings, test hypotheses, and recruit a large number of study participants (Kosinski, Matz, Gosling, Popov, & Stillwell, 2015; Wilson, Gosling, & Graham, 2012). In a recent high-profile study, Youyou, Kosinski, and Stillwell (2015) demonstrated that computer-based personality judgments based entirely on patterns of Facebook Likes (in fact, only 90-100 were needed for the models) are more accurate in predicting life outcomes than informant reports and, in some cases, even more accurate than self-reports (e.g., participants’ social network activity). Park et al. (2015) found a similar advantage of computer-based personality models over human personality judgments when the computer-based models were derived from participants’ word use in their Facebook status-updates.

These studies have important implications for the field of personality development as they ultimately open up the possibility of estimating trajectories of personality change indirectly from archival online behavior without ever having directly collected explicit personality information (i.e., administered a personality questionnaire). This, then, would open up the study of personality development beyond the limited number of existing and extensively mined longitudinal panel studies and thereby potentially dramatically broaden the data base for the field. Again, the fact that personality models based on online behavior have demonstrated unique predictive validity over self- and informant reports suggests that they

may not only facilitate but also psychometrically complement the study of personality development.

### **Assessing Daily Contexts**

The environment plays an important role in personality development (Roberts & Pomerantz, 2004; Roberts et al., 2008). Despite its importance, however, the issue of conceptualizing and assessing the environment and real-life contexts is often ignored or poorly operationalized and is rather complex (Roberts, 2007). It seems appropriate to distinguish between objective characteristics of the environment (e.g., inside or outside a building) and subjective perceptions of the environment. For example, Roberts et al. (2008) proposed a psychologically meaningful way to investigate contextual influences via the social role concept. They argued that rather than investigating the influence of objective contextual variables on personality development, it may be more meaningful to examine subjective environment in the form of social roles (e.g., worker role, parent role), and to investigate the relation between changes or stability in social roles and personality development. The idea is that roles contain cultural, societal, and individuals' expectations how to behave in social roles, and that an active, psychological commitment or investment to the roles might be associated with personality change (Lodi-Smith & Roberts, 2007). Self-report based ambulatory assessment methods can be easily adapted to sample everyday experiences and behaviors with respect to the investment in specific social roles. Likewise, wearable sensor technologies discussed above can be used to assess objective environmental information through sound, sight, smell, taste, touch, and other senses (cf. Sazonov & Neuman, 2014). As mentioned earlier, the breadth of context information may range from the narrow proximal situation to broad geographical regions (cf. Roberts & Pomerantz, 2004).

**Situations.** Notable conceptual/theoretical and assessment efforts have been recently made to better psychologically understand proximal situations in daily life (Rauthmann, Sherman, & Funder, 2015) and to assess the major dimensions of situation characteristics

based on retrospective self-reports (Rauthmann et al., 2014) and real-time using experience-sampling methods (Sherman, Rauthmann, Brown, Serfass, & Jones, 2015).

**Living contexts.** In addition, assessment strategies and tools have been developed to examine physical contexts at the medium level such as home environments including people's personal (e.g., bedrooms) and professional (e.g., offices, classrooms) living spaces (Graham, Gosling, & Travis, 2015) in order to understand how personality is expressed and detected in everyday real-life contexts (Gosling, Ko, Mannarelli, & Morris, 2002).

**Geographical contexts.** Finally, researchers also assess context data at the very broad geographical level of analysis (e.g., neighborhoods, cities; Rentfrow, 2014). The basic idea of this line of research is that the places where people live vary considerably in terms of their social, economic, political, climatic, physical, and personality characteristics (Rentfrow, Jokela, & Lamb, 2015). These conditions may affect how people from different geographical regions behave and interact with their environments and each other.

### **FUTURE DIRECTIONS**

Future research needs to attach more importance to people's daily life contexts, as they are the stages in which personality processes are assembled and unfold over time. At the moment, it is clear that the field of personality development lags considerably behind other fields in assessing constructs and processes under real-life and real-time conditions and in their incorporation of ambulatory assessment methods. This is on some level little surprising, given that personality development researchers are traditionally concerned with relatively slow social and behavioral processes that unfold over periods of years and decades, whereas the field of ambulatory assessment tends to be concerned with relatively fast psychological processes that unfold over periods of days and weeks. Yet, one important future avenue for the field of personality development is to make better use of ambulatory assessment methods since they have the potential to enrich the field exactly in its Achilles heel, namely the characterization of the situational and environmental context in which personality

development happens. One way to accomplish this would be to add ambulatory assessment components to existing longitudinal panel studies that are the prime target for personality development researchers. Of course, it would take some time and a few measurement time points until the momentary data could be fruitfully integrated into the analyses.

Following logically from this point, another important future avenue is to integrate personality processes across different time-scales. Historically, most personality studies employed cross-sectional designs and examine personality from the perspective of concurrent associations. The relatively few existing experience sampling studies (e.g., Fleeson & Gallagher, 2009) have focused on personality dynamics as they unfold over the course of days and weeks or over months to years (longitudinal studies). Traditional developmental longitudinal studies, finally, are looking at long-term personality stability and change over years and decades. Clearly, personality dynamics unfold at the three levels and they unfold at the three levels non-independently.

Measurement burst designs can help integrate slower acting and fast acting personality processes. A measurement burst research design involves longitudinal assessments that are planned around closely spaced successive “bursts” of assessments, rather than widely spaced successions of single time point assessments (see Stawski, MacDonald, & Sliwinski, 2016 for a review). It combines features of intensive short-term longitudinal methods such as ambulatory assessment with features of long-term longitudinal designs that are used to examine individuals over relatively long time intervals. Measurement burst designs provide researchers the unique opportunity to study long-term developmental changes in personality traits in combination with short-term dynamic personality processes that can only be measured on a daily or momentary basis, such as regulative and self-evaluative processes or emotional states in a given situation or real-life contexts (Stawski et al., 2016). Novel methodological approaches and statistical tools for studying personality processes across

different time-scales are currently being developed (Gerstorff, Hoppman, & Ram, 2014; Nestler, Grimm, & Schönbrodt, 2015).

Finally, to have a full understanding of personality in different contexts over time, it is important to consider multiple perspectives of personality (McAdams, 2015; McAdams & Olson, 2010). Given space constraints, this chapter focused on the assessment of traits and states that are primarily descriptive for individuals as social actors (cf. McAdams, 2013). One important future avenue for the field of personality development is to use novel assessment methods to track motivational and narrative personality characteristics and processes over time (cf. McAdams, 2013). For example, a study used written narratives of personality change to understand how people conceptualize their changing personality over time (Lodi-Smith, Geise, Roberts, & Robins, 2009). Future research could use the EAR method to assess narratives and to study how and in which social situations in daily life people narrate personality change. More broadly, the use of novel psychological and technological assessment advances would significantly contribute to the existing personality assessment repertoire of the field of personality development. In particular, the collection of auditory, visual, olfactory, and social and smartphone sensing data may create new opportunities for the assessment of personality (change) processes in daily life. In addition, more efforts should be made for assessing daily life contexts at different levels of specificity including proximal situations, living spaces, and geographical regions.

### **CONCLUSION**

The goal of this chapter has been to discuss personality assessment in daily life as a complement to traditional assessment methods in the field of personality development. Assessing personality under real-life and real-time conditions would provide a better understanding about the ways in which personality processes are assembled and unfold over time. The use of ambulatory assessment to capture personality change processes in real-life contexts would offer interesting novel assessment perspectives for the field of personality

development. Emerging developments in sensor-enabled mobile technologies to assess daily contexts and individual experiences, perceptions, and behaviors using auditory, visual, olfactory, and smartphone sensing data, will create new opportunities for researchers to study personality development and dynamics in daily life.

## REFERENCES

- Alicic, E., Barrett, A., Bowles, P., Conroy, R., & Mehl, M. (2016). Families coping with child trauma: A naturalistic observation methodology. *Journal of Pediatric Psychology, 41*, 117-127.
- Allemand, M., Steiger, A. E., & Fend, H. A. (2015). Empathy development in adolescence predicts social competencies in adulthood. *Journal of Personality, 83*, 229-241.
- Allemand, M., Zimprich, D., & Martin, M. (2008). Long-term correlated changes in personality traits in old age. *Psychology and Aging, 23*, 545-557.
- Baumeister, R. F., Vohs, K. D., & Funder, D. C. (2007). Psychology as the science of self-reports and finger movements: Whatever happened to actual behavior? *Perspectives on Psychological Science, 2*, 396-403.
- Bleidorn, W. (2015). What accounts for personality maturation in early adulthood? *Current Directions in Psychological Science, 24*, 245-252.
- Bolger, N., Davis, A., & Rafaeli, E. (2003). Diary methods: Capturing life as it is lived. *Annual Review of Psychology, 54*, 579-616.
- Bollich, K. L., Doris, J. M., Vazire, S., Raison, C. L., Jackson, J. J., & Mehl, M. R. (2016). Evesdropping on character: Assessing everyday moral behaviors. *Journal of Research in Personality, 61*, 15-21.
- Conner, T. S., Tennen, H., Fleeson, W., & Barrett, L. F. (2009). Experience sampling methods: A modern idiographic approach to personality research. *Social and Personality Psychology Compass, 3*, 292-313.
- Doherty, A. R., Hodges, S. E., King, A. C., Smeaton, A. F., Berry, E., Moulin, C. J., Lindley, S., Kelly, P., & Foster, C. (2013). Wearable cameras in health. *American Journal of Preventive Medicine, 44*, 320-323.



- Fleeson, W. (2001). Towards a structure- and process-integrated view of personality: Traits as density distributions of states. *Journal of Personality and Social Psychology*, *80*, 1011-1027.
- Fleeson, W. (2004). Moving personality beyond the person-situation debate: The challenge and the opportunity of within-person variability. *Current Directions in Psychological Science*, *13*, 83-87.
- Fleeson, W., & Gallagher, P. (2009). The implications of the Big-Five standing for the distribution of trait manifestation in behavior: Fifteen experience-sampling studies and a meta-analysis. *Journal of Personality and Social Psychology*, *97*, 1097-1114.
- Funder, D. C. (2001). Personality. *Annual Review of Psychology*, *52*, 197-221.
- Gerstorf, D., Hoppman, C., & Ram, N. (2014). The promise and challenges of integrating multiple time-scales in adult developmental inquiry. *Research in Human Development*, *11*, 75-90.
- Gosling, S. D., Ko, S. J., Mannarelli, T., & Morris, M. E. (2002). A room with a cue: Personality judgments based on offices and bedrooms. *Journal of Personality and Social Psychology*, *82*, 379-398.
- Gosling, S. D., & Mason, W. (2015). Internet research in psychology. *Annual Review of Psychology*, *66*, 877-902.
- Graham, L. T., Gosling, S. D., & Travis, C. K. (2015). The psychology of home environments a call for research on residential space. *Perspectives on Psychological Science*, *10*, 346-356.
- Harari, G. M., Lane, N. D., Wang, R., Crosier, B. S., Campbell, A. T., & Gosling, S. D. (in press). Using smartphone for collecting behavioral data in psychological science: Opportunities, practical considerations, and challenges. *Perspectives on Psychological Science*.

- Hektner, J. M., Schmidt, J. A., & Csikszentmihalyi, M. (2007). *Experience sampling method: Measuring the quality of everyday life*. Thousand Oaks, CA: Sage.
- Heller, D., Watson, D., Komar, J., Min, J. A., & Perunovic, W. Q. E. (2007). Contextualized personality: Traditional and new assessment procedures. *Journal of Personality, 75*, 1229-1254.
- Hooker, K., & McAdams, D. P. (2003). Personality reconsidered: A new agenda for aging research. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 58*, 296-304.
- Intille, S. S. (2012). Emerging technology for studying daily life. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 267-282). New York, NY: Guilford Press.
- Jackson, J. J., Bogg, T., Walton, K. E., Wood, D., Harms, P. D., Lodi-Smith, J., Edmonds, G. W., & Roberts, B. W. (2009). Not all conscientiousness scales change alike: A multi-method, multi-sample study of age differences in the facets of conscientiousness. *Journal of Personality and Social Psychology, 96*, 446-459.
- John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative Big Five trait taxonomy: History, measurement, and conceptual issues. In O. P. John, R. W. Robins, & L. A. Pervin (Eds.), *Handbook of personality: Theory and research* (3rd ed., pp. 114-158). New York, NY: Guilford.
- Kelly, P., Marshall, S. J., Badland, H., Kerr, J., Oliver, M., Doherty, A. R., & Foster, C. (2013). An ethical framework for automated, wearable cameras in health behavior research. *American Journal of Preventive Medicine, 44*, 314-319.
- Kosinski, M., Matz, S. C., Gosling, S. D., Popov, V., & Stillwell, D. (2015). Facebook as a research tool for the social sciences: Opportunities, challenges, ethical considerations, and practical guidelines. *American Psychologist, 70*, 543-556.

- Kraus, N., & Slater, J. (2016). Beyond words: How humans communicate through sound. *Annual Review of Psychology, 67*, 83-103.
- Lodi-Smith J., Geise, A. C., Roberts, B. W., & Robins, R. W. (2009). Narrating personality change. *Journal of Personality and Social Psychology, 96*, 679-689.
- Lodi-Smith J., Roberts, B. W. (2007). Social investment and personality: A meta-analysis of the relationship of personality traits to investment in work, family, religion, and volunteerism. *Personality and Social Psychology Review, 11*, 68-86.
- Mannay, D. I. (2016). *Visual, narrative, and creative research methods: Application, reflection and ethics*. New York, NY: Routledge.
- McAdams, D. P. (2013). The psychological self as actor, agent, and author. *Perspectives on Psychological Science, 8*, 272-295.
- McAdams, D. P. (2015). *The art and science of personality development*. New York, NY: Guilford Press.
- McAdams, D. P., & Olson, B. D. (2010). Personality development: Continuity and change over the life course. *Annual Review of Psychology, 61*, 517-542.
- Mehl, M. R., & Conner, T. S. (2012). *Handbook of research methods for studying daily life*. New York, NY: Guilford Press.
- Mehl, M. R., & Holleran, S. E. (2007). An empirical analysis of the obtrusiveness of and participants' compliance with the electronically activated recorder (EAR). *European Journal of Psychological Assessment, 23*, 248-257.
- Mehl, M. R., & Pennebaker, J. W. (2003). The sounds of social life: A psychometric analysis of students' daily social environments and natural conversations. *Journal of Personality and Social Psychology, 84*, 857-870.
- Mehl, M. R., Pennebaker, J. W., Crow, D. M., Dabbs, J., & Price, J. H. (2001). The Electronically Activated Recorder (EAR): A device for sampling naturalistic daily

- activities and conversations. *Behavior Research Methods, Instruments, & Computers*, 33, 517-523.
- Mehl, M. R., & Robbins, M. L. (2012). Naturalistic observation sampling: The Electronically Activated Recorder (EAR). In M. R. Mehl, & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 176-192). New York, NY: Guilford Press.
- Mehl, M. R., Robbins, M. L., & Deters, F. G. (2012). Naturalistic observation of health-relevant social processes: The electronically activated recorder methodology in psychosomatics. *Psychosomatic Medicine*, 74, 410-417.
- Mehl, M. R., Vazire, S., Ramírez-Esparza, N., Slatcher, R. B., & Pennebaker, J. W. (2007). Are women really more talkative than men? *Science*, 317, 82-82.
- Miller, G. (2012). The smartphone psychology manifesto. *Perspectives on Psychological Science*, 7, 221-237.
- Molenaar, P. C. M., & Campbell, C. G. (2009). The new person-specific paradigm in psychology. *Current Directions in Psychological Science*, 18, 112-117.
- Mroczek, D. K., & Spiro, A. (2007). Personality change influences mortality in older men. *Psychological Science*, 18, 371-376.
- Mroczek, D. K., Spiro, A., & Almeida, D. M. (2003). Between-and within-person variation in affect and personality over days and years: How basic and applied approaches can inform one another. *Ageing International*, 28, 260-278.
- Nestler, S., Grimm, K. J., & Schönbrodt, F. D. (2015). The social consequences and mechanisms of personality: How to analyze longitudinal data from individual, dyadic, round-robin, and network designs. *European Journal of Personality*, 29, 272-295.
- Nezlek, J. B. (2012). Diary methods for social and personality psychology. In J. B. Nezlek (Ed.) *The SAGE library in social and personality psychology methods*. London: Sage Publications.

- Noftle, E. E., & Fleeson, W. (2010). Age differences in big five behavior averages and variabilities across the adult life span: Moving beyond retrospective, global summary accounts of personality. *Psychology and Aging, 25*, 95-107.
- Noftle, E. E., & Fleeson, W. (2015). Intraindividual variability in adult personality development. In M. Diehl, K. Hooker, & M. J. Sliwinski (Eds.), *Handbook of intraindividual variability across the lifespan* (pp. 176-197). Routledge: New York.
- Park, G., Schwartz, H. A., Eichstaedt, J. C., Kern, M. L., Kosinski, M., Stillwell, D. J., Ungar, L. H., & Seligman, M. E. P. (2015). Automatic personality assessment through social media language. *Journal of Personality and Social Psychology, 108*, 934-952.
- Paunonen, S.V. (1998). Hierarchical organization of personality and prediction of behavior. *Journal of Personality and Social Psychology, 74*, 538-556.
- Pennebaker, J. W., Boyd, R. L., Jordan, K., & Blackburn, K. (2015). *The development and psychometric properties of LIWC2015*. Austin, TX: University of Texas at Austin.
- Pennebaker, J. W., Mehl, M. R., & Niederhoffer, K. G. (2003). Psychological aspects of natural language use: Our words, our selves. *Annual Review of Psychology, 54*, 547-577.
- Ramirez-Esparza, N., Mehl, M. R., Alvarez-Bermudez, J., & Pennebaker, J. W. (2009). Are Mexicans more or less sociable than Americans? Insights from a naturalistic observation study. *Journal of Research in Personality, 43*, 1-7.
- Rauthmann, J. F., Gallardo-Pujol, D., Guillaume, E. M., Todd, E., Nave, C. S., Sherman, R. A., Ziegler, M., Jones, A. B., & Funder, D. C. (2014). The Situational Eight DIAMONDS: A taxonomy of major dimensions of situation characteristics. *Journal of Personality and Social Psychology, 107*, 677-718.
- Rauthmann, J. F., Sherman, R. A., & Funder, D. C. (2015). Principles of situation research: Towards a better understanding of psychological situations. *European Journal of Personality, 29*, 363-381.

- Ray, J. L., & Smith, A. D. (2012). Using photographs to research organizations: Evidence, considerations, and application in a field study. *Organizational Research Methods, 15*, 288-315.
- Reis, H. T., & Gosling, S. D. (2010). Social psychological methods outside the laboratory. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed., Vol. 1, pp. 82-114). New York, NY: John Wiley.
- Rentfrow, P. J. (2014). *Geographical psychology: Exploring the interaction of environment and behavior*. Washington, DC: American Psychological Association.
- Rentfrow, P. J., Jokela, M., & Lamb, M. E. (2015). Regional personality differences in Great Britain. *PLoS ONE 10*: e0122245.
- Robbins, M. L., Focella, E. S., Kastle, S., Weihs, K. L., Lopez, A. M., & Mehl, M. R. (2011). Naturalistically observed swearing, emotional support and depressive symptoms in women coping with illness. *Health Psychology, 30*, 789-792.
- Robbins, M. L., Mehl, M. R., Holleran, S. E., & Kastle, S. (2011). Naturalistically observed sighing and depression in rheumatoid arthritis patients: A preliminary study. *Health Psychology, 30*, 129-133.
- Roberts, B. W. (2007). Contextualizing personality psychology. *Journal of Personality, 75*, 1071-1082.
- Roberts, B. W. (2009). Back to the future: Personality and assessment and personality development. *Journal of Research in Personality, 43*, 137-145.
- Roberts, B. W., & Jackson, J. J. (2008). Sociogenomic personality psychology. *Journal of Personality, 76*, 1523-1544.
- Roberts, B. W., Kuncel, N. R., Shiner, R., Caspi, A., & Goldberg, L. R. (2007). The power of personality: The comparative validity of personality traits, socioeconomic status, and cognitive ability for predicting important life outcomes. *Perspectives on Psychological Science, 2*, 313-345.

- Roberts, B. W., & Mroczek, D. (2008). Personality trait change in adulthood. *Current Directions in Psychological Science, 17*, 31-35.
- Roberts, B. W., & Pomerantz, E. M. (2004). On traits, situations, and their integration: A developmental perspective. *Personality and Social Psychology Review, 8*, 402-416.
- Roberts, B. W., & Wood, D. (2006). Personality development in the context of the neo-socioanalytic model of personality. In D. Mroczek & T. Little (Eds.), *Handbook of personality development* (pp. 11-39). Mahwah, NJ: Erlbaum.
- 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*, 1-25.
- Roberts, B. W., Wood, D., & Caspi, A. (2008). The development of personality traits in adulthood. *Handbook of personality: Theory and research, 3*, 375-398.
- Rosenberg, E. L. (1998). Level of analysis and the organization of affect. *Review of General Psychology, 2*, 247-270.
- Sazonov, E. & Neuman, M. (2014). *Wearable sensors: Fundamentals, implementation and application*. San Diego, CA. Elsevier Publishing.
- Schmid Mast, M., Gatica-Perez, D., Frauendorfer, D., Nguyen, L., & Choudhury, T. (2015). Social sensing for psychology automated interpersonal behavior assessment. *Current Directions in Psychological Science, 24*, 154-160.
- Schwarz, N. (2012). Why researchers should think “real-time.” In M. R. Mehl, & T. A. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 22-42). New York, NY: Guilford Press.
- Sherman, R. A., Rauthmann, J. F., Brown, N. A., Serfass, D. S., & Jones, A. B. (2015). The independent effects of personality and situations on real-time expressions of behavior and emotion. *Journal of Personality and Social Psychology, 109*, 872-888.

- Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology, 4*, 1-32.
- Sorokowska, A. (2013). Seeing or smelling? Assessing personality on the basis of different stimuli. *Personality and Individual Differences, 55*, 175-179.
- Sorokowska, A., Sorokowski, P., & Szmajke, A. (2012). Does personality smell? Accuracy of personality assessments based on body odour. *European Journal of Personality, 26*, 496-503.
- Soto, C. J., John, O. P., Gosling, S. D., & Potter, J. (2011). Age differences in personality traits from 10 to 65: Big Five domains and facets in a large cross-sectional sample. *Journal of Personality and Social Psychology, 100*, 330-348.
- Stawski, R. S., MacDonald, S. W. S., & Sliwinski, M. J. (2015). Measurement burst design. In S. K. Whitbourne (Ed.), *The Encyclopedia of adulthood and aging* (pp. 1-5). Hoboken, NJ: Wiley-Blackwell.
- Steiger, A. E., Allemand, M., Robins, R. W., & Fend, H. A. (2014). Low and decreasing self-esteem during adolescence predict adult depression two decades later. *Journal of Personality and Social Psychology, 106*, 325-338.
- Terracciano, A., McCrae, R. R., Brant, L. J., & Costa Jr, P. T. (2005). Hierarchical linear modeling analyses of the NEO-PI-R scales in the Baltimore Longitudinal Study of Aging. *Psychology and Aging, 20*, 493-506.
- Trull, T. J., & Ebner-Priemer, U. (2013). Ambulatory assessment. *Annual Review of Clinical Psychology, 9*, 151-176.
- Trull, T. J., & Ebner-Priemer, U. (2014). The role of ambulatory assessment in psychological science. *Current Directions in Psychological Science, 23*, 466-470.
- Vazire, S. (2010). Informant reports. In S. D. Gosling & J. A. Johnson (Eds.), *Advanced methods for conducting online behavioral research* (pp. 167-178). Washington, DC: American Psychological Association.



- Wilhelm, P., Perez, M., & Pawlik, K. (2012). Conducting research in daily life. In M. R. Mehl & T. S. Conner (Eds.), *Handbook of research methods for studying daily life* (pp. 62-86). New York: Guilford Press.
- Wilson, R. E., Gosling, S. D., & Graham, L. T. (2012). A review of Facebook research in the social sciences. *Perspectives on Psychological Science, 7*, 203-220.
- Wood, D., & Roberts, B. W. (2006). Cross-sectional and longitudinal tests of the Personality and Role Identity Structural Model (PRISM). *Journal of Personality, 74*, 779-810.
- Wood, D., Nye, C. D., & Saucier, G. (2010). Identification and measurement of a more comprehensive set of person-descriptive trait markers from the English lexicon. *Journal of Research in Personality, 44*, 258-272.
- Wrzus, C., & Mehl, M. R. (2015). Lab and/or field? Measuring personality processes and their social consequences. *European Journal of Personality, 29*, 250-271.
- Yarkoni, T. (2012). Psychoinformatics new horizons at the interface of the psychological and computing sciences. *Current Directions in Psychological Science, 21*, 391-397.
- Youyou, W., Kosinski, M., & Stillwell, D. (2015). Computer-based personality judgments are more accurate than those made by humans. *PNAS, 112*, 1036-1040.