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Fit to Be Good: Physical Fitness Is Negatively Associated With Deviance

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While modern organizations generate economic value, they also produce negative externalities in terms of human physical fitness, such that workers globally are becoming physically unfit. In the current research, we focus on a significant but overlooked indirect cost that lack of physical fitness entails—deviance. In contrast to early (and methodologically limited) research in criminology, which suggests that physically fit people are more likely to behave in a deviant manner, we draw on self-control theory to suggest the opposite: That physically fit people are less likely to engage in deviance. In Study 1, we assembled a dataset on 50 metropolitan areas in the U.S. spanning a 9-year period, and found that physical fitness index of a metropolitan area is negatively related to deviance in that area in a concurrent as well as time-lagged fashion. We complemented this aggregate-level theory test with two studies testing the theory at the individual level. In Study 2, we collected multi-source data from 3,925 military recruits who underwent physical training and found that those who score higher on physical fitness test are less likely to engage in deviance. Study 3 conceptually replicated the effect with both concurrent and time-lagged models using a five-wave longitudinal design in a sample of employees working in service roles, and also found that ego depletion mediates the effect of physical activity on workplace deviance. We speculate on economic implications of the observed relationship between physical fitness and deviance and discuss its relevance for organizations and public policy.

Keywords: physical fitness, physical activity, deviance, ego depletion, self-control

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Modern organizations create economic value by generating negative externalities in terms of human physical fitness, for instance, by directly or indirectly causing exhaustion and strain (de Jonge & Dormann, 2006; LePine et al., 2004), sleep deprivation (Barnes, 2012; Pilcher & Huffcutt, 1996), presenteeism (Johns, 2010), and poor nutrition (Wanjek, 2005). Organizations seem to be comfortable with the current cost–benefit implications of physical fitness issues, as indicated by the fact that such issues continue to be on the rise and are not actively managed in most organizations (e.g., Arvey et al., 1992; Gunderson et al., 1972; Hogan, 1991). On a global scale, the workforce is becoming more obese (World Health Organization, 2018; Wyatt et al., 2006), exhausted (Hassard, 2017; Kanai, 2006; Virtanen et al., 2012), and vulnerable to diseases (Clark et al., 2020; World Bank, 2020). These physical issues can be conceptualized as (low) physical fitness, which represents our overarching construct of interest and is defined as a set of attributes underlying the ability to perform physical activities, including cardio-respiratory fitness, muscle strength, body composition, and flexibility (Caspersen et al., 1985; Ortega et al., 2008).

In the current research, we aim to inform and extend the cost–benefit analysis of the relationship between economic production and physical fitness by uncovering a significant but overlooked cost associated with low physical fitness—deviance. Deviance refers to voluntary behavior that violates organizational and societal norms and threatens the well-being of the organization and the broader community (Robinson & Bennett, 1995). Research shows that deviance is prevalent and introduces systemic efficiency losses to organizations (Bennett & Robinson, 2000; Duffy et al., 2002; Lim et al., 2008; Porath & Erez, 2007). For example, costs associated with just one type of deviant behavior occurring in organizations—employee theft—are estimated to be as much as $40 billion yearly, which is nearly ten times the cost of all street crime combined, including burglaries and robberies (Federal Bureau of Investigation [FBI], 2018). These costs translate into as much as 70% of all business losses and cause estimated 30% of all business failures (Bullard & Resnik, 1983; Miner & Capps, 1996; Taylor, 1986).

Building on self-control theory (Baumeister et al., 1998; Inzlicht & Schmeichel, 2012; Muraven et al., 1998), we propose that physical fitness is negatively associated with deviance, and that this relationship is driven by ego depletion, or impaired self-control capacity (Baumeister & Vohs, 2007). Self-control capacity refers to cognitive resources that a person has available to override a desire or an impulse (Kotabe & Hofmann, 2015; Lian et al., 2017). For example, people require self-control capacity to override the

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impulse to engage in a deviant act in pursuit of a higher-order goal, such as the goal to align one's behavior with social expectations of ethical conduct. Self-control capacity can be enhanced over time through regular successful exertions of self-control (Baumeister et al., 1998, 2007), and physical activity represents one major domain in life in which such self-control is required and can therefore be developed (Oaten & Cheng, 2006; Zou et al., 2016). We argue that physically fit individuals are, on average, less likely to experience ego depletion, and hence more able to override their impulses to engage in deviant behaviors. We report three studies testing the relationship between physical fitness and deviance, using aggregate data from the general population across 50 metropolitan areas in the U.S., multi-source data from military recruits who underwent physical fitness training, and five-wave longitudinal multi-source data from employees working in service roles.

Our research extends past work on physical fitness in organizational sciences as well as related disciplines such as health psychology and public policy, which tended to focus on proximal individual outcomes of physical fitness, including cardiovascular health (Kodama et al., 2009), cognitive functioning (Smith et al., 2010), and job performance in physically demanding jobs (e.g., Arvey et al., 1992; Rhea et al., 2004). We extend this work by demonstrating that physical fitness issues may have important negative *social* consequences. Past research on physical fitness that examined social factors, conceptualized them exclusively as predictors of physical fitness. For example, individuals whose social belongingness needs are not fulfilled are less likely to be physically fit (Hawkley et al., 2009). In addition, individuals who receive less social support are less likely to follow up with their physical fitness goals (Cohen & Syme, 1985; Stroebe & Stroebe, 1996). Our research suggests that not only can social issues undermine physical fitness, but that lower physical fitness in turn may further fuel social issues. Therefore, our research uncovers an additional important connection between the social and the physical domains at work, which may lead to negative spirals that adversely affect employees' physical and social well-being. Our focus on social implications of physical fitness may open avenues for future organizational studies to generate a deeper understanding of how physical fitness shapes social dynamics at work, ultimately helping to cultivate workplaces that are more effective. Importantly, the core process of higher ego depletion associated with low physical fitness proposed here suggests that there might be a host of other workplace implications of low physical fitness that warrant future organizational research, including in the domains of workplace aggression (Christian & Ellis, 2011; Mawritz et al., 2017), delay of gratification and persistence (Baumeister & Alquist, 2009; Mischel, 1974, 1996), and impression management capacity at work (Vohs & Ciarocco, 2004; Vohs et al., 2005).

Second, our work resolves a long-standing theoretical puzzle in social sciences pertaining to physical fitness and norm abidance. Early work in criminology has attempted to uncover bio-physical underpinnings of deviance by specifying the physical prototype of deviant people (Glueck & Glueck, 1956; Sheldon et al., 1940). This body of work proposes that human physique can be classified into three physical types: ectomorphs (fragile and thin), mesomorphs (athletically fit), and endomorphs (overweight; see Sheldon et al., 1940). The controversial assertion from these studies is that people who are physically fit (i.e., mesomorphs) are most likely to behave in a deviant manner. However, a closer inspection of the underlying empirical research reveals designs that would be considered inadequate according to modern scientific standards, as well as mixed evidence (as elaborated below). Thus, our research consolidates and extends prior theorizing concerning physical fitness as an antecedent of deviance, and in so doing also contributes to related organizational bodies of literature, including those on employee unethical behavior (Kish-Gephart et al., 2010; Treviño et al., 2006) and workplace deviance (Duffy et al., 2002, 2006; Robinson & Bennett, 1995).

Finally, our research generates insights of practical relevance for organizations. One of the key claims of evolutionary sciences is that human physiology and psychology have been shaped by the evolutionary pressures of humans' environment of evolutionary adaptedness, that of highly physically active hunter gatherers, which can in many ways be discrepant from modern living and working conditions (Henrich, 2016; Symons, 1990). The increasingly social and knowledge-based nature of modern work is considered to be less aligned with evolved human needs for physical activity (Blair & Church, 2004; Fox & Hillsdon, 2007; Malina, 1996). By demonstrating benefits of physical fitness for organizationally relevant social dynamics and not just for individual outcomes, our research paints a more positive picture of the relevance of physical fitness for modern work. In particular, our research suggests that physical fitness (and the associated investments and social initiatives supporting it) may not only play a significant role in the success of physical work performance (Arvey et al., 1992; Rhea et al., 2004), but it also matters for increasingly relevant social and knowledge-based work of the modern economy.

Theoretical Development and Hypotheses

The idea of a "born criminal" germinated in the late 19th century when criminologist Cesare Lombroso made the controversial claim that criminals may be identified by their physical characteristics (Lombroso, 1911). Early research in criminology that followed has attempted to study the relationship between human body types and deviance empirically (Glueck & Glueck, 1956; Hartl et al., 1982; Hooten, 1969; Sheldon et al., 1940, 1949). For example, in a study of 200 delinquents from a social service agency, Sheldon et al. (1949) found that delinquents are more likely to have a mesomorphic (athletically fit) built. In a 30-year follow-up of Sheldon et al. (1949) research, Hartl et al. (1982) re-examined the same 200 men from Sheldon et al. (1949) study and reported that criminals are more likely to have a mesomorphic built. The idea that physical fit individuals are more likely to engage in deviance continues to be mentioned and thus remains somewhat influential even in contemporary discourse (Walby & Carrier, 2010).

Although the empirical research documented above suggests that physically fit individuals may be more likely to engage in deviance, past evidence remains inconclusive for several reasons. Most notably, the aforementioned studies have been criticized for suffering from critical methodological limitations, such as selection biases in sampling and lack of measurement validity (Maddan et al., 2008; Wilson & Herrnstein, 1985), raising doubts as to the conclusions drawn by past research on the topic. For example, most studies had no control group or matched sample, and no data on females, thus limiting the ability to draw strong conclusions based on the findings. Furthermore, methodologically superior replication attempts of early findings, by Glueck and Glueck (1956) and

McCandless et al. (1972), found no evidence in support of the notion that physically fit individuals are more likely to commit deviant acts. This body of work has also been largely atheoretical, leaving the rationale for the purported relationship typically undefined and untested. The primary argument appearing in this line of research is that mesomorphic individuals possess the physical ability to engage in acts of direct physical aggression (Hooten, 1969; Sheldon et al., 1940). However, it is unclear why such individuals would be motivated to engage in acts of aggression simply due to their physical built. We revisit this long-standing discussion and propose that physically fit individuals are *less* likely to engage in deviance, and that this relationship may be explained and understood from a self-control perspective.

According to the integrative self-control theory, self-control exertion is determined by control motivation and control capacity (see Kotabe & Hofmann, 2015, for a review). Whereas control motivation refers to the goal to control a desire (an impulse) and it is contingent on the strength of the desire-goal conflict, control capacity refers to nonmotivational cognitive resources that a person possesses at a particular moment and that can be deployed to control desire (Kotabe & Hofmann, 2015). In our context, we assume that the desire is to act on an impulse and engage in deviance (e.g., to benefit the self or out of frustration), while the higher-order goal is to abide by social norms and expectations (e.g., to avoid sanction or preserve a positive self-view of one's morality). We focus on control capacity, which scholars have generally conceptualized as ego depletion (e.g., Barnes et al., 2015; Lanaj et al., 2016; Yam et al., 2016), as a key mechanism linking physical fitness and ability to exert self-control (and thus ultimately refrain from engaging in deviant acts) given a strong theoretical background for the connection between the two, which we detail below. In contrast, there is less reason to believe that other factors relevant to self-control exertion (control motivation, desire or impulse strength, and higher order goal; Kotabe & Hofmann, 2015) would vary as a function of physical fitness.

As with most psychological variables, ego depletion manifests some degree of between-individual (trait-like) variation, but also varies over time (in a state-like fashion; Baumeister et al., 2006). As a trait, control capacity varies between individuals for different reasons, for example, differences in neuroanatomical make-up in interconnectivity of the prefrontal cortex, executive functioning, or relevant practice (Heatherton & Wagner, 2011; Hofmann et al., 2012). Thus, ego depletion can be thought of as a pool of self-control resources exhibiting some degrees of temporal stability, whereby some people are, on average, more likely to be ego depleted than others in general. At the state level, ego depletion exhibits significant variation over time, making it useful to conceptualize it as a state-level variable, whereby people feel more depleted on some days than other days.

Self-control exertion can temporarily impair self-control capacity (i.e., leads to ego depletion) right after the initial act of self-control. This phenomenon has been demonstrated in studies using a two-task experimental paradigm which show that exertion of self-control in one task undermines self-control in another task that immediately follows (Baumeister et al., 1998; Muraven et al., 1998). However, such momentary ego depletion is quickly restored and can be easily counteracted (Schmeichel & Vohs, 2009; Tice et al., 2007). Over time, people can increase their self-control capacity through a process of regular successful exertion of self-control and subsequent self-regulatory restoration. This process expands the pool of self-control resources as well as enhances the efficiency of self-control exertion (Baumeister et al., 1998, 2007). This potential for self-control capacity to be increased through successful acts of self-control exertion is key to our proposition linking physical fitness, ego depletion, and, ultimately, deviance.

There are several reasons why a higher frequency of successful self-control exertions enhances self-control capacity. In a review of studies on self-control improvement across various domains, including dietary monitoring, study habits, and money management, Baumeister et al. (2006) summarize these reasons as follows: "multiple theoretical perspectives would predict improvement in self-regulation as a result of practice. People ought simply to get better at almost anything they do over and over as a result of habit formation, increased knowledge and understanding, increased liking from familiarity, automatization, and other processes. Hence, improvements in self-regulation may have broad based positive consequences for self-regulatory capacity that extends even to domains of self-regulation unrelated to the practice." They further note that, for example, "keeping a diet ought to improve the person's ability to suppress unwanted thoughts, or adhering to a rigorous exercise program should result in better discipline in managing one's money" (Baumeister et al., 2006, p. 1779).

Building on the research that demonstrates broad-based self-control improvement as a function of domain-specific self-control practice, we propose that higher levels of physical fitness, which benefit from successful acts of self-control in the domain of physical activity, will be associated with higher self-control capacity (i.e., lower ego depletion). While physical fitness is partially genetically determined (see Montgomery & Safari, 2007, for a review), it is also shaped by exogenous factors and one of the key factors is physical activity (Ortega et al., 2008)—bodily movement produced by skeletal muscles that results in energy expenditure beyond that of a resting level (Pate et al., 1995). Hence, physical fitness may be conceptualized as both a trait variable that varies among individuals and as a state variable that varies over time. Research in sports sciences suggests that physical activity is highly correlated with physical fitness and is often treated as a proxy of physical fitness (e.g., Blair et al., 2001; Bouchard et al., 1994; Center for Disease Control, 1996; Pate et al., 1995). To the extent that people engage in more (less) physical activities for a sustained period, their physical fitness levels are likely to increase (decrease). Physical activity is a major domain of life in which self-control is required (Baumeister et al., 2006; see Boat & Cooper, 2019, for a review). Physical activity involves a tradeoff between short-term costs (e.g., time spent, physical discomfort) and long-term gains (e.g., physical health, self-control capacity). Overcoming the costs of physical activity and engaging in physical activity require successful acts of self-control. Thus, individuals who engage in more physical activity, on average, are more likely to build up their self-control capacity over time, such that they are better able to override desires or impulses in pursuit of higher-order goals, as compared to individuals who engage in less physical activity.

In support of this notion, past research has shown that individuals who participate in more physical activities are more likely to be successful at self-control in other domains than individuals who participate in less physical activities (Oaten & Cheng, 2006). Oaten and Cheng (2006) found that, in comparison to control participants, participants who engage in physical activities (e.g., weightlifting, resistance training) for three to four times per week show significant improvement in self-control capacity, as measured by enhanced performance on a visual tracking task following a thought-suppression exercise, at monthly intervals for a period of four months. Beyond direct benefits of physical activity for self-control development, people who engage in more physical activities are also more likely to adhere to dietary restrictions, as compared to those who engage in less physical activities (Lowe et al., 2014). Both diet and exercise are beneficial for physical fitness and important domains in which self-control exertion is required, implying a virtuous cycle of self-control development (Baumeister et al., 2006; Muraven et al., 1999).

In line with these arguments and findings directly related to self-control exertion, there is some indirect evidence supporting the idea that physical fitness is positively related to self-control capacity. Early organizational research found that physically fit individuals are higher on self-discipline, as measured by the Hogan Personality Inventory (Hogan, 1989). Neuro-scientific research also showed that physically fit (vs. less fit) individuals have higher levels of neuro-physiological adaptations in brain regions that are critical for response inhibition, a key aspect of self-control (Barella et al., 2010; Sibley et al., 2006). Considering this theoretical background and the associated empirical findings, we propose that physically fit (compared to less fit) individuals have higher self-control capacity and are hence less likely to be ego depleted.

We further propose that lower levels of ego depletion experienced among physically fit individuals are associated with lower levels of deviance. Ego depletion results in self-control impairment, making it more difficult for people to regulate their emotions, thoughts, and behaviors, and make them aligned with societal and personal standards rules and norms (Barnes et al., 2011; Inzlicht & Schmeichel, 2012; Schmeichel & Baumeister, 2004). When people experience ego depletion, they are less able to inhibit or suppress their maladaptive responses across domains of activity (Baumeister et al., 2007; DeWall et al., 2007). Consistent with this notion, past research has shown that when people experience ego depletion, they are more likely to cheat on laboratory tasks (Kouchaki & Smith, 2014), and engage in unethical behavior at work (Barnes et al., 2011). Importantly, this effect has also been documented in the context of deviance specifically (Christian & Ellis, 2011; Gino et al., 2011; Mead et al., 2009). In sum, building on self-control theory, we propose that physically fit individuals are less likely to engage in deviance and that ego depletion mediates this relationship. Formally stated:

Hypothesis 1: Physical fitness is negatively related to deviance.

Hypothesis 2: Ego depletion mediates the relationship between physical fitness and deviance.

Overview of Studies

We tested our theory in three studies. In Study 1, we tested whether physical fitness is negatively associated with deviance (Hypothesis 1) using an archival panel data of 50 metropolitan statistical areas (MSAs) in the U.S. across a 9-year period. In this context, Hypothesis 1 predicts that increases in MSA-level physical fitness index are associated with corresponding decreases in levels of deviance, operationalized as local crime rates. The physical fitness index involves aspects of the local environment, such as community resources and policies, which support physical activity. We examine whether these precursors of physical fitness are associated with lower deviance in the given year, and also conduct time-lagged analysis (controlling for past rates of deviance) to test whether physical fitness helps reduce deviance over time. Our theory suggests that sustained physical activity (facilitated by MSA physical fitness support) would build up self-control over time, which should produce positive spillover effects of physical fitness on deviance from year to year. The time-lagged approach helps enhance the internal validity of our conclusions (Orth et al., 2020).

We complemented this aggregate-level theory test (i.e., test using metropolitan-area-level data; Robinson, 1950) by conducting two studies at the individual-level, anchored in organizational settings. In Study 2, we tested Hypothesis 1 by examining whether objectively measured physical fitness of 3,925 military recruits is negatively related to peer-reported deviance. Recruits underwent physical fitness programs involving daily physical activity and so higher physical fitness scores can be assumed to be partly a result of sustained self-control exertion. Peer-reported data on deviance were collected a month later, thus yielding a time-separated or multi-wave design. However, because data on both physical fitness and deviance were each available at only one time point, we were not able to conduct time-lagged tests in this study. Study 3 addressed this limitation using a five-wave longitudinal design involving employees working in service roles. Study 3 also tested Hypothesis 2 by examining whether ego depletion mediates the effects of physical fitness on deviance. This project has an associated Open Science Framework webpage[1] containing study materials, data, and code for the analyses (with the exception of Study 2, which cannot be directly shared due to a confidentiality agreement required by the military, but any information regarding Study 2 data can be obtained from the first author).

Study 1

In Study 1, we conceptualize our phenomenon of interest across its individual versus aggregate-level (in our case, metropolitan-area-level) manifestations as an isomorphic composition model (Kozlowski & Klein, 2000). Specifically, we expect the benefits of physical fitness to accrue for individuals in a given aggregate-level unit (metropolitan area in our empirical setting), leading to an isomorphic expression of the phenomenon at the aggregate-level as a simple aggregation of underlying individual-level benefits. In other words, we do not assume interactions among individual-level processes to lead to an expression of the phenomenon at the aggregate-level that is different from the one at the individual-level (as in, e.g., the case of an interdependent team, where performance of different individual members and combined performance of the team represent substantively different constructs, with such mutations in the expression of constructs as a function of level usually referred to as "compilation" emergent processes; Kozlowski & Klein, 2000). In sum, our theory makes the same prediction at the individual as well as aggregate levels, and thus tests of the theory at both levels are meaningful.

[1] https://osf.io/qe5s2/?view_only=4744c51a43624547990be8f719139e24

Method

Measure

Physical Fitness Measure. We assembled a 9-year (2008–2016) panel dataset encompassing 50 MSA across the U.S. We obtained MSA-level American Fitness Index (AFI) data from the American College of Sports Medicine (ACSM) between 2008 and 2016, as the ACSM AFI program was launched in 2008 and the latest data on our proxy of deviance, described below, was from 2016. The AFI report measures the 50 most populous metropolitan areas in the U.S. annually and provides a physical fitness index that reflects a composite of fitness related factors, such as preventive and facilitative health behaviors and various community resources and policies that support physical activity. In 2008, potential indicators for the AFI data index were scored for relevance by a panel of 26 health and physical activity experts and through two rounds of Delphi-method scoring, 31 indicators were identified and weighted. The values for each indicator were then ranked and multiplied by the weight assigned by the expert panel (see https://americanfitnessindex.org/methodology/ for details). The AFI scores ranged from 0 to 100. The higher the AFI score of a metropolitan statistical area, the higher the physical fitness index of that area.

Deviance Measure. We collected data on the MSA-level crime rates from U.S. Federal Bureau of Investigation (FBI) between 2008 and 2016. This dataset includes law enforcement agencies responsible for over 97% of the U.S. population and it is widely used in criminology, economics, and psychology (e.g., Cantor & Land, 1985; Lu et al., 2018; Ranson, 2014). The FBI organizes offenses in three superordinate categories: violent crime (including murder and non-negligent manslaughter, forcible rape, robbery, and aggravated assault), property crime (including burglary, larceny theft, and motor vehicle theft), and total crime (including all crimes). We extracted MSA population size data from the Uniform Crime Reporting, and the MSA-level crime rates were computed as the number of crimes divided by the population of the given MSA.

Control Variables. We took steps to account for plausible alternative explanations by collecting a comprehensive list of time-varying MSA-level control variables. We extracted data on several variables between 2008 and 2016 that might be associated with both physical fitness as well as deviance levels of the local population. We note that when we reran all analyses without these controls, the significance and the direction of the coefficient of physical fitness in predicting deviance remained largely unchanged with respect to all outcomes examined.

Economic Variables. As the crime rates of a MSA may be related to its economic situation (Bursik & Grasmick, 1993), we controlled for several economic factors: (a) the median inflation-adjusted per capita income (in $1,000), (b) the proportion of population below poverty line, (c) unemployment rates (information was included for men and women separately). We extracted yearly data on these proxies from the American Community Survey conducted by the U.S. Census Bureau.

Air Pollution. Air pollution may be associated with crime (Lu et al., 2018) and air quality could plausibly impact physical fitness of the local population (e.g., by influencing the likelihood of outdoor physical activity). Thus, we extracted data on air pollution from the U.S. Environmental Protection Agency (EPA), which generates the Air Quality Index (AQI), an indicator of overall air quality. The AQI captures the local concentration of different air pollutants (such as CO, NO_2, and $PM_{2.5}$) on a given day and in the given MSA. The EPA considers the local area to be polluted on those days in which the AQI exceeds the value of 101. As our data were at the year-level, we controlled for the number of days in the year in which there was pollution in the given MSA.

Demographic Variables. Finally, we controlled for several relevant MSA-level demographic variables using data from the American Community Survey, all of which could be associated with local crime rates or opportunities for the local population to engage in physical activity. The factors were as follows, and summary citations next to each factor reference research showing that the given factor is potentially associated with deviance as well as physical fitness: (a) percentage of male population (Broidy & Agnew, 1997; Kruttschnitt, 2013) (b) median age (Tittle et al., 2003; Tulppo et al., 1998), (c) percentage of population who have bachelor degree or above (Lochner, 2004; Lochner & Moretti, 2004), and (d) population percentage of minorities, using indicators for the five racial categories specified by U.S. census (Jackson, 1989; Lu et al., 2018; Tonry, 1997).

Results and Discussion

The final sample consisted of 364 MSA-year-level observations with complete data.

Analytical Strategy. Our dependent variables are percentages restricted to the interval ranging from 0 to 1. Thus, beta regression was appropriate (Ferrari & Cribari-Neto, 2004). Using the Huber–White robust standard errors or nonparametric bootstrapping to derive estimates produced substantively the same results (see Tables S1–S4 in the supplementary document), as did rerunning the analyses using ordinary least squares regression or fractional logit regression (see Tables S5–S8 in supplementary document).

We tested Hypothesis 1 in two ways. First, we used the fitness index score of year t to predict crime rates in year t, thus modeling concurrent effects of physical fitness on deviance. Second, we conducted time-lagged analysis by using the fitness index score of year t to predict crimes rates in year $t + 1$ (controlling for crime rates in the current year), thus examining whether physical fitness reduces deviance over time.

Main Results. Table 1 shows descriptive statistics and correlations among variables. Fitness index score was negatively correlated with violent ($r = -.54$, $p < .001$), property ($r = -.39$, $p < .001$), and total ($r = -.45$, $p < .001$) crime rates. We generated all standardized coefficients reported in the article by multiplying unstandardized coefficients by the ratio of standard deviations of independent variables to the standard deviation of the dependent variable. Beta regression analysis results indicated that fitness index score at year t was negatively related to violent ($b_{\text{without controls}} = -0.014$, $\beta_{\text{without controls}} = -111.485$, $p < .001$; $b_{\text{with controls}} = -0.014$, $\beta_{\text{with controls}} = -105.754$, $p < .001$), property ($b_{\text{without controls}} = -0.008$, $\beta_{\text{without controls}} = -13.157$, $p < .001$; $b_{\text{with controls}} = -0.003$, $\beta_{\text{with controls}} = -5.795$, $p < .010$), and total crime ($b_{\text{without controls}} = -0.009$, $\beta_{\text{without controls}} = -13.303$, $p < .001$; $b_{\text{with controls}} = -0.005$, $\beta_{\text{with controls}} = -7.334$, $p < .001$) rates at year t (see Table 2). In addition, fitness index score at year t was negatively related to violent ($b = -0.015$, $\beta = 116.476$, $p < .001$), property ($b = -0.008$, $\beta = -14.369$, $p < .001$), and total crime rates ($b = -0.009$, $\beta = -14.605$, $p < .001$) in year $t + 1$, without control variables (see Models 1, 3, and 5 in Table 3).

Table 1
Study 1: Descriptive Statistics and Correlations Among Study Variables

	Variables	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	Fitness index	51.25	12.81	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2	Crime rate (Total)	0.04	0.01	−.45***	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3	Crime rate (Violent crime)	0.00	0.00	−.54***	.61***	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4	Crime rate (Property crime)	0.03	0.01	−.39***	.99***	.47***	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5	Income per capita ($ 1,000)	28.98	4.02	.65***	−.42***	−.32***	−.40***	—	—	—	—	—	—	—	—	—	—	—	—	—
6	Poverty	0.14	0.03	−.64***	.37***	.38***	.33***	−.81***	—	—	—	—	—	—	—	—	—	—	—	—
7	Male unemployed	0.08	0.03	−.12*	.10	.14**	.08	−.46***	.41***	—	—	—	—	—	—	—	—	—	—	—
8	Female unemployed	0.08	0.02	−.19***	.14**	.17**	.12*	−.47***	.49***	.93***	—	—	—	—	—	—	—	—	—	—
9	Unhealthy days	30.30	34.06	−.12*	−.07	−.06	−.07	−.23***	.21***	.27***	.30***	—	—	—	—	—	—	—	—	—
10	Male	0.49	0.01	.25***	.02	−.27***	.09	.21***	−.18***	−.11*	−.05	.17**	—	—	—	—	—	—	—	—
11	Median age	36.95	2.36	.07	−.35***	−.03	−.38***	.01	−.13*	.06	−.08	−.23***	−.61***	—	—	—	—	—	—	—
12	Bachelor or above	0.32	0.06	.69***	−.46***	−.43***	−.42***	.86***	−.64***	−.37***	−.37***	−.35***	.11*	.06	—	—	—	—	—	—
13	Black	0.15	0.10	−.28***	.24***	.49***	.16**	−.11*	.24***	.08	.14**	−.17**	−.62***	.08	−.13*	—	—	—	—	—
14	American Indian	0.00	0.01	−.12*	.14**	−.07	.17**	−.07	.11*	−.08	−.07	.19***	.38***	−.34***	−.13*	−.35***	—	—	—	—
15	Asian	0.06	0.06	.44***	−.28***	−.19***	−.27***	.57***	−.36***	−.04	.01	.01	.46***	−.08	.54***	−.34***	.06	—	—	—
16	Native Hawaiian	0.00	0.00	.33***	.09	−.08	.12*	.14**	−.13*	.04	.06	.11*	.56***	−.29***	.07	−.46***	.24***	.46***	—	—
17	Other races	0.04	0.04	.10	−.12*	−.14**	−.11*	.09	.07	.05	.17**	.47***	.54***	−.45***	.01	−.41***	.21***	.51***	.37***	—

Note. $n = 364$; American Indian = American Indian and Alaska Native; Native Hawaiian = Native Hawaiian and Other Pacific Islanders.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 2

Study 1: Fitness Index and Crime Rates at the Same Year (Beta Regression)

	Crime rate (Total)						Crime rate (Violent crime)						Crime rate (Property crime)					
	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
Variables	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*
Fitness index	−13.303***	−0.009***	(0.001)	−7.334***	−0.005***	(0.001)	−111.485***	−0.014***	(0.001)	−105.754***	−0.014***	(0.002)	−13.157***	−0.008***	(0.001)	−5.795**	−0.003**	(0.001)
Income per capita ($ 1,000)	—	—	—	4.705	0.010	(0.007)	—	—	—	95.631***	0.039***	(0.010)	—	—	—	2.651	0.005	(0.008)
Poverty	—	—	—	11.836***	3.913***	(0.777)	—	—	—	75.419***	4.865***	(1.105)	—	—	—	12.294***	3.632***	(0.838)
Male unemployed	—	—	—	−7.590*	−2.350*	(1.019)	—	—	—	29.314	1.771	(1.438)	—	—	—	−10.554**	−2.920**	(1.100)
Female unemployed	—	—	—	−0.780	−0.286	(1.186)	—	—	—	−27.565	−1.971	(1.691)	—	—	—	−0.140	−0.046	(1.278)
Unhealthy days	—	—	—	−7.412***	−0.002***	(0.000)	—	—	—	−38.608***	−0.002***	(0.000)	—	—	—	−8.029***	−0.002***	(0.000)
Male	—	—	—	−1.836	−2.223	(2.451)	—	—	—	−38.808*	−9.170*	(3.620)	—	—	—	−1.221	−1.321	(2.629)
Median age	—	—	—	−6.295***	−0.023***	(0.007)	—	—	—	13.877	0.010	(0.009)	—	—	—	−8.448***	−0.027***	(0.007)
Bachelor or above	—	—	—	−5.297	−0.703	(0.387)	—	—	—	−47.052*	−1.218*	(0.565)	—	—	—	−5.344	−0.634	(0.417)
Race																		
Black	—	—	—	3.623*	0.317*	(0.158)	—	—	—	61.802***	1.056***	(0.224)	—	—	—	2.586	0.202	(0.171)
American Indian	—	—	—	−0.242	−0.381	(1.600)	—	—	—	−5.071	−1.561	(2.443)	—	—	—	0.007	0.009	(1.706)
Asian	—	—	—	−2.125	−0.305	(0.287)	—	—	—	7.673	0.215	(0.409)	—	—	—	−2.753	−0.353	(0.310)
Native Hawaiian	—	—	—	10.890***	33.403***	(4.061)	—	—	—	75.864***	45.411***	(6.144)	—	—	—	11.133***	30.516***	(4.340)
Other races	—	—	—	−3.428*	−0.751*	(0.374)	—	—	—	17.348	0.742	(0.540)	—	—	—	−4.885*	−0.956*	(0.403)
Pseudo R^{2a}	—	0.057***	—	—	0.131***	—	—	0.040***	—	—	0.083***	—	—	0.046***	—	—	0.117***	—
Pseudo ΔR^2	—	—	—	—	0.075***	—	—	—	—	—	0.043***	—	—	—	—	—	0.071***	—

Note. $n = 364$; β represents standardized regression coefficients; *b* represents unstandardized regression coefficients; *SE* represents standard errors; American Indian = American Indian and Alaska native; Native Hawaiian = Native Hawaiian and other pacific islanders; the fixed effects of years are accounted for across all models.

[a] Beta regression does not have an equivalent of the R^2 or effect size that is found in ordinary least squares (OLS) regression. We followed McFadden (1974) for the calculation of Pseudo R^2. Given that Pseudo R^2 is not the same as what R^2 or effect size means in OLS regression (the proportion of variance explained by the predictors), we suggest interpreting this statistic with caution.

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

Table 3

Study 1: Fitness Index at Year t and Crime Rates at Year t + 1 (Beta Regression)

	Crime rate (Total) at year $t + 1$						Crime rate (Violent Crime) at year $t + 1$						Crime rate (Property crime) at year $t + 1$					
	Model 1			Model 2			Model 3			Model 4			Model 5			Model 6		
Variables	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*
Fitness index	−14.605***	−0.009***	−0.001)	−2.567**	−0.002**	(0.001)	−116.476***	−0.015***	(0.001)	−40.464***	−0.005***	(0.001)	−14.369***	−0.008***	(0.001)	−1.809†	−0.001†	(0.001)
Income per capita ($ 1,000)	—	—	—	−1.848	−0.004	(0.004)	—	—	—	−8.641	−0.004	(0.005)	—	—	—	−2.727	−0.005	(0.004)
Poverty	—	—	—	−0.878	−0.269	(0.424)	—	—	—	−12.855	−0.814	(0.628)	—	—	—	−1.481	−0.405	(0.427)
Male unemployed	—	—	—	3.801*	1.131*	(0.503)	—	—	—	45.334***	2.793***	(0.731)	—	—	—	3.894*	1.035*	(0.513)
Female unemployed	—	—	—	−3.136†	−1.101†	(0.577)	—	—	—	−41.219***	−2.995***	(0.865)	—	—	—	−2.607	−0.817	(0.586)
Unhealthy days	—	—	—	0.551	0.000	(0.000)	—	—	—	5.562	0.000	(0.000)	—	—	—	1.053	0.000	(0.000)
Male	—	—	—	1.922†	2.147†	(1.201)	—	—	—	−6.760	−1.564	(1.810)	—	—	—	2.834*	2.827*	(1.216)
Median age	—	—	—	−0.694	−0.002	(0.003)	—	—	—	5.413	0.004	(0.005)	—	—	—	−0.628	−0.002	(0.003)
Bachelor or above	—	—	—	2.250	0.278	(0.191)	—	—	—	28.082*	0.720*	(0.290)	—	—	—	2.378	0.263	(0.193)
Race																		
Black	—	—	—	0.755	0.062	(0.080)	—	—	—	−9.126	−0.154	(0.130)	—	—	—	1.245	0.091	(0.080)
American Indian	—	—	—	−0.560	−0.855	(0.847)	—	—	—	0.232	0.073	(1.280)	—	—	—	−0.556	−0.758	(0.859)
Asian	—	—	—	−0.889	−0.118	(0.137)	—	—	—	−12.938†	−0.355†	(0.209)	—	—	—	−0.335	−0.040	(0.138)
Native Hawaiian	—	—	—	1.635*	4.885*	(2.221)	—	—	—	10.205†	6.312†	(3.577)	—	—	—	1.084	2.893	(2.196)
Other races	—	—	—	−0.718	−0.148	(0.191)	—	—	—	17.998**	0.766**	(0.288)	—	—	—	−1.592	−0.292	(0.193)
Crime rate (Total)	—	—	—	26.582***	24.787***	(0.745)	—	—	—	—	—	—	—	—	—	—	—	—
Crime rate (Violent crime)	—	—	—	—	—	—	—	—	—	179.947***	174.072***	(5.146)	—	—	—	—	—	—
Crime rate (Property crime)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	30.995***	29.100***	(0.804)
Pseudo R^2	—	0.054***	—	—	0.273***	—	—	0.039***	—	—	0.201***	—	—	0.043***	—	—	0.268***	—
Pseudo ΔR^2	—	—	—	—	0.219***	—	—	—	—	—	0.163***	—	—	—	—	—	0.224***	—

Note. $n = 286$; β represents standardized regression coefficients; *b* represents unstandardized regression coefficients; *SE* represents standard errors; American Indian = American Indian and Alaska native; Native Hawaiian = Native Hawaiian and other pacific islanders; The fixed effects of years are accounted for across all models; The independent variable and all control variables are at year *t*.
$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

When we accounted for control variables and crime rates at year t, the fitness index score at year t was negatively related to violent ($b = -0.005$, $\beta = -40.464$, $p < .001$), and total crime rates at year $t + 1$ ($b = -0.009$, $\beta = -2.567$, $p < .010$). However, fitness index score at year t was marginally significantly related to property crime rate at year $t + 1$ ($b = -0.001$, $\beta = -1.809$, $p = .076$), although the effect was still significant based on a one-tailed analysis, which is appropriate given our directional hypothesis. Thus, Hypothesis 1 is supported using both concurrent and time-lagged analysis, examining various crime types, and with and without control variables.

Study 2

In Study 2, we examined the relationship between physical fitness and deviance in a military context. This context allowed for reliable measurement of our independent variable at the individual level. Specifically, the physical fitness test is conducted by military personnel using a validated measurement approach. Although the physical fitness test is conducted at a single time point, it is administered following an extensive training program aimed at improving physical fitness. Given this, we assume that individual fitness scores partly reflect improvements in physical fitness due to self-control exertion. Furthermore, the military context allowed us to measure deviance using peer-reported surveys adapted from established organizational research, resulting in a robust test of the relationship between physical fitness and deviance free of self-report biases. Beyond these theory-testing advantages (and limitations), the military context constituted a consequential setting within which to test our theory, as deviance in the military may not only negatively impact soldiers' effectiveness and morale, but also compromise national security.

Method

Participants and Procedure

We sent out invitation links to 5,657 men who were undergoing basic military training in the Singapore military.[2] It is mandatory for all 18-year-old male Singapore citizens and permanent residents to serve in the military for 2 years, which includes a compulsory 3-month basic military training. The usable dataset composed of 4,387 participants who agreed to take part in the study (78% response rate). Of the usable sample of 4,387 participants, we randomly selected a subsample of 439 (around 10% out of 4,387) participants to validate our measure of deviance to ensure its appropriateness for the military context. After validating the deviance measure, we sent out the main survey to the remaining 3,948 participants. After accounting for missing data, the final sample consisted of 3,925 military men.

The age of participants ranged from 17 to 26 years ($M = 19.82$, $SD = 1.23$) and 96% possessed at least an equivalent of a high school diploma. Based on our interviews with military commanders, we learned that new military recruits tend to adjust to their new environment and settle into the military regime in approximately 6–8 weeks. During this time, new military recruits generally adjust to the stress of military training. Physical fitness was measured at this time point with a standardized physical fitness test used by the military. Around 4 weeks after the physical fitness test, we obtained peer-ratings of deviance.

Measure

Physical Fitness Measure. We obtained data from a standardized physical fitness test used by the military. The test assesses the basic components of physical fitness and motor skills of soldiers and includes physical exercises such as pull-ups and running. The results are summed and rescaled into an overall score ranging from 0 (*unfit*) to 100 (*very fit*), with the midpoint corresponding to moderate fitness level. The physical test is consistent with physical fitness tests used extensively in the military and sports literatures (Cornum et al., 2011; Huffman et al., 2008).

Deviance Measure. In consultation with military personnel, and based on past work on deviance (Bennett & Robinson, 2000), we designed six deviance items appropriate for the military training context. Each recruit was attached to another recruit as a "buddy" so that they can assist each other during the training. We obtained deviance ratings from each recruit's buddy as this is the peer who is most familiar with the recruit's daily activities. The items described six acts of deviance: "lying to protect self," "faking to avoid training, task or punishment," "taking shortcuts thus adversely affecting the task or others," "disregard/disrespect others (e.g., put others down, made demeaning remarks, ignored opinions of others)," "get others into trouble (e.g., play malicious pranks)," and "take credit for others' contribution." Consistent with widely used measures of deviance (Bennett & Robinson, 2000; Stewart et al., 2009), participants indicated how often their buddy engaged in each behavior listed on a 5-point scale (1 = *never* to 5 = *everyday*; $\alpha = .83$).

Deviance Measure Validity Check. To validate our deviance measure, we conducted a pilot study by randomly sampling a sub-set of the respondents ($N = 439$). We administered a 22 item ($\alpha = .90$) counterproductive work behavior (CWB) scale from Spector et al. (2006) to assess convergent validity with an established measure focusing on deviant behaviors. We also administered a 44 item Big Five Inventory (BIF; αs $> .72$; John et al., 1991) to assess nomological and discriminant validity by demonstrating that deviance captured in our scale are distinguishable from social tendencies driven by differences in personality more generally, yet relate to them in ways consistent with past work. Whereas the Big Five is self-rated, CWB and our deviance measure are rated by the focal person's buddy.

First, we conducted an exploratory factor analysis (EFA) using principal component factoring and promax rotation. Results show that all items load onto one factor (factor loadings ranging from 0.66 to 0.84, see Table S9). Second, we conducted confirmatory factor analyses (CFA) to test the discriminant validity of our deviance measure. Given the small sample size to the large number of items (Landis et al., 2000), we utilized item parceling for CFA and randomly created two parcels items for each of the seven study variables (i.e., our deviance measure, CWB, and the Big Five personality traits;) Little et al., 2002). In total, we had 14 parcels. Specifically, we created two 11-item parcels for the 22 CWB items. In addition, we created two 3-item parcels for our six-item deviance measure. We also created two 4-item parcels for the eight-item extraversion measure and two 4-item parcels for the eight-item

[2] For Study 2, we obtained institutional review board (IRB) approval from the Singapore military. For Study 3, we obtained IRB approval from Singapore Management University (IRB-16-022-A069(816)), protocol title: "Physical Fitness and Deviant Behaviors."

neuroticism measure. Furthermore, we created a five-item parcel and a four-item parcel for the nine-item agreeableness measure and did the same for the nine-item conscientiousness measure. Finally, we created two five-item parcels for the 10-item openness to experience measure.

Due to the nested nature of our data that military personnel are clustered within platoons, we conducted multilevel CFAs (Muthen, 1994) following the steps recommended by Finch and Bolin (2017) and Dyer et al. (2005) in Mplus. Results showed that the seven-factor model (i.e., our deviance measure, CWB, and the Big Five personality traits) fit the data well, $\chi^2(112) = 182.313$, $p < .001$, CFI = 0.981, TLI = 0.968, RMSEA = 0.038, and had a better fit than alternative factor specifications (see Table S10 for details of model fit comparisons).

Our measure of deviance was strongly positively correlated with the established measure of CWB (Spector et al., 2006), ($r = 0.83$, $p < .001$), providing evidence of convergent validity. In terms of nomological and discriminant validity, our deviance measure correlated weakly and positively with neuroticism ($r = 0.11$, $p < .05$), weakly and negatively with agreeableness ($r = -0.11$, $p < .05$), and is unrelated to conscientiousness ($r = -0.07$, $p = .168$). These correlations are generally in line with those documented in the organizational deviance literature (for a meta-analysis, see Mackey et al., 2019), and at the same time demonstrate good discriminant validity of the deviance construct. Overall, our deviance measure exhibits adequate convergent, discriminant, and nomological validity. We also conducted EFA and CFAs with our main sample of military personnel ($N = 3{,}925$) and our results are consistent with the results of the EFA and CFAs from the validation study (see Table S9 and S10 for details).

Control Variables. We included several individual-level control variables that, based on prior work, we deemed as candidates for confounding factors. We note that the direction and significance of the effect of physical fitness reported in our main analysis are the same with and without control variables.

Age. We controlled for age because it has been linked with deviant behaviors (Mackey et al., 2019).

Personality Traits. We controlled for agreeableness, neuroticism, and conscientiousness because a recent meta-analysis showed that these personality traits predict deviance (Mackey et al., 2019), and they might plausibly be related to physical fitness (e.g., conscientiousness might be associated with lifestyle choices conducive to physical fitness). We measured these personality traits with items from the BFI (John et al., 1991). Agreeableness and conscientiousness were each measured with nine items. Neuroticism was measured with eight items. All three personality dimensions exhibited high reliabilities ($\alpha s > .76$).

Results

Table 4 presents descriptive statistics and bivariate correlations. Physical fitness was negatively correlated with deviance ($r = -12$, $p < .001$). In addition, consistent with past research (Mackey et al., 2019), agreeableness ($r = -.10$, $p < .001$) and conscientiousness ($r = -.06, p < .001$) were both negatively correlated with deviance, whereas neuroticism was positively correlated with deviance ($r = .06$, $p < .001$). Because our participants are nested within 26 platoons, we perform multilevel analysis to test Hypothesis 1 with physical fitness scores as our independent variable and deviance as our dependent variable. Supporting Hypothesis 1, physical fitness was negatively associated with deviance, $b = -0.002$, $\beta = -0.073$, $p < .001$ (see Table 5). Thus, using a large military sample, Study 2 replicated the primary finding that physical fitness was negatively related to deviance.

Study 3

Study 3 extended Studies 1 and 2 in several important ways. We increased the internal validity of our findings by conducting a five-wave longitudinal study where we included repeated measures of physical fitness, ego depletion, and workplace deviance, as well as controlled for potential confounds. Therefore in this study, as in Study 1, we are able to examine whether trait-like differences in physical fitness (e.g., due to genetic reasons, past physical activity, etc.) are associated with lower deviance and also conduct time-lagged analyses to examine how weekly changes in physical activity relate to subsequent state-like changes in ego depletion, and, in turn, rates of future deviance. This approach again allowed us to examine whether our hypothesized effect of physical fitness on deviance occurs concurrently as well as whether physical fitness builds up self-control capacity over time, with downstream beneficial implications for deviance. In addition to enhancing the internal validity of our conclusions, this approach was meant to demonstrate the actionable nature of the relationship we study, whereby introducing improvements in physical fitness levels may serve as a tool to decrease future deviance. With this objective in mind, we operationalized physical fitness as a widely-used proxy of physical activity, which represents a precursor of physical fitness that can be implemented by individuals as well as social systems. Finally, Study 3 also increased the generalizability of our findings with data collected from an organizational sample, and one that is more diverse in terms of gender and age.

Table 4

Study 2: Descriptive Statistics and Correlations Among Study Variables

Variables	*M*	*SD*	1	2	3	4	5	6
1 Physical fitness	58.30	19.84	—	—	—	—	—	—
2 Deviance	1.18	0.43	−.12***	—	—	—	—	—
3 Age	19.82	1.23	.08***	−.00	—	—	—	—
4 Agreeableness	3.81	0.51	.15***	−.10***	.09***	—	—	—
5 Conscientiousness	3.49	0.58	.21***	−.06***	.07***	.49***	—	—
6 Neuroticism	2.67	0.67	−.23***	.06***	−.05**	−.46***	−.53***	—

Note. $n = 3925$.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5
Study 2: Results of Multilevel Analyses (Physical Fitness Influences Deviance)

Variables	Deviance					
	Model 1			Model 2		
	β	*b*	*SE*	β	*b*	*SE*
Physical fitness	−0.080***	−0.002***	(0.000)	−0.073***	−0.002***	(0.000)
Age	—	—	—	0.010	0.004	(0.006)
Agreeableness	—	—	—	−0.078***	−0.065***	(0.016)
Conscientiousness	—	—	—	0.002	0.001	(0.014)
Neuroticism	—	—	—	−0.001	−0.001	(0.012)
R^2	—	0.151***	—	—	0.183***	—
ΔR^2	—	—	—	—	0.032***	—

Note. $n = 3925$; β represents standardized regression coefficients; *b* represents unstandardized regression coefficients; *SE* represents standard errors.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Method

Participants and Procedure

We employed a five-wave longitudinal design to test our hypotheses. We recruited full-time employees residing in India in collaboration with a local partner firm. The recruitment strategy involved approaching human resource heads across different industries and firms, who facilitated contact with employees who may be potentially interested in participating in our study. We focused on employees working in service roles given that such jobs involve regular social interactions (Côté, 2005; Totterdell & Holman, 2003) and thus afford the opportunity for deviant behavior (e.g., rudeness) on a relatively regular basis (Pearson & Porath, 2005; Porath & Erez, 2007). The surveys were administered in pen-and-paper format in each of the five waves. Pen-and-paper surveys were distributed during work hours every Thursday for 5 weeks at the respondents' work locations and collected after respondents have completed them on site. To ensure the quality of respondents in terms of English comprehension, and generalizability of conclusions to white-collar workers, we set a minimum income recruitment criterion in consultation with local experts and focused only on firms and jobs in which English is the main language of use (it is also an official language in India and the main language of business in all larger organizations).

At Time 1, surveys were distributed to 265 employee-coworker dyads (530 employees) and 166 employee-coworker dyads (332 employees) responded (response rate of 62.64%). At Time 2, 163 employee-coworker dyads responded (326 employees; response rate of 61.51%). At Time 3, 163 employee-coworker dyads responded (326 employees; response rate of 61.51%). At Time 4, 163 employee-coworker dyads responded (326 employees; response rate of 61.51%). Finally, at Time 5, 162 employee-coworker dyads responded (324 employees; response rate of 61.13%). After removing cases with missing data across study variables, the final sample for main analysis consisted of 318 unique employees (162 dyads) and 1416 unique observations.[3] In the final sample, employees' mean age was 30.06 years (*SD* = 6.01), 29.87% were female, and they worked in various service roles and held various job titles (e.g., cashier, customer care officer, consultant, medical representative, receptionist, sales executive, etc.). Employees' average tenure in their current organization was 3.75 years (*SD* = 4.29) and 38.05% had a university degree. In terms of organizational level, 65.41% were in non-management positions, 22.64% were first-line supervisors, 10.38% were in middle management, and 1.57% were in upper management.

Measures

Physical Fitness Measure. We used physical activity as a proxy for physical fitness. As mentioned earlier, physical activity is one of the key drivers of physical fitness (Ortega et al., 2008) and it has been used as a proxy of physical fitness in numerous studies in sports and health research (see Reiner et al., 2013, for a review). Furthermore, it offered advantages in terms of practical relevance of the conclusions derived from the study, because individuals can be encouraged and incentivized to engage in physical activity. We used the established International Physical Activity Questionnaire (IPAQ; Craig et al., 2003) to measure physical activity. IPAQ assesses physical activity undertaken across a comprehensive set of domains including leisure time, work-related and transport-related activity. In particular, IPAQ assesses the three specific types of physical activity: vigorous intensity activities, moderate intensity activities, and walking. Participants responded to the extent to which they engage in these three specific types of physical activity during the past 7 days. They responded to the frequency (measured in days per week) and duration (minutes per day) in which they engage in these physical activities.

Based on the scoring recommendations provided by IPAQ (see www.ipaq.ki.se for more information), we computed a score of total physical activity. Total physical activity was computed by weighting each type of its energy requirements defined in multiples of the resting metabolic rate (METS) to yield a score in metabolic equivalent (MET)-minutes. The selected MET values were based on past validation work (Ainsworth et al., 2000). Specifically, we used the following values for our analysis: Walking = 3.3 METs, Moderate Physical Activity = 4.0 METs, Vigorous Physical Activity = 8.0

[3] Our results remained unchanged whether we included or excluded participants with missing cases. Because we test time-lagged mediation, the sample size for each path is not the same if participants with missing cases are included. Given this, the main analysis reported in the article focuses on the sample of participants with no missing cases, and the results of analysis with missing cases included, which are consistent with the results of our main analysis, can be found online (see Tables S11 and S12 in supplementary document).

METs. MET-minutes per week was calculated as MET level (Walking/Moderate Physical Activity/Vigorous Physical Activity) × minutes of activity × number of days engaged in activity. For example, a person who engaged in 30 min of moderate physical activity for 2 days per week would have engaged in 4.0 × 30 × 2 = 240 MET-minutes of physical activity. We computed a combined total physical activity MET-minute/week as the summation of Walking, Moderate Physical Activity, and Vigorous Physical Activity MET-minute/week scores. To reduce the skewness of the MET-minute/week scores, we logged participants' scores, which is in line with past research (Burros, 1951; Cohen et al., 2003). The higher the logged MET-minute/week scores, the higher the levels of physical activity. Physical fitness was measured at all five time points.

Ego Depletion. We measured ego depletion with five items (Lin & Johnson, 2015) at each time point. Sample items are "I feel drained," and "My mental energy is running low." Participants were asked to indicate the extent to which they experience these subjective states during the past 7 days (1 = *strongly disagree* to 5 = *strongly agree*). The scale demonstrated adequate reliabilities across the five waves (αs ranging from 0.67 to 0.84, average α = 0.74). Previous organizational research has used this measure to assess ego depletion (Johnson et al., 2014; Lanaj et al., 2014).

Workplace Deviance. Workplace deviance was assessed with nineteen items from Bennett and Robinson (2000) measure at each time point. In each employee-coworker dyad, employees rated each other on the frequency of engaging in workplace deviant behaviors. Participants were asked to indicate "how often has [your coworker] engaged in the following behaviors at work in the past 7 days?" (1 = *none* to 5 = *more than three times*). Sample items include "Taken property from work without permission," and "Said something hurtful to someone at work." (αs > .74).

Control Variables. We included several time invariant and variant individual-level control variables, based on prior work, we deemed as potential confounding factors. The direction and significance of the effect of physical fitness reported in our main analysis are the same with and without control variables.

Demographics. As in Study 2, we controlled for employee age and additionally gender (there was no variation in gender in Study 2), because they have been linked with deviant behavior at work (Mackey et al., 2019).

Personality Traits. As in Study 2, we controlled for agreeableness, neuroticism, and conscientiousness. To reduce survey fatigue, we measured each of the personality traits with two items used in John et al. (1991)—one positive item and one negative (reverse) item with highest factor loadings in each category (1 = *strongly disagree* and 5 = *strongly agree*). The two items are conceptualized as formative indicators as the goal of combining them is to sample as distinct aspects of the construct domains using items with established nomological validity, as opposed to aiming for maximal overlap between items selected (Rammstedt & John, 2007). Thus, in line with past studies that used this measure and research using formative indicators more generally (Diamantopoulos & Winklhofer, 2001), we used the items to create a scale for each personality facet.

Results

Table 6 shows means, standard deviations, and correlations among the study variables. Logged MET-minute/week score was negatively correlated with ego depletion ($r = -.19$, $p < .001$) and deviance ($r = -.26$, $p < .001$). Ego depletion was positively correlated with deviance ($r = .16$, $p < .001$). Because of the nested nature of our data (measurement occasions nested within participants), we used multilevel modeling for the main analyses. The time-variant variables (i.e., physical fitness, ego depletion, and deviance) were at level one, while the time invariant variables (i.e., age, gender, agreeableness, neuroticism, and conscientiousness) were at level two.

Similar to Study 1, we tested our two hypotheses in two ways. First, we tested whether physical fitness influences ego depletion and deviance within the same time wave. Second, we tested whether physical fitness has a cross-wave effect on ego depletion and deviance (i.e., whether physical fitness at time t influences ego depletion and deviance at time $t + 1$, controlling for these variables at time t). Hypothesis 1 indicated that physical fitness is negatively related to deviance. Our results showed that logged MET-minute/week score at time t was negatively associated with deviance at time t ($b_{\text{without controls}} = -0.043$, $\beta_{\text{without controls}} = -0.170$, $p < .001$) without control variables. When we controlled for time invariant variables and ego depletion at time t, logged MET-minute/week score at time t was still negatively associated with deviance at time t

Table 6
Study 3: Descriptive Statistics and Correlations Among Study Variables

Level 2 variables	*M*	*SD*	1	2	3	4	5
1 Age	30.06	6.01	—	—	—	—	—
2 Gender	0.70	0.46	−.00	—	—	—	—
3 Agreeableness	3.84	0.57	.03	.01	—	—	—
4 Conscientiousness	4.15	0.69	−.07	.08	.10	—	—
5 Neuroticism	2.42	0.84	−.02	.02	−.14*	−.12*	—
Level 1 variables	*M*	*SD*	6	7	8		
6 Logged MET-minute/week score	6.39	0.98	—	—	—	—	—
7 Ego depletion	1.48	0.47	−.19***	—	—	—	—
8 Deviance (Rated by coworker)	1.35	0.25	−.26***	.16***	—	—	—

Note. $n = 318$ for level 2 variables; $n = 1{,}416$ for level 1 variables; Logged MET-minute/week score = logged scores of metabolic equivalent of task in minutes per week.
* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 7

Study 3: Results of Multilevel Analysis (Logged MET-Minute/Week Score Influences Deviance Via Ego Depletion at the Same Time Wave)

Variables	Ego depletion						Deviance (Rated by coworker)					
	Model 1			Model 2			Model 3			Model 4		
	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*
Logged MET-minute/week score	−0.143***	−0.068***	(0.014)	−0.131***	−0.063***	(0.014)	−0.170***	−0.043***	(0.007)	−0.153***	−0.039***	(0.007)
Ego depletion	—	—	—	—	—	—	—	—	—	0.093***	0.049***	(0.013)
Age	—	—	—	0.057†	0.004†	(0.002)	—	—	—	−0.065†	−0.003†	(0.001)
Gender	—	—	—	−0.018	−0.019	(0.033)	—	—	—	−0.051	−0.028	(0.019)
Agreeableness	—	—	—	−0.076*	−0.062*	(0.026)	—	—	—	−0.128***	−0.055***	(0.015)
Conscientiousness	—	—	—	−0.012	−0.009	(0.022)	—	—	—	−0.151***	−0.055***	(0.013)
Neuroticism	—	—	—	0.014	0.008	(0.018)	—	—	—	0.065†	0.019†	(0.010)
R^2	—	0.160***	—	—	0.189***	—	—	0.184***	—	0.392***	—	—
ΔR^2	—	—	—	—	0.029†	—	—	—	—	0.209***	—	—

Note. $n = 1{,}416$; β represents standardized regression coefficients; *b* represents unstandardized regression coefficients; *SE* represents standard errors; Logged MET-minute/week score = logged scores of metabolic equivalent of task in minutes per week.
† $p < .10$. * $p < .05$. *** $p < .001$.

($b_{\text{with controls}} = -0.039$, $\beta_{\text{with controls}} = -0.153$, $p < .001$, see Table 7). Similarly, results indicated that logged MET-minute/week score at time *t* was negatively associated with deviance at time $t + 1$ ($b_{\text{without controls}} = -0.017$, $\beta_{\text{without controls}} = 0.078$, $p < .001$) without control variables. When we accounted for time invariant control variables and time variant variables (i.e., ego depletion at time *t* and $t + 1$ and deviance at year *t*), logged MET-minute/week score at time *t* remained negatively associated with deviance at time $t + 1$ ($b_{\text{with controls}} = -0.017$, $\beta_{\text{with controls}} = -0.075$, $p < .001$, see Table 8). Thus, Hypothesis 1 is supported.

Hypothesis 2 stated that ego depletion mediates the relationship between physical fitness and deviance. To test Hypothesis 2, we conducted mediation tests with nonparametric bootstrapping to derive bias-corrected confidence intervals (CIs), and we set the number of bootstrapping samples to 5,000. Results showed that the indirect effect of logged MET-minute/week score at time *t* on deviance at time *t* via ego depletion at time *t* was significant when the indirect effect was computed by unstandardized coefficients, with or without control variables (*indirect effect*$_{\text{without controls}} = -0.004$, 95% CI = −0.007, −0.003; *indirect effect*$_{\text{with controls}} = -0.003$, 95% CI = −0.007, −0.002, see Table 9). Likewise, the indirect effect was also significant when it was computed by standardized coefficients, with or without control variables (*indirect effect*$_{\text{without controls}} = -0.014$, 95% CI = −0.028, −0.011; *indirect effect*$_{\text{with controls}} = -0.012$, 95% CI = −0.027, −0.010, see Table 9). In addition, the indirect effect of logged MET-minute/week score at time *t* on deviance at time $t + 1$ via ego depletion at time $t + 1$ was significant when the indirect effect was computed by unstandardized coefficients, with or without control variables (*indirect effect*$_{\text{without controls}} = -0.002$, 95% CI = −0.004, −0.001; *indirect effect*$_{\text{with controls}} = -0.002$, 95% CI =−.003, −.002, see Table 10). Similarly, the indirect effect was also significant when it was computed by standardized coefficients, with or without control variables (*indirect effect*$_{\text{without controls}} = -0.007$, 95% CI = −0.016, −0.006; *indirect effect*$_{\text{with controls}} = -0.007$, 95% CI = −0.014, −0.008, see Table 10). Therefore, Hypothesis 2 is supported. Conceptually replicating Studies 1 and 2, Study 3 showed that physical activity was negatively associated with workplace deviance, and also found that ego depletion mediated this relationship.

General Discussion

Across three studies, we found that physical fitness was negatively associated with deviance, and ego depletion mediated this effect in Study 3. We observe consistent findings across diverse samples and settings, suggesting generalizability of our results. We obtained these results using both concurrent and time-lagged analyses (in Studies 1 and 3), as well as by controlling for various potential confounding factors, thus strengthening the internal validity of the findings. The observed effect is also likely to be of practical significance. In the military context, deviance can be highly costly as they may not only compromise individual and collective safety, but also military and national security. For example, the U.S. army loses an estimated $7 billion annually due to deviance (Swanson, 2012). Based on the effect we obtained in Study 2, a 1% increase in fitness test scores decreases deviance in the military by 7.8 %, which translates into an estimated $0.55 billion in savings for the government from the military sector alone. Therefore, our research provides additional insights into the

Table 8
Study 3: Results of Multilevel Analysis (Logged MET-Minute/Week Score at Time t Influences Deviance at Time t + 1 Via Ego Depletion at Time t + 1)

Variables	Ego depletion at time $t + 1$						Deviance (Rated by coworker) at time $t + 1$					
	Model 1			Model 2			Model 3			Model 4		
	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*
Logged MET-minute/week score at time *t*	−0.138***	−0.067***	(0.015)	−0.140***	−0.068***	(0.015)	−0.078**	−0.017**	(0.006)	−0.075**	−0.017**	(0.006)
Ego depletion at time $t + 1$	—	—	—	—	—	—	—	—	—	0.052*	0.024*	(0.011)
Deviance (Rated by coworker) at time *t*	—	—	—	—	—	—	—	—	—	0.019	0.016	(0.020)
Ego depletion at time *t*	—	—	—	0.156***	0.150***	(0.028)	—	—	—	0.024	0.011	(0.010)
Age	—	—	—	0.068*	0.005*	(0.002)	—	—	—	−0.041	−0.002	(0.002)
Gender	—	—	—	−0.017	−0.018	(0.031)	—	—	—	−0.095*	−0.047*	(0.020)
Agreeableness	—	—	—	−0.073*	−0.060*	(0.025)	—	—	—	−0.160***	−0.061***	(0.016)
Conscientiousness	—	—	—	−0.045	−0.031	(0.021)	—	—	—	−0.230***	−0.074***	(0.014)
Neuroticism	—	—	—	0.001	0.001	(0.017)	—	—	—	−0.018	−0.005	(0.011)
R^2	—	0.152***	—	—	0.409***	—	—	0.115**	—	—	0.434***	—
ΔR^2	—	—	—	—	0.257***	—	—	—	—	—	0.318***	—

Note. $n = 1{,}110$; β represents standardized regression coefficients; *b* represents unstandardized regression coefficients; *SE* represents standard errors; Logged MET-minute/week score = logged scores of metabolic equivalent of task in minutes per week.
* $p < .05$. ** $p < .01$. *** $p < .001$.

cost–benefit analysis of the relationship between economic production and physical fitness by highlighting the potential financial savings that organizations and societies can achieve through increased physical fitness.

Implications for Research and Practice

Our research contributes to the self-control, physical fitness, and deviance literatures in several ways. Majority of research on self-control exertion tended to focus on the finding that self-control exertion impairs self-control capacity in the very short period immediately after the act of exertion (e.g., Baumeister et al., 1998; Muraven et al., 1998). In contrast to this perspective of self-control capacity being limited, our research adds to the body of work that highlights positive effects of successful self-control exertion for self-control capacity over time (Oaten & Cheng, 2006). We extend this literature to the important context of deviance by demonstrating with a set of rigorous tests that physical fitness builds up self-control capacity and helps people regulate their impulses to engage in deviance over time. In so doing, our results emphasize the importance of considering the time horizon of the impact of self-control exertion in terms of identifying positive ways in which self-control may be increased and the potential social benefits that might be attained in this manner.

Our study also adds to the deviance literature by focusing on a notable *physical* antecedent of deviance. Although individual differences, such as personality traits, have received extensive attention in research on antecedents of deviance (for a meta-analysis, see Berry et al., 2007), there is a dearth of work examining effects of physical characteristics on deviance in the organizational literature, even though such characteristics may be amenable to positive change (e.g., through physical activity). Our findings consistently disprove early criminology scholars who suggested that physically fit people are more likely to engage in deviant behavior (Lombroso, 1911; Sheldon et al., 1940), and paint a more positive picture of physical fitness. Our research challenges early research in criminology through a strong theoretical grounding and more robust methods to derive conclusive inferences regarding the relationship between physical fitness and deviance. In contrast to early criminology research that was largely atheoretical, we drew on self-control theory as our overarching model, and found support for the role of ego depletion in linking physical fitness and deviance. Hence, our research largely resolves a long-standing puzzle concerning the association between physical fitness and deviance, and is likely to end the outdated claims from criminology that still persist in education and popular discourse (Cullen & Wilcox, 2015; Maddan et al., 2008).

Despite the strengths of our research designs (i.e., macro- and micro-level data, rigorous operationalizations of our independent and dependent variables, diverse data sources, longitudinal design in Study 3, etc.), our studies have limitations that warrant future research. Studies 1 and 3 increased the internal validity of our conclusions using time-lagged analyses, and across studies, we controlled for potential confounding variables, however we are unable to fully exclude endogeneity concerns. Future studies could be conducted to provide stronger evidence of causality, for example by exploiting exogenous variation in physical fitness through random assignment to a program promoting physical fitness (e.g., a training and diet regime) using a waitlist design.

Table 9
Study 3: Results of Mediation Analysis (Logged MET-Minute/Week Score Influences Deviance Via Ego Depletion at the Same Time Wave)

Indirect effect		95% CI	
		LL	UL
Unstandardized coefficients			
Without control variables	−0.004	−0.007	−0.003
With control variables	−0.003	−0.007	−0.002
Standardized coefficients			
Without control variables	−0.014	−0.028	−0.011
With control variables	−0.012	−0.027	−0.010

Note. n = 1,416; Indirect effects are computed using a bootstrapping procedure with 5,000 resamples; CI = bias-corrected confidence intervals; LL = lower limit; UL = upper limit.

Future research can examine potential moderators of theoretical and practical relevance of the link between physical fitness and deviance as a way to identify organizationally actionable solutions. For example, different means through which organizations can reduce ego depletion can be examined as moderators, including workplace napping (Brown, 2004), job redesign (e.g., scheduling, reducing shift rotation; Christian & Ellis, 2011), and organizational policies such as encouraging employees to take micro-breaks during work (Mullins et al., 2014). Another important moderator to examine in future studies is trait self-control. Trait self-control refers to the temporally relatively stable between-person differences in capacity to regulate behaviors and inhibit impulses across domains and contexts (Tangney et al., 2004). Individuals high on trait self-control enjoy higher levels of physical and mental well-being, better interpersonal relations, and greater financial success (de Ridder et al., 2012; Tangney et al., 2004). When trait self-control is low, the relationship between physical fitness and deviance is likely to be strengthened as individuals with low trait self-control are more likely to conserve their limited self-control resources during self-control exertion (Baumeister & Vohs, 2007) and less effective in monitoring and regulating their goal-directed behavior (Wan & Sternthal, 2008; e.g., engaging in more physical activity and less deviance). In contrast, when trait self-control is high, the relationship between physical fitness and deviance is likely to be weakened because individuals with high trait self-control are more effective in allocating and investing their limited resources to inhibit their impulses to engage in deviance (Christian & Ellis, 2011; de Ridder et al., 2012). Testing this possibility is important, as it suggests that the observed relationship between physical fitness and deviance might be stronger among those chronically low in self-control, who are otherwise most vulnerable to a host of issues, including those concerning health, management of finances, learning, etc. (Baumeister et al., 2006).

Table 10
Study 3: Results of Mediation Analysis (Logged MET-Minute/Week Score at Time t Influences Deviance at Time t + 1 Via Ego Depletion at Time t + 1)

Indirect effect		95% CI	
		LL	UL
Unstandardized coefficients			
Without control variables	−0.002	−0.004	−0.001
With control variables	−0.002	−0.003	−0.002
Standardized coefficients			
Without control variables	−0.007	−0.016	−0.006
With control variables	−0.007	−0.014	−0.008

Note. n = 1,110; Indirect effects are computed using a bootstrapping procedure with 5,000 resamples; CI = bias-corrected confidence intervals; LL = lower limit; UL = upper limit.

In terms of practical implications of our findings, our work suggests that in the pursuit of economic benefits, managers and organizations should not neglect employees' physical fitness. Although our findings help predict who would be more likely to engage in deviant behavior, we hope that our research motivates organizations and economic systems to boost physical fitness among the less physically fit, as opposed to discriminating against such individuals. We propose that this is also a more sensible strategy given that physical fitness is malleable in a relatively short period of time (Corbin et al., 2008), so foregoing human capital potential based on this characteristic would also be problematic from an economic maximization standpoint. Thus, organizations may sponsor initiatives or interventions that include health seminars, corporate health, and fitness clubs to encourage physical activity and healthy behaviors (Conrad, 1988a, 1988b; Daley & Parfitt, 1996). Managers can also potentially draw on empirical evidence suggesting that financial incentives can motivate people to engage in physical activity and ultimately increasing physical fitness (Charness & Gneezy, 2009).

Conclusion

Across three studies, our results show that physical fitness is negatively related to deviance. Furthermore, we find that ego depletion mediates this relationship. Our findings challenge the widespread but empirically poorly supported claims from early criminology that physical fit individuals are more likely to engage in deviant behavior. In so doing, our studies uncover the social costs of being physically unfit beyond the well-documented detrimental effects on individual outcomes. Our research suggests that the immense negative consequences economic activity generate in terms of physical fitness also have hitherto invisible organizational and economic costs associated with them. By factoring in costs brought about through deviance, our hope is that organizations and societies will become more invested in promoting physical fitness.

References

Ainsworth, B. E., Haskell, W. L., Whitt, M. C., Irwin, M. L., Swartz, A. M., Strath, S. J., O'brien, W. L., Bassett, D. R., Jr., Schmitz, K. H., Emplaincourt, P. O., Jacobs, D. R., Jr., & Leon, A. S. (2000). Compendium of physical activities: An update of activity codes and MET intensities. *Medicine and Science in Sports and Exercise*, *32*(9), 498–504. https://doi.org/10.1097/00005768-200009001-00009

Arvey, R. D., Landon, T. E., Nutting, S. M., & Maxwell, S. E. (1992). Development of physical ability tests for police officers: A construct validation approach. *Journal of Applied Psychology*, *77*(6), 996–1009. https://doi.org/10.1037/0021-9010.77.6.996

Barella, L. A., Etnier, J. L., & Chang, Y. K. (2010). The immediate and delayed effects of an acute bout of exercise on cognitive performance of healthy older adults. *Journal of Aging and Physical Activity*, *18*(1), 87–98. https://doi.org/10.1123/japa.18.1.87

Barnes, C. M. (2012). Working in our sleep: Sleep and self-regulation in organizations. *Organizational Psychology Review*, *2*(3), 234–257. https://doi.org/10.1177/2041386612450181

Barnes, C. M., Lucianetti, L., Bhave, D. P., & Christian, M. S. (2015). "You wouldn't like me when I'm sleepy": Leaders' sleep, daily abusive supervision, and work unit engagement. *Academy of Management Journal*, *58*(5), 1419–1437. https://doi.org/10.5465/amj.2013.1063

Barnes, C. M., Schaubroeck, J., Huth, M., & Ghumman, S. (2011). Lack of sleep and unethical conduct. *Organizational Behavior and Human Decision Processes*, *115*(2), 169–180. https://doi.org/10.1016/j.obhdp.2011.01.009

Baumeister, R. F., & Alquist, J. L. (2009). Self-regulation as a limited resource: Strength model of control and depletion. In J. P. Forgas, R. F. Baumeister, & D. M. Tice (Eds.), *Psychology of self-regulation: Cognitive, affective, and motivational processes* (pp. 21–33). Psychology Press.

Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology*, *74*(5), 1252–1265. https://doi.org/10.1037/0022-3514.74.5.1252

Baumeister, R. F., Gailliot, M., DeWall, C. N., & Oaten, M. (2006). Self-regulation and personality: How interventions increase regulatory success, and how depletion moderates the effects of traits on behavior. *Journal of Personality*, *74*(6), 1773–1801. https://doi.org/10.1111/j.1467-6494.2006.00428.x

Baumeister, R. F., & Vohs, K. D. (2007). Self-regulation, ego depletion, and motivation. *Social and Personality Psychology Compass*, *1*(1), 115–128. https://doi.org/10.1111/j.1751-9004.2007.00001.x

Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science*, *16*(6), 351–355. https://doi.org/10.1111/j.1467-8721.2007.00534.x

Bennett, R. J., & Robinson, S. L. (2000). Development of a measure of workplace deviance. *Journal of Applied Psychology*, *85*(3), 349–360. https://doi.org/10.1037/0021-9010.85.3.349

Berry, C. M., Ones, D. S., & Sackett, P. R. (2007). Interpersonal deviance, organizational deviance, and their common correlates: A review and meta-analysis. *Journal of Applied Psychology*, *92*(2), 410–424. https://doi.org/10.1037/0021-9010.92.2.410

Blair, S. N., Cheng, Y., & Holder, J. S. (2001). Is physical activity or physical fitness more important in defining health benefits? *Medicine and Science in Sports and Exercise*, *33*(s6), 379–399. https://doi.org/10.1097/00005768-200106001-00007

Blair, S. N., & Church, T. S. (2004). The fitness, obesity, and health equation: Is physical activity the common denominator? *Journal of the American Medical Association*, *292*(10), 1232–1234. https://doi.org/10.1001/jama.292.10.1232

Boat, R., & Cooper, S. B. (2019). Self-control and exercise: A review of the bi-directional relationship. *Brain Plasticity*, *5*(1), 97–104. https://doi.org/10.3233/BPL-190082

Bouchard, C., Shephard, R. J., & Stephens, T. (1994). *Physicalactivity, fitness, and health: International proceedings and consensus statement*. Human Kinetics.

Broidy, L., & Agnew, R. (1997). Gender and crime: A general strain theory perspective. *Journal of Research in Crime and Delinquency*, *34*(3), 275–306. https://doi.org/10.1177/0022427897034003001

Brown, M. (2004). Taking care of business: Self-help and sleep medicine in American corporate culture. *Journal of Medical Humanities*, *25*(3), 173–187. https://doi.org/10.1023/B:JOMH.0000036636.43638.03

Bullard, P., & Resnik, A. (1983). Too many hands in the corporate cookie jar. *Sloan Management Review*, *25*(1), 51–56.

Burros, R. H. (1951). Three rational methods for the reduction of skewness. *Psychological Bulletin*, *48*(6), 505–511. https://doi.org/10.1037/h0060008

Bursik, R. J., & Grasmick, H. G. (1993). Economic deprivation and neighborhood crime rates, 1960–1980. *Law & Society Review*, *27*(2), 263–284. https://doi.org/10.2307/3053937

Cantor, D., & Land, K. C. (1985). Unemployment and crime rates in the post-World War II United States: A theoretical and empirical analysis. *American Sociological Review*, *50*(3), 317–332. https://doi.org/10.2307/2095542

Caspersen, C. J., Powell, K. E., & Christenson, G. M. (1985). Physical activity, exercise, and physical fitness: Definitions and distinctions for health-related research. *Public Health Reports*, *100*(2), 126–131. https://doi.org/10.2307/20056429

Center for Disease Control. (1996). *Physical activity and health: A report of the surgeon general*.

Charness, G., & Gneezy, U. (2009). Incentives to exercise. *Econometrica*, *77*(3), 909–931. https://doi.org/10.3982/ECTA7416

Christian, M. S., & Ellis, A. P. J. (2011). Examining the effects of sleep deprivation on workplace deviance: A self-regulatory perspective. *Academy of Management Journal*, *54*(5), 913–934. https://doi.org/10.5465/amj.2010.0179

Clark, A., Jit, M., Warren-Gash, C., Guthrie, B., Wang, H. H. X., Mercer, S. W., Sanderson, C., McKee, M., Troeger, C., Long, K., Checchi, F., Perel, P., Joseph, S., Gibbs, H. P., Banerjee, A., & Eggo, R. M. (2020). Global, regional, and national estimates of the population at increased risk of severe COVID-19 due to underlying health conditions in 2020: A modelling study. *The Lancet. Global Health*, *8*(8), 1003–1017. https://doi.org/10.1016/s2214-109x(20)30264-3

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). Lawrence Erlbaum.

Cohen, S., & Syme, S. L. (1985). Issues in the study and application of social support. In S. Cohen & S. L. Syme (Eds.), *Social support and health* (pp. 3–22). Academic Press.

Conrad, P. (1988a). Health and fitness at work: A participants' perspective. *Social Science & Medicine*, *26*(5), 545–550. https://doi.org/10.1016/0277-9536(88)90387-5

Conrad, P. (1988b). Worksite health promotion: The social context. *Social Science & Medicine*, *26*(5), 485–489. https://doi.org/10.1016/0277-9536(88)90381-4

Corbin, C., Welk, G., Corbin, W., & Welk, K. (2008). *Concepts of fitness and wellness: A comprehensive lifestyle approach*. McGraw-Hill Education.

Cornum, R., Matthews, M. D., & Seligman, M. E. P. (2011). Comprehensive soldier fitness: Building resilience in a challenging institutional context. *American Psychologist*, *66*(1), 4–9. https://doi.org/10.1037/a0021420

Côté, S. (2005). A Social interaction model of the effects of emotion regulation on work strain. *Academy of Management Review*, *30*(3), 509–530. https://doi.org/10.5465/amr.2005.17293692

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., Pratt, M., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine and Science in Sports and Exercise*, *35*(8), 1381–1395. https://doi.org/10.1249/01.MSS.0000078924.61453.FB

Cullen, F. T., & Wilcox, P. (2015). *The Oxford handbook of criminological theory*. Oxford University Press.

Daley, A. J., & Parfitt, G. (1996). Good health—Is it worth it? Mood states, physical well-being, job satisfaction and absenteeism in members and non-members of a British corporate health and fitness club. *Journal of Occupational and Organizational Psychology*, *69*(2), 121–134. https://doi.org/10.1111/j.2044-8325.1996.tb00604.x

de Jonge, J., & Dormann, C. (2006). Stressors, resources, and strain at work: A longitudinal test of the triple-match principle. *Journal of Applied Psychology*, *91*(6), 1359–1374. https://doi.org/10.1037/0021-9010.91.5.1359

de Ridder, D. T., Lensvelt-Mulders, G., Finkenauer, C., Stok, F. M., & Baumeister, R. F. (2012). Taking stock of self-control: A meta-analysis of how trait self-control relates to a wide range of behaviors. *Personality and

Social Psychology Review, *16*(1), 76–99. https://doi.org/10.1177/1088868311418749

DeWall, C. N., Baumeister, R. F., Stillman, T. F., & Gailliot, M. T. (2007). Violence restrained: Effects of self-regulation and its depletion on aggression. *Journal of Experimental Social Psychology*, *43*(1), 62–76. https://doi.org/10.1016/j.jesp.2005.12.005

Diamantopoulos, A., & Winklhofer, H. M. (2001). Index construction with formative indicators: An alternative to scale development. *JMR, Journal of Marketing Research*, *38*(2), 269–277. https://doi.org/10.1509/jmkr.38.2.269.18845

Duffy, M. K., Ganster, D. C., & Pagon, M. (2002). Social undermining in the workplace. *Academy of Management Journal*, *45*(2), 331–351. https://doi.org/10.5465/3069350

Duffy, M. K., Ganster, D. C., Shaw, J. D., Johnson, J. L., & Pagon, M. (2006). The social context of undermining behavior at work. *Organizational Behavior and Human Decision Processes*, *101*(1), 105–126. https://doi.org/10.1016/j.obhdp.2006.04.005

Dyer, N. G., Hanges, P. J., & Hall, R. J. (2005). Applying multilevel confirmatory factor analysis techniques to the study of leadership. *The Leadership Quarterly*, *16*(1), 149–167. https://doi.org/10.1016/j.leaqua.2004.09.009

Federal Bureau of Investigation. (2018). *FBI releases 2018 crime statistics*. https://www.fbi.gov/news/pressrel/press-releases/fbi-releases-2018-crime-statistics

Ferrari, S., & Cribari-Neto, F. (2004). Beta regression for modelling rates and proportions. *Journal of Applied Statistics*, *31*(7), 799–815. https://doi.org/10.1080/0266476042000214501

Finch, W. H., & Bolin, J. E. (2017). *Multilevel modeling using Mplus*. CRC Press.

Fox, K. R., & Hillsdon, M. (2007). Physical activity and obesity. *Obesity Reviews*, *8*(s1), 115–121. https://doi.org/10.1111/j.1467-789X.2007.00329.x

Gino, F., Schweitzer, M. E., Mead, N. L., & Ariely, D. (2011). Unable to resist temptation: How self-control depletion promotes unethical behavior. *Organizational Behavior and Human Decision Processes*, *115*(2), 191–203. https://doi.org/10.1016/j.obhdp.2011.03.001

Glueck, S., & Glueck, E. (1956). *Physique and delinquency*. Harper & Bros.

Gunderson, E. K., Rahe, R. H., & Arthur, R. J. (1972). Prediction of performance in stressful underwater demolition training. *Journal of Applied Psychology*, *56*(5), 430–432. https://doi.org/10.1037/h0033443

Hartl, E. M., Monnelly, E. P., & Elderkin, R. D. (1982). *Physique and delinquent behavior: A thirty-year follow-up of William H. Sheldon's varieties of delinquent youth*. Academic Press.

Hassard, J. (2017). Time and industrial sociology. In P. Slyton, J. Hassard, S. Hill, & K. Starkey (Eds.), *Time, work, and organization* (pp. 13–34). Routledge.

Hawkley, L. C., Thisted, R. A., & Cacioppo, J. T. (2009). Loneliness predicts reduced physical activity: Cross-sectional & longitudinal analyses. *Health Psychology*, *28*(3), 354–363. https://doi.org/10.1037/a0014400

Heatherton, T. F., & Wagner, D. D. (2011). Cognitive neuroscience of self-regulation failure. *Trends in Cognitive Sciences*, *15*(3), 132–139. https://doi.org/10.1016/j.tics.2010.12.005

Henrich, J. (2016). *The secret of our success*. Princeton University Press.

Hofmann, W., Schmeichel, B. J., & Baddeley, A. D. (2012). Executive functions and self-regulation. *Trends in Cognitive Sciences*, *16*(3), 174–180. https://doi.org/10.1016/j.tics.2012.01.006

Hogan, J. (1989). Personality correlates of physical fitness. *Journal of Personality and Social Psychology*, *56*(2), 284–288. https://doi.org/10.1037/0022-3514.56.2.284

Hogan, J. (1991). Structure of physical performance in occupational tasks. *Journal of Applied Psychology*, *76*(4), 495–507. https://doi.org/10.1037/0021-9010.76.4.495

Hooten, E. A. (1969). *The American criminal: An anthropological study*. Greenwood Press.

Huffman, A. H., Culbertson, S. S., & Castro, C. A. (2008). Family-friendly environments and U.S. Army soldier performance and work outcomes. *Military Psychology*, *20*(4), 253–270. https://doi.org/10.1080/08995600802345162

Inzlicht, M., & Schmeichel, B. J. (2012). What is ego depletion? Toward a mechanistic revision of the resource model of self-control. *Perspectives on Psychological Science*, *7*(5), 450–463. https://doi.org/10.1177/1745691612454134

Jackson, P. I. (1989). *Minority group threat, crime, and policing: Social context and social control*. Praeger Publishers.

John, O. P., Donahue, E. M., & Kentle, R. L. (1991). *The big five inventory—Versions 4a and 54*. Institute of Personality and Social Research, University of California.

Johns, G. (2010). Presenteeism in the workplace: A review and research agenda. *Journal of Organizational Behavior*, *31*(4), 519–542. https://doi.org/10.1002/job.630

Johnson, R. E., Lanaj, K., & Barnes, C. M. (2014). The good and bad of being fair: Effects of procedural and interpersonal justice behaviors on regulatory resources. *Journal of Applied Psychology*, *99*(4), 635–650. https://doi.org/10.1037/a0035647

Kanai, A. (2006). Economic and employment conditions, karoshi (work to death) and the trend of studies on workaholism in Japan. In R. J. Burke (Ed.), *Research companion to working time and work addiction* (pp. 158–172). Edward Elgar.

Kish-Gephart, J. J., Harrison, D. A., & Treviño, L. K. (2010). Bad apples, bad cases, and bad barrels: Meta-analytic evidence about sources of unethical decisions at work. *Journal of Applied Psychology*, *95*(1), 1–31. https://doi.org/10.1037/a0017103

Kodama, S., Saito, K., Tanaka, S., Maki, M., Yachi, Y., Asumi, M., Sugawara, A., Totsuka, K., Shimano, H., Ohashi, Y., Yamada, N., & Sone, H. (2009). Cardiorespiratory fitness as a quantitative predictor of all-cause mortality and cardiovascular events in healthy men and women: A meta-analysis. *Journal of the American Medical Association*, *301*(19), 2024–2035. https://doi.org/10.1001/jama.2009.681

Kotabe, H. P., & Hofmann, W. (2015). On integrating the components of self-control. *Perspectives on Psychological Science*, *10*(5), 618–638. https://doi.org/10.1177/1745691615593382

Kouchaki, M., & Smith, I. H. (2014). The morning morality effect: The influence of time of day on unethical behavior. *Psychological Science*, *25*(1), 95–102. https://doi.org/10.1177/0956797613498099

Kozlowski, S. W. J., & Klein, K. J. (2000). A multilevel approach to theory and research in organizations: Contextual, temporal, and emergent processes. In K. J. Klein & S. W. J. Kozlowski (Eds.), *Multilevel theory, research, and methods in organizations: Foundations, extensions, and new directions* (pp. 3–90). Jossey-Bass.

Kruttschnitt, C. (2013). Gender and crime. *Annual Review of Sociology*, *39*(1), 291–308. https://doi.org/10.1146/annurev-soc-071312-145605

Lanaj, K., Johnson, R. E., & Barnes, C. M. (2014). Beginning the workday yet already depleted? Consequences of late-night smartphone use and sleep. *Organizational Behavior and Human Decision Processes*, *124*(1), 11–23. https://doi.org/10.1016/j.obhdp.2014.01.001

Lanaj, K., Johnson, R. E., & Wang, M. (2016). When lending a hand depletes the will: The daily costs and benefits of helping. *Journal of Applied Psychology*, *101*(8), 1097–1110. https://doi.org/10.1037/apl0000118

Landis, R. S., Beal, D. J., & Tesluk, P. E. (2000). A comparison of approaches to forming composite measures in structural equation models. *Organizational Research Methods*, *3*(2), 186–207. https://doi.org/10.1177/109442810032003

LePine, J. A., LePine, M. A., & Jackson, C. L. (2004). Challenge and hindrance stress: Relationships with exhaustion, motivation to learn, and learning performance. *Journal of Applied Psychology*, *89*(5), 883–891. https://doi.org/10.1037/0021-9010.89.5.883

Lian, H., Yam, K. C., Ferris, D. L., & Brown, D. (2017). Self-control at work. *The Academy of Management Annals*, *11*(2), 703–732. https://doi.org/10.5465/annals.2015.0126

Lim, S., Cortina, L. M., & Magley, V. J. (2008). Personal and workgroup incivility: Impact on work and health outcomes. *Journal of Applied Psychology*, *93*(1), 95–107. https://doi.org/10.1037/0021-9010.93.1.95

Lin, S. H., & Johnson, R. E. (2015). A suggestion to improve a day keeps your depletion away: Examining promotive and prohibitive voice behaviors within a regulatory focus and ego depletion framework. *Journal of Applied Psychology*, *100*(5), 1381–1397. https://doi.org/10.1037/apl0000018

Little, T. D., Cunningham, W. A., Shahar, G., & Widaman, K. F. (2002). To parcel or not to parcel: Exploring the question, weighing the merits. *Structural Equation Modeling*, *9*(2), 151–173. https://doi.org/10.1207/s15328007sem0902_1

Lochner, L. (2004). Education, work, and crime: A human capital approach. *International Economic Review*, *45*(3), 811–843. https://doi.org/10.1111/j.0020-6598.2004.00288.x

Lochner, L., & Moretti, E. (2004). The effect of education on crime: Evidence from prison inmates, arrests, and self-reports. *The American Economic Review*, *94*(1), 155–189. https://doi.org/10.1257/000282804322970751

Lombroso, C. (1911). *Crime: Its causes and remedies*. William Hernemann.

Lowe, C. J., Hall, P. A., Vincent, C. M., & Luu, K. (2014). The effects of acute aerobic activity on cognition and cross-domain transfer to eating behavior. *Frontiers in Human Neuroscience*, *8*, Article 267. https://doi.org/10.3389/fnhum.2014.00267

Lu, J. G., Lee, J. J., Gino, F., & Galinsky, A. D. (2018). Polluted morality: Air pollution predicts criminal activity and unethical behavior. *Psychological Science*, *29*(3), 340–355. https://doi.org/10.1177/0956797617735807

Mackey, J. D., McAllister, C. P., Ellen, B. P., & Carson, J. E. (2019). A meta-analysis of interpersonal and organizational workplace deviance research. *Journal of Management*. Advance online publication. https://doi.org/10.1177/0149206319862612

Maddan, S., Walker, J. T., & Miller, J. M. (2008). Does size really matter? *The Social Science Journal*, *45*(2), 330–344. https://doi.org/10.1016/j.soscij.2008.03.009

Malina, R. M. (1996). Tracking of physical activity and physical fitness across the lifespan. *Research Quarterly for Exercise and Sport*, *67*(s3), 48–57. https://doi.org/10.1080/02701367.1996.10608853

Mawritz, M. B., Greenbaum, R. L., Butts, M. M., & Graham, K. A. (2017). I just can't control myself: A self-regulation perspective on the abuse of deviant employees. *Academy of Management Journal*, *60*(4), 1482–1503. https://doi.org/10.5465/amj.2014.0409

McCandless, B. R., Persons, W. S., III, & Roberts, A. (1972). Perceived opportunity, delinquency, race, and body build among delinquent youth. *Journal of Consulting and Clinical Psychology*, *38*(2), 281–287. https://doi.org/10.1037/h0020200

McFadden, D. (1974). Conditional logit analysis of qualitative choice behavior. In P. Zarembka (Ed.), *Frontiers in econometrics* (pp. 104–142). Academic Press.

Mead, N. L., Baumeister, R. F., Gino, F., Schweitzer, M. E., & Ariely, D. (2009). Too tired to tell the truth: Self-control resource depletion and dishonesty. *Journal of Experimental Social Psychology*, *45*(3), 594–597. https://doi.org/10.1016/j.jesp.2009.02.004

Miner, J. B., & Capps, M. H. (1996). *How honesty testing works*. Quorum Books.

Mischel, W. (1974). Process in delay of gratification. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 7, pp. 249–299). Academic Press.

Mischel, W. (1996). From good intentions to willpower. In P. Gollwitzer & J. Bargh (Eds.), *The psychology of action* (pp. 197–218). Guilford Press.

Montgomery, H., & Safari, L. (2007). Genetic basis of physical fitness. *Annual Review of Anthropology*, *36*(1), 391–405. https://doi.org/10.1146/annurev.anthro.36.081406.094333

Mullins, H. M., Cortina, J. M., Drake, C. L., & Dalal, R. S. (2014). Sleepiness at work: A review and framework of how the physiology of sleepiness impacts the workplace. *Journal of Applied Psychology*, *99*(6), 1096–1112. https://doi.org/10.1037/a0037885

Muraven, M., Baumeister, R. F., & Tice, D. M. (1999). Longitudinal improvement of self-regulation through practice: Building self-control strength through repeated exercise. *The Journal of Social Psychology*, *139*(4), 446–457. https://doi.org/10.1080/00224549909598404

Muraven, M., Tice, D. M., & Baumeister, R. F. (1998). Self-control as a limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology*, *74*(3), 774–789. https://doi.org/10.1037/0022-3514.74.3.774

Muthen, B. O. (1994). Multilevel covariance structure analysis. *Sociological Methods & Research*, *22*(3), 376–398. https://doi.org/10.1177/0049124194022003006

Oaten, M., & Cheng, K. (2006). Longitudinal gains in self-regulation from regular physical exercise. *British Journal of Health Psychology*, *11*(4), 717–733. https://doi.org/10.1348/135910706X96481

Ortega, F. B., Ruiz, J. R., Castillo, M. J., & Sjöström, M. (2008). Physical fitness in childhood and adolescence: A powerful marker of health. *International Journal of Obesity*, *32*(1), 1–11. https://doi.org/10.1038/sj.ijo.0803774

Orth, U., Clark, D. A., Donnellan, M. B., & Robins, R. W. (2020). Testing prospective effects in longitudinal research: Comparing seven competing cross-lagged models. *Journal of Personality and Social Psychology*. Advance online publication. https://doi.org/10.1037/pspp0000358

Pate, R. R., Pratt, M., Blair, S. N., Haskell, W. L., Macera, C. A., Bouchard, C., Buchner, D., Ettinger, W., Heath, G. W., King, A. C., Kriska, A., Leon, A. S., Marcus, B. H., Morris, J., Paffenbarger, R. S., Jr., Patrick, K., Pollock, M. L., Rippe, J. M., Sallis, J., & Wilmore, J. H. (1995). Physical activity and public health: A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *Journal of the American Medical Association*, *273*(5), 402–407. https://doi.org/10.1001/jama.1995.03520290054029

Pearson, C. M., & Porath, C. L. (2005). On the nature, consequences and remedies of workplace incivility: No time for "nice"? Think again. *The Academy of Management Perspectives*, *19*(1), 7–18. https://doi.org/10.5465/ame.2005.15841946

Pilcher, J. J., & Huffcutt, A. I. (1996). Effects of sleep deprivation on performance: A meta-analysis. *Sleep*, *19*(4), 318–326. https://doi.org/10.1093/sleep/19.4.318

Porath, C. L., & Erez, A. (2007). Does rudeness really matter? The effects of rudeness on task performance and helpfulness. *Academy of Management Journal*, *50*(5), 1181–1197. https://doi.org/10.5465/amj.2007.20159919

Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality*, *41*(1), 203–212. https://doi.org/10.1016/j.jrp.2006.02.001

Ranson, M. (2014). Crime, weather, and climate change. *Journal of Environmental Economics and Management*, *67*(3), 274–302. https://doi.org/10.1016/j.jeem.2013.11.008

Reiner, M., Niermann, C., Jekauc, D., & Woll, A. (2013). Long-term health benefits of physical activity—A systematic review of longitudinal studies. *BMC Public Health*, *13*, Article 813. https://doi.org/10.1186/1471-2458-13-813

Rhea, M. R., Alvar, B. A., & Gray, R. (2004). Physical fitness and job performance of firefighters. *Journal of Strength and Conditioning Research*, *18*(2), 348–352. https://doi.org/10.1519/R-12812.1

Robinson, S. L., & Bennett, R. J. (1995). A typology of deviant workplace behaviors: A multidimensional scaling study. *Academy of Management Journal*, *38*(2), 555–572. https://doi.org/10.5465/256693

Robinson, W. S. (1950). Ecological correlations and the behavior of individuals. *American Sociological Review*, *15*(3), 351–357. https://doi.org/10.2307/2087176

Schmeichel, B. J., & Baumeister, R. F. (2004). Self-regulatory strength. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 84–98). Guilford Press.

Schmeichel, B. J., & Vohs, K. (2009). Self-affirmation and self-control: Affirming core values counteracts ego depletion. *Journal of Personality and Social Psychology*, *96*(4), 770–782. https://doi.org/10.1037/a0014635

Sheldon, W. H., Hartl, W. M., & McDermott, E. (1949). *Varieties of delinquent youth: An introduction to constitutional psychiatry*. Harper and Brothers Publishers.

Sheldon, W. H., Stevens, S. S., & Tucker, W. B. (1940). *The varieties of human physique*. Harper and Brothers Publishers.

Sibley, B. A., Etnier, J. L., & Le Masurier, G. C. (2006). Effects of an acute bout of exercise on cognitive aspects of Stroop performance. *Journal of Sport & Exercise Psychology*, *28*(3), 285–299. https://doi.org/10.1123/jsep.28.3.285

Smith, P. J., Blumenthal, J. A., Hoffman, B. M., Cooper, H., Strauman, T. A., Welsh-Bohmer, K., Browndyke, J. N., & Sherwood, A. (2010). Aerobic exercise and neurocognitive performance: A meta-analytic review of randomized controlled trials. *Psychosomatic Medicine*, *72*(3), 239–252. https://doi.org/10.1097/PSY.0b013e3181d14633

Spector, P. E., Fox, S., Penney, L. M., Bruursema, K., Goh, A., & Kessler, S. (2006). The dimensionality of counterproductivity: Are all counterproductive behaviors created equal? *Journal of Vocational Behavior*, *68*(3), 446–460. https://doi.org/10.1016/j.jvb.2005.10.005

Stewart, S. M., Bing, M. N., Davison, H. K., Woehr, D. J., & McIntyre, M. D. (2009). In the eyes of the beholder: A non-self-report measure of workplace deviance. *Journal of Applied Psychology*, *94*(1), 207–215. https://doi.org/10.1037/a0012605

Stroebe, W., & Stroebe, M. (1996). The social psychology of social support. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles* (pp. 597–621). Guilford Press.

Swanson, C. A. (2012). *Financial crisis; Department of defense spending: How to control fraud, waste, and abuse in the military* [Unpublished master's thesis]. Marine Corps University.

Symons, D. (1990). Adaptiveness and adaptation. *Ethology and Sociobiology*, *11*(4–5), 427–444. https://doi.org/10.1016/0162-3095(90)90019-3

Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality*, *72*(2), 271–324. https://doi.org/10.1111/j.0022-3506.2004.00263.x

Taylor, R. R. (1986). A positive guide to theft deterrence. *Personnel Journal*, *65*(8), 36–40.

Tice, D. M., Baumeister, R. F., Shmueli, D., & Muraven, M. (2007). Restoring the self: Positive affect helps improve self-regulation following ego depletion. *Journal of Experimental Social Psychology*, *43*(3), 379–384. https://doi.org/10.1016/j.jesp.2006.05.007

Tittle, C. R., Ward, D. A., & Grasmick, H. G. (2003). Gender, age, and crime/deviance: A challenge to self-control theory. *Journal of Research in Crime and Delinquency*, *40*(4), 426–453. https://doi.org/10.1177/0022427803256074

Tonry, M. (1997). Ethnicity, crime, and immigration. *Crime and Justice*, *21*, 1–29. https://doi.org/10.1086/449248

Totterdell, P., & Holman, D. (2003). Emotion regulation in customer service roles: Testing a model of emotional labor. *Journal of Occupational Health Psychology*, *8*(1), 55–73. https://doi.org/10.1037/1076-8998.8.1.55

Treviño, L. K., Weaver, G. R., & Reynolds, S. J. (2006). Behavioral ethics in organizations: A review. *Journal of Management*, *32*(6), 951–990. https://doi.org/10.1177/0149206306294258

Tulppo, M. P., Makikallio, T. H., Seppanen, T., Laukkanen, R. T., & Huikuri, H. V. (1998). Vagal modulation of heart rate during exercise: Effects of age and physical fitness. *The American Journal of Physiology*, *274*(2), 424–429. https://doi.org/10.1152/ajpheart.1998.274.2.H424

Virtanen, M., Heikkilä, K., Jokela, M., Ferrie, J. E., Batty, G. D., Vahtera, J., & Kivimäki, M. (2012). Long working hours and coronary heart disease: A systematic review and meta-analysis. *American Journal of Epidemiology*, *176*(7), 586–596. https://doi.org/10.1093/aje/kws139

Vohs, K. D., Baumeister, R. F., & Ciarocco, N. J. (2005). Self-regulation and self-presentation: Regulatory resource depletion impairs impression management and effortful self-presentation depletes regulatory resources. *Journal of Personality and Social Psychology*, *88*(4), 632–657. https://doi.org/10.1037/0022-3514.88.4.632

Vohs, K. D., & Ciarocco, N. J. (2004). Interpersonal functioning requires self-regulation. In R. F. Baumeister & K. D. Vohs (Eds.), *Handbook of self-regulation: Research, theory, and applications* (pp. 392–407). The Guilford Press.

Walby, K., & Carrier, N. (2010). The rise of biocriminology: Capturing observable bodily economies of "criminal man." *Criminology & Criminal Justice*, *10*(3), 261–285. https://doi.org/10.1177/1748895810370314

Wan, E. W., & Sternthal, B. (2008). Regulating the effects of depletion through monitoring. *Personality and Social Psychology Bulletin*, *34*(1), 32–46. https://doi.org/10.1177/0146167207306756

Wanjek, C. (2005). *Food at work: Workplace solutions for malnutrition, obesity and chronic diseases*. International Labour Office.

Wilson, J. Q., & Herrnstein, R. J. (1985). *Crime and human nature*. Simon & Schuster.

World Bank. (2020). *How tackling the world's deadliest diseases can boost a healthy workforce and economic growth*. https://www.worldbank.org/en/news/immersive-story/2020/02/06/tackling-worlds-deadliest-diseases-can-boost-healthy-workforce-and-economic-growth

World Health Organization. (2018). *World health statistics*. http://apps.who.int/iris/bitstream/handle/10665/272596/9789241565585-eng.pdf?ua=1

Wyatt, S. B., Winters, K. P., & Dubbert, P. M. (2006). Overweight and obesity: Prevalence, consequences, and causes of a growing public health problem. *The American Journal of the Medical Sciences*, *331*(4), 166–174. https://doi.org/10.1097/00000441-200604000-00002

Yam, K. C., Fehr, R., Keng-Highberger, F. T., Klotz, A. C., & Reynolds, S. J. (2016). Out of control: A self-control perspective on the link between surface acting and abusive supervision. *Journal of Applied Psychology*, *101*(2), 292–301. https://doi.org/10.1037/apl0000043

Zou, Z., Liu, Y., Xie, J., & Huang, X. (2016). Aerobic exercise as a potential way to improve self-control after ego-depletion in healthy female college students. *Frontiers in Psychology*, *7*, Article 501. https://doi.org/10.3389/fpsyg.2016.00501