

## *The majority of professionally active women diagnosed with eating disorders may be at risk of work addiction: an overlooked comorbidity*

### BACKGROUND

Work addiction (WA) has been previously linked to several diseases and disorders, but there is scarce literature on its association with eating disorders (EDs). Both WA and EDs share similar etiological factors (notably rigid perfectionism) and clinical features. The aim of this study was to provide an initial overview of the literature on this potential comorbidity, and investigate the co-occurrence of EDs and WA, and their relationship with sociodemographic and work-related variables, health, and personality.

### PARTICIPANTS AND PROCEDURE

In a pen-and-pencil cross-sectional study, the Bergen Work Addiction Scale (BWAS), a question about a current or previous diagnosis of EDs and other mental disorders, personality questionnaires, and questions concerning demographic, health and work-related variables were administered to 723 Polish employees from various professions.

### RESULTS

Six females (0.8%) and none of the males declared having been diagnosed with EDs, which is, to a large extent, congruent with the expected prevalence in the general population. Five out of these six females (83%) reached the cut-off

score for WA. Of all women who reached this cut-off, 5.5% reported EDs. All these women were in their twenties, not married, having no children, working in non-managerial positions, with body mass index (BMI) in the normal range or below. Preliminary comparisons with matched comparison groups were conducted.

### CONCLUSIONS

These initial results suggest that WA may be highly prevalent among professionally active women diagnosed with EDs. Functioning of individuals with EDs in the workplace is a vastly understudied issue which merits more attention owing to high suicide risk and mortality due to health complications, particularly cardiovascular disease (CVD), related to EDs and overworking, a significant prevalence of subclinical EDs in female populations (especially among youth), and a typically worse prognosis for EDs comorbid with other disorders. Both problematic behaviors are related to denial, which suggests that these may be much more prevalent problems than current estimates indicate.

### KEY WORDS

eating disorders; obsessive-compulsive personality disorder; study addiction; work addiction; workaholism

ORGANIZATION – University of Gdansk, Gdansk, Poland

AUTHORS' CONTRIBUTIONS – A: Study design · B: Data collection · C: Statistical analysis · D: Data interpretation · E: Manuscript preparation · F: Literature search · G: Funds collection

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*Covering up or hiding is the worst remedy for mental disorders.*

*[...] an eating disorder is a mental disorder that is consumed with control and perfection.*

Lindsey Stirling, the author of "Sleepwalking"

## BACKGROUND

There is still a scarcity of studies on the functioning of individuals with eating disorders (EDs) in the workplace, and specifically on the relationship of EDs with work-related problematic behaviors and phenomena (overworking, burnout, absenteeism, presenteeism, workplace deviance, mobbing, and bullying), especially compulsive overworking. Work addiction and EDs show significant specific similarities in terms of potential etiological factors and clinical features. Both show a strong relationship to rigid perfectionism, which is increasingly identified as a transdiagnostic process (Egan et al., 2011), as well as obsessive-compulsiveness, including anankastia/obsessive-compulsive personality disorder (OCPD). These are associated with a strong need for control (ICD-11 – World Health Organization, 2019; DSM-5 – American Psychiatric Association, 2013), as well as related to rigidity/flexibility, consistently with the assumption that inflexibility in the transdiagnostic processes is essential in making them problematic and pathological (Morris & Mansell, 2018). Similar family factors have been suggested as crucial for both disorders (e.g., enmeshment and criticism), and it was suggested that they generally might represent a way of coping with problems of identity and personal control (Polivy & Herman, 2002), specifically as a way to compensate for low self-esteem (see Andreassen, 2014; Atroszko et al., 2019; Griffiths et al., 2018). Apart from core rigid perfectionism underlying many (perhaps most) cases of EDs and WA, both of these disorders share a high degree of denial, and low self-awareness and insight into the problematic behavior (see Couturier & Lock, 2006; Goldstein et al., 2009; Holton, 2016; Pickard, 2016, 2018; Stoddard Dare & Derigne, 2010; Vandereycken & Van Humbeeck, 2008). Taking all this into account, it is surprising that there is no systematic investigation on their comorbidity. Moreover, there is a vast discrepancy in the number of high-quality scientific papers on WA (and anankastia/OCPD) in comparison to EDs (see Figure 1; for an overview of the relationship of compulsive overworking with other mental disorders and health, including its neglect in scientific literature and policies, see Atroszko et al., 2020).

The aim of this study was to investigate the co-occurrence of EDs and WA in a relatively large and varied sample of the working population, and factors potentially related to their comorbidity, including sociodemographic variables (gender, age, marital

status, children), work-related variables (work engagement, burnout), personality (neuroticism, competitiveness), psychopathology (attention deficit hyperactivity disorder, depression, anxiety), and health and health-related behaviors (stress, migraines, thyroid dysfunction, alcohol and tobacco consumption, sleep problems and patterns).

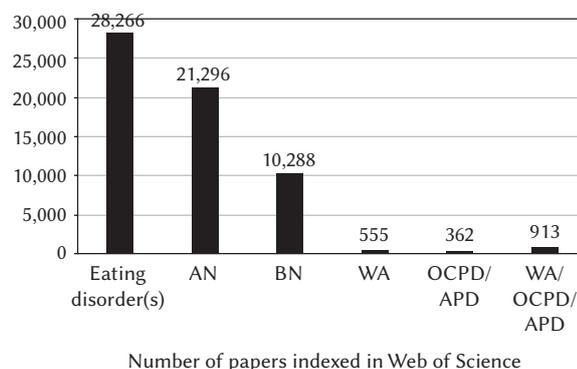
## WORK ADDICTION

Work addiction has a relatively long history of research (Atroszko, 2019a; Atroszko & Griffiths, 2017), in comparison to other behavioral addictions, and recently, consensus among leading experts researching in the field regarding WA have been established. These included a general agreement that: I) compulsive overworking is a genuine problem, II) that there were enough empirical data to support its relationship with impaired psychosocial functioning of clinical relevance, III) that compulsive overworking was not a transient behavioral pattern and that there was evidence for the persistence of WA among a minority of individuals, IV) that the factors that contribute to WA go far beyond personality alone and that more research on the contribution of meso-level and macro-level factors to work addiction is urgently needed (see Atroszko et al., 2019). Based on the existing em-

*Eating disorders and work addiction*

**Figure 1**

*Number of papers based on Web of Science search on 20 May 2020, by the first author for papers published between 1900 and 2019 using phrases: i) 'eating disorder' or 'eating disorders', ii) 'anorexia nervosa', iii) 'bulimia nervosa', iv) 'work addiction' or 'workaholism', v) 'obsessive-compulsive personality disorder' or 'anankastic personality disorder', vi) 'work addiction' or 'workaholism' or 'obsessive-compulsive personality disorder' or 'anankastic personality disorder' or 'compulsive overworking'. There seems to be more than a 30-fold difference in high-quality scientific publication coverage between domains of eating disorders and compulsive overworking.*



empirical data and conceptualizations, and in order to facilitate studies on both the valid diagnostic criteria and more precise prevalence estimates, a general definition of work addiction as a behavioral addiction has been proposed: “Work addiction is characterized by a compulsion to work and preoccupation with work activities leading to a significant harm and distress of a functionally impairing nature to the individual and/or other significantly relevant relationships (friends, family). The behavior is characterized by the loss of control over the working activity and persists over a significant period of time. This problematic work-related behavior can have varying intensity from mild to severe” (Atroszko et al., 2019, p. 9). Suggestions concerning the development of specific diagnostic symptoms were delineated: “Loss of control over the working activity involves working more than planned despite the negative consequence and/or unsuccessful attempts to reduce the activity and/or progressive increase in time spent on working. Withdrawal symptoms (including irritability, negative feelings, sleep problems, etc.) are frequent if the planned/desired amount of work is hindered or appear when attempts at reduction of the amount of work are undertaken. The work activity often serves to reduce negative feelings and/or avoid interpersonal and/or intrapersonal conflicts” (Atroszko et al., 2019, p. 9). This definition is congruent with current general definitions of behavioral addiction. Furthermore, study addiction (SA) has been suggested to be an early form of work addiction and the data gathered so far, though limited (see Atroszko et al., 2019), are highly consistent with this hypothesis (see Atroszko, 2015, 2018, 2019b; Atroszko et al., 2015, 2016a, 2016b; Griffiths et al., 2018). This has vital importance from the perspective of investigating and understanding the development of compulsive overworking, especially in relation to EDs, because similarly to EDs, it can be observed and associated with substantial harm already among adolescents (Wróbel, 2020). Therefore, it is possible to investigate EDs and WA/SA co-occurrence in adolescent populations, which previously happened to be a theoretical and empirical hindrance (see Munno et al., 2016) or scales developed for measuring work would have doubtful validity when used in adolescent and student samples (Pallanti et al., 2006; see Griffiths et al., 2018 for information on using WA scales in these samples).

#### PREVALENCE OF WORK ADDICTION

Currently, WA is not recognized in official classifications of disorders – ICD-11 (WHO, 2019) or DSM-5 (APA, 2013) – therefore, the available data on prevalence are based on psychometric testing. Presently, the most theoretically sound and empirically valid (though having certain limitations, see Bereznow-

ski & Konarski, 2020) cut-off score uses a polythetic approach applied to seven common addiction symptoms defined for WA-related behaviors (Andreassen et al., 2012). Estimates based on this method range from 6.6% addicted in Denmark, 8.1% in a large sample of young Swiss men, 8.3% in a nationally representative sample in Norway, 16.8% in a sample of the working population in Poland, and 20.6% in Hungary (Andreassen et al., 2014; Atroszko et al., 2017; Lichtenstein et al., 2019; Marmet et al., 2019; Orosz et al., 2016). The analogous cut-off score based on the Bergen Study Addiction Scale showed that the prevalence rate of SA in an online sample in Norway was 9.7%, and in convenience samples of students in Poland, rates varied from 6.4% in samples collected during classes at university to 14.2% in samples collected online (Atroszko, 2015), 16.0% among students of music academies (Lawendowski et al., 2019), and 15.4% among high school students in Poland (Wróbel, 2020) and 17.1% in India (Bisht & Godiyal, 2016). While there are still not enough data to conclude that SA is an early form of work addiction, the available studies strongly suggest that it is likely, and the data on prevalence are consistent with that hypothesis. Based on I) these data and II) a review of studies, which also used different cut-offs, suggesting prevalence rates of work addiction of about 8-10%, as well as III) prevalence of OCPD, which is the most prevalent personality disorder in the general population and is hypothesized to be the main risk factor for WA (see Atroszko et al., 2020), it can be expected that this problematic behavior is generally significantly more prevalent than most other addictions and disorders, including behavioral addictions, and its prevalence substantially varies between countries. These differences in prevalence rates may be closely related to cultural factors and their interaction with socioeconomic conditions of particular countries, for example, an interaction of work ethic, consumer values, and economic pressures (see Atroszko et al., 2019, 2020).

#### EATING DISORDERS

Both diagnostic classification systems ICD-11 (WHO, 2019) and DSM-5 (APA, 2013) distinguish similar types of feeding or eating disorders, including specific diagnoses, i.e., anorexia nervosa (AN), bulimia nervosa (BN), binge eating disorder (BED), avoidant-restrictive food intake disorder, pica, rumination-regurgitation disorder (in DSM-5 named “rumination disorder”), and two “umbrella” categories: “other specified feeding or eating disorder”, and “feeding or eating disorder, unspecified” (in DSM-5 named “unspecified feeding or eating disorder”) (WHO, 2019; APA, 2013). In this article, two common EDs, i.e., AN and BN, are of main interest. They both

are characterized by abnormal eating behaviors, as well as by preoccupation with food, body weight, and shape that is connected with the impairment of crucial functions (Herpertz-Dahlmann, 2009). AN is characterized by essentially low body weight, which co-occurs with behaviors such as reducing energy intake, purging behaviors, and also behaviors intended to increase energy expenditure (which may be related to WA as potentially high energy expenditure activity) (WHO, 2019). BN is characterized by periodic episodes of binge eating, which co-occur with inappropriate compensatory behaviors leading to prevention of weight gain (including self-induced vomiting) (WHO, 2019). Binge eating, both as part of BN and BED, is closely related to addictive behaviors and disorders, and BED is increasingly recognized as a potential food addiction (Gearhardt et al., 2011).

The highest levels of morbidity and mortality rates compared to other mental disorders (Arcelus et al., 2011; Herpertz-Dahlmann, 2009) and frequent self-harm (27.3% of eating-disordered patients were documented to have a lifetime history of non-suicidal self-injury) (Cucchi et al., 2016) are both outstanding features of EDs. According to a meta-analysis, standardized mortality rates were 5.86 for AN and 1.93 for BN (Arcelus et al., 2011). EDs carry a substantial burden for society and are related to lower employment rates and lower earnings; however, the low sample size typical for studies on EDs did not make these differences in earnings statistically significant (Samnaliev et al., 2015). Nonetheless, EDs with comorbid disorders seem to generate even lower employment rates and lower earnings. The global disease burden of eating disorders increased by 65% between 1990 and 2016 (Erskine et al., 2016). A meta-analytic review did not reveal a relationship between EDs and socioeconomic status, which suggests the complexity of factors affecting this relationship (Wildes et al., 2001).

#### PREVALENCE OF EATING DISORDERS

Although eating disorders are not common in the general population, they are dangerous due to their significant influence on society and elevated mortality risk (Smink et al., 2012). The lifetime prevalence of AN and BN are 0.9% and 1.5% among women, and 0.3% and 0.5% among men (Hudson et al., 2007). EDs already show similar prevalence rates among groups of adolescents with rates of lifetime prevalence of 0.3% for AN and 0.9% for BN (Swanson et al., 2011). AN occurs in 8 cases per 100,000 population per year, and BN is in 12 cases per 100,000 population per year (Hoek & Van Hoeken, 2003). The prevalence of eating disorders in Poland can be expected to be similar to those estimates; however, the scarcity of good epidemiological studies prevents a more in-depth analysis

of this aspect (Jaworski et al., 2019). Moreover, the majority of studies indicate that prevalence of EDs is constantly increasing (Hudson et al., 2007; Micali et al., 2013; Pike & Dunne, 2015), although it may be due to changes in diagnostic criteria (Qian et al., 2013). EDs are most prevalent among women and more common in Western countries than in Asian ones (Qian et al., 2013). The pattern of onset of AN and BN is similar up to age 25; however, beyond that age, new cases of AN can be observed (Hoek, 2006). One in five adolescent females are or have been dealing with ED-related problems during their life (Isomaa et al., 2009; Modrzejewska & Bomba, 2010). Moreover, recent studies have shown a significant increase of new AN cases in the high-risk group of 15-19-year-old girls (Kotwas et al., 2020; Smink et al., 2012). Similarly, there was a significant increase in ED prevalence among girls and young women (aged 12-21) in Poland between 1988 and 2004 (Pilecki et al., 2009). While the prevalence of EDs is relatively low, it has to be taken into account that subclinical levels of EDs among youth are considerable (Croll et al., 2002; Drosdzol-Cop et al., 2017; Modrzejewska & Bomba, 2010; Włodarczyk-Bisaga & Dolan, 1996; Włodarczyk-Bisaga et al., 1995), and EDs are related to denial and low awareness of the disorder, which may contribute to its underdiagnosis (Couturier & Lock, 2006; Vandereycken & Van Humbeeck, 2008).

#### ETIOLOGY OF WORK ADDICTION AND EATING DISORDERS

EDs and WA, to a large extent, share potential etiological factors. Several causes for EDs have been suggested, including the role of genetic and environmental factors, such as negative life events or weight teasing (Waszczuk et al., 2019). A general hypothesis postulates that they may represent a way of coping with problems of identity and personal control (Polivy & Herman, 2002). Specific biological factors, such as genetic vulnerabilities (Lee et al., 2019) and insulin sensitivity, have been investigated (Ilyas et al., 2019). Body dissatisfaction is among the main underlying considerations. Other potential causes are similar to those suggested and investigated in relation to work addiction. They include sociocultural factors (e.g., media and peer influences), family factors (e.g., enmeshment and criticism), negative affect, and low self-esteem (Andreassen, 2014; Polivy & Herman, 2002). Low problem-solving orientation or poor problem-solving skills have been theorized to lead to substance use, addictive disorders, and EDs (Aldao et al., 2010; Atroszko, 2015; Griffiths et al., 2018). Stress is considered as a potential etiological factor responsible for affecting the onset and further development of EDs (Sauro et al., 2008) as well as work addiction (see Atroszko, 2019a). Moreover, chronic stress tends

to be a factor responsible for the persistence of EDs (Sauro et al., 2008). Both EDs and WA were previously linked to burnout, which is characterized as a set of symptoms resulting from chronic, ill-managed stress at work (Clark et al., 2016; Kristanto et al., 2016); specifically, it might be expected that high job stress is related to habitual and emotional eating (Potocka & Mościcka, 2011), as well as restrictive eating (Ruggiero et al., 2008). For example, the interaction of individual predispositions and environmental factors can be observed in the fact that both EDs and WA/SA are common among musicians, arguably due to their perfectionism, depression, anxiety, stress, peer pressure and social isolation (Kapssetaki & Easmon, 2019; Lawendowski et al., 2019; Niemeier & Larsen, 2020). A recent paper emphasized the need for systematic studies on compulsive overworking, burnout, and the global burden of disease, among other things, because currently we do not know to what extent burnout is a cause, effect or part of the clinical manifestation of other disorders (Atroszko et al., 2020).

#### COMORBIDITIES OF WORK ADDICTION AND EATING DISORDERS

Comorbidity is defined in various ways; however, all conceptualizations are based on a single core concept of the presence of more than one distinct health condition in an individual (Valderas et al., 2009). Further data on potential common causes and similarity in clinical manifestations come from comorbidity studies suggesting that EDs and WA may, to a large extent, share comorbidities, including very specific ones. Moreover, co-occurrence of disorders plays an important role as findings indicate that comorbidity is related to worse health outcomes, to more complex clinical management, and increased health care costs (Valderas et al., 2009; Vall & Wade, 2015). Similarly to many other disorders, both EDs and WA co-occur with mood disorders, especially major depressive disorder, and anxiety disorders (see Atroszko et al., 2019, 2020; Blinder et al., 2006; Braun et al., 1994; Herzog et al., 1992), though anxiety and mood disorders may co-occur more often with BN than AN (Hudson et al., 2007). There is significant comorbidity of EDs with personality disorders (PD) (Farstad et al., 2016; Martinussen et al., 2017). In this context, both EDs and WA share substantial comorbidities with particular disorders such as frequent co-occurrence of AN and WA with obsessive-compulsive personality disorder (OCPD) (Atroszko, 2019a, b; Atroszko et al., 2020; Blinder et al., 2006; Lilienfeld et al., 2006). These three disorders share a common factor of rigid perfectionism (Atroszko, 2019a, b; Atroszko et al., 2019, 2020; Clark et al., 2016; Halmi, 2004; Halmi et al., 2000, 2005). It was suggested that OCPD is a risk factor for WA, and re-evaluation of OCPD conceptualization

and diagnostics may be required (Atroszko, 2019a, b; Atroszko et al., 2020).

Furthermore, there is some consistent, though somewhat limited, evidence suggesting that co-occurrence of EDs and obsessive-compulsive disorder (OCD) could be explained by shared etiological factors (Altman & Shankman, 2009). Similarly, WA was associated with OCD (Andreassen et al., 2016). Moreover, EDs and WA are related to excessive exercising and potentially to exercise addiction (Andreassen et al., 2013; Davis & Claridge, 1998). On the other hand, BN patients are more likely to suffer from alcohol abuse (twice as often as AN patients), smoking (Anzengruber et al., 2006), and polysubstance abuse (three times more often) (Blinder et al., 2006; Hudson et al., 2007). Similarly, WA is related to alcohol dependence (Marmet et al., 2019). Generally, BN co-occurs more often with substance use disorders and impulse-control disorders than AN (Hudson et al., 2007). Studies show that ADHD co-occurs with EDs, especially BN (Biederman et al., 2007; Bleck et al., 2015), and WA (Atroszko et al., 2017; Andreassen et al., 2016; Marmet et al., 2019). ADHD is a predictor of bingeing and/or purging behaviors but not restrictive behaviors (Bleck et al., 2015). Moreover, Both EDs and WA are related to social anxiety and fear of evaluations (Atroszko, 2015; Lawendowski et al., 2019; Levinson & Rodebaugh, 2012; Marmet et al., 2019).

Additionally, EDs show consistent associations with several autoimmune diseases (including thyroid dysfunction); nevertheless, currently, there seem to be no conclusive data on the causal pathways between EDs and these diseases (Raevuori et al., 2014; Wotton et al., 2016). Stress-related disorders, such as posttraumatic stress disorder, acute stress reaction, adjustment disorder, and other stress reactions, were found to be significantly associated with the risk of subsequent autoimmune disease (AD; Song et al., 2018). It is consistent with the notion that stress, including work stress, can be a risk factor for AD. Notably, EDs have a well-established association with cardiovascular disease (CVD) (Casiero & Frishman, 2006). WA research is more preliminary in this case (Atroszko 2015; Atroszko & Atroszko, 2019; Balducci et al., 2018; Salanova et al., 2016); however, the premises for assuming that compulsive overworking may be an independent and important risk factor for CVD are relatively strong (see Atroszko et al., 2020).

#### WORK ADDICTION, EATING DISORDERS AND SLEEP

Both EDs and WA show similar sleeping patterns, including substantial sleep problems and disorders. About half of individuals with EDs experience sleep disturbance, and those who experience it have even more pronounced symptoms, such as higher binge

and vomiting frequency (Kim et al., 2010). Studies consistently show that WA is associated with low sleep quality and sleep problems (see Griffiths et al., 2018). Recently, there has been a rapidly increasing number of studies aiming to explain the mechanisms by which WA affects sleep disturbance (Gillet et al., 2018; Hancock et al., 2019; Reiner et al., 2019; Scafuri et al., 2019; Spagnoli et al., 2019; Spagnoli et al., 2018). This is an especially appreciated effort since sleep is closely related to health and mortality (Gallicchio & Kalesan, 2009). For example, there are significant interrelationships among EDs, WA, sleep, and CVD, which merit systematic investigation because CVD is the first cause of mortality in the world (Atroszko et al., 2020; Balducci et al., 2018; Casiero & Frishman, 2006; Salanova et al., 2016).

Furthermore, there is a significant association between circadian preference and EDs because eating-disordered patients are more often evening types (Natale et al., 2008; Schmidt & Randler, 2010), which is to some extent paralleled in studies on WA (Andreassen et al., 2017). Evening-type individuals function with the best efficiency during the evening hours and prefer to go to bed and wake up late (Adan et al., 2012). Chronotypes have been linked to health; particularly, evening types are frequently found to show worse indicators of health than morning types, including mood disorder symptoms (Au & Reece, 2017). Eveningness may often be incompatible with work schedules and behaviors, poor sleep quality, sleep debt, and work-related chronic fatigue (see Andreassen et al., 2017).

#### WORK ADDICTION, EATING DISORDERS AND PERSONALITY

EDs and WA share, to no small extent, similarities in potential personality risk factors. Personality traits are closely related to a host of mental disorders (Lahey, 2009). Perfectionism, as a personality trait, is distinguished into adaptive and maladaptive (Lo & Abbot, 2013). In the clinical literature, the latter is understood as rigid, dysfunctional perfectionism and a transdiagnostic process strongly related to a wide range of psychopathology (Limburg et al., 2017) including EDs (Cassin & von Ranson, 2005; Dahlenburg et al., 2019; Lilenfeld et al., 2006) and WA (Clark et al., 2016; Griffiths et al., 2018). Perfectionism is consistently found to be related to EDs, both AN and BN (Dahlenburg et al., 2019; Halmi, 2004; Halmi et al., 2000; Mikołajczyk & Samochowiec, 2004). A meta-analysis of longitudinal studies showed that perfectionism underlies bulimic symptoms (Kehayes et al., 2019). The significance of perfectionism to EDs is even greater when it is taken into account that a recent study demonstrated that perfectionism is increasing over time (Curran & Hill, 2019). Furthermore, review

and meta-analytic papers suggest that EDs, apart from being related to specific characteristics (such as a drive for thinness, poor interoceptive awareness, ineffectiveness, low self-directedness, low cooperativeness, and traits associated with avoidant personality disorders), are most often related to obsessive-compulsive personality traits, and negative emotionality/neuroticism (Cassin & von Ranson, 2005; Lilenfeld et al., 2006). The latter traits are consistently linked to WA (Clark et al., 2016; Griffiths et al., 2018). Furthermore, both EDs and WA have been linked to harm avoidance (Cassin & von Ranson, 2005; see Atroszko, 2018 for discussion of internalizing/externalizing framework applied to SA/WA), and both are related to social anxiety and fear of evaluations (Atroszko, 2015; Lawendowski et al., 2019; Levinson & Rodebaugh, 2012; Marmet et al., 2019). Nonetheless, some specific differences among EDs also have to be emphasized, including high constraint and persistence and low novelty seeking characteristic for AN, and high impulsivity, sensation seeking, novelty seeking, and traits associated with borderline personality disorders for BN (Cassin & von Ranson, 2005). WA is characterized by high perseverance (see Atroszko, 2018), but it has also been found to be related to disorders characterized by impulsivity, such as bipolar disorder (Di Nicola et al., 2010; Marmet et al., 2019). This might be related to the long clinically observed, though scarcely empirically studied, heterogeneity of WA types (Fassel, 1990; Robinson, 2000).

EDs are related to competitiveness (Striegel-Moore et al., 1990), particularly hyper-competitiveness, and also to the need to achieve in appearance (Burckle et al., 1999). Competitiveness is closely related to narcissistic rivalry (Back et al., 2013; Krizan & Herlache, 2018). Narcissism is related to EDs (Cassin & von Ranson, 2005; Lawson et al., 2008; Waller et al., 2007; Waller et al., 2008). Competitiveness (and type A personality) and narcissism are associated with WA/SA (Andreassen et al., 2012; Atroszko & Atroszko, 2019; Atroszko et al., 2019; Clark et al., 2016; Clark et al., 2010). Again, this has vital importance since a generational trend of increasing narcissism can be observed in recent decades (Twenge et al., 2008), and these changes are not limited to Western cultures (Cai et al., 2012).

#### EATING DISORDERS, WORK ADDICTION AND WORK ENGAGEMENT, AND PERFORMANCE

Though EDs, especially AN (but not binge eating), cause severe work impairment (Hudson et al., 2007), there are very limited data on the relationship between EDs and work performance, and available data suggest that EDs may affect productivity negatively (Smith, 2009). EDs may be related to lower employment rates and lower earnings; however, more good

quality studies are needed on this issue (Samnaliev et al., 2015). More data are available on EDs and academic variables, which may be crucial in understanding how problematic behaviors affect fulfilling the basic social roles of a student and later of a professionally active adult. While gifted adolescents were found to be more at risk for EDs (Garner, 1991), generally EDs are negatively related to academic performance (Adelantado-Renau et al., 2018; Hoerr et al., 2002; Veses et al., 2015; Yanover & Thompson, 2008). Disturbed eating patterns among high school female students in relation to school pressures and high school workload affecting their health were observed already in the late 19<sup>th</sup> century (Crichton-Browne, 1892; Hall, 1904). Problematic eating behavior was noted to appear during exam preparation and after exam failure (Nasser, 1994), and is related to feelings of failure (Kagan & Squires, 1984). It is congruent with recent findings showing a significant role of social pressures in EDs' etiology (Waszczuk et al., 2019), as well as a meta-analysis confirming women's apparent higher punishment sensitivity (Cross et al., 2011). Fear of failure is central to dysfunctional perfectionism (Lo & Abbot, 2013), and may have similar effects in school, academic, and work environments.

WA is related to higher work engagement; however, currently available data strongly suggest that these are two different constructs (Atroszko et al., 2019; Di Stefano & Gaudiino, 2019). At the same time, the few studies investigating the relationship between WA and performance suggest that WA/SA is related to worse work/academic performance (Griffiths et al., 2018), including more harm caused by WA individuals in health professions (Andreassen et al., 2018), consistently with the studies showing higher burnout of work addicts and burnout associated with medical mistakes (see Atroszko et al., 2019). However, not all studies find lower productivity of WA, which probably depends on the methodology (Balducci et al., 2020). Since studies suggest that organizations rather appreciate workaholic behaviors and work addiction is related to higher managerial positions (see Atroszko et al., 2020), performance evaluations may be biased if productivity is based on supervisors' performance ratings using subjective Likert-type scales. Curiously, this potential bias is reflected in recent scientific papers defending workaholicism as a positive phenomenon (Baruch, 2011). A specific area of association between EDs, WA, and workplace performance and health may be related to stimulant consumption. EDs are related to higher caffeine consumption, which is also related to a higher workload (Burgalassi et al., 2009; Ciapparelli et al., 2010; Striegel-Moore et al., 2006). It has been suggested that compulsive overworking may be an important variable in understanding the relationships between caffeine intake, high workload, and CVD (Atroszko, 2019c).

## THEORETICAL CONSIDERATIONS ON WORK ADDICTION AND EATING DISORDERS

High workload and adverse work conditions (e.g., high-demand, low-control work environments) are associated with eating patterns and related disorders such as obesity and overweight (Schulte et al., 2007). These in turn are long-recognized risk factors for a host of diseases and disorders constituting major components of the global burden of disease (Visscher & Seidell, 2001). Stress seems to modify total food intake in two ways, resulting in under- or overeating, and this may be influenced by stressor severity (Torres & Nowson, 2007). While stress is recognized as common risk factor for addiction and obesity (Sinha & Jastreboff, 2013), little is known on how workload, adverse work conditions and proclivity for compulsive overworking are related to EDs, especially those of restrictive type (Ruggiero et al., 2008). What many addictions and obesity have in common is the loss of control over behavior with strong reinforcing effects, disrupted self-control, stress reactivity, and interoceptive awareness, resulting in overindulgence in consumption of food, alcohol or drugs, or in certain behaviors (Volkow et al., 2013; Volkow & Wise, 2005). This, to some extent, is similar to the relationships between BN and some types of WA-related behaviors with underlying impulsivity; therefore, it could be expected that some types of WA will also show considerable relationships with binge eating and food addiction. On the other hand, what WA and such EDs as AN have in common is the high need for control over multiple behaviors including almost all aspects of life, and loss of control over specific behavior, that is workload and restrictive eating patterns respectively (Atroszko et al., 2019; Griffiths, 2013).

Curiously, some of the first typologies describing work addiction used concepts from the ED field, such as "bulimic workaholic" (Robinson, 2000) or "work anorexic" (Fassel, 1990) to reflect the clinical manifestation of the addiction including a tendency for procrastination and "binge working" afterward. To the authors' knowledge, there are no systematic studies so far investigating the relationship between work addiction and EDs. Studies using the Shorter PROMIS Questionnaire (SPQ) for measuring multiple addictive behaviors typically found that compulsive working co-occurred with food starving and food binging behaviors (MacLaren & Best, 2010; Pallanti et al., 2006). All these behaviors are measured by SPQ, which showed adequate psychometric properties. A stronger premise for considering comorbidity of EDs and WA comes from a study showing that 26.1% of bulimics and 25.0% of anorexic clinical samples obtained SPQ scores for working compulsively falling above the 90% cut-off (Christo et al., 2003). These studies using SPQ also typically find a stronger relationship be-

tween compulsive working and food starving rather than food binging (Haylett et al., 2004).

The comorbidity of EDs and WA may be especially significant, taking into account that generally, individuals suffering EDs with comorbid disorders tend to have worse prognostics than those without comorbidities (Valderas et al., 2009; Vall & Wade, 2015). Furthermore, the issue of comorbid or underlying disorders in behavioral addictions is still a problem that requires theoretical clarification and more empirical evidence (see Atroszko, 2019a, b). It was suggested that underlying or comorbid disorders should not be an exclusion criterion for diagnosing a behavioral addiction, including work addiction, especially because of the risk of worse outcomes (Atroszko, 2019a, b). Comorbidity of EDs and WA may prove an interesting case as both may share similar underlying risk factors, including OCPD and vulnerabilities such as rigid perfectionism. The in-depth analysis of such cases may prove insightful from the perspective of conceptualizing them in the official classifications of disorders and a potential step towards a more transdiagnostic approach in understanding psychopathology.

Moreover, EDs show fairly low prevalence in general populations; however, subclinical levels of EDs may show significantly higher prevalence and be related to mood and anxiety disorders. Prevalence of subclinical AN (restricting subtype) in a sample of adolescent girls was 3.5%, 13.3% for weight concerns (restricting subtype), 3.8% for subclinical BN, and 10.8% for subclinical binge eating disorder (estimates for Quebec, Canada; Touchette et al., 2011). Furthermore, clinical and subclinical EDs are more prevalent in specific subpopulations such as professional musicians or athletes; however, type of sport needs to be taken into account (Kapsetaki & Easmon, 2019; Smolak et al., 2000; Sundgot-Borgen & Torstveit, 2004). Work addiction seems to be perhaps the most prevalent behavioral addiction (with estimates ranging from 6.6% in Denmark to 20.6% in Hungary; Lichtenstein et al., 2019; Orosz et al., 2016). The understanding of potential co-occurrence of EDs with WA should be of high significance from the point of view of early prevention programs.

## HYPOTHESES

The main hypothesis is that co-occurring EDs and WA will be related to indicators or risk factors of worse potential outcomes (in comparison to individuals with WA only and those never diagnosed with EDs and scoring low on WA) such as higher prevalence of other diseases, disorders, and health problems as well as personality traits conducive to worse health (neuroticism, competitiveness; Lahey, 2009; Lohse et al., 2017). In terms of these variables, EDs/WA and WA

are expected to reflect a spectrum with the first category (EDs/WA) showing worse potential outcomes and highest levels of similar potential risk factors. Based on the existing literature, it was hypothesized that: (H1) there would be significant co-occurrence of WA among individuals diagnosed with EDs; (H2) EDs would be more prevalent among employed young women than men; co-occurring EDs and WA would be related to: (H3) higher work engagement and burnout, (H4) higher neuroticism, and competitiveness, (H5) more psychopathology (ADHD, depression, anxiety) and worse physical health, and poor health-related behaviors (stress, migraines, thyroid dysfunction, higher alcohol consumption, higher tobacco consumption, sleep problems and patterns [eveningness]).

## PARTICIPANTS AND PROCEDURE

Detailed information on the used methods (sample, instruments, and statistical analyses, including their limitations) can be found in the Appendix. For the questionnaires, Cronbach's  $\alpha$  coefficients in the present study are shown in Table 3.

## SAMPLE

The sample comprised 723 employees (513 [71.0%] women and 200 [27.7%] men; 10 [1.4%] participants did not report their sex) from a wide range of professions, including lawyers, managers, IT specialists, academics, researchers, medical doctors, psychologists, teachers, engineers, accountants, commercial trades, librarians and functionaries (see Table S1 in the Appendix).

## INSTRUMENTS

*Demographics.* Questions were asked concerning age, sex, relationship status, number of children, years of completed education, professional position, normal work hours per week, and total work time per week (open-ended questions). The difference between normal and total work time was an indicator of extra hours of work per week.

*Health.* Questions concerning current diseases or disorders and previously diagnosed diseases or disorders were asked (closed-ended response format), with an additional open-ended question for diseases not included in the list. It included asking about EDs, and specifically, AN and BN were mentioned in the question. Questions about currently taken prescribed medications were asked (open-ended response format). Information on thyroid drugs as an indicator of thyroid dysfunction was used in the analyses. Ques-

tions concerning current height and weight were asked. On the basis of this information, body mass index (BMI) was calculated. Only one woman reporting EDs had BMI below the norm ( $< 18.5$ ), but most (4 of 6) were in the lower range of norm  $< 21$ .

*Health behaviors.* Questions concerning drinking alcohol currently (*yes/no*) and ever smoking tobacco every day (*yes/no*) were asked.

*Bergen Work Addiction Scale (BWAS).* The BWAS was used to assess work addiction (Andreassen et al., 2012).

*Adult ADHD Self-Report Scale (ASRS-Version 1.1).* This scale comprises 18 questions (6 main items in part A, and 12 additional items in part B) of symptoms of ADHD in adults (Kessler et al., 2005) congruent with the criteria found in the latest (fifth) edition of the Diagnostic and Statistical Manual for Mental Disorders (DSM-5; APA, 2013).

*Mini-International Personality Item Pool (Mini-IPIP).* The Polish adaptation of the Mini-IPIP (Czerwiński & Atroszko, 2020; Czerwiński et al., 2019) was used as a measure of the Five-Factor Model of personality (Donnellan et al., 2006). The scale showed good validity in the present sample (Atroszko et al., 2017; Czerwiński & Atroszko, 2020; Czerwiński et al., 2019).

*Competitiveness Scale.* The scale is part of the achievement motivation inventory developed by Cassidy and Lynn (1989).

*Perceived Stress Scale.* Perceived stress was measured by a Polish adaptation of the Perceived Stress Scale (PSS-10; Cohen et al., 1983).

*Sleep.* Several questions concerning sleep-related problems were asked alongside a question concerning eveningness/morningness.

*Maslach Burnout Inventory – General Survey (MBI-GS).* The MBI-GS (Schaufeli et al., 1996) can be used in any occupational context and includes three subscales (i.e., exhaustion, cynicism, and professional efficacy) that parallel those of the original MBI, except that items do not explicitly refer to working with people.

*Utrecht Work Engagement Scale (UWES-9).* Work engagement was measured by means of the UWES-9 (Schaufeli & Bakker, 2003), which investigates the experience of aspects of the construct by means of three three-item scales: Vigor (VI), Dedication (DE), and Absorption (AB).

## PROCEDURE

Data collection was based on convenience sampling. The study was conducted among the working population in Poland. The participants were required to be working professionally for at least two years prior to the study. In total, 800 questionnaires were distributed among participants. Employees were invited to participate anonymously in the study through their

employers or directly. It was a pen-and-pencil cross-sectional study. The study took place from January 2014 to July 2016. No monetary or other material rewards were given for participation. Written informed consent was obtained from each participant.

## STATISTICAL ANALYSIS

*Descriptive statistics.* Internal consistencies, percentages, means, mean ranks, and standard deviations were calculated.

*Group differences.* Three groups were distinguished based on present or previously diagnosed EDs, and cut-off score for work addiction: I) diagnosed EDs and cut-off score suggesting WA (EDs/WA;  $n = 5$ ), and two comparison groups, including II) those reaching cut-off score for WA without diagnosed EDs (WA;  $n = 12$ ), and III) individuals without EDs or WA (no EDs/WA;  $n = 74$ ). The two comparison groups were distinguished to match the EDs/WA group based on gender (females), age (20-27 years old), BMI (normal or below normal), not being married/divorced or separated, having no children, and having no managerial responsibilities. This assures more control over crucial sociodemographic variables and health status based on BMI, which are known to be related to WA and EDs. In order to examine the group differences, appropriate statistical procedures were applied. In the case of continuous data (with normal distributions in population), orthogonal contrasts were defined and calculated to analyze differences between: I) both WA groups together (EDs/WA and WA) vs. no EDs/WA group, II) EDs/WA vs. WA. Orthogonal contrasts are the recommended method for such an analytical plan, as they follow assumptions behind the modern confirmatory approach to science, are based on theoretical assumptions concerning differences between the studied groups, and provide higher power than *post hoc* tests (Rosenthal & Rosnow, 1985). For order level data, similar group comparisons were conducted using the Mann-Whitney *U* test. For categorical data, similar group comparisons were conducted using the chi-square test. Note that the latter two tests are not exact analogs of contrasts; therefore, total alpha levels are not comparable, and there may be some bias (see Appendix). Corrections for multiple comparisons were not used, which is congruent with current recommendations and practices (Gelman et al., 2012). All tests were two-tailed, and the significance level was set to .05. Analyses were conducted using IBM SPSS 25.

## ETHICS

The study was carried out in accordance with the Declaration of Helsinki, and was approved by both

the Norwegian Data Protection Official for Research, and the Research Ethics Committee at the Psychology Department of the University of Gdansk in Poland.

## RESULTS

### DESCRIPTIVE STATISTICS

Six females (0.8%) and none of the males reported being diagnosed with EDs, which is, to a large extent, congruent with the expected prevalence in the general population. Women who reported EDs constituted 1.2% of all women. Five out of these six (83%) females reached a cut-off score for WA. On the other hand, among all participants who reached the cut-off score for WA ( $n = 125$ , 17.4%), 4.0% reported EDs, and among all women who reached the cut-off score for WA ( $n = 91$ , 17.7% of all women), 5.5% reported EDs. All women with EDs were in their twenties (20-27 years), not married/divorced/separated/widowed, having no children, working in non-managerial positions, with BMI in the normal range or below. Based on these results, matched comparison groups were created, including those who reached the cut-off score for work addiction but were lacking EDs ( $n = 12$ ), and those without WA or EDs ( $n = 74$ ). Table 1 presents a summary of prevalence estimates as well as showing the structure of data used for comparisons between groups. The statistical tests showed that the matched groups did not differ significantly in terms of age and BMI (see Table 2). Altogether, there were 20.4% women ( $n = 19$ ) who reached the cut-off score

for work addiction among these groups ( $n = 93$ ) based on sociodemographic and BMI criteria, and 5.4% with EDs/WA. Among young, professionally active women who reached the cut-off score for WA ( $n = 19$ ), 26.3% ( $n = 5$ ) reported EDs. Notably, 20.0% of women with EDs/WA reported being previously diagnosed with depression, and migraines, and taking thyroid drugs for hyperthyroidism, and a staggering 80.0% reported ever experiencing sleepwalking or night terrors.

### GROUP COMPARISONS

EDs/WA and WA groups in comparison to the non-EDs/WA group obtained a higher score on the work addiction scale,  $t(88) = 10.37$ ,  $p < .01$ , reported higher total work hours per week,  $t(88) = 2.33$ ,  $p < .05$ , higher extra hours,  $t(86) = 2.14$ ,  $p < .05$ , obtained higher scores on stress measured with PSS-4,  $t(88) = 2.70$ ,  $p < .01$ , and PSS-10,  $t(88) = 2.97$ ,  $p < .01$ , higher scores on ADHD Screening total score (Part A and B),  $t(88) = 3.25$ ,  $p < .01$ , and ADHD Full scale,  $t(88) = 3.10$ ,  $p < .01$ , and reported fewer sleep minutes,  $t(87) = -4.87$ ,  $p < .01$ , as well as more sleep deficits,  $t(86) = 2.59$ ,  $p < .05$  (Table 2). EDs/WA and WA persons were more likely than non-EDs/WA to report depression,  $\chi^2(1, N = 91) = 5.95$ ,  $p < .05$ , and to walk in sleep or experience night terrors,  $\chi^2(1, N = 91) = 4.82$ ,  $p < .05$ . The Mann-Whitney  $U$  test indicated that the restless or "crawling" feelings in legs at night was greater for EDs/WA and WA persons (mean rank = 61.38) than for non-EDs/WA persons (mean rank = 42.47),  $U = 367.50$ ,  $p < .01$  (Tables 3 and 4).

*Eating disorders  
and work  
addiction*

**Table 1**

*Numbers and percentages for study variables. Percentages in brackets represent number for the category in a column within the number for the category in a row in such a way that it can be read: "column category" constitutes ...% of "row category," e.g. "women with WA constitute 83% of women with ED", or "women with ED constitute 5.5% of women with WA". Most important estimates are in bold*

Variable	<i>N</i>	Women	Young women matched	Women WA	Young women matched plus WA	Women ED
1. Total sample	723	513 (71.9%) <sup>a</sup>	93 (13.0%) <sup>a</sup>	<b>91 (12.8%)<sup>a</sup></b>	19 (2.7%)	<b>6 (0.8%)</b>
2. Women	513	–	93 (18.1%)	<b>91 (17.7%)</b>	19 (3.7%)	<b>6 (1.2%)</b>
3. Young women matched <sup>b</sup>	93	–	–	19 (20.4%)	19 (20.4%)	5 (5.4%)
4. Women with WA	91	–	–	–	19 (20.9%)	<b>5 (5.5%)</b>
5. Young women matched <sup>b</sup> plus WA	19	–	–	–	–	5 (26.3%)
6. Women with ED	6	–	–	<b>5 (83.0%)</b>	–	–

*Note.* <sup>a</sup> without ten missing values on gender; <sup>b</sup> groups matched on: sex (women), age (20-27 years), managerial position (no managerial position), marital status (not married, divorced, separated or widowed; single or in a relationship), children status (no children), BMI (normal or below).

**Table 2**

*Cronbach's  $\alpha$  coefficients for questionnaires, mean scores, standard deviations (SD), t-test results and correlations for contrasts alongside odds ratios (OR) for comparisons between study groups. Groups were matched on: sex (women), age (20-27 years), managerial position (no managerial position), marital status (not married, divorced, separated or widowed; single or in relationship), children status (no children), BMI (normal or below)*

Variable	$\alpha$	Work addiction and eating disorder (n = 5)		Work addiction without eating disorder (n = 12)		No work addiction and no eating disorder (n = 74)		Contrast 1 1 and 2 vs. 3		Contrast 2 1 vs. 2	
		M	SD	M	SD	M	SD	t-test	$r_{\text{contrast}}$ (OR)	t-test	$r_{\text{contrast}}$ (OR)
1. Age	–	22.00	3.08	22.83	2.41	23.24	2.29	–1.21	.13 (1.61)	–0.67	.07 (1.29)
2. BMI	–	20.44	2.50	20.42	1.78	20.50	1.85	–0.14	.01 (1.04)	0.02	.00 (1.00)
3. Work addiction scale	.84	27.80	2.77	26.75	2.77	15.16	4.23	10.37**	.74 (54.11)	0.49	.05 (1.20)
4. Normal work hours per week	–	33.20	19.47	39.67	4.62	37.38	12.23	–0.27	.03 (1.12)	–1.01	.11 (1.49)
5. Total work hours per week	–	50.60	11.15	47.50	14.40	41.86	9.89	2.33*	.24 (2.45)	0.55	.06 (1.24)
6. Extra hours	–	17.40	13.54	7.83	13.87	4.61	12.64	2.14*	.23 (2.36)	1.40	.15 (1.73)
7. Extraversion IPIP	.77	16.20	1.64	13.33	4.38	12.97	4.11	1.52	.16 (1.80)	1.33	.14 (1.67)
8. Agreeableness IPIP	.75	17.60	2.07	15.92	4.42	16.62	2.63	0.16	.02 (1.08)	1.09	.12 (1.55)
9. Conscientiousness IPIP	.76	14.00	3.39	12.50	3.45	14.65	3.68	–1.32	.14 (1.67)	0.77	.08 (1.34)
10. Neuroticism IPIP	.71	15.60	0.89	14.17	3.46	13.09	3.57	1.77	.19 (2.02)	0.77	.08 (1.34)
11. Openness Intellectual IPIP	.72	15.20	3.70	15.25	3.19	14.82	3.63	0.39	.04 (1.16)	–0.03	.00 (1.00)
12. Competitiveness	.82	18.80	1.79	15.25	4.47	15.89	3.82	1.02	.11 (1.49)	1.74	.18 (1.94)
13. UWES W Vigor	.85	9.40	5.46	11.75	4.22	9.53	4.40	0.81	.09 (1.39)	–1.00	.11 (1.49)
14. UWES W Dedication	.82	7.80	4.97	12.17	5.20	9.51	4.79	0.33	.04 (1.16)	–1.69	.18 (1.94)
15. UWES W Absorption	.78	10.40	6.54	12.25	5.24	9.08	4.75	1.57	.17 (1.87)	–0.71	.08 (1.34)
16. MBI Exhaustion	.89	21.40	9.99	17.83	7.28	17.73	7.61	0.84	.09 (1.39)	0.87	.09 (1.39)
17. MBI Cynicism	.71	17.40	5.68	16.75	6.14	15.37	6.15	0.96	.10 (1.44)	0.20	.02 (1.08)
18. MBI Efficacy	.83	31.50	3.32	32.75	4.94	28.93	6.57	1.63	.17 (1.87)	–0.34	.04 (1.16)

(Table 2 continues)

**Table 2**

(Table 2 continued)

Variable	$\alpha$	Work addiction and eating disorder (n = 5)		Work addiction without eating disorder (n = 12)		No work addiction and no eating disorder (n = 74)		Contrast 1 1 and 2 vs. 3		Contrast 2 1 vs. 2	
		M	SD	M	SD	M	SD	t-test	$r_{\text{contrast}}$ (OR)	t-test	$r_{\text{contrast}}$ (OR)
19. Stress PSS 4	.75	12.60	2.07	12.67	3.20	10.11	3.27	2.70**	.28 (2.88)	-0.04	.00 (1.00)
20. Stress PSS 10	.88	34.00	4.53	34.42	6.68	27.96	7.44	2.97**	.30 (3.13)	-0.11	.01 (1.04)
21. ADHD Screening Part A	-	2.00	1.00	2.00	1.76	1.45	1.14	1.56	.16 (1.80)	0.00	.00 (1.00)
22. ADHD Screening (Part A and B)	-	8.20	1.92	6.17	3.69	4.39	2.88	3.25**	.33 (3.55)	1.29	.14 (1.67)
23. ADHD Screening Full scale	.82	54.60	6.11	48.50	9.98	44.45	7.61	3.10**	.31 (3.26)	1.45	.15 (1.73)
24. Sleep per day (minutes)	-	322.00	79.50	368.33	57.66	431.30	60.04	-4.87**	.46 (6.55)	-1.43	.15 (1.73)
25. Sleep need (minutes)	-	456.00	65.04	509.00	78.30	500.12	66.31	-0.89	.09 (1.39)	-1.45	.15 (1.73)
26. Sleep deficits (minutes)	-	134.00	66.56	<b>134.45</b>	120.18	69.51	79.67	2.59*	.27 (2.77)	-0.01	.00 (1.00)

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

**Table 3**

*Numbers and percentages for categories of variables,  $\chi^2$  values, and  $\phi$  coefficients alongside odds ratios (OR) for comparisons between study groups. Groups were matched on: sex (women), age (20-27 years), managerial position (no managerial position), marital status (not married, divorced, separated or widowed; single or in relationship), children status (no children), BMI (normal or below)*

Variable	Categories	Work addiction and eating disorder		Work addiction without eating disorder		No work addiction and no eating disorder		$\chi^2$ 1 and 2 vs. 3		$\chi^2$ 1 vs. 2	
		Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	Number (%)	$\chi^2$	$r_\phi$ (OR)	$\chi^2$	$r_\phi$ (OR)
1. ADHD	No	5 (100%)	10 (83.3%)	72 (97.3%)	2.70	.17 (1.89)	0.94	.24 (2.41)			
	Yes	0 (0%)	2 (16.7%)	2 (2.7%)							
2. Depression	No	4 (80.0%)	10 (83.3%)	72 (97.3%)	5.95*	.26 (2.63)	0.03	.04 (1.16)			
	Yes	1 (20.0%)	2 (16.7%)	2 (2.7%)							
3. Neurosis/Anxiety	No	5 (100%)	12 (100%)	74 (100%)	-	-	-	-			
	Yes	0 (0%)	0 (0%)	0 (0%)							
4. Migraine	No	4 (80.0%)	10 (83.3%)	68 (91.9%)	1.41	.13 (1.59)	0.03	.04 (1.16)			
	Yes	1 (20.0%)	2 (16.7%)	6 (8.1%)							
5. Thyroid drugs	No	4 (80.0%)	12 (100%)	71 (95.9%)	0.11	.04 (1.14)	2.55	.39 (4.55)			
	Yes	1 (20.0%)	0 (0%)	3 (4.1%)							
6. Alcohol	No	1 (20.0%)	1 (8.3%)	4 (5.4%)	0.91	.10 (1.45)	0.46	.17 (1.82)			
	Yes	4 (80.0%)	11 (91.7%)	70 (94.6%)							
7. Smoking every day	No	2 (40.0%)	6 (50.0%)	50 (67.6%)	2.52	.17 (1.84)	0.14	.09 (1.39)			
	Yes	3 (60.0%)	6 (50.0%)	24 (32.4%)							
8. Sleepwalking or experienced night terrors	No	1 (20.0%)	7 (58.3%)	55 (74.3%)	4.82*	.23 (2.38)	2.08	.35 (3.85)			
	Yes	4 (80.0%)	5 (41.7%)	19 (25.7%)							

*(Table 3 continues)*

**Table 3**

(Table 3 continued)

Variable	Categories	Work addiction and eating disorder		Work addiction without eating disorder		No work addiction and no eating disorder		1 and 2 vs. 3		1 vs. 2	
		Number (%)	Number (%)	Number (%)	Number (%)	$\chi^2$	$r_g$ (OR)	$\chi^2$	$r_g$ (OR)	$\chi^2$	$r_g$ (OR)
9. Morning or evening active	Pronounced morning active	1 (20.0%)	0 (0%)	18 (24.3%)	0 (0%)	3.13	.19 (1.98)	4.89	.54 <sup>a</sup> (10.01)		
	To some extent morning active	0 (0%)	4 (33.3%)	17 (23.0%)	4 (33.3%)						
	To some extent evening active	3 (60.0%)	4 (33.3%)	21 (28.4%)	4 (33.3%)						
	Pronounced evening active	1 (20.0%)	4 (33.3%)	18 (24.3%)	4 (33.3%)						
10. Morningness	Morningness	1 (20.0%)	4 (33.3%)	35 (47.3%)	4 (33.3%)	1.76	-.14 (1.67)	0.30	-.13 (1.64)		
	Eveningness	4 (80.0%)	8 (66.7%)	39 (52.7%)	8 (66.7%)						

Note. \*  $p < .05$ , \*\*  $p < .01$ , <sup>a</sup> – Cramér's  $\phi$

**Table 4**

Mean ranks, z values for Mann-Whitney U test, and d values alongside r and odds ratios (OR) for comparisons between study groups. Groups were matched on: sex (women), age (20-27 years), managerial position (no managerial position), marital status (not married, divorced, separated or widowed; single or in relationship), children status (no children), BMI (normal or below)

Variable	Work addiction and eating disorder		Work addiction without eating disorder		No work addiction and no eating disorder		U Mann-Whitney	
	Mean rank	1 and 2 vs. 3	Mean rank	1 vs. 2	Mean rank	1 and 2 vs. 3	$\chi^2$ 1 and 2 vs. 3	OR 1 vs. 2
1. Do you have difficulties falling asleep or staying asleep?	49.91	1 and 2 vs. 3	45.10	1 vs. 2	45.10	1 and 2 vs. 3	0.14 (.07)	1.29
2. Do you snore?	12.00	1 and 2 vs. 3	7.75	1 vs. 2	46.70	1 and 2 vs. 3	0.83 (.38)	4.51
3. Do you have breathing pauses or do you stop breathing during sleep?	42.94	1 and 2 vs. 3	8.92	1 vs. 2	45.34	1 and 2 vs. 3	0.11 (.06)	1.22
4. Do you have restless or "crawling" feelings in your legs at night that go away if you move your legs?	8.00	1 and 2 vs. 3	9.42	1 vs. 2	42.47	1 and 2 vs. 3	0.05 (.03)	1.10
5. Do you experience nightmares?	61.38	1 and 2 vs. 3	8.00	1 vs. 2	44.70	1 and 2 vs. 3	0.10 (.05)	1.21
	11.40	1 vs. 2	8.00	1 vs. 2	42.47	1 vs. 2	0.26 (.13)	1.60
	10.50	1 vs. 2	8.38	1 vs. 2	44.70	1 vs. 2	0.58 (.28)	2.87
	10.50	1 vs. 2	8.38	1 vs. 2	44.70	1 vs. 2	0.65 (.31)	3.22
	10.50	1 vs. 2	8.38	1 vs. 2	44.70	1 vs. 2	0.21 (.10)	1.46
	10.50	1 vs. 2	8.38	1 vs. 2	44.70	1 vs. 2	0.39 (.19)	2.03

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

## DISCUSSION

The aim of this study was to investigate the relationship between WA and EDs in a relatively large and varied sample of the working population, and factors related to their potential comorbidity. Six females (0.8%) and none of the males reported having eating disorders, which is, to a large extent, congruent with the expected prevalence in the general population (Hudson et al., 2007). Five out of these six (83%) females reached the cut-off score for WA (H1 and H2 substantiated). Among all work addicted women, 5.5% reported EDs, which is a considerably higher prevalence than in the general population of women. All women with EDs were in their twenties (mostly early twenties), not married, having no children, working in non-managerial positions, with BMI in the normal range or below.

Generally, the results showed that groups of WA co-occurring with ED, and WA alone were associated with indicators of worse psychosocial functioning in comparison to the non-WA group. Furthermore, the results are congruent with the assumption that comorbid EDs/WA are related to higher severity in comparison to the WA only group and to the group without EDs and WA. However, due to the very small sample size and limited statistical power, the related effects did not reach statistical significance. It has high importance for therapy and prevention, as studies show that more comorbidities among disorders are related to worse outcomes (Valderas et al., 2009; Vall & Wade, 2015). It is important to note that based on the results of this study, very little or nothing can be said about EDs without WA since there was only one such case in this dataset. The interpretation of the results needs to be cautious and take into account that there were only five women with comorbid WA/EDs. This makes it necessary both to avoid excessive generalizations based on the results but also to take a closer look at potential areas for further investigation, which may be overlooked due to the very low statistical power of the analyses. For this reason, estimates of effect sizes were provided, which may indicate potential important effects that are statistically non-significant in this study but which may represent real, and both theoretically and practically important, effects.

### WORK-RELATED VARIABLES

EDs/WA and WA alone groups worked significantly more extra hours in comparison to the non-WA group, and the results suggested that EDs/WA worked more extra hours than the WA alone group. This is consistent with the assumption that comorbid EDs/WA among females may be an indicator of the severity of the disorders, which in relation to

WA is expressed as higher workload. Furthermore, EDs/WA and WA alone groups tended to score higher on the absorption component of work engagement, which is consistent with previous studies on WA-related behaviors (Atroszko & Atroszko, 2019; Di Stefano & Gaudiino, 2019). At the same time, the WA alone group tended to score higher on the dedication component than the EDs/WA group (H3 partially substantiated). Dedication is related to a person's sense of meaning, passion, inspiration, self-importance, and challenge related to work. Therefore, this result may suggest that higher severity of symptoms among the EDs/WA group may be reflected in a loss of meaning of work, which in turn may suggest higher depression and hopelessness. However, the results did not indicate any differences in terms of burnout between the groups. EDs/WA and WA only groups had only slightly higher scores on the loss of efficacy in comparison to the non-WA group (H3 partially substantiated). This is somewhat unexpected because previous studies showed the relationship between WA and burnout and depression (Griffiths et al., 2018). Perhaps the sample was too small to yield statistically significant results for the relationship between WA and burnout.

### PERSONALITY TRAITS

While none of the comparisons yielded statistically significant results concerning personality, there is some indication that neuroticism tended to be higher among the ED/WA and WA-alone groups in comparison to non-WA individuals. It is congruent with previous studies showing that negative affectivity/neuroticism is consistently linked to EDs and WA (Cassin & von Ranson, 2005; Clarke et al., 2016; Griffiths et al., 2018; Lilienfeld et al., 2006). Furthermore, the WA/EA group had higher scores (close to statistical significance) in comparison to the WA only group on competitiveness, which suggests that high competitiveness may underlie EDs among WA women (H4 partially substantiated). This is highly congruent with previous studies showing competitiveness and hyper-competitiveness as a risk factor underlying EDs and WA/SA (Atroszko & Atroszko, 2019; Burckle et al., 1999; Striegel-Moore et al., 1990). It is also congruent with studies showing that narcissism is related to EDs and WA (Andreasen et al., 2012; Atroszko et al., 2019; Cassin & von Ranson, 2005; Clark et al., 2010, 2016; Lawson et al., 2008; Waller et al., 2007, 2008). These findings are of vital importance since both neuroticism and competitiveness are personality traits conducive to worse health, including higher CVD risk (Casiero & Frishman, 2006; Lahey, 2009; Lohse et al., 2017).

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and work  
addiction*

## HEALTH AND HEALTH-RELATED BEHAVIORS

EDs/WA and WA alone groups showed higher levels of perceived stress than the non-WA group, with an odds ratio (*OR*) of 3.13. EDs/WA and WA alone groups scored significantly higher on the ADHD scale than the non-WA group, and the results suggest that the EDs/WA group scored higher than the WA alone group. However, the results using cut-off scores for WA and ADHD yielded somewhat different results suggesting more cases of ADHD among the WA only group. This discrepancy may stem from methodological issues related to using dichotomic cut-off scores applied to continuous data and differences in clinical validity of the full ADHD scale (Kessler et al., 2005). Nevertheless, the results are congruent with studies linking both EDs and WA with ADHD (H5 partially substantiated; Andreassen et al., 2016; Atroszko et al., 2017; Biederman et al., 2007; Bleck et al., 2015; Marmet et al., 2019).

Furthermore, EDs/WA and WA alone groups reported higher rates of diagnosed depression than the non-WA group, with an estimated *OR* of 2.61. None of the participants in these groups reported being previously diagnosed with an anxiety disorder. EDs/WA and WA alone groups reported higher rates of migraines than the non-WA group, with an estimated *OR* of 2.42. EDs/WA and WA alone groups did not differ significantly statistically from the non-WA group in terms of reported thyroid drug treatment; however, EDs/WA tended to report higher rates of thyroid drug treatment than the WA alone group. This result is congruent with findings that EDs are closely associated with endocrinological AD (Raevuori et al., 2014; Wotton et al., 2016), and that stress-related disorders are significantly associated with risk of subsequent autoimmune disease (AD) (Song et al., 2018). Work addiction is related to higher stress in and outside work, and burnout (Griffiths et al., 2018). These results are, to a large extent, consistent with the assumption that EDs/WA comorbidity is related to higher severity and potentially higher comorbidity also with other mental disorders and diseases.

EDs/WA and WA alone groups did not differ from the non-WA group in terms of reported alcohol consumption; however, EDs/WA tended to report lower rates of alcohol consumption than the WA alone group. Note that this may be related to higher rates of depression and thyroid medication intake in the EDs/WA group. EDs/WA and WA alone groups tended to report higher rates of ever smoking tobacco every day than the WA alone group, with an estimated *OR* of 1.84, which is congruent with findings of higher smoking among BN (Anzengruber et al., 2006). Substance use and abuse may present complex patterns both in the case of EDs and WA due to heterogeneity of EDs and WA types, reflecting differences on impulsivity and patterns of comorbidities

(Cassin & von Ranson, 2005; Di Nicola et al., 2010; Marmet et al., 2019). Different types of WA showing different clinical manifestations were previously suggested but never systematically investigated (Fassel, 1990; Robinson, 2000). Differentiating these types may have profound significance for prevention and treatment.

## SLEEP

A staggering 80% of the EDs/WA group reported experiencing sleepwalking or night terrors. EDs/WA and WA alone groups reported fewer minutes of sleep per day, and more sleep deficits than non-WA. EDs/WA and WA alone groups had higher rates of walking in sleep or night terrors than the non-WA group, with an *OR* of 2.38, and EDs/WA had higher rates in this respect in comparison to the WA alone group, with an *OR* of 3.84. Moreover, EDs/WA and WA alone groups had higher rates of restless leg syndrome symptoms than the non-WA group, with an *OR* of 2.87, and EDs/WA tended to show higher rates (not statistically significant) in this respect in comparison to the WA alone group, with an *OR* of 3.22. EDs/WA and WA alone groups tended to show higher rates (not statistically significant) of difficulties falling asleep or staying asleep. It is highly consistent with previous studies on commonly occurring sleep disturbance in EDs and WA (Griffiths et al., 2018; Kim et al., 2010). Furthermore, EDs/WA and WA alone groups reported a higher tendency for eveningness than the non-WA group, with an *OR* of 1.66. It is congruent with previous findings showing an association of EDs with circadian rhythms and higher proclivity for eveningness (Natale et al., 2008; Schmidt & Randler, 2010), which was also found in a study on WA (Andreassen et al., 2017). While explaining causal relationships between circadian rhythms and health is tricky due to the complexity of the phenomena, there is a strong indication that EDs are related to eveningness and frequent sleep problems, and more data seem to support such patterns in WA. The existing evidence suggests an interesting relationship between disturbed eating behaviors related to WA and sleep, which merits further attention and systematic study (Guirguis, 1986; Howell & Schenck, 2009; Schenck et al., 1991).

## STRENGTHS AND LIMITATIONS

In terms of limitations, it should be noted that the present study was based on a convenience sample, predominantly female, and due to its sample size and known prevalence rates of EDs, it was only possible to detect the EDs among women, not men. Therefore, the results cannot be generalized to other popula-

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tions without some reservations. Moreover, due to these shortcomings, the provided statistical analyses are, to a large degree, underpowered and severely limited (their interpretation should be very cautious). All data were based on self-report, and the usual weaknesses of such data (such as social desirability bias, recall biases, common method bias, etc.) should be noted. The design was cross-sectional; therefore, it is impossible to draw causal inferences. Since WA is not an officially recognized disorder, and there is no gold standard diagnostic method, the cut-off score on BWAS was used as an indication of potential WA. WA is probably more associated with AN rather than BN, but in this study, these two diagnoses were not distinguished.

Regarding the strengths of the present study, it is the first study (as far as the authors are aware) to investigate the relationship of WA with EDs. It was conducted in a relatively large Polish sample of employees from a wide range of professions. A comprehensive set of variables comprising possible antecedents of WA and EDs was included. The results show a multitude of potential unexplored areas of research of vital importance for the treatment and prevention of both EDs and WA. This seems to have a high public health priority since EDs and overworking are related to high suicide risk and mortality due to health complications, particularly CVD (Arcelus et al., 2011; Atroszko, 2019a, c; Atroszko et al., 2020; Casiero & Frishman, 2006; Hiyama & Yoshihara, 2008). Consequently, this study significantly adds to the existing literature, specifically on EDs, WA, and more generally on behavioral addictions.

## PREVENTION AND TREATMENT

Finally, what EDs and WA share, and it is probably a crucial similarity, is that in reference to both problematic behaviors there are severe limitations in I) recognizing the disorder (Atroszko et al., 2020; Couturier & Lock, 2006; Goldstein et al., 2009; Holton, 2016; Pickard, 2016, 2018; Stoddard Dare & Derigne, 2010; Vandereycken & Van Humbeeck, 2008), and II) receiving disorder-specific treatment (Le et al., 2017; Le et al., 2018; Weissman & Rosselli, 2017), or treatment at all. Furthermore, specific prevention programs need to be developed (Atroszko et al., 2020; Austin, 2016). Both ED and WA affected individuals often have a low problem-solving orientation or poor problem-solving skills (Aldao et al., 2010; Atroszko, 2015), for which cognitive-behavioral therapies can be recommended (Aldao et al., 2010; Andreassen, 2014). Motivational interviewing has high efficacy in addiction treatment and can be applied to WA (Andreassen, 2014). Few specific interventions are recommended for EDs (Le et al., 2017); however, specialized treatments for AN may not provide benefits

over comparator interventions (Murray et al., 2019). Nevertheless, it seems that the crucial challenge currently is to address the high rates of underdiagnosis of both EDs and WA due to low awareness of these disorders and sociocultural factors which may support them (Atroszko et al., 2020; Le et al., 2017), and investigate their comorbidity to understand common etiological factors and clinical features. Furthermore, mindfulness-based interventions have well-documented effectiveness in a wide range of mental disorders (Goyal et al., 2014), including EDs (Vanzhula & Levinson, 2020), and some evidence in WA (Aziz et al., 2020; Van Gordon et al., 2017; Van Gordon et al., 2014). These interventions may be used at a population level for the prevention of ED and WA (see Atroszko et al., 2020, on the need for population-based prevention). Mindfulness training can be effectively used in schools from early education (Dunning et al., 2019), as well as in the workplace (Bartlett et al., 2019).

## CONCLUSIONS AND FUTURE RESEARCH DIRECTIONS

The results show considerable comorbidity of WA and EDs, and suggest that the majority of young, professionally active women with diagnosed EDs may be at high risk of WA. WA co-occurring with ED and WA alone in comparison to non-addicted individuals were associated with indicators of worse psychosocial functioning, including higher depression and ADHD risk, higher stress, and sleep disturbance. The co-occurring WA and EDs showed patterns of relationships (with pronounced effect sizes but mostly not reaching statistical significance due to small sample size and low statistical power) with health behaviors, most notably with marked sleep disturbance, suggesting that this comorbidity might be related to higher severity and worse outcomes than WA alone. The sample comprised very young women (in their early twenties), and sleep problems may be among the first indicators of current impaired self-regulation and predictors of developing subsequent health problems.

Functioning of individuals with EDs in the workplace is a vastly understudied issue which merits more attention owing to I) high suicide risk and mortality due to health complications, particularly CVD, associated with EDs and overworking, II) significant prevalence of subclinical EDs in female populations (especially among youth), and its noteworthy relationship with mood and anxiety disorders, III) high prevalence of WA, and iv) potential high co-occurrence of ED/WA. Both problematic behaviors are related to denial, which suggests that these may be much more prevalent problems than current estimates indicate. Eating

patterns and dietary factors are almost completely neglected in relation to WA, despite strong empirical and theoretical premises suggesting significant potential interplay between compulsive overworking, unhealthy food habits, and health (Atroszko, 2019c). Future studies should look into the relationship of WA with EDs in very large representative samples.

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## SAMPLE

Participants' mean age was 36.37 years ( $SD = 11.33$ ), ranging from 20 to 79 years. In terms of professional position, 43 (5.9%) participants were top-level managers, 56 (7.7%) mid-level managers, 113 (15.6%) had other managerial tasks, and 448 (62.0%) participants held non-managerial positions (63 participants did not report their managerial status). Concerning educational level, three participants (0.4%) had up to ten years of education (which corresponds to primary education), 126 (17.4%) had between 10 and 15 years of education (which roughly corresponds to secondary education), 473 (65.4%) had between 16 and 20 years of education (which more or less corresponds to Bachelor's or Master's degree), 94 (13.0%) had between 20 and 25 years of education, and 17 (2.3%) participants had 26 or more years of education, respectively. In terms of relationship status, 149 (20.6%) were single (including divorced, separated, and widows/widowers), and 570 (78.8%) were either married or in a relationship.

## INSTRUMENTS

*Demographics.* Questions were asked concerning age, sex (0 – woman, 1 – man), relationship status (single, married, partner/boyfriend/girlfriend, divorced, separated, widow/widower), number of children, years of completed education, professional position (1 – top-level manager, 2 – mid-level manager, 3 – other manager functions, 4 – no managerial duties), normal work hours per week and total work time per week (open-ended questions). The difference between normal and total work time was an indicator of extra hours of work per week. Since the reported years of completed education had several outliers (i.e., very high values) influencing skewness of the data distribution, a truncation procedure setting 26 years as the highest limit was used. This roughly corresponded to obtaining a Ph.D. and/or an additional Master's degree.

*Bergen Work Addiction Scale (BWAS).* The BWAS was used to assess work addiction (Andreassen et al., 2012), and includes seven items corresponding to the seven core addiction components – salience, mood modification, tolerance, withdrawal, conflict, relapse and problems (Brown, 1993; Griffiths, 2005). The questions concerned symptoms experienced in the past 12 months. Responses are provided on a scale ranging from 1 (*never*) to 5 (*always*). The prevalence of work addiction, in accordance with the cut-off based on a polythetic approach (i.e., scoring 4 [*often*]

or 5 [*always*] on at least four of the seven items) was 17.4%. The polythetic approach used in the present study is in line with modern psychiatric nosology (APA, 2013).

*Adult ADHD Self-Report Scale (ASRS-Version 1.1).* All items are answered on a 5-point scale ranging from 1 (*never*) to 5 (*very often*), yielding an overall score from 18 to 90. High scores indicate high levels of ADHD symptoms. Scoring 3 (*sometimes*) or more on item 1-3, and 4 (*often*) or more on item 4-6 in part A, indicates clinical levels of ADHD.

*Mini-International Personality Item Pool (Mini-IPIP).* It comprises 20 items, four reflecting each of the following dimensions: *extraversion* (e.g., being outgoing, talkative), *agreeableness* (e.g., being sympathetic and warm), *conscientiousness* (e.g., being organized and structured), *neuroticism* (e.g., being nervous and moody), and *intellect/imagination* (e.g., being creative and intellectual), the latter being equal to the *openness* dimension. Each item is answered on a five-point scale ranging from 1 (*very inaccurate*) to 5 (*very accurate*). The scale showed good validity in the present sample (Atroszko et al., 2017; Czerwiński et al., 2019; Czerwiński & Atroszko, 2020).

*Competitiveness Scale.* It measures motivation to compete with others with five items, for example, "I feel it is important to win both when it comes to work and games" or "It irritates me when other persons perform better than me." Each item is answered on a five-point scale ranging from 1 (*strongly agree*) to 5 (*strongly disagree*). The sum was reverse-scored so that a higher score would indicate higher competitiveness. The single factor structure of the scale showed slightly inadequate fit to the data,  $\chi^2/df = 12.16$ , CFI = .95, TLI = .91, RMSEA = .124 (90% CI = .098-.153). Standardized factor loadings on items were: .59, .78, .78, .62, .69. On the basis of modification indices, error terms of item 1 and item 4 were correlated. The modified single factor structure of the scale showed adequate fit to the data,  $\chi^2/df = 5.94$ , CFI = .98, TLI = .96, RMSEA = .083 (90% CI = .053-.116). Standardized factor loadings on items were: .62, .77, .76, .66, .69.

*Perceived Stress Scale.* It consists of ten items with a 5-point Likert response format scale, ranging from 1 (*never*) to 5 (*very often*). The 4-item version of the scale (PSS-4) has shown good validity and reliability in previous research (Atroszko, 2015). In order to provide better comparability of the results, both 10-item and 4-item version results were presented in this paper.

*Sleep.* Several questions concerning sleep-related problems were asked, including walking in sleep or night terrors ("Have you [now or previously] been

walking in your sleep or experienced night terrors?" [yes/no]), difficulties falling asleep or staying asleep ("Do you have difficulties falling asleep or staying asleep?"), snoring ("Do you snore?"), sleep apnea ("Do you have breathing pauses or do you stop breathing during sleep?"), restless legs syndrome ("Do you have restless or 'crawling' feelings in your legs at night that go away if you move your legs?"), nightmares ("Do you experience nightmares?"). The latter five questions were responded to on a 4-point scale: 1 (*never*), 2 (*sometimes*), 3 (*frequently*), 4 (*always*). Furthermore, questions concerning sleep duration were asked: "On average, how much sleep do you get per day? (open-ended format in minutes)", and "On average, how much sleep do you need in order to feel adequately rested? (open-ended format in minutes)." The difference between the needed and the obtained amount of sleep was treated as an indicator of sleep deficits. A question concerning eveningness/morningness was asked: "Please indicate to what extent you are a morning or evening active individual with responses: pronounced morning active (i.e., morning alert and evening tired) (1), to some extent morning active (2), to some extent evening active (3), pronounced evening active (i.e., morning tired and evening active) (4)." Responses 1 and 2 were also recoded into one category (morningness) and responses 3 and 4 into the second category (eveningness).

*Maslach Burnout Inventory – General Survey* (MBI-GS). Responses to items are given on a frequency scale varying from 0 (*never*) to 6 (*every day*). Exhaustion is measured with five items, including "I feel burned out from my work," and "I feel tired when I get up in the morning and have to face another day on the job." Cynicism is also measured with five items. Example items are: "I have become less enthusiastic about my work," and "I have become more cynical about whether my work contributes anything." Finally, professional efficacy is measured with six items, including "I feel I am making an effective contribution to what this organization does," and "In my opinion, I am good at my job."

*Utrecht Work Engagement Scale* (UWES-9). The dimension of vigor refers to high levels of energy and mental resilience while working, the willingness to invest effort in one's work, and persistence even in the face of difficulties. Dedication is characterized by the experience of a sense of significance, enthusiasm, inspiration, and pride in connection with one's work. Absorption means being fully concentrated on one's work, whereby time passes quickly, and one has difficulties in detaching oneself from work. Responses to items are given on a frequency scale varying from 0 (*never*) to 6 (*every day*). The items' wording was based on the Polish version by Szabowska-Walaszczyk et al. (2011).

## STATISTICAL TESTS – GENERAL REMARKS

EDs are fairly rare conditions with prevalence rates in the general population not exceeding 1%. For this reason in any sample based on a general population, the number of individuals with a diagnosed ED will be relatively small. It will have a profound effect on the statistical analyses because they will be considered underpowered and often on the verge of any meaningful inferences. It should be kept in mind when interpreting the results of the present study as the total number of participants with ED is  $n = 6$ , and the size of the group with both ED and WA is  $n = 5$ . It is consistent with population estimates of ED prevalence; nevertheless, it poses significant limitations on the possible statistical analyses and their meaning. For example, in many cases of chi-square tests, the expected values were less than 5. For these reasons, the present study needs to be considered as a preliminary but useful source of information. In order to compensate for the very low statistical power of most of the analysis, we provide different effect sizes, which may be easier to interpret, may constitute some indication of the potential meaning of the presented results, and therefore they may be useful in delineating directions of future research. Limitations on interpreting effect sizes from small sample research need to also be kept in mind.

*Effect sizes.* Different effect sizes were provided for particular statistical tests, including  $r$ ,  $\phi$ ,  $r$  for contrasts, and the odds ratio (*OR*). Due to the very small sample size only notably large effects could yield statistically significant results. In order to account for that, effect sizes were transformed according to formulas provided by Rosnow, Rosenthal, and Rubin (2000). In all cases, the  $r$  family effect size and *OR* were presented adjacently. They may be easier to interpret, may constitute some indication of the potential meaning of the presented results, and therefore they may be useful in delineating directions for future research. Limitations on interpreting effect sizes from small sample research also need to be kept in mind. Similarly, potential limitations on interpreting transformed effect sizes (for example,  $r$  into *OR*) need to be taken into account.

**Table S1**

*Structure of participants' professions divided into ten major groups of occupations distinguished by the International Standard Classification of Occupations (ISCO-08)*

Ten major groups of occupations	<i>n</i> (%)
Managers	35 (4.96)
Professional	534 (75.64)
Technicians and associate professionals	45 (6.37)
Clerical support workers	32 (4.53)
Service and sales workers	32 (4.53)
Skilled agricultural, forestry and fishery workers	1 (0.14)
Craft and related trades workers	3 (0.42)
Plant and machine operators, and assemblers	3 (0.42)
Elementary occupations	10 (1.42)
Armed forces occupations	11 (1.56)

*Eating disorders  
and work  
addiction*