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Evolutionary benefits of personality traits when facing workplace bullying

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ABSTRACT

Facing workplace bullying negatively affects physical and mental health, and consequently quality of life and well-being. Personality traits that can help an individual survive and reproduce entail more benefits than costs. Building on two evolutionary theories, Life History Theory and Costly Signaling Theory, this study aims to provide novel insights into *how* and *why* personality traits are associated with facing workplace bullying and health-related quality of life. A heterogeneous group of 324 employees in Sweden provided data on workplace bullying, perceived health-related quality of life, and personality traits, controlling for sex and age. We found that openness (HEXACO model) and Machiavellianism (Dark Triad model) served as moderators. Employees with high values of these traits experienced significantly less affected health-related quality of life when facing workplace bullying. Our results indicate evolutionary origins of the personality traits openness and Machiavellianism. A new finding is that possessing, exhibiting, and maintaining traits reflecting a more creative and competitive interpersonal style increases an employee's ability to survive aversive environments.

1. Introduction

Work is important for people's health, quality of life and well-being, and for providing them with meaning and income. Between 2% and 30% of working people worldwide are targets of workplace bullying (Nielsen et al., 2010). Workplace bullying occurs when an employee, without the possibility to control the situation, is exposed to frequent and prolonged escalation of destructive acts and attitudes, such as harassment, offensiveness, and social exclusion which negatively and persistently affect his or her work (Einarsen & Mikkelsen, 2003). Meta-analyses and reviews (Nielsen & Einarsen, 2012; Verkuil et al., 2015) show that facing workplace bullying is significantly related to mental health problems (anxiety, depression), poor welfare (low quality of life, poor sleep), and physical ill health (neck pain, headache). Some researchers argue (e.g. Book et al., 2012; Volk et al., 2018) that an evolutionary approach may be relevant for providing insights into different contexts of bullying behaviors. In the current study, we try to explain bullying 'survival' by applying a new perspective on workplace bullying (Monks et al., 2009). To safeguard their health-related well-being targets of workplace bullying need to 'survive' their adverse work environment by rapidly signaling effective and innovative strategies, feelings, cognitions, and behaviors.

1.1. Evolutionary theories: life history theory and costly signaling theory

By describing two evolutionary theories (Buss, 2009), Life History Theory and Costly Signaling Theory, we introduce the basic theoretical foundation upon which we may interpret our results. Comparing with our pre-agriculture ancestors, who spent most of their daily time hunting and defending the group (males) or collecting, cooking and childrearing (women), people today, irrespective of sex, spend most of their daily time at work. Psychological theories with their evolutionary origins have previously been helpful for explaining the meaning of behaviors and tactics in modern workplace environments (e.g. Jonason et al., 2015; McClanahan, 2020).

The *Life History Theory* (Kaplan & Gangestad, 2005) posits that everyone has limited time and energy resources and therefore uses this energy effectively "to successfully select, attract, and retain a mate, at least long enough for successful conception" (Buss, 2009, p. 361). As problem-solving requires energy, and as the solving of one problem uses energy that could have been used to solve another problem, people tend to allocate their energy towards different forms of investments, which "ultimately increase the reproductive success of genetic relatives" (Buss, 2009, p. 361). An example of such strategic investment may be to have many offspring but invest as little as possible in each or only in some of

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them (fast strategy); or have one or few offspring but invest heavily in all of them (slow strategy). Nevertheless, the long-term commitment is closely related to the current workplace context. Most people spend more than half of their lives at their work. The workplace is a very important life area for the individual's strivings and for enhancing and maintaining his or her health, quality of life and well-being. The Life History Theory is often used to understand how people adopt certain forms of strategies (fast or slow) in view of limited resources. In face of workplace bullying a target needs to effectively allocate his or her limited resources by being creative to safeguard and protect health, quality of life and well-being.

The *Costly Signaling Theory* (Buss, 2009) is closely linked to the Life History Theory and posits that individuals compete with each other "in sending signals to others about their quality as a mate, friend, and coalition member. Those perceived as having the highest quality have an advantage in being chosen by the highest quality mates, friends, and coalitions /…/ If individuals exaggerate their value, they might succeed in obtaining mates or friends who would be otherwise out of their league" (Buss, 2009, p. 361). This theory proposes that 'costly' signals *artificially* an increase in the perceived value of desirable personal characteristics and personal access to resources far beyond the person's real value. Such costliness carries meaning for something. Costly Signaling Theory was initially developed to explain characteristics related to form and structure (morphology) as honest signals of an individual's underlying qualities in the context of looking for a potential mate. Recently, the scope of this theory has been expanded to explain the meaning of the signals of different acts and behaviors, for example philanthropy, risk taking and heroism, conspicuous consumption, and religious commitment (McAndrew, 2019).

How may Costly Signaling Theory be an appropriate evolutionary theory for explaining traits in a work context? Workplace bullying is costly for bullied employees who risk their well-being, health, good social reputation, and sometimes injury. It is related to frequent and prolonged escalation of destructive acts (e.g. harassment, offensiveness, and social exclusion) and these acts have negative and persistent impacts on mental and physical health (Einarsen & Mikkelsen, 2003; Nielsen & Einarsen, 2012; Verkuil et al., 2015). Workplace bullying is also costly for organizations. By sending fast and creative signals to others in the group of coworkers that one is 'immune' against bullying or that one is a winner in a tough workplace bullying context, or even by being willing to use bullying tactics, one may create an image of possessing successful qualities (strength, good health, energy, and courage) and skills (such as social engagement, innovation, and creativity, see Soto et al., 2020) as a mate, friend, and coalition member. These signals need be sufficiently strong and naturally sincere, because the group members know that "success cannot be faked" (Buss, 2009, p. 361). Evolutionarily speaking, "there has been significant selective pressure to develop strategies for detecting honest signals of quality in others (i.e., cheaters will be punished)" (McAndrew, 2019, p. 2). Potential targets of bullying need to send high-quality signals conveying the message that it is best to show respect and select another target for bullying. The signaler must convey that he or she has both the skills and resources necessary to ensure health-related quality of life by being dominant, energetic, creative, and capable of building effective coalitions. The signals of possessing successful qualities must be visible to others and be strong enough to convince and dissuade potential bullies. The senders of signals containing high values of these qualities must have sufficient resources to spend and must be able to easily afford a high-quality signal. According to Grafen (1990) the adaptive benefits will outweigh the costs.

1.2. How do evolutionary theories apply to the HEXACO model?

There are general personality traits, known as HEXACO (Ashton & Lee, 2007) consisting of honesty-humility, emotionality/neuroticism, extraversion, agreeableness, conscientiousness, and openness. The HEXACO traits have shown substantial heritability, and this is generally in line with the evolutionary perspective of personality traits.

Life History Theory conceptualizes why personality traits characterized by vigorous and cognitively fast actions, typical for extraversion and openness, may be viewed as an adaptive strategy (Daly & Wilson, 2005). Using fast strategy is an issue of high level of energy, cognition, and creativity. Both extraversion and openness are parts of an *agentic* meta-factor reflecting "strivings for mastery, power, self-assertion, and self-expansion" (Digman, 1997, p. 1250). Through advances in personality neuroscience agency illuminates *plasticity* defined as "the general tendency to explore and engage with possibilities" (McCrae & Costa, 2015, p. 21). Individual differences in plasticity are believed to be influenced by neurotransmitter dopamine, which in turn impacts on the levels of both extraversion and openness, but in different ways. Dopamine influences motivation, emotion, and reward (extraversion), and higher cognition (openness) (McCrae & Costa, 2015).

In evolutionary psychology, Costly Signaling Theory is usually applied to explain major individual differences (e.g. Miller, 2000), for instance differences in personality traits. Such explanations emphasize the benefits of changing the perceptions of others and the need to do so in ways that are difficult to fake, which requires trustworthy information to avoid manipulation through dishonest signals. People high in extraversion and openness are perceived as agentic (dominant, 'self-interested') and strive for qualities attracting the highest quality mates and friends. Only those who possess the best physical condition, being most energetic and having sufficient good economic resources may send visible signals of possessing such resources, and thus attract mates and friends. Below, we have identified, based on the HEXACO model, the characteristics that are conceptually relevant for this study of people with high values on extraversion and openness (Ashton & Lee, 2007).

1.2.1. Conceptual benefits over costs of each investigated trait from the HEXACO model

When conceptualizing possible benefits over possible costs of each investigated trait when facing workplace bullying, we primarily consider high levels of each trait. Our focus is on occupational psychology, on the benefits and costs in terms of health-related quality of life. High levels of *extraversion* comprise important adaptive behavioral components at work such as being socially dominant, powerful, and vigorous, active, positive, and sociable. This trait reflects aspects of the motivation to be socially cooperative with others, but also to be domineering (Buss, 1991). Those high on extraversion will exchange energy with others within the work environment and within different relationships. Employees high in extraversion are prone to have more social connections inside the organization and more varied professional alternatives. Extraversion reflects a mixture of dominance and vitality. Evolutionarily, extraversion reflects the most obvious individual difference. Even at the first meeting with strangers, by simply observing their face and posture, it is possible to assess the level of their extraversion (Connelly & Ones, 2010), which presents an evolutionary advantage. From an adaptive perspective, our best guess about a possibly causal moderating link of extraversion would be that people who signal social dominance (boldness) and status, are vigorous, and care about social relationships may be more tolerant when facing workplace bullying if it allows them to maintain their social access and relationships. In other words, as long as one is still liked by most people in the organization, i.e. one experiences significant benefits from the group membership, being bullied by other people is a cost that one may be willing to accept.

High levels of *openness* also reflect adaptive behavioral components at work such as being creative, flexible, interested in and curious of others, but also being tolerant and open to change. People high in openness appreciate art, eccentric ideas, adventure, and imagination (Sibley, 2012).

People high in openness tended to be creative at work, which is summarized in several meta-analyses (e.g. Zare & Flinchbaugh, 2019).

Creativity, defined as an ability to develop novel and useful ideas to a particular task (Amabile, 1983), may be an adaptive aspect of openness. It is also linked with organizational effectiveness (Detert & Burris, 2007). This personality trait reflects a preference for cognitive engagement. People high in this trait prefer to 'do away with the old', are interested in new ideas and more eager to explore new perspectives (Wu & Hu, 2013). In evolutionary terms, likely costs of high openness are expenditure of energy. High levels of openness may expend energy in the pursuit of rewards generated by novel ideas or new ways of doing things (Ashton & Lee, 2007). The question is whether openness may minimize the costs of being bullied. We argue that openness constitutes a key resource providing an employee with a large range of strategies for coping with bullying. Possessing high openness facilitates an appropriate selection and implementation of these resources (Hildenbrand et al., 2018). Openness is also associated with reinterpretation and problem-focused strategies (Xu & Chopik, 2020). Due to being more tolerant, assertive, and willing to accept novelty, openness reflects a flexible, imaginative, and intellectually curious approach in dealing with stressful events (Rai & Agarwal, 2019; Wu & Hu, 2013).

In sum, in terms of the HEXACO model, extraversion and openness may theoretically be possible moderators in the relationship between workplace bullying and health-related quality of life. Some emerging findings suggest that these personality traits may be especially important conditional factors with regard to the health outcomes in the context of bullying (Butucescu et al., 2020; Nielsen & Einarsen, 2018) and other stressful events, e.g. workplace discrimination (Xu & Chopik, 2020). According to Nielsen and Einarsen, bullying is a costly process and is related to reduced individual resources. Effective reallocation of resources is therefore intended. Given the theoretical evolutionary approach of our study, we propose the following hypothesis:

H1. We hypothesize that personality traits expressing openness, creativity, dominance and a need to socialize with others (i.e. openness and extraversion) moderate the negative association between facing workplace bullying and health-related quality of life.

1.3. How do evolutionary theories apply to the Dark Triad model?

There are also malevolent and offensive personality traits, known as the Dark Triad (Jones & Paulhus, 2014; Paulhus & Williams, 2002), consisting of subclinical narcissism, Machiavellianism, and subclinical psychopathy. During recent years, when applying the evolutionary perspective (Buss, 1995), attention has been drawn to provide a possible adaptive role of these traits in workplace environments (e.g. Jonason et al., 2015).

Narcissism is highly correlated with extraversion. Consequently, these traits would have similar adaptive functions in the workplace environment. We suppose that in addition to being socially dominant and agentic (narcissism), it would also be adaptive to be competitive and strategic. When experiencing bullying the target would not wait too long to act. It is important to use the limited energy for acting as soon as possible to form successful coalitions and to persuade managers to intervene to stop the negative consequences of bullying. Thus, a fast life strategy would be more effective.

We believe that Costly Signaling Theory will explain how and why even socially aversive personality traits may be associated with facing workplace bullying and promoting health-related quality of life. We will try to argue that *signaling* a dominant, competitive, and strategic coalition-building interpersonal style has the potential to increase an employee's ability to survive aversive environments. Promoting one's own values, being dominant and self-promotion are typical for people with narcissism, while competition and strategic coalition building are typical for Machiavellians.

1.3.1. Conceptual benefits over costs of each investigated Dark Trait

The Dark Triad traits, especially narcissism and Machiavellianism, but not psychopathy, may improve the interpersonal functioning and possibly well-being of the employees possessing them, because these traits possess adaptive components such as being strategic and dominant (Furnham et al., 2013).

Narcissistic people build social networks (O'Boyle et al., 2015), in both private and workplace environments. Their behavior reflects tactics to gain power and to this end they may be more tolerant of being bullied. By building coalitions and developing social strategies they may minimize the costs of being bullied, but they do not easily share information about themselves, which may hamper the establishment of coalitions. People high in narcissism tend to impress by making themselves very presentable. They attract attention by bragging about themselves, and by going to great lengths to show their talents and abilities in front of others (Wallace & Baumeister, 2002). These behaviors are driven by a desire for status and the clear signaling of this status to onlookers, probably to demonstrate superior genetic or personal qualities. Grapsas et al. (2020) offer a model helping to understand people high in narcissism, how they estimate whether they can enhance their own social status or reduce the status of others. Their willingness and ability to self-promote or self-abnegate may be helpful in face of bullying.

People high in *Machiavellianism* are often cold, but charming and cunning with a cynical worldview and they strive for power, money, and status (Rauthmann & Kolar, 2012). They focus on themselves (are agentic) and their self-interests and use interpersonal strategies, manipulation, deception, and exploitation of others to satisfy their own needs and desires (Christie & Geis, 1970). People high in Machiavellianism tend to get what they want and are good strategists in reputation-building, coalition formation, and revenge actions (Rauthmann & Will, 2011). Buss (1995) argued that many important adaptive issues for people are social, for example there are several challenges in forming successful coalitions. This may be especially challenging in workplace groups. When facing bullying, it may be necessary to form a successful coalition, which requires identifying key resources possessed by potential allies, assessing which of the co-workers assess these key resources, modelling the values of these friends, estimating or determining the magnitude, amount, or volume of potential sources of strategic inference, and "initiating sequential and incremental chains of reciprocity, and detecting signs of 'cheating' or nonreciprocity" (Buss, 1995, p. 9). Even high levels of malevolent traits comprise adaptive components (Jonason et al., 2010). Therefore, in terms of the Dark Triad model, Machiavellianism and narcissism may be possible moderators in our study.

H2. We hypothesize that personality traits expressing competitiveness (i.e. Machiavellianism and narcissism) moderate the negative association between facing workplace bullying and health-related quality of life.

1.4. Aims

This study aims to provide novel insights into *how* and *why* personality traits are associated with facing workplace bullying and health-related quality of life. We have applied an evolutionary personality-related approach (Buss, 1991) that enables us to understand and interpret different forms of behavior as a form of evolutionary adaptation. Possessing high values of some personality traits may protect (evolutionarily speaking: 'adapt') and help bullying targets survive the process of being a target in an aversive workplace environment. This perspective is a new one.

2. Methods

2.1. Participants

A power analysis using G*Power 3.1.9.2 (Faul et al., 2009) suggested a minimum sample size of 316 participants given the number of

independent factors in the interaction model, an alpha of 0.05, a statistical power of 0.80 (for the average effect size in social and personality psychology), and an effect size of 0.025 (for the large effect size in tests of moderation, see Kenny, 2016; Hair Jr. et al., 2016). Our cross-sectional survey was answered by 324 people.

The participants (70% female; 58% married or cohabiting; 17% non-cohabiting partner; 25% single), aged from 17 to 75 years ($M = 40$, $SD = 11.3$), included a heterogeneous group of employees in Sweden. Most of them (74%) had full-time employment, and 18% had staff responsibility. They had worked at the same workplace from 0.1 to 41 years ($M = 6$, $SD = 5.5$). The size of their actual work group varied from 1 to 75 coworkers ($M = 16$, $SD = 10.2$). The educational levels of the participants were: elementary/middle school (9 years) (7%); high school/occupational education (3 years) (23%); college/university (<3 years) (35%); or bachelor's degree or higher (3 years or more) (35%). Because we included sex and age as control variables in the moderation analyses, they are based on 319 participants only (missing data below 1%).

2.2. Instruments

2.2.1. Independent variable: workplace bullying

The Negative Acts Questionnaire-Revised (NAQ-R) (Einarsen et al., 2009) is a measure designed to capture the extent to which one encounters workplace bullying. The respondents respond to 22 items dealing with how often they have been subjected to specific negative behaviors or situations at their workplace during the last six months. Responses are given on a five-point scale from 1 (*never*) to 5 (*daily*). We used a Swedish version (Dåderman & Ragnestål-Impola, 2019) of the NAQ-R.

2.2.2. Dependent variable: perceived health-related quality of life

The EuroQol Five-Dimension Questionnaire (EQ-5D-3L; Nordlund et al., 2005) is one of the most widely used standardized measures to evaluate perceived health-related quality of life. The EQ-5D-3L questionnaire (EQ-5D) comprises five statements regarding possible difficulties with mobility, self-care, ability to perform daily activities, pain or discomfort, and anxiety or depression. The possible responses are *no difficulties*, *some difficulties*, and *extreme difficulties*. We used the officially translated version of the EQ-5D (euroqol.org), and calculated an index for each participant using a table produced by Burström et al. (2014, Table 6), based on a large selection of Swedish health-related data.

2.2.3. Moderating variables: personality traits

The short version of the International Personality Item Pool (Mini-IPIP6) (Sibley, 2012) is a measure of extraversion, agreeableness, conscientiousness, neuroticism, openness, and honesty-humility (HEXACO model). Each scale consists of four items. The response options range from 1 (*very inaccurate*) to 7 (*very accurate*). We used the Swedish version (translated by Bäckström; Dåderman & Ragnestål-Impola, 2019) of the Mini-IPIP6.

The Short Dark Triad (SD3) scales (Jones & Paulhus, 2014) measure socially aversive personalities (Machiavellianism, subclinical psychopathy, and subclinical narcissism). Each scale consists of nine items. The response options range from 1 (*strongly disagree*) to 5 (*strongly agree*). We used a Swedish version (translated and adapted by Lindén and Dåderman; Dåderman & Ragnestål-Impola, 2019) of the SD3.

3. Procedure

Most of the participants ($n = 204$) were recruited individually by a master's student and volunteers through their personal contacts and networks using a snowball method (Biernacki & Waldorf, 1981). Those who agreed to participate answered the anonymous questionnaires, put them in 'prepaid' and addressed envelopes, and posted them to the first author's faculty. To finish the study additional anonymous data ($n = 120$) were sampled using a snowball method through personal contacts and networks by posting an online link to the survey using online questionnaires.[1]

The participation in the study was voluntary, and the questionnaires were anonymous and confidential, as ensured by the data collection procedure used. All participants were informed of the nature of the study and provided consent to participate. The response rate could not be determined.

4. Results

4.1. Descriptive results and correlational analyses

Harman's single factor test was performed to control common method variance (CMV) (Podsakoff et al., 2003). Results of unrotated Principal Factor Analysis indicated that first factor explained 31.4% of the total variance. Thus, CMV was not a problem in our study.

Table 1 shows the descriptive statistics and bivariate correlations.

Numerous correlations were evident between personality traits and facing workplace bullying: negative with extraversion, and positive with neuroticism and Machiavellianism; as well as between personality traits and the measure of health-related quality of life: positive with extraversion and openness, and negative with neuroticism (Table 1). The correlation between narcissism and extraversion was strong; between Machiavellianism and extraversion it was weak. In line with the Dark Triad theory (Paulhus & Williams, 2002), Machiavellianism and openness were only marginally correlated. The Dark Triad traits scales were relatively highly correlated. However, a Variance Inflation Factor was 2.3. The value below 4 indicates that the results might not be inflated by multicollinearity.

4.2. Moderation analyses

We conducted moderation using version 3.4 of the PROCESS macro (Hayes, 2018) in SPSS-v25, applying an ordinary least squares approach and a bootstrap method (with 5000 bootstrapped samples) to estimate the conditional (moderated) effects.

4.2.1. Moderation by personality traits from the HEXACO model

We hypothesized that personality traits expressing openness and a need to socialize with others, i.e. openness and extraversion, moderate the negative association between facing workplace bullying and health-related quality of life. The model using extraversion as a moderator explained 18% of the variance in health-related quality of life ($F(5, 313) = 14.06$, $p < 0.001$). There was a significant extraversion main effect ($b = 0.15$, $SE = 0.05$, 95% CI = 0.052 to 0.257), but not an interaction effect ($b = 0.05$, $SE = 0.05$, 95% CI = −0.037 to 0.140). The model using openness as a moderator explained 18% of the variance in health-related quality of life ($F(5, 313) = 14.48$, $p < 0.001$). There was a significant openness and facing workplace bullying main effect as well as interaction effect (Table 2). The significant interaction effect explained an additional 1.3% of the variance ($F(1,313) = 5.20$, $p < 0.05$). The slope coefficients were − 0.43 ($p < 0.001$) for low, −0.33 ($p < 0.001$) for average, and − 0.23 ($p < 0.001$) for high openness, implying that the examined relationship was stronger when openness decreased (Fig. 1). To explore possible shared variance between HEXACO personality traits we used other HEXACO personality traits as control variables. An interaction effect was still observed: $R^2 = 0.27$, $F(10, 308) = 11.37$, $p < 0.01$; $\Delta R^2 = 1.4\%$, $F(1, 308) = 5.79$, $p = 0.017$. As Supplemental information, Supplementary Tables A1 and A2 provide details of this

[1] This latter group comprised significantly more women and these participants were significantly younger, healthier, and lower in the Dark Triad personality traits as well as HEXACO traits, excluding extraversion and conscientiousness. The two groups did not differ regarding their experience of workplace bullying.

Table 1
Descriptive statistics and Pearson's correlation coefficients ($N = 324$).

	M	*SD*	α	1	2	3	4	5	6	7	8	9	10	11	12
1. NAQ-R	36.01	10.85	0.92	–											
2. EQ-5D index	0.89	0.09	–	−0.34**	–										
HEXACO															
3. Extraversion	4.39	1.27	0.84	−0.16**	0.21**	–									
4. Agreeableness	5.43	0.99	0.75	−0.09	0.10	−0.02	–								
5. Conscientiousness	5.46	1.06	0.77	−0.09	0.02	0.05	0.17**	–							
6. Neuroticism	3.25	1.04	0.68	0.20**	−0.27**	−0.14**	0.00	−0.17**	–						
7. Openness	5.04	0.93	0.65	−0.07	0.15**	0.22**	0.20**	0.00	−0.08	–					
8. Honesty-humility	4.51	1.29	0.78	−0.06	0.10	−0.39**	0.43**	−0.01	0.06	0.03	–				
Dark Triad															
9. Narcissism	2.84	0.69	0.82	0.03	0.11	0.61**	−0.33**	0.03	−0.19**	0.12*	−0.62**	–			
10. Machiavellianism	2.60	0.61	0.81	0.12*	−0.09	0.25**	−0.47**	−0.06	−0.05	0.01	−0.60**	0.58**	–		
11. Psychopathy	1.90	0.62	0.80	0.08	0.08	0.39**	−0.54**	−0.09	−0.11	−0.02	−0.52**	0.69**	0.63**	–	
Control variables															
12. Sex (0 = female, 1 = male)	0.30	0.46	–	-0.00	0.17**	−0.01	−0.36**	−0.21**	−0.24**	−0.08	-0.21**	0.22**	0.14*	0.39**	–
13. Age	39.92	11.30	–	0.11	−0.14*	−0.08	−0.05	0.19**	−0.20**	−0.07	0.06	0.09	0.07	0.04	0.01

Note. *$p < 0.05$; **$p < 0.01$; M = mean; SD = standard deviation; NAQ-R = The Negative Acts Questionnaire-Revised; EQ-5D Index = Indicator of health-related quality of life. The average inter-item correlations for all measures exceeded the acceptable value of 0.30 (Briggs & Cheek, 1986); it was 0.33 for the openness scale.

analysis.

4.2.2. Moderation by personality traits from the Dark Triad

We hypothesized that personality traits expressing competitiveness, i.e. Machiavellianism and narcissism, moderate the negative association between facing workplace bullying and health-related quality of life (Table 2). The model using Machiavellianism as a moderator explained 17% of the variance in health-related quality of life ($F(5, 313) = 13.81$, $p < 0.001$). The significant interaction effect explained an additional 2.5% of the variance ($F(1, 313) = 8.07$, $p < 0.05$). Further, we used other Dark Triad personality traits as control variables, and an interaction effect was still observed: $R^2 = 0.20$, $F(7, 311) = 11.07$, $p < 0.001$; $\Delta R^2 = 1.4\%$, $F(1,311) = 5.55$, $p = 0.019$.

The slope coefficients were −0.44 ($p < 0.001$) for low, −0.30 ($p < 0.001$) for average, and −0.18 ($p > 0.05$) for high Machiavellianism, implying that the examined relationship was stronger when Machiavellianism decreased (Fig. 2).

The model using narcissism as a moderator accounted for 17% of the variance in health-related quality of life ($F(5, 313) = 13.04$, $p < 0.001$). There was a non-significant narcissism main effect ($b = 0.09$, $SE = 0.05$, 95% CI = −0.014 to 0.195), as well as a non-significant interaction effect ($b = 0.07$, $SE = 0.05$, 95% CI = −0.016 to 0.161). As Supplemental information, Supplementary Tables A1 and A3 provide details of this analysis.

5. Discussion

Our study shows that only two of four hypothesized personality traits significantly moderate the relationship between facing workplace bullying and health-related quality of life, controlling for sex and age. We believe that these traits, i.e. openness and Machiavellianism, express an evolutionary adaptive strategy when facing workplace bullying.

With regards H1, only one of the personality traits of the HEXACO model, i.e. openness, and not extraversion, considerably acted as moderator. People who are high in openness are more open to varying and new experiences, and are more creative and flexible, broad-minded, and curious, which transforms the experience of uncomfortable situations with other people from being frightening to being challenging. Thus, possessing high values of openness was probably a valuable trait for our ancestors when managing more negative acts and behavior from others, and this trait has also shown moderation effects in our study in present-day coping with poor health caused by workplace bullying.

With regards H2, only one of the personality traits of the Dark Triad model expressing competitiveness, i.e. Machiavellianism, and not narcissism, considerably acted as moderator. We suppose that an employee high in Machiavellianism has an inherent, evolution-related power that helps develop, and effectively use, different contacts and coalitions for own goals, when criticized, rejected, or otherwise attacked. In face of bullying, Machiavellians may use their superficial charm ($r = 0.63$ with psychopathy). By being extravert ($r = 0.25$), they may use their carefully developed contacts to begin strategic rivalry with others. Machiavellians are experts in effective tactics for managing ruthless and unscrupulous persons (Forsyth et al., 2012). Machiavellians aim to keep power and a good reputation. Thus, having a strong belief in one's own qualities as a natural leader, being strategically minded and capable of building coalitions, and having a competitive interpersonal style are evolutionarily beneficial.

5.1. Theoretical implications and contributions

This study adds to a growing body of research (e.g. Jonason et al., 2014; Jonason et al., 2015; Pilch, 2020) showing less biased understanding of the Dark Triad traits in the workplace, interpreting the results through evolutionary psychology. It is important to see these traits not only as socially aversive, but also as beneficial for health-related overcoming of negative acts by co-workers in today's tough workplace

Table 2
Linear model of predictors of health-related quality of life: openness and Machiavellianism as moderators.

Dependent variable	Health-related quality of life					
Moderator	Openness			Machiavellianism		
Independent variable	*B*	*SE*	95% *CI*	*B*	*SE*	95% *CI*
Constant	−0.111	0.061	−0.230;0.009	−0.131	0.062	−0.252;−0.010
Sex (0 = female, 1 = male)	0.374	0.111	0.154;0.594	0.367	0.113	0.144;0.590
Age	−0.092	0.051	−0.193;0.009	−0.123	0.052	−0.225;−0.020
Workplace bullying	−0.392	0.051	−0.430;−0.228	−0.295	0.053	−0.399;−0.190
Moderator	0.136	0.051	0.035;0.237	−0.057	0.052	−0.159;0.046
Workplace bullying x moderator	0.100	0.043	0.154;0.594	0.144	0.051	0.044;0.243
R^2/adj. R^2	0.19/0.18 $p < 0.001$			0.18/0.17 $p < 0.001$		
ΔR^2	0.014 $p = 0.023$			0.020 $p = 0.005$		
f^2	0.016			0.025		
JN value	1.606			0.961		

Note. *B* = unstandardized coefficient; *SE* = standard error; CI = confidence interval; adj. R^2 = adjusted coefficient of determination; ΔR^2 = coefficient of determination change; f^2 = Cohen's (1988) effect size for hierarchical regression model; JN value = moderator value defining the Johnson-Neyman's region of significance.

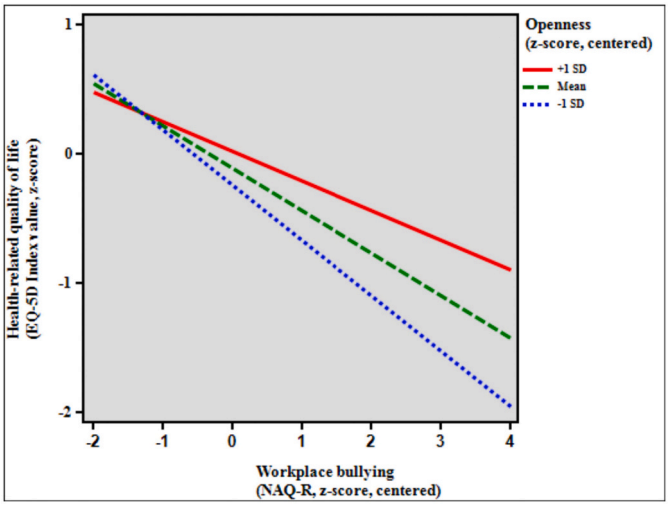

Fig. 1. Simple slope equations of the regression of health-related quality of life on three levels of openness.
Note. Controlling for age and sex.

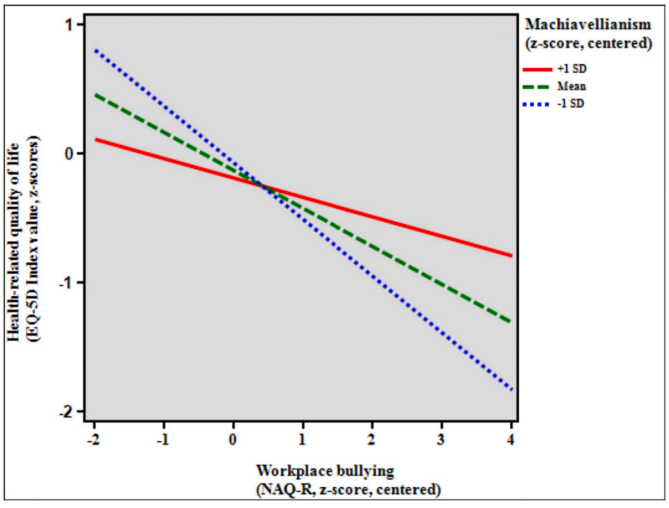

Fig. 2. Simple slope equations of the regression of health-related quality of life on three levels of Machiavellianism.
Note. Controlling for age and sex.

environments. Recent meta-analyses (Birkeland Nielsen et al., 2017; O'Boyle et al., 2012) show that facing workplace bullying correlates with some personality traits, but also focus on the dysfunctional effects of the Dark Triad. Until now, the moderating effect of the Dark Triad personality traits on the investigated relationships had not been examined among employees.

We will now try to explore our contribution to evolutionary theory while keeping in mind that bullying is harmful and generates serious problems, conflicts, and unpleasant events at work. Workplace bullying may be devastating for the target's self-esteem and reputation. We believe that our theoretical contribution mainly concerns the two evolutionary theories.

One possible contribution to the *Life History Theory* may be the importance of possessing high values of openness in face of workplace bullying due to the related ability to apply the fast adaptive strategy. We believe that an immediate and more creative manner of reaction to signs of workplace bullying may be more effective than to speak with numerous friends. Friends may be very good at listening, but they do not always have sufficient resources to act. Prior studies suggest that people high in openness have greater stress resilience (including physiological indicators) and better stress regulation compared to people low in openness (Dale et al., 2020; Oswald et al., 2006; Williams et al., 2009); consequently, the former can use a wider range of coping repertoire, which can help them apply coping strategies more effectively (Hildenbrand et al., 2018).

According to the *Costly Signaling Theory* (Buss, 2009), social competition leads to a ruthless struggle for a perfect image and good reputation. Consequently, employees high in Machiavellianism compete with others because they are strongly goal oriented. Their main goal is power and a good reputation.

People high in Machiavellianism are good at strategic reputation-building and coalition formation (Rauthmann & Will, 2011). They are also agentic. We have already mentioned that agentic people tend to express high ambition and power striving. Elevated levels of agency (self-orientation) are one of the hallmarks of Machiavellianism, but these levels are also elevated for extrovert and narcissistic people, but for other reasons (pleasure). Possibly, this is more elevated for just Machiavellians and, more importantly, more focused on specific goals. Workplace bullying is harmful for self-esteem, so taking care of one's own 'brand' and reputation would be beneficial. This can be helpful when building a strategic defense network. When facing bullying, the main skill is possibly being strategic. Above all, the bullying target needs a successful coalition. It is therefore important to have the necessary skills for predicting how a large network can be profitable and which key resources in co-workers can be helpful against bullying at work. Following Buss (1995), creating incremental chains of reciprocity and detecting signs of 'cheating' is an adaptive strategy. Individuals who can send vivid and clear signals to co-workers that they possess successful

qualities are showing that they are 'immune' against workplace bullying, which explains why being Machiavellian can help the person survive in an adverse environment.

5.2. Strengths, limitations, and suggestions for further studies

The cross-sectional design of our study limits the assessment of causal directions of the relationships between personality, workplace bullying and health. It remains to be tested to what extent our results are generalizable to non-Swedish-speaking populations. The fact that the participants were from a non-English speaking country is valuable because it helps advance the cross-cultural validity of the theories on workplace bullying.

In addition, we used a short form of each of the six major broad-bandwidth dimensions of personality, which has considerably psychometric strength (Sibley, 2012), but it has also some limitations (see below). The Mini-IPIP6 is an interesting compromise between the HEXACO and Big Five models as it retains the factor structure of the latter while adding the sixth factor of the former. We are aware of the limitations, however, the brief HEXACO inventory (De Vries, 2013) has not yet been translated into Swedish.

Cronbach's (1951) alpha is the most used index of reliability, but it is not a measure of internal consistency, because it also depends on the test's length. High levels of coefficient alpha "may indicate little more than that the test is long" (Davenport & Davison, 2015, p. 8), which was also acknowledged by Cronbach himself. In the current study, Cronbach's coefficients alpha of the NAQ-R and DT3 measures (Table 1) were between 0.80 and 0.92, but for the Mini-IPIP6 it was between 0.65 (openness) and 0.84 (extraversion). The Mini-IPIP6 measures comprise only four items each. In addition, the openness scale consists of relatively heterogeneous items, three of which were reversed, which could affect the value of the Cronbach's alpha coefficient, but not the scale's reliability. If the number of items comprising a scale is below the number of eight a Cronbach's alpha coefficient of 0.60 is acceptable (Nunnally, 1979). In such case the average interitem correlation is a more easily interpretable measure of homogeneity or internal consistency. This measure should exceed 0.30 (Briggs & Cheek, 1986) and for the openness scale it was acceptable (0.33).

Moreover, the Mini-IPIP6 does not include specific facets of extraversion, for example dominance and social vitality. It could be a presumed explanation why extraversion did not emerge as a significant moderator in our study. Hence, it might make sense that highly dominant employees would be less affected by workplace bullying, and thus still be able to maintain health-related quality of life. However, due to the HEXACO measure used here, it is not possible to separate the dominance versus social vitality aspects of extraversion. In addition, Soto et al. (2020) emphasize that as a set of functionally related capacities extraversion represents social-engagement skills, i.e. capacities used to actively engage with other people, especially through persuasive skill and energy regulation. Hence, the non-significant result could be due to lack of measurement precision for the trait in question.

In addition, due the same kind of limitation, we could not precisely measure specific facets of openness. Openness in terms of functionally related capacities illustrates innovation skills, i.e. capacities used to engage with novel ideas and experiences, mainly through creative and self-reflection skills (Soto et al., 2020), which possibly in a similar study would show elevated values on openness to ideas or/and actions. We acknowledge this limitation and consider that it would be a relevant issue for future studies.

6. Conclusions

Despite minor limitations, we conclude that, from an evolutionary perspective, high levels of some traits probably present adaptive advantages. Possessing the personality traits openness and Machiavellianism may be an adaptive evolutionary development resulting in natural 'protective' benefits for employees facing bullying in the workplace.

CRediT authorship contribution statement

Anna M. Dåderman: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration, Funding acquisition. **Beata A. Basinska:** Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing, Visualization.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.paid.2021.110849.

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