

Do I feel ill because I crave for work or do I crave for work because I feel ill? A longitudinal analysis of work craving, self-regulation, and health

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Background: The theory of work craving defines workaholism as a pathological work addiction which comprises: (a) obsessive–compulsive desire to work, (b) anticipation of self-worth compensatory incentives from working, (c) anticipation of reduction of negative emotions or withdrawal symptoms from working, and (d) neurotic perfectionism. Research has shown that workaholism is associated with adverse health outcomes. However, the antecedents of workaholism and the causal direction of the relationship with health have been largely neglected. **Aims:** In the present longitudinal study, we expect that work craving is predicted by deficits in emotional self-regulation (i.e., low action orientation) and mediates the relationship between self-regulation deficits and symptoms of psychological distress. We expected work craving to have an effect on later psychological distress symptoms, but not psychological distress symptoms to have an effect on later work craving. **Methods:** In a sample of 170 German employees, a half-longitudinal design using two times of measurement was implemented to specify the paths of two different structural equation models of mediation: (a) action orientation to later work craving and work craving to later psychological distress, and alternatively, (b) the temporal order of action orientation to later distress and distress to later work craving. **Results:** Our data indicated that work craving partially mediated the relationship between self-regulation deficits and psychological distress, but psychological distress symptoms were not found to increase later work craving. **Conclusions:** The presented longitudinal study indicates important mechanisms of work craving, especially by highlighting the influence of self-regulation deficits on work craving and, in turn, psychological distress.

Keywords: work craving, workaholism, work addiction, action orientation, health

INTRODUCTION

Working might not be the first thing that comes to mind when asked to think of an addiction. However, workaholism appears to be a fairly prevalent type of addiction. In fact, recent studies estimate that approximately 10% of the U.S. population suffer from workaholism (Sussman, Lisha, & Griffiths, 2011) and its prevalence is even higher among management workers and in specific sectors of employment (Andreassen, Griffiths, Hetland, & Pallesen, 2012; Taris, Schaufeli, & Shimazu, 2010). A drawback in the research on work as an addiction has been the lack of a methodologically reasonable multidimensional measure of work-related craving. Therefore, in the present study we used the multidimensional concept of work craving to better explain workaholism and to methodologically integrate its addictive elements.

Work craving as well as deficits in the self-regulation of negative affect have separately been found to be linked with mental health (see references in next section). Indeed, recent findings suggest that work craving acts as a mediator between self-regulation deficits and psychosomatic symptoms (Wojdylo, Baumann, Fischbach, & Engeser, 2014). However, a longitudinal examination of these three factors is currently lacking. In this article, we focus on how the three factors relate to each other.

Workaholism and health

Oates (1971, p. 11) used the term *workaholism* in analogy to alcoholism and defined it as an “addiction to work, the compulsive and uncontrollable need to work incessantly.” Empirical findings demonstrate that workaholism is related to a variety of negative outcomes such as mental and physical health complaints (Burke, Oberklaid, & Burgess, 2004; McMillan & O’Driscoll, 2004; Shimazu & Schaufeli, 2009; Wojdylo, Baumann, Buczny, Owens, & Kuhl, 2013), sleep problems (Kubota et al., 2010), increased work–family conflict (Bakker, Demerouti, & Burke, 2009), and low life satisfaction (Bonebright, Clay, & Ankenmann, 2000; Shimazu, Schaufeli, & Taris, 2010).

While the association between workaholism and health problems has been established empirically, to our knowledge, no study has longitudinally tested both possible directions of causality. The commonly preferred direction in theoretical assumptions is that workaholism exerts a

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negative influence on health. Indeed, Shimazu and colleagues (Shimazu, Schaufeli, Kamiyama, & Kawakami, 2015; Shimazu, Schaufeli, Kubota, & Kawakami, 2012) confirmed this assumption in a longitudinal design. However, research on stress–strain relationships in occupational psychology suggests that an examination of the reverse direction is also warranted (De Jonge et al., 2001; Zapf, Dormann, & Frese, 1996). Thus, addressing the issue of “the current lack of interest in reciprocal effects” (Taris & Kompier, 2003, p. 3), we model both causal directions using longitudinal data. Furthermore, we apply Wojdylo’s (2013) concept of work craving that defines workaholism more clearly as pathological and comprises the full spectrum of an addiction.

Workaholism as work craving

Some widespread concepts of workaholism revolve around the behavioral component of workaholism, that is, excessive working (e.g., Ng, Sorensen, & Feldman, 2007; Spence & Robbins, 1992). At first sight, this behavioral definition of workaholism may appear plausible. However, working excessively hard is also characteristic of the healthy work style of work engagement. Despite this similarity, workaholism and work engagement are distinct work styles that clearly differ in their underlying emotions and motivations (Schaufeli, Taris, & Van Rhenen, 2008; Wojdylo et al., 2014). Whereas workaholics are driven by avoidance motivation and try to compensate negative feelings and low self-worth, engaged employees are intrinsically motivated, find themselves vigorously and effectively connected with their work activities, and are well able to meet the demands of their jobs (Taris et al., 2010; Van Beek, Hu, Schaufeli, Taris, & Schreurs, 2012). These findings further support the pathological nature of workaholism and the necessity to differentiate it from work engagement.

Wojdylo (2013) conceptualized workaholism as *work craving* – a clearly pathological work style and addiction disorder that comprises four dimensions. In addition to the recognized (a) *obsessive–compulsive component*, three further dimensions crucial for the diagnosis of work addiction are (b) *anticipation of self-worth compensatory incentives* from work, (c) *anticipation of relief* from negative affect or withdrawal symptoms resulting from working, and (d) *neurotic perfectionism*. Recent empirical evidence supports the four-factorial structure of the work craving scale, the convergent and incremental validity with respect to other measures of workaholism, and the discriminant validity with respect to the healthy work style of work engagement (Wojdylo et al., 2013, 2014).

This multidimensional concept differs from conceptualizations of workaholism that predominantly emphasize obsessive–compulsive features (Robinson, 2007; Schaufeli, Taris, & Bakker, 2006; Van Beek, Taris, & Schaufeli, 2011). Based on work craving theory, we agree that obsessive–compulsive components are inherent in workaholism, but we state that they are not sufficient to explain its addictive nature (Wojdylo, 2013; Wojdylo et al., 2013). Work craving theory extends the concepts of workaholism by drawing on theory and findings from addiction research (Berridge, Robinson, & Aldridge, 2009; Tiffany & Conklin,

2000; Young & Wohl, 2009). Especially the hedonic components (i.e., anticipation of self-worth compensation and relief from negative affect) are important for understanding the incentives behind addictive working and may explain the high prevalence and chronic nature of workaholism (see Andreassen, 2014). Work craving and the tendency to regulate affect through excessive working may be greater the less people are able to regulate affect in other ways.

Action orientation

Affect regulation refers to the ability of an individual to increase, maintain, or decrease positive and negative affect (Koole, 2009). Following Wojdylo et al. (2014), we assessed the ability to self-regulate affect by *failure-related action orientation* (AOF; Kuhl, 1994; see also Koole & Jostmann, 2004; Kuhl & Beckmann, 1994). AOF is defined as the capacity to reduce negative affect during or after exposure to failure, threats, or demands and to maintain or even improve access to the self (i.e., implicit representations of own wishes, goals, and preferences). In contrast, *failure-related state orientation* (i.e., low AOF) indicates deficits in the ability to self-regulate affect and is accompanied by ruminative thoughts.

In a series of studies, Koole and Jostmann (2004) found that demanding conditions led action-oriented participants to down-regulate negative affect as measured by self-report (Study 1), and these participants exhibited faster detection of happy faces among a crowd of angry faces (Study 3). In addition, demanding conditions increased action-oriented participants’ access to self-related information (Study 3). Furthermore, the demand-contingent happy among angry faces pop-out was mediated by increased self-access indicating that action-oriented participants regulate affect through the implicit self (Study 3). This self-confrontational and intuitive form of affect regulation has been shown to be qualitatively distinct from related constructs such as reappraisal and suppression (Gross & John, 2003; cf. Koole & Jostmann, 2004), explicit self-esteem (Rosenberg, 1965; cf. Kazén, Baumann, & Kuhl, 2005), optimism (Scheier & Carver, 1985; cf. Bossong, 2001), and self-efficacy beliefs (Bandura, 1991; cf. Diefendorff, 2004).

Research has found associations between failure-related state orientation (low AOF) and psychosomatic symptoms, depression, low self-esteem, and ruminative self-consciousness (Baumann, Kaschel, & Kuhl, 2007; Baumann & Quirin, 2006; Diefendorff, Hall, Lord, & Streat, 2000). All of these symptoms are also associated with work craving, and Wojdylo et al. (2014) found work craving to partially mediate the relationship between failure-related state orientation and psychological distress. The reasoning behind testing action orientation as an antecedent rather than a consequence of work craving is based on the conceptualization of action orientation as a personality disposition that forms during early childhood and remains rather stable over time (Kuhl, 2000, 2001).

Poor self-regulation (low AOF) seems to facilitate work craving as an alternative albeit unfavorable coping strategy that suppresses negative feelings. Workaholics set unrealistically high achievement standards (neurotic perfectionism)

that allow them to stay busy enough to avoid ruminating about negative thoughts and feelings. Thus, workaholism may be a way to cope with negative feelings without truly self-regulating them (Biebrich & Kuhl, 2004; Kuhl, 2001). This self-suppressive form of affect regulation has been associated with poor health in a cross-sectional design (Wojdylo et al., 2014).

Hypotheses

In an attempt to replicate the findings of Wojdylo et al. (2014) in a longitudinal design, we expected work craving (WCS) to mediate the relationship between failure-related action orientation (AOF) and psychological distress as assessed by the general health questionnaire (GHQ). Path *a*: We expected action orientation to be associated with lower work craving ($H_{AOF-WCS_T}$). More specifically, we expected action orientation at preassessment to predict decrements in work craving from pre- to postassessment ($H_{AOF-\Delta WCS}$). Path *b*: We expected work craving to be associated with higher psychological distress ($H_{WCS-GHQ_T}$). More specifically, we expected work craving at preassessment to predict increases in psychological distress from pre- to postassessment ($H_{WCS-\Delta GHQ}$).

Product of a and b

In Model A (see Figure 1), we hypothesized that work craving acts as a partial mediator between action orientation

and psychological distress. This hypothesis would be confirmed if our analyses yielded a significant negative regression path *a* ($H_{AOF-\Delta WCS}$), a significant positive path *b* ($H_{WCS-\Delta GHQ}$), and a negative product *ab* (H_{WCSab}). Admittedly, it is already a suitable indicator for a significant mediation when both individual mediation paths *a* and *b* reach significance (Cole & Maxwell, 2003). However, following current recommendations (Little, 2013), we also tested whether the confidence interval of a post hoc test of the product of the paths, *ab*, does not include zero and, thus, more reliably supports mediation ($H_{WCSab-CI}$).

Reversed order path b

Concerning the possible reversed order of causality between work craving and psychosomatic symptoms, in Model B (see Figure 2) we expect psychosomatic symptoms at preassessment to fail to significantly predict changes in work craving between pre- and postassessment ($H_{GHQ-WCS\Delta}$). In the unexpected case of a significant result, this would not contradict our other hypotheses. Indeed, if both directions of causality of path *b* were to become significant, we would refer to this as a reciprocal effect. *Model fit hypotheses*: We predict that our Model A (see Figure 1) will produce an adequate fit to the data according to several important fit indices (H_A). In comparison to Model B (see Figure 2), we expect Model A to consistently produce a better fit ($H_{A > B}$).

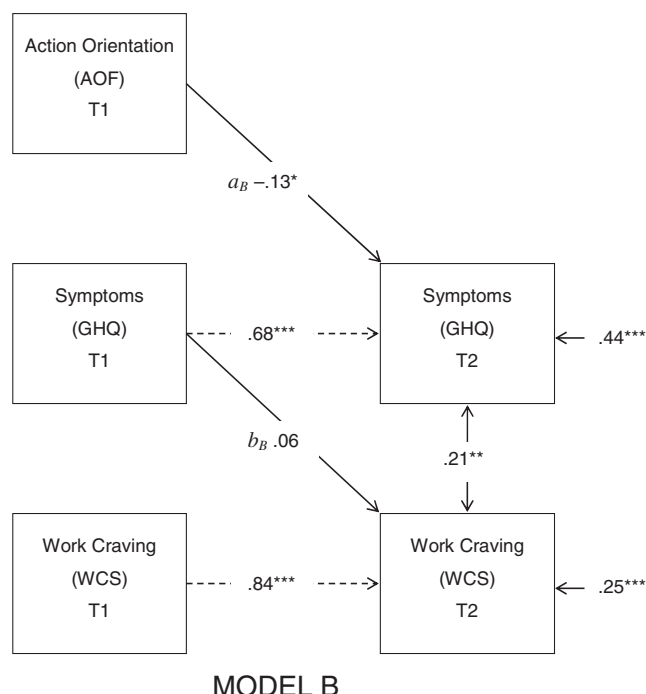
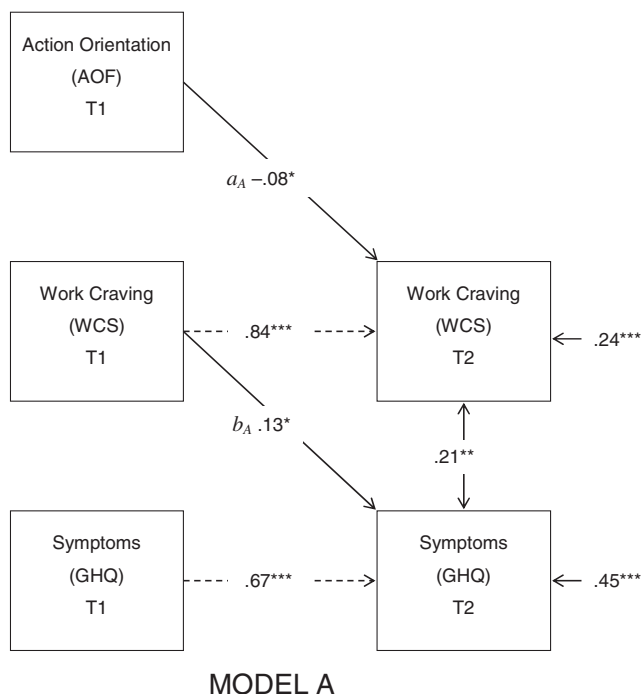


Figure 1. Standardized regression coefficients of half-longitudinal mediation Model A tested through structural equation modeling.

Rectangles indicate observed variables. The residual variance components (error variances) indicate the amount of unexplained variance. For each predicted variable, $R^2 = (1 - \text{error variance})$.

* $p < .05$; ** $p < .01$; *** $p < .001$

Figure 2. Standardized regression coefficients of half-longitudinal mediation Model B tested through structural equation modeling.

Rectangles indicate observed variables. The residual variance components (error variances) indicate the amount of unexplained variance. For each predicted variable, $R^2 = (1 - \text{error variance})$.

* $p < .05$; ** $p < .01$; *** $p < .001$

Path c

We expected a negative correlation between failure-related action orientation and psychological distress ($H_{\text{AOF-GHQ}}$). More specifically, we expected action orientation (AOF) at preassessment to predict decrements in psychological distress (GHQ) between pre- and postassessment ($H_{\text{AOF-}\Delta\text{GHQ}}$). It should be noted that due to a caveat in the statistical method used (see section: Statistical analyses), we could only test this hypothesis in Model B rather than in our preferred Model A. Because this hypothesis is not of importance for the demonstration of mediation, we do not consider this a significant limitation for our purposes.

METHODS

Participants and procedure

This study is part of the Work Craving International Project (WCIP), a cohort research venture in Germany and Poland. The goal of WCIP is to study the new conceptualization of workaholism as work craving and its personality antecedents. Participants in this study were 129 women and 41 men ($N = 170$) either working at a university or as schoolteachers in the federal state of Rhineland-Palatinate (Rhineland-Pfalz), Germany, who voluntarily participated in an online survey.

The recruitment process for the university employees involved sending e-mails to all staff at Trier University and Trier University of Applied Sciences. For the schoolteachers, all school principals in Rhineland-Palatinate were sent an e-mail informing them about the study with the request to distribute the information to all teachers at their school. Participants voluntarily completed a series of questionnaires online in a German version, which took approximately 45 minutes to complete. The participants' average age was 42.72 years ($SD = 11.9$), ranging from 20 to 67 years. Of all participants, 55.3% were full-time employees, 12.4% worked 30 hours a week, 26.5% were employed part-time, and 5.9% less than part-time. When asked about relationship status, 55.3% reported they were married, 26.5% were in a relationship, 16.5% were living alone, and 1.8% did not provide information. About two-thirds of our sample (61.8%) worked at universities: 31.8% at Trier University of Applied Sciences and 30.0% at Trier University. One-third of our sample (28.2%) worked as schoolteachers: 15.3% were teaching in primary schools, 4.7% in secondary/graduate schools, 10.6% in special schools, 5.3% in vocational schools, and 2.4% in other school forms. As their highest educational level, 4.2% of the sample indicated having finished primary school, 21.8% secondary/graduate school, 15.9% with a degree from college/university of applied sciences, and 54.7% with a university degree.

Measures

Action orientation. The Action Control Scale (ACS; Kuhl, 1994) was used to assess self-regulation competencies. In the present study, the 12 items of the failure-related dimension of action orientation (AOF) were used (for information

on reliability and validity see Diefendorff et al., 2000; Kuhl & Beckmann, 1994). An example item of the AOF scale is "When I've worked for weeks on one project and then everything goes completely wrong: (A) It takes me a long time to get over it. (B) It bothers me for a while, but then I don't think about it anymore." AOF scores were calculated by summing up the number of action-oriented alternatives selected and could range from 0 to 12, with higher scores indicating higher action orientation. In the present study, AOF showed a good ($\alpha \geq 0.7$) internal consistency with Cronbach's alphas of 0.82 at T1 and 0.87 at T2.

Work craving. Workaholism was assessed by the 28-item Work Craving Scale (WCS; Wojdyla et al., 2013). It consists of four subscales with seven items each: obsessive-compulsive desire for work (*I have an urge to work more and more*), anticipation of self-worth compensatory incentives from work (*Overworking makes me feel important*), anticipation of reduction of negative affect and withdrawal symptoms (*Working now would bring me a relief*), and neurotic perfectionism (*Even though I perform a task very carefully, I feel that it is not done correctly enough*). Items were scored on a seven-point agreement rating scale ranging from 1 (*not at all*) to 7 (*completely*). Higher scores indicated higher work craving and the scale showed excellent ($\alpha \geq 0.9$) internal consistency with Cronbach's alphas of 0.95 at T1 and 0.97 at T2.

Psychological distress. The General Health Questionnaire (GHQ-28; Goldberg & Hillier, 1979) was used to assess the severity of symptoms of psychological distress. The GHQ consists of four subscales consisting of seven items each: somatic symptoms (*Have you recently felt that you are ill?*), anxiety and insomnia (*Have you recently lost much sleep over worry?*), social dysfunction (*Have you recently been taking longer over the things you do?*), and severe depression (*Have you recently felt that life is not worth living?*). All 28 items were rated on four-point scales ranging from 1 to 4 with different labels across items. Higher GHQ scores reflected more symptoms of psychological distress. The GHQ showed excellent internal consistency, with Cronbach's alphas of 0.94 at T1 and $\alpha = 0.95$ at T2.

Statistical analyses

Half-longitudinal mediation. Path analysis using the maximum likelihood estimation method was used as implemented in Mplus version 6 (Muthén & Muthén, 1998–2010, Los Angeles, CA). In order to overcome the severe limitations of examining mediation with cross-sectional data (Gollob & Reichardt, 1987; Maxwell, Cole, & Mitchell, 2011; Selig & Preacher, 2009), an autoregressive longitudinal design was used. Longitudinal hypotheses of mediation would require at least three-time points to test the temporal ordering of variables. For the current study, although three times of measurements were initially intended, this would have resulted in a sample size of $N = 50$ participants, and this is inadequate for SEM procedures. Instead, two times of measurement per participant were included, yielding a sample size of $N = 170$. These two times of measurement were three months apart for $N = 135$ and six months apart for $N = 35$. With only two time points per participant effectively available to us, we decided to model

our data according to guidelines of “half-longitudinal mediation” (Cole & Maxwell, 2003; Little, 2013), which provides the benefits of controlling for prior levels in the predicted variables (i.e., autoregression). Thus, we examined the significance of the influences on the *change* variance of the mediator (mediation path *a*) and the outcome variable (mediation path *b*) across time points, as opposed to merely testing the influence on the *levels* of the variables across time points (Little, 2013).

Following Cole and Maxwell (2003), if paths *a* and *b* are both significantly different from zero, then the product (mediation parameter) *ab* will also be significantly different from zero. However, as Little argues (2013), this statement has recently been debated, and therefore the post hoc approaches of the Monte Carlo simulation (MacKinnon, Lockwood, & Williams, 2004) or bootstrap estimations (Preacher & Hayes, 2008) are recommended for testing the significance of the *ab* product in order to assert a significant mediation.

As previously mentioned, our hypothesis $H_{\text{AOF-}\Delta\text{GHQ}}$ suffers from a methodological caveat in the statistical model used (half-longitudinal mediation) preventing us from testing this hypothesis in our model of choice. Therefore, $H_{\text{AOF-}\Delta\text{GHQ}}$ cannot be tested as a direct path in our preferred Model A, but will only be tested as a mediation path in the alternative Model B. In case of a complete longitudinal design with at least three waves of data, the direct path *c* from *X* to *Y* can be tested simultaneously as mediation path *a* from predictor (*X*) to mediator (*M*) and path *b* from mediator (*M*) to outcome (*Y*) (Little, 2013). However, as Cole and Maxwell (2003, p. 563) clearly state, in a half-longitudinal design with two waves of data, “although we can estimate [mediation paths product] *ab*, we cannot directly test the significance of path *c*. In other words, we can test whether *M* is a partial mediator, but we cannot whether *M* completely mediates the *X*-*Y* relation.” That is, the direct path *c* ($H_{\text{AOF-}\Delta\text{GHQ}}$) in Model A should not be specified or estimated. Therefore, we can only test for a partial mediation and not the conceivable but highly unlikely full mediation. Nevertheless, we can still test the same hypothesis $H_{\text{AOF-}\Delta\text{GHQ}}$ in Model B, where it acts as the mediation path *a* rather than the direct path *c*.

Performed analyses. Correlational analyses were performed to gain basic insight into the data. Structural equation modeling (SEM; Jöreskog & Sörbom, 1993) was used to test and compare two path models in their fit and regression coefficients. Only having access to two times of measurement, Models A and B (see Figures 1 and 2) were specified as half-longitudinal mediation (Cole & Maxwell, 2003) and tested using the maximum likelihood (ML) method in Mplus 6 (Muthén & Muthén, 1998–2010). The Monte Carlo Method for Assessing Mediation (MCMAM) was used to create a confidence interval of the mediation paths product *ab* in order to determine whether the mediation effect differs from zero after 20,000 repetitions with the model parameters (Selig & Preacher, 2008).

Model fit indices. We report the model fit indices recommended by Kline (2005) and Hooper, Coughlan, and Mullen (2008): chi-square test, root mean square error of approximation (RMSEA), comparative fit index (CFI), and standardized root mean square residual (SRMR). In addition, we include the sample-size adjusted Bayesian information criterion (SABIC).

The chi-square test indicates good fit when insignificant ($p > 0.05$) (Barrett, 2007). However, at small sample sizes, the chi-square test lacks the statistical power to distinguish between good and poor fitting models (Kenny & McCoach, 2003). The impact of sample size can be reduced by considering the relative chi-square (χ^2/df) to be at most 3.0 (Iacobucci, 2010; Kline, 2005). The RMSEA should be less than 0.07 (Steiger, 2007). It should be noted that the RMSEA is less preferable at small sample sizes as it tends to overreject true-population models (Hu & Bentler, 1999). The CFI should be at least 0.95, and the SRMR should be less than 0.08 (Hu & Bentler, 1999). The CFI performs well even when the sample size is small (Tabachnick & Fidell, 2007). The SABIC is a measure of fit for comparing different models. The model with the lower information criterion value indicates the better fit. In a simulation study, SABIC functioned well across a variety of experimental conditions (Tofighi & Enders, 2008).

Handling of missing data. The data consisted of 0.3% missing values. Little’s (1988) MCAR Test, as implemented in IBM SPSS 12, confirmed that values were missing completely at random $\chi^2(3129) = 3102, p = 0.63$. Missing values were replaced with the sample median on the respective item in SPSS 12. Subsequently, data were exported for SEM analyses in Mplus. To further exclude a systematic influence of the replacement of missing values on our results, a more sophisticated approach to replacing missing values; the full information maximum likelihood (FIML) estimation method as implemented by Mplus 6, was also applied on the original data as reference. However, as equivalent results (including implications for model fit and statistical significance of regression coefficients) emerged from both methods of missing value replacement, we chose to report results from our data analysis using the more parsimonious and unambiguous approach of replacement with the sample median rather than FIML.

Ethics

The study was conducted in accordance with the Declaration of Helsinki. We informed participants about the study and that data were anonymized and used for scientific purposes only and with their participation they consent to the use of the data for scientific purposes. We explicitly emphasized that participants could stop and object the use of the data at any time without any personal consequences. We obtained ethical approval from the Federal School Review Board, Rhineland-Palatinate, Germany (Aufsichts- und Dienstleistungsdirektion Rheinland-Pfalz: ADD 51 111-32/129-12) and from the Federal Data Protection and Media Board, Rhineland-Palatinate, Germany (Landesbeauftragte für Datenschutz und Informationsfreiheit Rheinland-Pfalz: LfD RLP 6.08.22.001:0363).

RESULTS

Descriptive statistics and correlations

Table 1 presents descriptive data and correlations between study variables. Consistent with hypothesis $H_{\text{AOF-WCSR}}$,

Table 1. Descriptive data and bivariate correlations (Pearson) for key study variables at both data points ($N = 170$)

| Variable | M (SD) | Scale | Range | α | (2) | (3) | (4) | (5) | (6) | (7) | Sex ^{a,b} |
|---------------------------------|---------------|-------|---------|----------|--------|---------|---------|---------|---------|---------|--------------------|
| (1) Action Orientation (AOF) T1 | 5.66 (3.41) | 0–12 | 0–12 | .82 | .81*** | -.40*** | -.43*** | -.44*** | -.45*** | .20* | .16* |
| (2) Action Orientation (AOF) T2 | 5.66 (3.74) | 0–12 | 0–12 | .87 | | -.36*** | -.42*** | -.47*** | -.48*** | .23** | .24** |
| (3) Work Craving (WCS) T1 | 2.86 (1.13) | 1–7 | 1–6 | .95 | | | .87*** | .46*** | .44*** | -.24*** | .04 |
| (4) Work Craving (WCS) T2 | 2.82 (1.22) | 1–7 | 1–6.5 | .97 | | | | .44*** | .49*** | -.29*** | -.02 |
| (5) Symptoms (GHQ) T1 | 1.94 (.48) | 1–4 | 1.2–3.5 | .94 | | | | | .73*** | -.20** | -.14 |
| (6) Symptoms (GHQ) T2 | 1.92 (.49) | 1–4 | 1.2–3.8 | .95 | | | | | | -.25*** | -.09 |
| (7) Age ^a | 43.14 (11.93) | | 20–67 | | | | | | | | .21** |

Note: ^a $N = 169$ at T2; ^bfemale = 1; male = 2. * $p < .05$; ** $p < .01$; *** $p < .001$.

higher work craving (WCS) was related to lower failure-related action orientation (AOF), ($r = -.40$ and $-.42$ at T1 and T2, respectively). Consistent with hypothesis $H_{WCS-GHQ}$, higher work craving was also associated with more symptoms of psychological distress as assessed by the GHQ, ($r = .46$ and $.49$ at T1 and T2, respectively). Consistent with hypothesis $H_{AOF-GHQ}$, higher AOF was related to fewer symptoms of psychological distress ($r = -.44$ and $-.48$ at T1 and T2, respectively). Other significant correlations show that age was associated with higher AOF, lower work craving, and fewer symptoms of psychological distress. Male gender was associated with higher AOF and higher age. Consistent with previous studies (e.g., Wojdylo et al., 2013), gender was not significantly associated with work craving.

Model fit

The two structural equation models, A (WCS as mediator) and B (GHQ as mediator), generally displayed similar levels of fit to the data (see Table 2). However, Model A showed a slightly better fit than Model B and reached an acceptable chi-square value whereas Model B did not. In addition, the direct comparison of the SABIC favored Model A. These findings are consistent with hypothesis $H_{A > B}$. Following the cut-off criteria for the goodness of fit indices outlined above, Model A achieved acceptable chi-square values (both χ^2/df and p -value), inadequate RMSEA, and good CFI and SRMR. In other words, with exception of the sample-size sensitive RMSEA, our Model A fit the data well (H_A). Model B displayed inadequate chi-square values (both χ^2/df and p -value), inadequate RMSEA, however, the CFI and SRMR were acceptable.

Path coefficients

Figures 1 and 2 illustrate the standardized beta regression coefficients for path Models A and B, respectively. These values provide information about the size and direction of effects between the factors at their corresponding time points.

Model A. Consistent with hypothesis $H_{AOF-\Delta WCS}$, failure-related action orientation (AOF) at T1 predicted significant decrements in work craving (WCS) from T1 to T2 ($a_A = -.08$). Consistent with hypothesis $H_{WCS-\Delta GHQ}$, work craving at T1 predicted significant increases in distress symptoms (GHQ) from T1 to T2 ($b_A = .13$). Thus, both mediation paths of Model A were significant, a_A ($H_{AOF-\Delta WCS}$) and b_A ($H_{WCS-\Delta GHQ}$). Together, they yielded a negative (standardized) ab product (-0.010692), indicating that, consistent with hypothesis H_{WCSab} , work craving acted as mediator between low action orientation and increments in distress symptoms. However, the post hoc Monte Carlo test (MCMAM) produced a confidence interval which included zero (95% CI with unstandardized ab product ranging from -0.00441 to $.0000762$), thus not supporting our hypothesis $H_{WCSab-CI}$. Note that the MCMAM used the unstandardized path coefficients, which due to the scales of our measures made this unstandardized product ab appear considerably smaller than the standardized ab mediation effect presented in the preceding hypothesis.

Table 2. Indices of model fit for tested SEMs

| Mediation model | Model fit index | | | | | |
|-----------------|----------------------|----------------------------------|-------|------|------|---------|
| | Chi ² (2) | Chi ² <i>p</i> -value | RMSEA | CFI | SRMR | SABIC |
| A (AOF-WCS-GHQ) | 5.518 | .06 | .102 | .991 | .024 | 419.114 |
| B (AOF-GHQ-WCS) | 7.838 | .02 | .131 | .985 | .029 | 421.434 |

Model B. Consistent with hypothesis $H_{AOF-\Delta GHQ}$, failure-related action orientation (AOF) at T1 predicted significant decrements in distress symptoms (GHQ) from T1 to T2 ($a_B = -.13$). Consistent with our zero hypothesis $H_{GHQ-\Delta WCS}$, distress symptoms (GHQ) at T1 did not predict significant increases in work craving (WCS) from T1 to T2 ($b_B = 0.06$). Because only the first mediation path in Model B reached statistical significance, a_B ($H_{AOF-\Delta GHQ}$), results did not support the assumption that distress symptoms mediated the relationship between low action orientation and work craving.

Summary of Models A and B. Lower action orientation significantly predicted increases in work craving and distress symptoms over the next three to six months. However, higher levels of distress symptoms did not predict significant increases in work craving over the next three to six months.

DISCUSSION

The aim of the present article was to examine, in a longitudinal framework, how work craving, failure-related action orientation, and psychological distress relate to each other. Specifically, we tested our preferred Model A, with work craving acting as a mediator between action orientation and psychological distress, against an alternative Model B, which assumes the degree of psychological distress to mediate the relationship between failure-related action orientation and work craving.

Our study showed that low failure-related action orientation led to a later increase in work craving. The core element of failure-related action orientation is the ability to self-regulate negative affect (Kuhl, 2001; Kuhl & Beckmann, 1994). The findings by Koole and Jostmann (2004), for example, clearly show that action-oriented individuals regulate affect intuitively, in a non-defensive, self-confrontational, and highly context-sensitive manner. When people do not have this ability, they have to regulate affect in other ways, for example, by distraction and suppression. Work craving can be seen as such an alternative, suppressive form of affect regulation fueled by a deficit in self-regulation (Biebrich & Kuhl, 2004; Kuhl, 2001).

Our results also demonstrated that work cravers experience more symptoms of psychological distress. The finding that work craving led to a later increase in symptoms is in line with numerous previous findings on the negative relationship between workaholism and health (Burke et al., 2004; McMillan & O'Driscoll, 2004; Shimazu & Schaufeli, 2009; Wojdylo et al., 2013). Accordingly, with lower action orientation leading to later increases in work craving and work craving leading to later increases in psychological distress, it appears that work craving mediated the relationship between the ability to self-regulate negative affect and

psychological distress. We did not find a reverse or reciprocal relationship between work craving and psychological distress. In other words, craving for work leads to a considerable increase in psychological distress, however, psychological distress does not seem to give rise to later work craving.

Study implications

The first contribution of our study to the research field of workaholism is that we used longitudinal data to replicate the finding of Wojdylo et al. (2014), which suggested that work craving acts as a mediator between failure-related action orientation and symptoms of psychological distress. While cross-sectional data are suitable for finding associations between variables to generate hypotheses, only experimental and longitudinal designs allow the examination of causal hypotheses such as moderation and mediation (Little, 2013). The longitudinal support we found for important functional mechanisms adds credibility to the conceptualization of work craving and warrants further research.

Second, we examined an alternative temporal order of variables by testing symptoms of psychological distress as a mediator and their effect on work craving as an outcome variable. Prior longitudinal studies on the association between workaholism and mental health were constrained to testing the one preferred direction of causation (e.g., Shimazu et al., 2012). Beyond merely confirming our hypothesized causal direction between work craving and distress symptoms, we also did not find support for the reverse and reciprocal causal directions between these two variables. By testing both causal directions that can be implied by a correlation, we addressed a key issue in longitudinal designs (Taris & Kompier, 2003).

Third, studies on workaholism have typically measured workaholism as only obsessive-compulsive phenomenon and examined either its association with outcome variables such as health or (albeit more rarely) the antecedents such as external reinforcement and personality dispositions (see the review on workaholism by Andreassen, 2014). Our study integrates antecedents as well as consequences of pathological workaholism (understand as an addiction) within the theory of work craving. The finding that low action orientation is one of the causes of work craving is highly informative for the ultimate goal of creating multidimensional interventions to prevent and treat work addiction effectively.

Study limitations

Several limitations of our study need to be discussed. First, our preferred structural equation model demonstrated relatively low standardized regression coefficients. The relatively small effect sizes of the two mediation paths reached statistical significance individually, but did not meet the

requirements of the post hoc test that is currently recommended in the literature on mediation (Little, 2013; Preacher & Hayes, 2008). This is likely in part due to our sample size, which can be considered very small for SEM analysis. However, as De Lange, Taris, Kompier, Houtman, and Bongers (2004) pointed out for a similar longitudinal design, it is important to note that cross-lagged effects (such as work craving on symptoms) refer to predicting *changes* in a variable from Time 1 to Time 2 (after accounting for Time 1–Time 2 stability effects of distress symptoms). They further state that “by definition these effects will be small, as many phenomena will be relatively stable across the 1-year time interval employed in this study. Thus, the small effects found in this study are common in longitudinal research” (p. 162). A much shorter time lag was implemented in our study: For almost 80% of the participants, the measurements were only three months apart. The short time lag and our small sample size most likely constrained our effect sizes and offer plausible explanations as to why the mediation path product failed to reach significance in the Monte Carlo post hoc test. The finding that the individual mediation paths of our hypothesized lagged model accomplished statistical significance – despite these limiting circumstances – indicates that our effect sizes may be regarded as compelling (Prentice & Miller, 1992; see also Dormann & Zapf, 2002; Ford et al., 2014).

Second, we have not yet established any cut-off scores to distinguish normal from pathological levels of work craving. For this reason, we currently cannot provide an estimate of the prevalence of work craving in our sample of schoolteachers and university employees. However, the lack of prevalence estimates is not untypical for the research field of workaholism as there has been a lack of consensus on how workaholism should be measured and where the threshold between normal and clinical populations should lie (Andreassen, 2014). The work craving scale may offer a solution to this problem. Because it assesses workaholism as a clearly pathological work style and grasps the mechanisms of a work addiction it may provide an important input for determining cut-off scores in future research.

Third, we would have preferred to have three times of measurement without compromising sample size requirements. Two main shortcomings of the two-wave half-longitudinal as compared to a full three-wave mediation model described by Cole and Maxwell (2003) are valid here as well: We cannot directly test the significance of the direct path c from X to Y . Thus, there is no way of testing for complete mediation. However, findings of complete mediation are very rare in psychological research. The second limitation of this design is that we cannot test the stationarity assumption. Stationarity, which is often referred to as measurement invariance, means that the same causal effects do not change in magnitude over time, for example, that the size of the effect of work craving on health is the same between Times 1 and 2 as between Times 2 and 3 (Little, Preacher, Selig, & Card, 2007). These two limitations are unlikely to confound the testing of our theoretical predictions. Indeed, failing to control for previous levels of the dependent variables typically creates much greater problems than not accounting for violations of stationarity (Cole & Maxwell, 2003).

Further important limitations found in this study include the self-report nature of our measures and the use of a convenience sample, which might introduce unmeasured confounding variables due to a self-selection bias and thus limit the external validity of results.

CONCLUSIONS

The present longitudinal study investigated the concept of work craving, which distinctly defines workaholism as pathological and incorporates crucial features of addiction. Our longitudinal design allowed us to identify deficits in the ability to self-regulate negative affect (i.e., low action orientation) as a precursor of work craving and psychological distress as a consequence of work craving. Indeed, work craving partially mediated the association between low action orientation and psychological distress. The present findings advance our understanding of the underlying mechanisms of work craving and provide useful insights on how to better prevent and treat this addiction.

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