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Citation for published version (APA):

Dubbelt, L., Oostrom, J. K., Hiemstra, A. M., & Modderman, J. P. L. (2015). Validation of a digital work simulation to assess Macchiavellianism and compliant behavior. *Journal of Business Ethics*, 130(3), 619-637. <https://doi.org/10.1007/s10551-014-2249-x>

DOI:

[10.1007/s10551-014-2249-x](https://doi.org/10.1007/s10551-014-2249-x)

Document status and date:

Published: 01/09/2015

Document Version:

Accepted manuscript including changes made at the peer-review stage

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
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- The final published version features the final layout of the paper including the volume, issue and page numbers.

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Validation of a Digital Work Simulation to Assess Machiavellianism and Compliant Behavior

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Received: 9 August 2013 / Accepted: 9 June 2014
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Abstract "This paper describes a new and innovative measure that is developed to predict workplace deviance through the measurement of Machiavellianism and Compliant Behavior. Two field studies were conducted to study the validity of the digital work simulation. In Study 1, ($N = 113$) support was found for the construct validity of the simulation. The constructs as measured with the simulation correlated significantly with self-reported measures of the constructs and were related to personality and self-esteem. Study 2 ($N = 285$) examined the criterion-related validity of the simulation and showed that through the assessment of Machiavellianism the simulation was able to predict workplace deviance, and incrementally predicted organizational deviance over and above the Machiavellianism Personality Scale. Machiavellianism as measured with the simulation was less susceptible to social desirable answering compared to the Machiavellianism self-report. The paper finishes with study limitations, future research directions, and practical implications.

Keywords Digital work simulation · Machiavellianism · Compliant behavior · Workplace deviance

Introduction

Deviant workplace behaviors (e.g., fraudulent behaviors, theft, and bullying) regularly make headlines. The costs of these behaviors are staggering as they can lead to high turnover rates, bankruptcy, and an impaired business reputation (Kaptein 2008; Levy and Tziner 2011). It has been estimated that theft alone costs organizations in the US \$200 billion annually (Vardi and Weitz 2004). Even though the importance of managing workplace deviance has been acknowledged, the measurement of deviance has been handicapped (Fox et al. 2007). Most studies on workplace deviance rely on self-reports (Bennett and Robinson 2000; Fox et al. 2007; Mount et al. 2006). Self-reports are known to be restricted by self-deception, negative affectivity, and social desirable answering (Fox et al. 2007; Stewart et al. 2009). Other studies use other-reports of workplace deviance (Fox et al. 2007; Mount et al. 2006; Stewart et al. 2009). But these reports may be restricted by limited opportunities to observe behavior (Stewart et al. 2009). Furthermore, a coworker or supervisor is most likely to only observe behaviors that directly affect him or her (Fox et al. 2007). In addition, archival data are not able to grasp the entire range of deviant behaviors (Fox et al. 2007).

Therefore, the present article introduces a new measurement method, a digital work simulation to predict deviant workplace behavior based on the decisions that individuals make regarding an ethical dilemma and the resulting behavior (i.e., Machiavellianism and Compliant Behavior). This new measurement may help to overcome the disadvantages associated with the assessment of this

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type of behavior. Simulations are contextualized selection and assessment procedures that psychologically or physically mimic key aspects of a job (Lievens and De Soete 2012). Simulations have been found to incrementally predict job behaviors over and above more traditional measurements of cognitive ability and personality (Koczwara et al. 2012; Lievens and Coetsier 2002). Furthermore, it has been demonstrated that simulations are difficult to fake (Lievens and De Soete 2012).

The first step in the validation of the digital work simulation is to examine its construct validity, which is the focus of Study 1. To establish the construct validity, Study 2 focuses on cross validating the findings of Study 1. In addition, Study 2 will examine the practical value of the digital work simulation in the assessment context by looking at its incremental validity in the prediction of workplace deviance compared to self- and other-reports. Since being less susceptible to social desirable answering is an important argument for the utilization of digital work simulations (Lievens and De Soete 2012), Study 2 also examines whether the digital work simulation is less susceptible to social desirable answering than a self-report. Before turning to the two studies, a more elaborate description is given on workplace deviance and assessment through digital work simulations.

Workplace Deviance

Workplace deviance consists of behavior that harms the organization and its employees by violating organizational norms (e.g., theft, property destruction, drug use, alcohol use; Robinson and Bennett 1995). These organizational norms consist of not only rules formulated by the organization but can also adhere to societal norms (Bennett and Robinson 2000). Two forms of workplace deviance can be distinguished, namely interpersonal deviance and organizational deviance (Robinson and Bennett 1995; Sackett 2002). Organizational deviance refers to behavior harmful to the organization like theft, taking longer breaks, and withholding effort (Mount et al. 2006). Interpersonal deviance consists of behavior directed at others in the organization, such as teasing, cursing, or rude behavior. Deviant behaviors vary along a dimension of seriousness (Robinson and Bennett 1995). An example of a minor offense is leaving early, while sexual harassment is classified as more serious.

A variety of antecedents of deviant behaviors have been suggested (Kish-Gephart et al. 2010). The decision to behave in line with ethics or not is dependent on the individual, the culture in which the situation takes place, the work situation, and the relationship of the individual with others (Beu et al. 2003). In this article, the focus is on

the individual. Since deviant workplace behavior is a common problem in organizations, it is expected that employees not only always initiate this behavior but may also be asked to behave in an unethical way by others (Anand et al. 2004; Beu and Buckley 2004). This implies that employees exhibit proactive (i.e., initiate deviant behaviors themselves) and reactive behavior (i.e., comply with deviant requests of others). Proactive behavior concerns behavior that consists of not only actively seeking information and opportunities to attain goals, but also actively influencing the environment (Crant 2000). Examples of proactive deviant behaviors are the behaviors typically shown by Machiavellianistic people; actively engaging in amoral manipulation, striving for status for oneself, distrusting others, and controlling others (Dahling et al. 2009). Machiavellianism can be defined as a quantitative personality trait that implies that everyone is able to behave in a Machiavellianistic way but that some act more strongly on it than others (Wilson et al. 1996). But, it can also be seen as a strategy of social conduct to manipulate others to achieve your goals. Reactive behavior entails behavior adaptation to the environment (Crant 2000) and that may result in behavior that is not in line with organizational or individual ethics (Wahn 1993). Forms of reactive deviant behavior are avoiding conflicts and complying with unethical requests of others (Brief et al. 1991; Gudjonsson et al. 2004; Wahn 2003). Defining compliant behavior presents a challenge as there are many disciplinary lenses through which compliant behavior can be viewed (Anderson and Johnson 2005; Interligi 2010). Even within organizational psychology itself, there are diverse definitions of compliant behavior. Some researchers view compliant behavior as positive work behavior (e.g., Borman and Motowidlo 1997; Smith et al. 1983). For example, Smith et al. (1983) describe compliant behavior as the “good citizen” syndrome of doing things that are right and for the sake of the system. Others view compliant behavior as potentially harmful behavior, as employees tend to comply with requests even if these requests violate ethical principles and values (Petersen and Dietz 2000; Wahn 2003).

The present study focuses on the construct of *Compliant Behavior* (CB) as defined by Gudjonsson (1992, p. 137), “the tendency of the individual to go along with propositions, requests or instructions, for some immediate instrumental gain.” We believe this definition of compliant behavior best describes the potentially harmful behavior of employees that we aim to predict. Because compliance with deviant behavior of others may be just as harmful to organizations as the initiation of deviant behavior by an individual employee, the digital work simulations will aim to measure the constructs of Machiavellianism and Compliant Behavior (CB).

Digital Work Simulations

Since the introduction of the Sims in 2000, real-life simulations have become common practice for game developers. These games have set the example for digital work simulations that can be used as a selection or development instrument by human resources. Digital work simulations are computerized replicas of tasks, knowledge, skills, and abilities required in the actual work context (Lievens and De Soete 2012). These simulations come in different forms; well-known examples are situational judgment tests, webcam tests, and serious games (Lievens and De Soete 2012; Oostrom et al. 2010). Most simulations are used to measure skills and performance levels (Lievens and Patterson 2011). The application of simulations in the selection context is based on the belief that behavior is consistent across situations (Wernimont and Campbell 1968). Hence, the performance on the simulation is representative of actual job performance.

Digital simulations have several advantages compared to their paper-and-pencil counterparts. The possibility of adding video and audio fragments to the test makes the test more interactive, more realistic, and more immersive (Shute et al. 2009). This enables the test-taker to be an actual participant instead of being an observer (Mitchell 2004). Research has also shown that simulations increase the motivation of participants; they are preferred by applicants over other selection instruments (Hausknecht et al. 2004). Additionally, simulations are cognitively more demanding compared to self-reports making faking more difficult (Nguyen et al. 2005). Furthermore, it has been found that simulations have less adverse impact than regular paper-and-pencil tests (Schmitt and Mills 2001). Of course there are also some disadvantages to digital simulations. Because of the complexity of the simulations, questions are asked within a context, it is often hard to validate the test (Funke 1998). They are also fairly costly to develop compared to their paper-and-pencil counterparts (Lievens and Sackett 2006).

Currently, most simulations are based on critical incidents of a particular job or field (McDaniel and Nguyen 2001). Another common practice is to create a simulation based on competencies derived from a job analysis. These approaches have difficulties with establishing what the simulation is actually measuring (e.g., Lievens et al. 2002). More specifically, these simulations revolve around critical incidents in particular jobs. Thus, those incidents are not designed to measure specific constructs, which makes it hard to link specific constructs to performance on the simulations. Our approach is different, since it is construct-driven (i.e., based on Machiavellianism and CB). A construct-driven approach has the following advantages: (1) the specification of the construct domain helps to reduce

contamination due to the measurement of unintended, non-job-relevant constructs, and (2) it provides insight into why the simulation is related to the criteria of interest, which increases the ability to generalize findings across jobs (Christian et al. 2010; Lievens 2006). The present research aimed to establish the construct validity (Study 1 and 2) and predictive validity (Study 2) of a construct-driven digital work simulation.

Study 1

The first study aims to establish the construct validity of the digital work simulation that was developed to assess behavior as a result of ethical decision-making, namely Machiavellianism and CB. This is examined by relating the scores of Machiavellianism and CB on the digital work simulation to the scores on well-established self-report measures of these and related constructs, namely the Machiavellian Personality Scale (MPS; Dahling et al. 2009), the Gudjonsson Compliance Scale (GCS; Gudjonsson 1989), Big Five personality traits (Goldberg 1992), Honesty–Humility as measured with a scale of the HEXACO (Lee and Ashton 2004), and self-esteem (Rosenberg 1979). Below the theoretical bases for the hypotheses are provided.

The digital work simulation consists of scenes that confront participants with challenging work-related situations. In these scenes, participants need to respond based on what they would do in those situations. According to the principle of behavioral consistency, these responses will be a reliable reflection of actual work behavior (Wernimont and Campbell 1968). The items in the digital work simulation that represent Machiavellianism and CB were based on two existing questionnaires, more specifically the MPS (Dahling et al. 2009) and the GCS (Gudjonsson 1989). The most common used Machiavellianism measure is the Mach-IV by Christie and Geis (1970; e.g., Fehr et al. 1992; Paulhus and Williams 2002; Ashton et al. 2000). However, this method has three limitations: an inconsistent reliability across studies, an ambiguous factor structure, and it consists of items which are double-barreled (Dahling et al. 2009). To overcome these problems, Dahling et al. (2009) developed the MPS. The MPS is a self-report measure of Machiavellianism and has been shown to relate to workplace deviance and to subordinates' job satisfaction ($r = .38, p < .01$; $r = -.19, p < .01$; Dahling et al. 2009).

CB measurements are currently scarce. Most measures of compliance aim to measure compliance to medical treatments and cannot be applied to a work setting (for example, Tsang et al. 2006). Other measures focus on sensitive topics (for example, “done something that you did not believe was right in order to meet the goals set by

your boss”; e.g., Wahn 2003) and may therefore be prone to socially desirable answers (Stewart et al. 2009). Another often used measurement of compliance is created by Gudjonsson (1989), named the GCS. This scale measures a general form of compliance. However, this measure is not designed to predict work-related behavior. The digital work simulation would be an enhanced measurement method to measure CB, since it is specifically designed to measure CB in the workplace. The first hypotheses focus on the relation between the scores on the digital simulation and the scores on the GCS and the MPS. We hypothesize that

Hypothesis 1 Machiavellianism as measured with the digital work simulation will be positively related to Machiavellianism as measured with the MPS.

Hypothesis 2 CB as measured with the digital work simulation will be positively related to CB as measured with the GCS.

To further investigate the construct validity of the digital work simulation, the relation between Machiavellianism and personality (i.e., Big Five, Honesty–Humility) and self-esteem is examined. The Big Five personality factors consist of Extraversion (i.e., energetic, sociable, spontaneous), Agreeableness (i.e., kind, cooperative, trustful), Conscientiousness (i.e., organized, practical, thorough), Neuroticism (i.e., nervous, emotional, guilt-ridden), and Openness (i.e., intelligent, imaginative, analytical; Goldberg 1992). The Big Five have been found to relate to Machiavellianism (Jakobwitz and Egan 2006; Lee and Ashton 2005; Paulhus and Williams 2002), and even have been found to explain 25 % of the variance in Machiavellianism (Vernon et al. 2008). Therefore, relating Machiavellianism as measured with the simulation to personality would provide support for the construct validity of the simulation. A Machiavellianistic individual has been found to be neurotic (Neuroticism; $r = .38$), unpleasant (Agreeableness; $r = -.16$ to $-.47$), and non-conscientious (Conscientiousness; $r = -.27$ to $-.34$; Jakobwitz and Egan 2006; Lee and Ashton 2005; Paulhus and Williams 2002). Highly Machiavellianistic individuals want to control and manipulate others (Dahling et al. 2009). These behaviors fit with the characteristics of a highly neurotic individual (i.e., envious, intrusive, and instable; Goldberg 1990), therefore, the positive link between Machiavellianism and Neuroticism seems intuitive. Furthermore, agreeable individuals are less likely to manipulate others or have a cynical and skeptical outlook on others than Machiavellianistic individuals (Dahling et al. 2009; Goldberg 1990). In addition, Machiavellianism has been found to relate to economic opportunism (Sakalaki et al. 2007). Opportunism itself is characterized by behavior that promotes personal interests by deceit, lying, and treachery. This type of

behavior is neither less likely to cross the mind of an agreeable individual, nor would it cross the mind of an individual scoring high on Conscientiousness. Opportunism entails the belief that deals need to be broken when necessary (Sakalaki et al. 2007), while conscientious individuals place high value on deals (Goldberg 1990). Moreover, Machiavellianistic individuals are known to keep up deals only when it is beneficial for them and will bend the rules to attain their own goals (Wilson et al. 1996). In line with these findings, we expect that both Agreeableness and Conscientiousness will be negatively related, whereas Neuroticism will be positively related to Machiavellianism as measured in the digital work simulation. Thus, we hypothesize that

Hypothesis 3 Machiavellianism as measured with the digital work simulation will be positively related to Neuroticism (H3a) and will be negatively related to Agreeableness (H3b) and to Conscientiousness (H3c).

Honesty–Humility has been added to the Big Five as a sixth factor of personality (Lee and Ashton 2005). It has been defined by sincerity, fairness, and modesty, and as antithesis of slyness, pretentiousness, and greed. Lee and Ashton (2005), therefore, suggested that Honesty–Humility would largely capture the same as the Dark Triad (i.e., Narcissism, Psychopathy, and Machiavellianism). Their results confirm that assumption, since Honesty–Humility is negatively related to Machiavellianism ($r = -.40$ to $-.57$). Thus, if the simulation is successfully measuring Machiavellianism than Machiavellianism as measured with the simulation should be negatively related to Honesty–Humility. We hypothesize that

Hypothesis 4 Machiavellianism as measured with the digital work simulation will be negatively related to Honesty–Humility.

To examine the construct validity of CB more thoroughly, the relation between CB and personality is studied. Compliance has been found to correlate significantly with Neuroticism ($r = .36$ – $.39$) and Extraversion ($r = -.22$ to $-.31$; Gudjonsson et al. 2004). The positive relation between Neuroticism and CB seems logical, since a neurotic individual is described as anxious, worrying, and moody (Eysenck and Eysenck, 1975). A highly neurotic individual is more prone to experience emotional stress and may therefore be more prone to exhibit CB to avoid negative emotions. Finally, introverts are expected to show more CB as they are reserved and tend to lack assertiveness (Gudjonsson et al. 2004). Hence, we hypothesize that

Hypothesis 5 CB as measured with the digital work simulation will be positively related to Neuroticism (H5a) and negatively related to Extraversion (H5b).

In several previous studies, a link between CB and self-esteem has been found (Gudjonsson and Sigurdsson 2003; Gudjonsson et al. 2002). Self-esteem can be described as a positive or negative attitude toward the self (Rosenberg 1979). Individuals with poor self-esteem tend to avoid conflict with others and their lack of confidence makes it harder for them to resist requests of others (Gudjonsson et al. 2002). Additionally, having a low self-esteem is associated with experiencing more distressing emotions which makes them disengage from their goals faster when others put pressure upon them (Gudjonsson and Sigurdsson 2003). Therefore, individuals with a poor self-esteem are more likely to comply with requests of others. Thus, we hypothesize that

Hypothesis 6 CB as measured with the digital work simulation will be negatively related to self-esteem.

Method

Participants and Procedure

Participants were approached via the website of a large HRD consultancy firm in the Netherlands and through the network of the researchers. The total sample consisted of 113 participants, 42 were female (37.2 %) and 71 were male (62.8 %). Their mean age was 36.48 years ($SD = 10.92$; range 19–66) and on average they had 12.78 years of work experience ($SD = 10.53$; range 0–40). Of the participants, 58 had a master degree (51.3 %), 36 had a bachelor degree (31.9 %), and 19 had another type of degree (16.9 %). The sample consisted of participants working in various job sectors: healthcare (11.5 %), finance (16.8 %), ICT (12.4 %), education (8.0 %), and other job sectors (51.4 %). They received an email in which the goal of the study was explained and specific instructions were provided. The instructions described the different tests and the total duration (approximately 45 min). After reading the instructions, the participants participated in the digital work simulation and they also filled out scale items on CB, Machiavellianism, personality, and self-esteem (see measures section). A report of their scores was sent to the participants.

Measures

All scale items were answered on a 5-point Likert-type scale (1 = *NO!*, 2 = *no*, 3 = *?*, 4 = *yes*, 5 = *YES!*), unless otherwise mentioned. All questionnaires were translated to the Dutch language following the guidelines of the International Test Commission (ITC; Hambleton 2001).

Digital Work Simulation

The digital work simulation was constructed for the target population of a large Dutch HRD consultancy firm that mainly consists of highly educated clients that work within a commercial setting. For this reason, participants take on the role of a sales representative when completing the simulation. Constructing the digital work simulation was an iterative process, in which current recommended practice for the development of simulations was followed (e.g., Weekley et al. 2006).

The digital work simulation consisted of five scenes in which the participant, playing a sales representative in a global toy-enterprise, was confronted with several work-related ethical dilemmas. The simulation starts with a general introduction in which the role and tasks of the participant are explained and in which the characters in the simulation, the company, and a new product are introduced. Subsequently, each scene represents a different challenge, related to the launch of the new product that is relevant for the job of a sales representative. The scenes were constructed by four subject matter experts and contain interactions with supervisors, colleagues, and subordinates. Hence, the power distance, which can influence Machiavellianistic behavior (Christie and Geis 1970), between the participant and the characters within the digital work simulation varied from being a subordinate of someone to supervising others. These interactions with the simulation take place via email, voice mail, and direct dialogs between the participant and the simulated characters. The response options in the dialogs are constructed as items. Participants are instructed to respond to these items based on what he/she would do in a real work setting (e.g., behavioral tendency response format).

Initially, 16 items were developed to measure Machiavellianism, four items for each dimension of Machiavellianism (see Dahling et al. 2009). The items of Machiavellianism as measured with the digital work simulation were based on the same themes as the MPS of Dahling et al. (2009). After an initial factor analyses, it was decided to exclude two items to increase the fit of the total model. Those two items represented interactions with subordinates. To test the structure of the digital work simulation a series of maximum likelihood confirmatory factor analyses (CFA) was conducted. Different indices were used to evaluate the fit of the hypothesized two-factor model. Among those indices was the χ^2 test, but since this test is sensitive to sample size it was decided to also look at the Comparative Fit Index (CFI), the Tucker–Lewis Index (TLI), the standardized root mean square residual (SRMR), and the Root Mean Square Error of Approximation (RMSEA) (Hair et al. 2006). A model fits well to the data if the CFI and TLI values are .95 or higher and the RMSEA

values are .07 or less. SRMR values could be biased upward, therefore, the use of other indices is recommended. For the first study, the CFA including the two items resulted in the following fit: $\chi^2 = 216.62$, $df = 163$, $p = .00$, CFI = .69, TLI = .64, SRMR = .09, RMSEA = .05. Excluding the two items resulted in a better fit of the model $\Delta\chi^2 = 48.49$, $\Delta df = 35$, $p = .06$. Four items were developed to measure CB with the digital work simulation and were based on the GCS and were adapted in such a way that they represented ethical dilemmas (Gudjonsson 1989). The items were scored on a 4-point Likert-type scale (*NO!*, *no*, *yes*, *YES!*). Example items can be found in Appendix.

The hypothesized second-order factor model with Machiavellianism and CB as the second-order constructs and the four Machiavellianism dimensions and the two CB dimensions as the first-order constructs provided a better fit of the data $\chi^2 = 168.13$, $df = 128$, $p = .01$, CFI = .74, TLI = .69, SRMR = .09, RMSEA = .05, than a one-factor model $\chi^2 = 218.19$, $df = 135$, $p < .01$, CFI = .46, TLI = .39, SRMR = .11, RMSEA = .07, $\Delta\chi^2 = 50.06$, $\Delta df = 7$, $p < .01$. The second-order factor model proved to have an equal fit to the data as a two-factor model (i.e., Machiavellianism and CB as first-order constructs) $\chi^2 = 172.93$, $df = 134$, $p < .01$, CFI = .75, TLI = .71, SRMR = .09, RMSEA = .05, $\Delta\chi^2 = 4.80$, $\Delta df = 6$, $p = .57$. Based on theoretical grounds and the divergent and convergent validity evidence for the Machiavellianism dimensions (as reported below), the analyses are based on the second-order factor model.¹

To test the divergent and convergent validity of Machiavellianism measured with the digital work simulation (from now on referred to as the Machiavellianism scale), correlations were calculated between the dimensions of the Machiavellianism scale as well as between the dimensions of the MPS and the Machiavellianism scale. The correlations between the dimensions of the Machiavellianism scale varied between $r = .13$ ($p = .16$) and $r = .30$ ($p = .001$). The Machiavellianism scale as a whole was related to the MPS subscales of Control $r = .23$ ($p < .05$), Amoralism $r = .28$ ($p < .01$), and Status $r = .27$ ($p < .01$). The correlations between the dimensions of the MPS and their respective dimensions in the Machiavellianism scale are $r = .31$ ($p = .001$) for Amoralism, $r = .23$ ($p = .01$) for Status, $r = .22$ ($p = .02$) for Control, and $r = .23$ ($p = .02$) for Distrust. These convergent validity coefficients were higher than all divergent validity coefficients.

The final Machiavellianism scale consisted of 14 items and 4 items measured CB (from now on referred to as the CB scale). Estimating the internal consistency of simulations (such as SJT-like simulations) is often problematic and not very relevant, because most simulations tend to assess multiple constructs (McDaniel and Whetzel 2005).

Self-reported Machiavellianism

For construct validation purposes, Machiavellianism was also measured with a self-report measure, the MPS (Dahling et al. 2009). The scale consists of 16 statements and an example of a statement of Machiavellianism is “I like to give the orders in interpersonal situations.” The MPS was developed to measure four dimensions of Machiavellianism suggested by Dahling et al. (2009). Our data supported the four-dimensional structure, $\chi^2 = 143.55$, $df = 100$, $p < .01$, CFI = .91, TLI = .90, SRMR = .08, RMSEA = .06. Overall, the MPS had a reliability of $\alpha = .85$. Reliabilities of the separate scales were Amoralism $\alpha = .78$; Control $\alpha = .58$; Status $\alpha = .80$; Distrust $\alpha = .77$.

Self-reported Compliance

Compliance was measured with the GCS (Gudjonsson 1989). This questionnaire consists of 20 statements. One of the statements is “I give in easily to people when I am pressured.” Although the GCS is developed to measure two underlying factors, namely the eagerness to please others and the inclination to avoid conflict and confrontation, confirmatory factor analyses showed only a reasonable model fit for a one-factor model, $\chi^2 = 290.07$, $df = 170$, $p < .01$, CFI = .73, TLI = .69, SRMR = .09, RMSEA = .08. This factor can be interpreted as a general factor of how individuals react when pressured by others. The reliability of the GCS was $\alpha = .78$.

Personality

Personality was measured with the 50 item representation of the Goldberg (1992) Big Five markers in the International Personality Item Pool (IPIP 2001). An example of a statement is “Have frequent mood swings.” The reliabilities of the scales of the IPIP were $\alpha = .85$ for Extraversion, $\alpha = .86$ for Neuroticism, $\alpha = .85$ for Conscientiousness, $\alpha = .70$ for Agreeableness, and $\alpha = .74$ for Openness.

Honesty–Humility

Honesty–Humility was measured with 12 items of the IPIP measuring constructs similar to those included in Lee and Ashton’s (2004) HEXACO personality inventory. These

¹ It was not possible to test for measurement invariance regarding gender differences in Study 1 because of the small sample (i.e., 42 women and 71 men).

Table 1 Descriptive statistics and correlations between the study variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Age	36.48	10.92	(-)															
2. Gender	.37	.49	-.14	(-)														
3. Education	6.14	1.25	.02	.10	(-)													
4. Work experience	12.78	10.53	.92**	-.16	-.09	(-)												
5. Computer skills	4.25	0.88	-.23*	-.16	.07	-.17	(-)											
6. Machiavellianism scale	2.38	0.32	-.14	-.17	-.07	-.12	.06	(-)										
7. CB scale	1.89	0.55	-.22*	.10	.01	-.26**	.04	.08	(-)									
8. MPS	2.35	0.53	-.19*	-.27**	-.20*	-.12	.16	.31**	-.14	(.88)								
9. GCS	2.64	0.42	-.20*	.03	-.02	-.22*	-.17	.19*	.28**	-.01	(.78)							
10. Extraversion	3.37	0.66	-.02	.17	.07	-.03	.09	-.09	-.18	.03	-.45**	(.85)						
11. Agreeableness	4.05	0.40	.04	.24*	-.01	.08	.01	-.28**	-.04	-.35**	-.19*	.26**	(.70)					
12. Conscientiousness	3.74	0.64	.10	.16	-.12	.16	-.03	-.13	-.19	.06	-.26**	.26**	.36**	(.85)				
13. Neuroticism	2.35	0.66	-.16	.07	.12	-.24*	-.11	.07	.22*	-.01	.44**	-.34**	-.23*	-.40**	(.86)			
14. Openness	3.83	0.50	-.01	-.22*	.12	-.01	.31**	-.10	-.05	.01	-.37**	.35**	.25**	.14	-.21*	(.74)		
15. Honesty-Humility	3.75	0.49	.17	.21*	.12	.16	-.05	-.39**	.01	-.60**	-.19*	-.01	.57**	.07	-.13	-.01	(.65)	
16. Self-esteem	4.09	0.55	.20*	-.01	-.10	.30**	-.05	-.11	-.24**	-.11	-.40**	.38**	.32**	.51**	-.73**	.23*	.21*	(.84)

Note Coefficient alphas are presented on the diagonal, between parentheses. Gender is coded as follows: 0 = male, 1 = female. Education is coded as follows: 1 = primary school to 7 = university. All scales range from 1 to 5, except for the Machiavellianism scale and the CB scale which range from 1 to 4. $N = 113$

CB scale compliant behavior scale, *MPS* Machiavellianism personality scale, *GCS* Gudjonsson compliance scale

* $p < .05$, ** $p < .01$

items were chosen considering the definition of the four subscales of Honesty–Humility (i.e., sincerity, fairness, greed avoidance, and modesty) and their representativeness of this definition. An example of a statement is “Pretend to be concerned for others.” The reliability of the questionnaire was $\alpha = .65$.

Self-esteem

Self-esteem was measured with the Rosenberg Self-Esteem Scale, which consists of 10 items (Rosenberg 1979). One of the items was: “On the whole, I am satisfied with myself.” The reliability of the scale was $\alpha = .84$.

Results

Descriptive Statistics

Means, standard deviations, reliabilities, and correlations between all study variables are provided in Table 1. Age correlated negatively with several of the study measures (the CB scale, $r = -.22$, $p < .05$; MPS, $r = -.19$, $p < .05$; GCS, $r = -.20$, $p < .05$). So, older participants exhibited more CB, more Machiavellianistic behavior, and more compliance. Gender correlated negatively with the MPS ($r = -.27$, $p < .05$). This implies that women scored lower on the MPS than men. Repeated measure ANOVAs (with age and gender as covariates) did not show significant differences in participants’ CB or Machiavellianistic responses based on the power distance to the characters within the digital work simulation.

Hypotheses Testing

A Bonferroni correction was applied to test our hypotheses. Nine hypotheses were tested, therefore, the adjusted p value was $0.05/9 = 0.006$. As stated in Hypothesis 1, the Machiavellianism scale was positively related to Machiavellianism as measured with the MPS ($r = .31$, $p < .006$). Hypothesis 2 was also supported, and the CB scale was positively related to CB as measured with the GCS ($r = .28$, $p < .006$). The negative relation between Machiavellianism and Agreeableness was replicated supporting Hypothesis 3b ($r = -.28$, $p < .006$). No significant relations between the Machiavellianism scale and Neuroticism (H3a; $r = .07$, $p = .49$) and the Machiavellianism scale and Conscientiousness (H3c; $r = -.13$, $p = .16$) were found. Hypothesis 4, stating that the Machiavellianism scale would be negatively related to Honesty–Humility, was supported ($r = -.39$, $p < .006$). We also examined whether the dimensions of the Machiavellianism scale correlated differently with the outcome variables. As Table 2 shows, the correlations are

Table 2 Correlations between the dimensions of the Machiavellianism scale and the outcome variables in Study 1

	Distrust	Control	Amorality	Status
Agreeableness	-.13	-.22*	-.22*	-.15
Conscientiousness	-.11	-.16	.09	-.18
Neuroticism	.13	.04	-.01	.01
Honesty–humility	-.29**	-.17	-.32**	-.22*

* $p < .05$; ** $p < .01$

fairly similar for all dimensions. Scores on the CB scale were not significantly related to Neuroticism ($r = .22$, $p = .021$), but the correlation was in the expected direction. Therefore, Hypothesis 5a was rejected. The CB scale was not significantly related to Extraversion ($r = -.18$, $p = .06$). Therefore, Hypothesis 5b was not supported. Self-esteem was, as hypothesized, negatively related to the CB scale (H6; $r = -.24$, $p < .006$). The correlations between the two self-report measures and personality and self-esteem were in line with the correlations found between the simulation and those constructs (see Table 1). In sum, the Machiavellianism scale was positively related to the MPS and negatively related to Agreeableness and Honesty–Humility. The CB scale was positively related to the GCS and Neuroticism, and negatively related to self-esteem.

Discussion Study 1

The aim of Study 1 was to examine the construct validity of a digital work simulation designed to assess Machiavellianism and CB when confronted with an ethical dilemma. The correlations indicated that the digital work simulation is indeed measuring Machiavellianism and CB, thus, providing support for the construct validity of the digital work simulation. The correlations were small to medium sized and the validity of the constructs measured by both work simulation and the self-report measures is mainly reflected in its usability for work-related decisions (criterion-related validity). In other words, significant correlations were expected and found, but this leaves the question which instrument is more valid to predict workplace deviance largely unanswered. The proof of the pudding, therefore, lies in the establishment of the criterion validity of both types of instruments (self-report vs. simulation).

The correlations found between the digital work simulation and the self-report measures were significant, yet point at a difference between the constructs that are measured with the two instruments. The MPS measures a more trait-like construct in comparison to the digital work simulation which measures Machiavellianism through behavior (Dahling et al. 2009). Wilson et al. (1996) suggested

that Machiavellianism is a strategy of social conduct that refers to manipulating others for personal gain and has its roots in evolution. While Machiavellianism as a trait-like construct might be more stable over situations, Machiavellianism as a strategy of social conduct may be more dependent on the situation which would explain the difference between the two scales. It is likely that the digital work simulation taps more into Machiavellianism as social conduct instead of Machiavellianism as a trait-like construct. Further, the digital work simulation specifically measures work-related Machiavellianism, whereas the MPS measures a context-free trait. Additionally, the digital work simulation specifically measures compliance with an unethical request at work, while the GCS measures a more general form of compliance (Gudjonsson 1989). Although a construct-driven approach was applied to develop the simulation, it is still possible that characteristics of the simulation have influenced participants (for example, the context of the simulation, the cognitive difficulty of the simulation). These characteristics can result in biased reports (Spector 2006). Hence, significant but medium-sized correlations were to be expected. Likewise, the answers on the self-report measures may be affected by faking. Therefore, the proof of the pudding lies in Study 2.

In addition, Study 1 was able to replicate most of the previously found relations between the constructs measured in the simulation and personality and self-esteem. The Machiavellianism scale was, as expected, related to Agreeableness. This result is consistent with previous research (e.g., Paulhus and Williams 2002) and concurs with the description of Machiavellianistic individuals as individuals who use exploitative tactics and are socially destructive (Wilson et al. 1996). Unexpectedly, no link between Machiavellianism and Conscientiousness and Neuroticism was found (neither in the simulation nor in the self-report measure). This result may be caused by the self-selection effect. Previous research on the self-selection effect found that research volunteers scored on average lower on Neuroticism and higher on Conscientiousness than non-respondents (Lönngqvist et al. 2007). The negative relation between Machiavellianism and Honesty–Humility found in previous research was replicated. This result is consistent with Machiavellianism described as the willingness to exploit others, which is contradictory to the reluctance to exploit others of an honest and humble individual (Ashton et al. 2000).

The CB scale was indeed negatively related to self-esteem. A compliant individual has, as expected, less self-esteem. Although the correlation between CB and Extraversion was not significant, the size of the correlation was comparable to correlations found in previous simulation research (e.g., McDaniel et al. 2007). It is plausible that the absence of a real interaction limits the correlation of Extraversion when tested in a simulation. In more

interactive simulations, like webcam tests, where participants state their own answers instead of selecting a pre-defined answer, the correlation with Extraversion is generally higher (e.g., Oostrom et al. 2011). The correlation between the CB scale and Neuroticism was also non-significant, but the correlation was in the expected direction and comparable in size to correlations found in previous simulation research (e.g., McDaniel et al. 2007). Perhaps, participants only felt partially responsible for the outcomes of the digital work simulation, which may have restricted the size of the correlation. When participants were truly judged on their performance in the digital work simulation, they might feel more responsible. This would, for example, entail that they would feel more guilty when they would not comply with a request made by others.

Study 2

So far, Study 1 was able to provide preliminary proof on the construct validity of the digital work simulation. On the base of these results, Study 2 is conducted and focuses on the practical value of the simulation: does the simulation do a better job in predicting actual work behavior than the self-reports of Machiavellianism and CB, or not? Moreover, it is important to replicate the findings of Study 1 regarding the correlations found between the digital work simulation and the self-report measures. Lastly, the susceptibility of the digital work simulation to social desirable answering is studied.

As mentioned earlier, a distinction can be made between interpersonal deviance and organizational deviance (Robinson and Bennett 1995). Interpersonal deviance is directed at individuals, while organizational deviance is directed at the organization itself. Prior research has found a link between Machiavellianism and interpersonal deviance (Bennett and Robinson 2000; Christie and Geis 1970; Ricks and Fraedrich 1999). Ricks and Fraedrich (1999) studied Machiavellianism among sales representatives and concluded that individuals with a high Machiavellianism score are more productive, but are judged less favorable by their managers. Their higher productivity may be explained by their greater focus on financial and personal success (Dahling et al. 2009; Tang and Chen 2008). The less favorable judgment implies that high Machiavellianistic individuals function less well in social interactions and, thus, may be more prone to engage in interpersonal deviance. Moreover, a study conducted by Bennett and Robinson (2000) found a positive relation between Machiavellianism and interpersonal deviance. Previous research conducted by Bennett and Robinson (2000) found a positive relation between Machiavellianism and organizational deviance, supporting the idea that Machiavellianistic individuals will do anything to attain their goal (Dahling et al. 2009). Therefore, we hypothesize that

Hypothesis 7 Machiavellianism as measured with the digital work simulation will be positively related to interpersonal deviance (H7a) and organizational deviance (H7b).

The direct link between CB and workplace deviance has not been studied yet. When considering the definition of CB (i.e., the tendency of the individual to comply with propositions, requests or instructions, for some immediate instrumental gain; Gudjonsson 1992), it seems plausible that the two concepts are related. Since CB is triggered when pressure is put on the individual, workplace deviance would occur when the individual experiences some kind of pressure (Colbert et al. 2004; Gudjonsson 1992). CB is mainly motivated by the fear of negative consequences (Treviño et al. 1998). Noncompliance with a request of a manager may have serious consequences for a person's salary and promotion chances (Grasmick and Kobayashi 2002). Hence, we hypothesize that

Hypothesis 8 The CB as measured with the digital work simulation will be positively related to interpersonal deviance (H8a) and organizational deviance (H8b).

In order to examine the added practical value of the digital work simulation, it is necessary to examine its incremental validity over self-reports (the MPS and the GCS) in the prediction of workplace deviance. Research by Dahling et al. (2009) found a positive relation between the score on the MPS and workplace deviance. It is expected that the digital work simulation will incrementally predict workplace deviance over and above the MPS, since the simulation focuses on measuring behavior, while the MPS measures a trait-like construct (Dahling et al. 2009). The relation between the GCS and workplace deviance has not been studied before. It seems plausible that both the GCS and the digital work simulation will predict workplace deviance and that the simulation will incrementally predict workplace deviance over and above the GCS. The digital work simulation specifically focuses on measuring compliant behavior at work, while the GCS measures a more general form of compliance (Gudjonsson 1989). Therefore, it is hypothesized that

Hypothesis 9 Machiavellianism as measured with the digital work simulation will incrementally predict interpersonal deviance (H9a) and organizational deviance (H9b) over and above the MPS.

Hypothesis 10 CB as measured with the digital work simulation will incrementally predict interpersonal deviance (H10a) and organizational deviance (H10b) over and above the GCS.

It is a well-known fact that self-reports are highly susceptible to response biases (e.g., ego-enhancing biases, rationalization; Stewart et al. 2009). An alternative is using

a non-self-report measure, thereby, avoiding the response biases of self-reports. But non-self-reports have their restrictions as well due to restricted observation opportunities of the behavior and a possibility of the fundamental attribution error. This attribution error implies that the observer does not take into account the situational influence on behavior (Mount et al. 2006; Stewart et al. 2009). It is expected that the digital work simulation is less susceptible to response biases, more specifically to social desirable answering. Simulations are known to be more cognitively demanding, consequently making social desirable answering more difficult (Lievens and De Soete 2012). Hence, it is hypothesized that

Hypothesis 11 Machiavellianism (H11a) and CB (H11b) as measured with the digital work simulation are less susceptible to socially desirable answering than the MPS and the GCS.

Method

Participants and Procedure

Participants were invited via a panel of a Dutch HRD consultancy firm and via a professional panel. They received an email with details about the study and a link to the questionnaire. Both panels consisted of employed individuals who all had a basic understanding of the English language. The sample consisted of 285 participants of which 116 were female (40.7 %) and 169 were male (50.3 %). The response rate was 12.9 %. Their age ranged from 17 to 69 years ($M = 42.62$, $SD = 10.44$) and their work experience ranged from 0 to 45 years ($M = 19.11$, $SD = 10.65$). The sample consisted of 174 participants with a bachelor degree (61.1 %), 87 with a master degree (30.5 %), and 24 participants with another type of degree (8.4 %). The participants worked in a variety of job sectors: healthcare (22.1 %), finance (15.8 %), ICT (11.9 %), education (10.5 %), and other job sectors (39.7 %).

Participants completed the digital work simulation, filled out scale items on compliance, workplace deviance, and social desirability (see measures section). These items were translated to the Dutch language following the ITC guidelines (Hambleton 2001). To obtain a more complete view of the true workplace deviance of employees, it was decided to use both a self-report measure and an other-report measure. The participants were therefore asked to invite their managers or colleagues to fill out the Workplace Deviance Questionnaire as well (Stewart et al. 2009). In total, 64 other-reports were obtained (40.6 % managers and 59.4 % colleagues). The answers of the managers and colleagues were compared and no significant differences

between the two groups were found. Therefore, it was decided to analyze them as one group. All participants received a report on their scores.

Measures

The Digital Work Simulation

To test the structure of the digital work simulation, a series of maximum likelihood CFAs was conducted. The same indices as in Study 1 were used to evaluate the fit of the models. The exclusion of the two items resulted also in a significant better fit of the data $\Delta\chi^2 = 55.25$, $\Delta df = 33$, $p < .01$. The second-order factor model with Machiavellianism and CB as the second-order constructs and the four Machiavellianism dimensions and the two CB dimensions as the first-order constructs provided a better fit of the data, $\chi^2 = 278.86$, $df = 128$, $p < .01$, CFI = .73, TLI = .68, SRMR = .07, RMSEA = .06, than a one-factor model $\chi^2 = 320.07$, $df = 135$, $p < .01$, CFI = .67, TLI = .62, SRMR = .07, RMSEA = .07, $\Delta\chi^2 = 42.21$, $\Delta df = 7$, $p < .01$. The second-order factor model did not significantly provide a better fit than a two-factor model $\chi^2 = 288.39$, $df = 134$, $p < .01$, CFI = .68, TLI = .72, SRMR = .07, RMSEA = .06, $\Delta\chi^2 = 9.53$, $\Delta df = 6$, $p = .15$. The correlations between the dimensions of the Machiavellianism scale varied between $r = .15$ ($p = .10$) and $r = .36$ ($p = .001$). The correlations between the dimensions of both scales are $r = .25$ ($p = .001$) for Amorality, $r = .19$ ($p = .001$) for Status, $r = .29$ ($p = .001$) for Control, and $r = .13$ ($p = .03$) for Distrust. These convergent validity coefficients were higher than all divergent validity coefficients. Again, the analyses were done based on the second-order factor model.² These results are in line with the findings of Study 1. Machiavellianism as measured with the digital work simulation will from now on be referred to as the Machiavellianism scale and CB as measured with the digital work simulation as the CB scale.

Machiavellianism and Compliance

The same version of the MPS and the GCS was used in this study as in Study 1. The overall reliability of the MPS was

$\alpha = .80$ and of the dimensions: Amorality $\alpha = .80$; Control $\alpha = .60$; Status $\alpha = .77$; and Distrust $\alpha = .68$. The reliability of the GCS was $\alpha = .85$.

Workplace Deviance

The Workplace Deviance Questionnaire (WDQ) of Bennett and Robinson (2000) was used as a self-report measure of interpersonal deviance as well as organizational deviance. The scale consists of 7 items measuring interpersonal deviance ($\alpha = .82$) and 11 items measuring organizational deviance ($\alpha = .89$). The items were measured on a 5-point Likert-type scale (1 = *never*, 2 = *once*, 3 = *several times a year*, 4 = *weekly*, 5 = *daily*) consistent with previous research done by Mount et al. (2006). An interpersonal deviance item was “Made fun of someone at work” and an organizational deviance item was: “Taken property from work without permission.”

The other-report workplace deviance scale was filled out by the manager or colleague of the participant. This measure of workplace deviance was created by Stewart et al. (2009) and it specifically targets other-reports of workplace deviance. It was largely based on the WDQ, but the perspectives of the statements were altered and some statements were dropped. The scale is scored on a 5-point Likert-type scale (1 = *never*, 2 = *once*, 3 = *several times a year*, 4 = *weekly*, 5 = *daily*). The scale consists of 4 interpersonal deviance items (e.g., “Played a mean prank on someone at work”) and 8 organizational deviance items (e.g., “Took property from work without permission”). The reliability of the other-report of interpersonal deviance scale was $\alpha = .87$ and $\alpha = .95$ of the other-report of organizational deviance scale.

Social Desirable Answering

The Marlowe–Crowne Social Desirability Scale (MCSDS) is a measure of socially desirable answering (Reynolds 1982). The short version of the MCSDS used in this study consisted of 13 items. The items have two response options (1 = *true*, 2 = *false*). An example of an item is “No matter who I’m talking to, I’m always a good listener.” The reliability of this scale was $\alpha = .67$.

Results

Descriptive Statistics

Means, standard deviations, reliabilities, and correlations of all study variables are provided in Table 3. Age was negatively related to several of the study measures (CB, $r = -.16$, $p < .01$; MPS, $r = -.12$, $p < .05$; GCS, $r = -.18$,

² To test for measurement invariance, we tested whether the hypothesized model was different for men versus women. A χ^2 difference test was used to test whether the factor loadings significantly differed between men and women. The baseline model, with no between group constraints, showed adequate fit to the data, $\chi^2 = 515.56$, $df = 258$, $p < .01$, CFI = .61, TLI = .53, SRMR = .10, RMSEA = .06. The measurement invariant model, with constrained measurement weights, also showed a good fit to the data, $\chi^2 = 518.99$, $df = 273$, $p < .01$, CFI = .62, TLI = .58, SRMR = .11, RMSEA = .08. The $\Delta\chi^2 = 3.43$, with $\Delta df = 15$, was non-significant ($p = .99$), indicating that the factor loadings are equivalent for men and women.

Table 3 Descriptive statistics and correlations between the study variables

	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Age	42.62	10.44	(-)													
2. Gender	.41	.49	-.05	(-)												
3. Education	6.15	0.84	-.10	.11	(-)											
4. Work experience	19.11	10.65	.88**	-.05	-.09	(-)										
5. Computer skills	4.21	0.72	-.12*	-.17**	.13*	-.12*	(-)									
6. Machiavellianism scale	2.40	0.36	.01	-.08	-.02	.08	.08	(-)								
7. CB scale	1.83	0.58	-.16**	-.03	.05	-.11	-.06	.38**	(-)							
8. MPS	2.47	0.47	-.12*	-.20**	-.08	-.09	.08	.22**	.07	(.80)						
9. GCS	2.56	0.49	-.18**	.14*	.07	-.17**	-.04	.09	.29**	.12	(.85)					
10. SIDS	1.48	0.48	-.10	-.24**	-.10	-.11	.04	.17**	.08	.37**	.03	(.82)				
11. OIDS	1.32	0.56	.27*	-.24	-.03	.26*	.14	.33**	.19	.27*	.10	.48**	(.87)			
12. SODS	1.47	0.47	.01	-.08	.02	-.04	.08	.22**	.08	.25**	.12	.65**	.69**	(.89)		
13. OODS	1.31	0.55	.13	-.14	-.07	.14	.20	.46**	.24	.30*	.27*	.45**	.85**	.77**	(.86)	
14. Social desirability	1.72	0.19	.16**	.01	-.08	.14*	.03	-.13*	-.15*	-.30**	-.25**	-.46**	-.31*	-.48**	-.38**	(.67)

Note Coefficient alphas are presented on the diagonal, between parentheses. Gender is coded as follows: 0 = male, 1 = female. Education is coded as follows: 1 = primary school to 7 = university. All scales range from 1 to 5, except for the Machiavellianism Scale and the CB Scale which range from 1 to 4 and the MCSDS which ranged from 1 to 2. Sample; $N = 285$. Managers/colleagues; $N = 64$

CB scale compliant behavior scale, *MPS* Machiavellianism personality scale, *GCS* Gudjonsson compliance scale, *SIDS* self-report interpersonal deviance scale, *OIDS* other-report interpersonal deviance scale, *SODS* self-report organizational deviance scale, *OODS* other-report organizational deviance scale

* $p < .05$, ** $p < .01$

$p < .01$). Hence, younger participants exhibited more CB, more Machiavellianistic behavior, and more compliance. Gender was negatively related to the MPS ($r = -.20$, $p < .01$) and positively related to the GCS ($r = .14$, $p < .05$). Thus, women scored lower on the MPS than men, but higher on the GCS. These correlations are similar to those found in Study 1. Repeated measure ANOVAs (with age and gender as covariates) did not show significant differences in participants' CB or Machiavellistic responses based on the power distance to the characters within the digital work simulation.

Study 2 provided data which enabled the cross-validation of the digital work simulation. The positive correlations found in Study 1 between the digital work simulation and the MPS and the GCS were replicated in the Study 2. The Machiavellianism scale was positively related to the MPS ($r = .22$, $p < .01$). The CB scale was positively related to the GCS ($r = .29$, $p < .01$), thus reconfirming the construct validity of the digital work simulation.

Hypotheses Testing

A significant positive correlation between the Machiavellianism scale and both the self-report interpersonal deviance scale ($r = .17$, $p < .01$) and the other-report interpersonal deviance scale ($r = .33$, $p < .01$) was found, supporting Hypothesis 7a. Hypothesis 7b was supported as well, the Machiavellianism scale was positively related to both the self-report organizational deviance scale ($r = .22$, $p < .01$) and the other-report organizational deviance scale ($r = .46$, $p < .01$). The CB scale was not related to the self-report interpersonal deviance scale ($r = .08$, $p = .16$), nor to the other-report interpersonal deviance scale ($r = .19$, $p = .14$); therefore, H8a was not supported. H8b was also not supported, as the CB scale was not significantly related to the self-report organizational deviance scale ($r = .08$, $p = .18$), nor to the other-report organizational deviance scale ($r = .24$, $p = .06$).

Hierarchical regression analyses were conducted to examine the incremental validity of the two scales of the digital work simulation over and above the MPS and the GCS in predicting interpersonal deviance and organizational deviance, controlling for age, gender, and social desirable answering. Only significant regression models regarding the incremental prediction of workplace deviance are presented in a table. First, the results regarding self-reported interpersonal deviance: The Machiavellianism scale ($\beta = .06$, $t = 1.21$, $p = .23$) did not incrementally predict the self-report interpersonal deviance scale over and above the MPS ($\beta = .20$, $t = 3.57$, $p < .01$). This model explained 30.7 % of the variance in the self-report interpersonal deviance scale ($F = 24.68$, $p < .01$). Second, the Machiavellianism scale ($\beta = .20$, $t = 1.62$, $p = .11$)

Table 4 Incremental validity of the Machiavellianism scale in predicting self-reported organizational deviance

	β	t	R^2	ΔR^2	ΔF
Step 1					
Age	-.08	1.45			
Gender	-.05	-0.91			
Social desirability	-.45	-8.22**	.24	.24	29.42**
Step 2					
MPS	.08	1.39	.25	.01	3.58
Step 3					
Machiavellianism scale	.14	2.71**	.27	.02	7.36**

Note Standardized regression weights are for final step

** $p < .01$

Table 5 Incremental validity of the Machiavellianism scale in predicting other-reported organizational deviance

	β	t	R^2	ΔR^2	ΔF
Step 1					
Age	.02	0.14			
Gender	-.25	-2.06*			
Social desirability	-.35	-2.81**	.22	.22	5.77**
Step 2					
MPS	.04	0.29	.24	.02	1.25
Step 3					
Machiavellianism Scale	.37	3.12**	.35	.11	9.78**

Note Standardized regression weights are for final step

* $p < .05$, ** $p < .01$

did not incrementally predict the other-report interpersonal deviance scale over and above the MPS ($\beta = .07$, $t = 0.54$, $p = .59$). The entire model explained 30.6 % of the other-report interpersonal deviance scale ($F = 5.12$, $p = .01$). Hypothesis 9a was not supported. Third, the hierarchical regression analyses showed that the Machiavellianism scale ($\beta = .14$, $t = 2.71$, $p < .01$) did incrementally predict the self-report organizational deviance scale over and above the MPS ($\beta = .08$, $t = 1.39$, $p = .17$). The entire model explained 26.8 % of the variance in the self-report organizational deviance scale ($F = 20.42$, $p < .01$; Table 4). Fourth, the Machiavellianism scale ($\beta = .37$, $t = 3.12$, $p < .01$) incrementally predicted the other-report organizational deviance scale over and above the MPS ($\beta = .04$, $t = .29$, $p = .78$). The model predicted 35.0 % of the variance in the other-report organizational deviance scale ($F = 6.23$, $p < .01$; Table 5). Thus, Hypothesis 9b was supported.

The results show that the CB scale ($\beta = .02$, $t = .37$, $p = .71$) did not incrementally predict the self-report interpersonal deviance scale over and above the GCS ($\beta = -.06$, $t = -1.12$, $p = .26$). The entire model explained

Table 6 Correlations between the dimensions of the Machiavellianism scale and the outcome variables of Study 2

	Distrust	Control	Amorality	Status
Self-reported interpersonal deviance	.14*	.10	.17**	.04
Other-reported interpersonal deviance	.26*	.06	.38**	.24
Self-reported organizational deviance	.15*	.11	.18**	.15*
Other-reported organizational deviance	.36**	.08	.53**	.34**
Social desirable answering	−.12	−.01	−.14*	−.08

* $p < .05$; ** $p < .01$

26.9 % of the variance in the self-report interpersonal deviance scale ($F = 20.57$, $p < .01$). In addition, the CB scale ($\beta = .03$, $t = .21$, $p = .84$) did not incrementally predict the other-report interpersonal deviance scale over and above the GCS ($\beta = .09$, $t = .64$, $p = .53$). The model explained 26.9 % of the variance in the other-report interpersonal deviance scale ($F = 4.27$, $p = .01$). Hypothesis 10a and 10b were not supported. The CB scale ($\beta = .01$, $t = .22$, $p = .82$) did not incrementally predict the self-report organizational deviance scale over and above the GCS ($\beta = .02$, $t = .31$, $p = .76$). The model explained 24.0 % of the variance in the self-report organizational deviance scale ($F = 17.58$, $p < .01$). The CB scale ($\beta = .07$, $t = .53$, $p = .60$) did not incrementally predict the other-report organizational deviance scale over and above the GCS ($\beta = .21$, $t = 1.59$, $p = .12$). The model explained 26.8 % of the variance in the other-report organizational deviance scale ($F = 4.24$, $p = .01$).

Both the MPS ($r = -.30$, $p < .01$) and the Machiavellianism scale ($r = -.13$, $p < .05$) were significantly related to social desirable answering. The t -statistic of the difference between the two correlations was computed (Chen and Popovich 2002). The two correlations were significantly different ($t = 2.40$, $p < .05$). Therefore, Hypothesis 11a was supported. The GCS ($r = -.25$, $p < .01$) was significantly related to social desirable answering, as was the CB scale ($r = -.15$, $p < .05$). However, these correlations were not significantly different ($t = -1.46$, $p > .05$). Hypothesis 11b was, therefore, not supported. Again, it was examined whether the dimensions of the Machiavellianism scale correlated differently with the outcome variables. As Table 6 shows, the correlations are fairly similar for the different dimensions. We also calculated the correlations between social desirable answering and the dimensions. Only the correlation with Amorality was significant and positive (Table 6). In sum, the Machiavellianism scale was positively related to all

four workplace deviance scales, while CB was not related to any of the workplace deviance scales. Further, the Machiavellianism scale incrementally predicted the self- and other-reported organizational deviance. Lastly, the Machiavellianism scale was less susceptible to social desirable answering than the MPS.

Discussion Study 2

Study 2 offered results on the cross-validation of the digital work simulation and on the criterion-related validity of Machiavellianism as measured with the digital work simulation in the prediction of workplace deviance. The second study was able to replicate the previously found correlations between the digital work simulation and the MPS and the GCS. Thus, the digital work simulation measured Machiavellianism and CB in two different samples. The results also showed that the digital work simulation is able to predict interpersonal and organizational deviance through the assessment of Machiavellianism. In addition, the Machiavellianism scale of the digital work simulation incrementally predicted organizational deviance over and above the MPS. Furthermore, the digital work simulation is found to be less susceptible to social desirable answering than the MPS. The results will be discussed more elaborately below.

This study was able to replicate the previously found relation between Machiavellianism and workplace deviance. As stated above, Machiavellianistic individuals are more focused on financial and personal success (Dahling et al. 2009; Tang and Chen 2008). Machiavellianistic individuals will maximize their own benefit and rather manipulate others than cooperate with them (Gunnthorsdottir et al. 2002). Furthermore, if necessary, they will steal to attain their goal. No relation was found between CB and workplace deviance and this may be caused by the process of moral disengagement, more specifically, by the displacement of responsibility (Bandura et al. 1996). Following the notion of moral disengagement, when complying with an unethical request, the individual may displace their responsibility to the request maker, thereby judging one's own actions as legitimate and not as deviant. The absence of a link between the CB scale and the other-report of workplace deviance is interesting. This may be a result of the relation between the participant and the manager or colleague. If the other reporter is someone who asks the participant to comply, then the reporter would not deem the behavior of the participant as deviant.

Further, Machiavellianism as measured with the digital work simulation was able to incrementally predict organizational deviance over and above the MPS, but not incrementally predict interpersonal deviance. Wilson et al.

(1996) pointed out that Machiavellianistic individuals cannot attain their goals through manipulation and defection alone, sometimes cooperation is necessary. In the digital work simulation, the individual needed to attain a clear goal, namely, achieving a successful product launch. In order to achieve that goal, the individual may feel the need to cooperate and, therefore, act less Machiavellianistic in the digital work simulation in comparison to completing the MPS.

The results of Study 2 indicate that the digital work simulation was less susceptible to social desirable answering than the MPS. This result supports the research done by Nguyen et al. (2005) who found that simulations are less susceptible to social desirable answering compared to self-reports. This study did not find a difference in susceptibility to social desirable answering between the CB scale and the GCS. This may be explained by the need of compliant individuals to present themselves in a favorable way and, thus, giving social desirable answers (Gudjonsson and Sigurdsson 2004). It should also be noted that social desirability scales themselves are criticized and that their ability to detect a social desirability bias is often questioned (Uziel 2010).

In Table 3, two results attract attention. First, the correlation between the Machiavellianism scale and other ratings of workplace deviance are more highly correlated with each other than the Machiavellianism scale and the MPS. Others often have a clearer lens when looking at behavior of colleagues and they only judge the behavior in the work context not in other contexts (Connelly and Hülshager 2012). In this light, it is not surprising that the Machiavellianism scale which specifically measures work-related behavior correlates higher with the other ratings of workplace deviance than with the MPS which is a more general trait-like variable. Another noticeable result is the negative correlation between other ratings and social desirable behavior. Social desirable behavior is culturally approved behavior (Reynolds 1982), whereas deviant behavior violates organizational and societal norms (Robinson and Bennett 1995). Thus, deviant behavior is undesirable social behavior in the eyes of others explaining the significant negative correlation. Concluding remarks, limitations, and research suggestions are discussed below.

General Discussion

The purpose of the present studies was to validate a digital work simulation. Research on simulations often fails to validate these instruments, because of their complexity (Funke 1998). This research was able to find some initial support for the construct validity of the digital work simulation as well as the criterion-related validity of the

Machiavellianism scale. The results show that a digital work simulation is able to measure Machiavellianism and CB. Further, Machiavellianism as measured in the digital work simulation is able to predict workplace deviance. A digital work simulation provides practitioners with an alternative measure of Machiavellianism and CB. In addition, the digital work simulation has been shown to be less susceptible to social desirable answering than an existing Machiavellianism questionnaire.

Although we urge for replicating the study in other cultural settings, we believe that our study results are generalizable to other countries. Since workplace deviance is a problem in organizations worldwide (Ones 2002), a reliable prediction of workplace deviance is valuable. Taking into account the low response rate of Study 2 of both employees (i.e., 12.9 %) and their respective managers or colleagues (i.e., 22.5 %; the response rate of Study 1 is unknown since the questionnaire was on the website of a large HRD-company), a self-selection effect might have occurred. Even though it is difficult to estimate the effect of nonresponse because the identity of the non-respondents is unknown (Dey 1997), it is likely that it caused an underestimation of the variance of the measured constructs. Study participation was voluntary and took at least 30 min. One could expect that highly Machiavellianistic individuals dropped out because the reward (i.e., a report of their test scores) did not outweigh the investment. The low response rate among managers and colleagues might be biased given the research topic. It is plausible that participants have asked managers or colleagues that they like to work with to rate their workplace deviance. Likeability causes ratings to be biased through the halo effect, resulting in a more positive rating of the participant (Tsui and Barry 1986). Therefore, we urge replication in an organizational setting, where self-selection may be less of an issue.

Even though a digital work simulation has its advantages over more conventional measurement methods of workplace deviance, some aspects of it are still in need of more research. A particularly interesting aspect to look at is the duration of the simulation. It is known that Machiavellianistic individuals will first explore their surroundings before displaying defective strategies (Paulhus and Williams 2002). Therefore, it may be interesting to create a digital work simulation which allows more exploration and, hence, takes longer to complete than the current one. Further, to gain more insight into the fluctuations in Machiavellianistic and compliant behavior, it is also important to examine the test-retest reliability in the future. Retesting participants can provide us with more insight into what the digital work simulation is actually measuring through Machiavellianism; a more trait-like construct (Dahling et al. 2009) or a strategy of social conduct (Wilson et al.

1996). Furthermore, test–retest reliability is a more suitable reliability indicator of simulations than Cronbach’s alpha (Motowidlo et al. 1990). Lastly, the influence of interaction partner (i.e., subordinate, colleague, and supervisor) provides interesting research opportunities.

Another interesting area of research might be to look at possible confounders (e.g., need for achievement, narcissism, regulatory focus). Previous research by Dahling et al. (2009) showed that Machiavellianism is positively related to the competitive part of need for achievement and to narcissism. Furthermore, regulatory focus may also offer more insight into the responses that participants provide, especially a prevention focus (i.e., focus on safety and security needs; Crowe and Higgins 1997). A prevention focus primes individuals not to fail at work and make decisions based on that premise. It might be the case that individuals with a prevention focus are more inclined to comply with unethical requests and are more likely to act deviant in order to avoid failing at work.

In practice, a digital work simulation which measures Machiavellianism and CB can be used to assess individual’s tendency to behave unethically, whether it is initiated by the individual or by the context. Unethical behavior is costly (Vardi and Weitz 2004), therefore, it is valuable for both the organization as well as the individual to know whether individuals have the tendency to behave unethically. Awareness of ethics and one’s own responses to ethical dilemmas can decrease chances of behaving unethically after one receives a business ethics training (Ritter 2006; Weber 2007). Further, the results of the digital work simulation should only be provided to the employee and not to the supervisor to protect the employee. For example, when a supervisor knows that an individual is likely to comply with an ethical request that employee might be pressured more and more to give into the requests of the supervisor. The present study provides results on an innovative digital work simulation predicting workplace deviance through ethical dilemmas by measuring Machiavellianism. To the best of our knowledge, this is the first validated simulation that is able to predict workplace deviance based on Machiavellianism. The Machiavellianism scale of the digital work simulation was less susceptible to social desirable answering; supporting the notion that a digital work simulation is a good alternative in the prediction of deviant workplace behavior. Furthermore, the results provided support for the incremental validity of the Machiavellianism scale of the digital work simulations in predicting deviant behavior over and above existing questionnaires.

Acknowledgments We wish to thank Alec Serlie, Christof van Nimwegen, and Ranj Serious Game Design for their invaluable contributions to this research project. The intellectual property rights of the digital work simulation tested in this manuscript are of GITP.

Appendix

Compliant Behavior

You regularly speak to Richard Adams, don’t you? I would prefer to keep this between you and me for now; I’m a bit... euh, embarrassed. It’s a little complicated, I hope you understand? Please don’t mention this issue before I have spoken to my manager.

- NO! like it or not, I don’t agree.
- No, this might prevent problems on their side, don’t you think?
- Yes, it’s not the way we normally do things but I guess you have your reason.
- YES! I’m with you.

Machiavellianism—Amorality

Romania is known for its slow bureaucratic processes when it comes to permits. There are experienced agencies with contacts which can speed up the process if we pay them. They contact the right people and make sure that everything is quickly arranged. It is THE way to quickly establish ourselves. No doubt that competitors will use this opportunity and we cannot stay behind. But I’m hesitant. What do you think, should we do that?

- NO! The only way to arrange this is to do this via the official way, even though it is more difficult.
- No, I’m hesitant, I would not feel comfortable with it.
- Yes, maybe this is a smart thing to do and it should be considered.
- YES! That’s advantageous for us.

Machiavellianism—Distrust

Well, I’m not sure. I was in Europe having dinner with one of your clients. We mainly talked about their US sales strategy, but then they mentioned unfair product pricing of one of our competitors. I want to further investigate this, now that I’ve already spoken to them. Do you trust me with that?

- NO!, what’s in it for you?
- No, I have my doubts.
- Yes, that sounds trustworthy.
- YES! I fully trust you with that!

Machiavellianism—Control

Of course, we do not have a deal without a signature but the tone in the meeting was serious! This client owes me

something and I like to achieve my targets. I will quickly make an offer that I will send to them tonight.

- NO! You need to take more time for that.
- No, I think this requires more of our time and attention.
- Yes, that seems like a good plan.
- YES! Good luck, I'm curious to see what happens.

Machiavellianism—Status

I hear you are doing a good job there in Europe! What will be your next step, running for CEO at Skywarp?

- NO, that totally leaves me cold.
- No, I think it's the result that counts.
- Yes, that sounds good, don't you think?
- YES, that reward would be well deserved.

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