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**Machine Learning to Detect Dissimulation in the Dirty
Dozen Questionnaire**

**Machine Learning per Rilevare la Dissimulazione al Questionario Dirty
Dozen**

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ABSTRACT

Our research concerns the Dark Triad (i.e., subclinical levels of narcissism, Machiavellianism, psychopathy) and its concealment to obtain child custody. Even before the Dark Triad became a focus of interest for many researchers, numerous studies had investigated the negative characteristics associated with its traits. Liars, manipulative, impulsive, and selfish, these personalities often engage in behaviors that have adverse effects on others. Dark personalities have negative influences on the psychological well-being of their acquaintances and thus on the psychosocial development of their children. Starting from the knowledge that lying is widespread in forensic fields, it becomes of paramount importance to assess the presence of these traits in parents in child custody cases and to have effective methodologies available to detect Dark Triad dissimulation attempts. Since nearly forty years, numerous clinical instruments have been equipped with control scales to detect the simulation or dissimulation of responses (e.g., the Lie and Frequency scales of the MMPI-2). A whole line of research has then developed ad hoc instruments to detect mental disorders' simulation without actually investigating their presence (e.g., SIMS and SIRS). However, a common limit of these two types of tools concerns their ability to detect only the tendency to lie in the questionnaire, without indicating in which specific items lying occurred. In recent years, research has investigated new methods to overcome this problem. One solution being studied recently is based on Machine Learning algorithms trained to recognize anomalies. Indeed, recent studies demonstrated Machine Learning's capability to detect faked responses in

questionnaires (such as the Big Five Questionnaire and questionnaires to investigate Depressive Disorder and cognitive deficits) with very high accuracy ($\approx 96\%$).

In light of this, we investigated the effectiveness of Machine Learning to detect at a single item level dissimulation attempts at the Dirty Dozen questionnaire exploring the Dark Triad. Six hundred subjects filled in the Dirty Dozen questionnaire by dissimulating specific answers to obtain custody of their children. Participants were divided into twelve groups of 50 subjects each. Each group was asked to lie to a different questionnaire question. Regressor Chain and Multiclass Classifier models have been trained to discriminate between simulated and honest answers. Results showed that the former could detect dissimulation attempts in 28% of faked answers, with a global accuracy of 88%; the latter classified different experimental groups correctly with an accuracy of 43%. A small negative correlation between age and Dark Triad scores and large correlations between the Triad traits were found. In agreement with the existing literature, higher psychopathy scores were recorded in men. On the other hand, in contrast to previous studies, women showed higher narcissism scores than men, and no sex differences were found for the Machiavellian trait. The lying condition showed lower scores than the honest one due to the participants' successful attempts to dissimulate. The attempt at dissimulation was detectable in all traits and 10 out of 12 items.

INTRODUZIONE

Il nostro lavoro di ricerca riguarda la Triade Oscura (ovvero la presenza subclinica di narcisismo, machiavellismo e psicopatia) e la sua dissimulazione per ottenere la custodia dei figli. Anche prima che la Triade Oscura diventasse un focus di interesse di molti ricercatori, numerosi studi avevano indagato le caratteristiche negative associate ai suoi tratti. Queste personalità bugiarde, manipolatrici, impulsive ed egoiste spesso mettono in atto comportamenti che hanno effetti avversi sugli altri. Le personalità oscure hanno influenze negative sul benessere psicologico dei loro cari, e quindi anche sullo sviluppo psicosociale dei propri figli. Partendo dalla conoscenza che la menzogna è piuttosto diffusa nell'ambito forense, diventa di fondamentale importanza sia valutare la presenza di questi tratti in genitori che sono coinvolti in cause per l'affidamento dei figli, sia essere in possesso di metodologie efficaci che permettano di rilevare i tentativi di dissimulazione della Triade Oscura. Da circa quarant'anni numerosi strumenti clinici sono stati equipaggiati di scale di controllo per rilevare la simulazione o la dissimulazione delle risposte (ad esempio, le scale *Lie* e *Frequency* dell'MMPI-2). Un'intera linea di ricerca ha poi sviluppato strumenti ad hoc per individuare la simulazione di disturbi mentali, senza in realtà indagarne l'effettiva presenza (ad esempio, SIMS e SIRS). Ad ogni modo, un limite comune a questi due tipi di strumenti riguarda proprio la loro abilità di rilevare solo una propensione alla menzogna, senza indicare in quale specifico item vi sia una contraffazione della risposta. Una soluzione studiata di recente si basa su algoritmi di Machine Learning allenati a riconoscere le anomalie. Infatti, studi recenti hanno

dimostrato la capacità del Machine Learning nell'individuare risposte menzognere nei questionari (come il Big Five Questionnaire e questionari che indagano il Disturbo Depressivo e i deficit cognitivi) con un'accuratezza molto elevata ($\approx 96\%$).

Alla luce di tutto ciò, nel nostro lavoro di ricerca abbiamo indagato l'efficacia di questa tecnica nel rilevare a livello del singolo item i tentativi di dissimulazione al questionario Dirty Dozen che valuta la Triade Oscura. Seicento soggetti hanno compilato il questionario Dirty Dozen dissimulando alcune specifiche risposte per ottenere la custodia dei propri figli. I partecipanti erano divisi in dodici gruppi di 50 soggetti ciascuno, e ad ogni gruppo era richiesto di mentire ad una domanda diversa. I modelli di Machine Learning di Regressor Chain e Multiclass Classifier sono stati istruiti a discriminare le risposte oneste da quelle menzognere. Il primo di questi è riuscito a riconoscere i tentativi di dissimulazione nel 28% delle domande mentite, con un'accuratezza globale dell'88%. Il secondo modello invece ha classificato correttamente il 43% dei soggetti nei vari gruppi sperimentali. È stata trovata una bassa correlazione negativa tra l'età dei soggetti e la Triade Oscura e correlazioni positive fra tutti i tratti della triade. In accordo con la letteratura esistente, i maschi hanno ottenuto punteggi più alti delle femmine nella psicopatia. D'altra parte, contrariamente ad altri studi, le donne hanno ottenuto punteggi più alti nel narcisismo, mentre non sono emerse differenze di genere per il tratto machiavellico. Come conseguenza del tentativo riuscito da parte dei partecipanti di dissimulare alcune domande, la condizione disonesta ha mostrato punteggi più bassi rispetto alla condizione onesta. Il tentativo di dissimulazione è risultato rilevabile in tutti i tratti e in 10 item su 12.

CHAPTER 1

The Dark Triad

The term “Dark Triad” in the literature refers to three behavioral traits that occur at a subclinical level (namely within the normal range), generally considered predictors of antisocial behavior: Machiavellianism, narcissism, and psychopathy (Paulhus & Williams, 2002). Subjects with high traits belonging to this Triad are characterized by a tendency to manipulate, high self-esteem, and low empathy.

The great interest in this psychological construct is relatively recent. It was established about twenty years ago when Paulhus and Williams (2002) approached this constellation of traits. Before describing the Dark Triad in more detail, it is important to note that its existence is guaranteed by a dimensional approach to personality disorders. According to this perspective, the characteristic features of a disorder can be arranged at one point on a continuum that runs from one extreme to the other. The cut-off between normality and pathology is then set. Despite the dichotomous healthy-pathological distinction, it must be borne in mind that the established cut-off is a convention and a necessity that still leaves room for subclinical manifestations of a given disorder. That implies that disorders are extreme variants of dispositions also present in non-pathological subjects, making it possible to investigate the presence of subclinical features of a disorder even in a non-pathological sample.

This chapter will explore the three traits that constitute the Dark Triad. It will also discuss the current knowledge about the sex-related differences within the dark personalities, the effect of the traits features on various aspects of life, such as work and

social relationships, and the factors playing a key role in developing these personalities. Finally, we will explore the fundamental tools for investigating the presence and levels of the Dark Triad.

1.1 Machiavellianism

The term “Machiavellianism” derives from Niccolò Machiavelli’s book *The Prince* (1513). In this work, the author argues that even honest people have no qualms about using amoral strategies when dealing with dishonest ones. Indeed, Machiavelli’s work inspired the items of Christie and Geis’ Mach IV questionnaire (1970) used to identify Machiavellian personality traits. The latter are characterized by a tendency to manipulate and use fraudulent strategies to achieve one’s goals (Sattler & Linden, 2021). Machiavellian personalities are oriented towards success and power and are willing to make others pay the price for it if necessary. They are selfish, fascinated by external rewards, and convinced that the end justifies the means: they tend to lie, cheat, or mistreat others to achieve their goals (Jones & Paulhus, 2009). Machiavellianism is also characterized by cynicism, superficiality in interpersonal relationships, and a propensity to use deception and coercion (McHoskey, 2001; Sattler & Linden, 2021). Subjects with high Machiavellian traits are also characterized by an elevated perception of their manipulative abilities, although their emotional intelligence (EI) is not as high as they believe (Dahling et al., 2009). It is easy to understand how the characteristics of this trait can lead to amoral and anti-judicial behavior: Machiavellianism is indeed often associated with unlawful acts and violence, even though these personalities do not generally engage in extreme forms of antisocial behavior (Jones & Paulhus, 2009, pp. 93-108). It is also understandable why Machiavellian personalities tend to have successful careers, especially when the work setting is not well structured. It should also be

considered that individuals who exhibit high Machiavellian traits are perceived as intelligent and ambitious. In contrast, those who show typical low traits are described as insecure, emotional, and unintelligent (Cherulnik et al., 1981).

Although an inverse correlation has been observed between Machiavellianism and social relationships in adulthood, few studies have investigated what factors contribute to the development of a Machiavellian personality (Abell & Brewer, 2014). The literature indicates that heritability is low (31%), so several authors have considered that the environment has a crucial influence, with particular reference to the parent-child relationship (Vernon et al., 2008; Veselka et al., 2011).

1.2 Narcissism

The term “narcissism” derives from the Greek mythological character Narcissus, a good-looking young boy son of a nymph and a river goddess. Legend says that Narcissus was much loved, but he did not return any of his attention. Among the people he rejected, one of them prayed that Narcissus could feel the pain he caused by not reciprocating love. The prayer was heard, and Narcissus was condemned to fall in love with the first person he saw. When the curse was cast, Narcissus was standing by a pond. When he approached the water to drink, he saw his reflection and fell madly in love with himself.

There are several versions of the myth in literature, all of which have in common Narcissus’ inability to love others. This concept is the basis of the construct of narcissism as it is considered in the literature. Fantasies of success and control and the need to be appreciated are linked to that trait. This personality usually tries to fulfill this need through various strategies, such as displaying material goods and vanity (Buss & Chiodo, 1991; Kernberg, 1989; Morf & Rhodenwalt, 2001). The narcissist may also sometimes wish for positions of power or high social status, such as Machiavellian personalities. However,

this is not considered a core feature of the trait (Brunell et al., 2008). An interesting peculiarity that is more than understandable given the characteristics described above is that narcissistic personalities tend to be highly responsive to all events threatening their status and image (Jones & Paulhus, 2010).

A common misconception is that narcissistic personalities cannot have any social relationships. It is indeed considered a personality incapable of establishing loving relationships with others since it is characterized by excessive self-love. Actually, this conception is not entirely accurate. As Emmons (1984) and Campbell (1999) point out, narcissistic personalities show a combination of traits (such as extroversion, appealing, groomed appearance, courage, and self-confidence) that makes them attractive in the short term and makes it easier for them to approach others and build relationships. That is functional to the underlying personality characteristics: feeling capable of establishing relationships and attracting others allows narcissists to maintain high self-esteem (Wurst et al., 2017). The matter becomes problematic in the long term when other typical characteristics of this trait begin to overwhelm the initial charm. Lack of interest in others, selfishness, lack of empathy, and emotional coldness are the main causes of these long-term problems (Brunell & Campbell, 2011).

In the scientific literature, narcissism has been distinguished into two types based on its manifestation: *overt narcissism* - characterized by an explicit expression of the subject's grandiose self-regard - and *covert narcissism* - characterized by more significant inhibition, vulnerability, and hypersensitivity to criticism and a tendency not to express one's fantasies of grandeur (Cooper & Ronningstam, 1992). Although manifested differently, both types of narcissism are based on disproportionate self-esteem and a need for recognition by others. This sense of grandiosity displayed by narcissists seems to be

based on a profound perception of worthlessness that drives them to show a perfect image of themselves (Ronningstam, 2010). That may be why narcissism is sometimes associated with aggressive behavior when the subject is publicly criticized and their appearance is threatened, leading to high responsiveness to events potentially threatening their status (Bushman et al., 2009; Jones & Paulhus, 2010).

Among the most widely used instruments in the literature investigating the narcissistic personality are the Hyper-Sensitive Narcissism Scale (HSNS; Hendin & Cheek, 1997) for *covert narcissism* and the Narcissistic Personality Inventory (NPI-16; Ames et al., 2006) for *overt narcissism*.

The American Psychiatric Association (APA) describes personality disorders as “[...] *an enduring pattern of inner experience and behavior that deviates markedly from the expectations of the individual’s culture, is pervasive and inflexible, has an onset in adolescence or early adulthood, is stable over time, and leads to distress or impairment [...]*” (APA, 2013, p. 747). Therefore, personality disorders are represented by non-adaptive action, thinking, and interaction modes. The fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) synthetically describes Narcissistic Disorder as “[...] *a pervasive pattern of grandiosity (in fantasy or behavior), a constant need for admiration, and a lack of empathy, beginning by early adulthood and present in a variety of contexts [...]*” (APA, 2013, p. 775). It is therefore inferred that narcissistic personalities see themselves as fantastic and relevant. This disorder belongs to the Cluster B personality disorders (or named “dramatic-eccentric cluster”), together with Borderline, Antisocial, and Histrionic Personality Disorders and, according to the DSM-V (APA, 2013), it is the rarest of all (prevalence less than 1% in the general population).

These disorders have apparent difficulties maintaining stable relationships and they negatively influence others.

Personality psychologists sometimes consider narcissism a feature of normal personality rather than a disorder, as it can also appear in a non-adaptive form (Rhodewalt & Peterson, 2009). Like many other disorders, it has been defined as a variable that manifests itself along a continuum, a variable with characteristics similar to those of Narcissistic Personality Disorder but that is not maladaptive to a less severe degree, as described above (Raskin & Hall, 1979). As we previously explained, this is in line with the current approach to personality disorders.

On the other hand, a non-pathological narcissism is evolutionarily understandable since abilities such as increasing one's social status are beneficial in a hierarchically structured society where individuals with higher social status have more benefits. From an evolutionary point of view, those who can climb the social pyramid have a better chance of survival. Indeed Sedikides et al. (2004) found a positive correlation between non-pathological narcissism and psychological health. According to Cheng et al. (2010), the narcissistic trait may have therefore evolved to allow people to have greater chances of survival. That also aligns with what was said above about narcissism and success in social relationships in the short term.

1.3 Psychopathy

The etymology of the term “psychopathy” literally means “mental illness” (from “psyche” - “mind” and “pathos” - “suffering,” “disease”). However, many researchers agree that psychopathy is not associated with the profound suffering that characterizes other mental disorders. Psychopathic personalities are rational and conscious of their behavior and the possible consequences, lacking empathy, manipulative, impulsive,

thrill-seeking, and irresponsible. Moreover, these personalities often tend to be destructive to themselves and others (Hare, 2003; Hare & Neumann, 2009).

1.3.1 Historical Introduction to Psychopathy

One of the first to take a deep interest in psychopathy was the French psychiatrist Philippe Pinel, who in 1801 coined the term “*mania without delirium*” to refer to psychopathic personalities, characterized by a lack of inhibition and remorse. From 1801 onwards, many specialists such as James Cowles Prichard (1837), Emil Kraepelin (1907), and Kurt Schneider (1959) got interested in this subject and delineated numerous subgroups of this personality. In 1930, George Everett Partridge, an American psychologist, identified a subset of psychopathic personalities called the “*sociopathic personality*”. This personality was characterized by a refusal to adapt to the demands of society. Although, as Hare and Neumann (2009) point out, the two terms “psychopathy” and “sociopathy” are not entirely overlapping (since the origins of sociopathy are to be found in society while those of psychopathy in the interaction between genetics, biology and the psychology of the individual), the introduction of this new sub-category has led scientists over the last 50 years to define indiscriminately as psychopaths or sociopaths people who break the law.

A breakthrough for the concept of psychopathy occurred in 1941 when the psychiatrist Hervey Cleckley published the book *The Mask of Sanity*, where he outlined the psychopathic personality as externally normal but internally psychotic. As can be understood from the book’s title, these subjects manage to cover their lack of internal personality with a semblance of normality. According to Cleckley, only a careful and prolonged observation can detect this pathological personality since subjects with psychopathic personalities seem well adapted and functional on a superficial analysis.

Sixteen specific theoretical criteria for the psychopathic personality emerged from Cleckley's studies:

1. *Absence of delusions and other signs of irrational thinking;*
2. *Superficial charm and good "intelligence";*
3. *Absence of "nervousness" or psychoneurotic manifestations;*
4. *Failure to follow any life plan;*
5. *Unreliability;*
6. *Untruthfulness and insincerity;*
7. *Lack of remorse and shame;*
8. *Inadequately motivated antisocial behavior;*
9. *Unresponsiveness in general interpersonal relations;*
10. *Poor judgment and failure to learn by experience;*
11. *Pathologic egocentricity and incapacity for love;*
12. *General poverty in significant affective reactions;*
13. *Specific loss of insight;*
14. *Suicide rarely carried out;*
15. *Fantastic and uninviting behavior with drink and sometimes without;*
16. *Sex life impersonal, trivial, and poorly integrated;*

To understand the influence of Partridge's (1930) classification mentioned above, we only need to consider that in 1952 the DSM introduced the Sociopathic Personality Disturbance, which incorporated some aspects of Cleckley's (1941) description of psychopathy.

Despite the important implications of Partridge's (1930) and Cleckley's (1941) studies, identifying these subjects was still unclear. That resulted, in 1980, in the birth of a research program led by Hare and based on Cleckley's principles, which gave rise to the first theorization of the diagnostic tool still used today in its latest version Hare Psychopathy Checklist-Revised (PCL-R; Hare, 1991). Caretti and Craparo (2010, pp. 229-240) stated that Hare's (1996, pp. 26) latest definition of psychopaths is that of "*intraspecies predators who use charm, manipulation, intimidation, and violation to control others and to satisfy their own selfish needs. Lacking in conscience and feelings for others, they coldly-bloodedly take what they want and do as they please, violating social norms and expectations without the slightest sense of guilt or regret.*". In 1993, Hare distinguished three categories of psychopaths, which we will now briefly consider. *Primary psychopaths*, characterized by a heritable emotional deficit, are self-confident, friendly (they are excellent speakers), devoid of negative emotions, and charming. It must be borne in mind that this is only the façade, as these people are manipulators with no respect for others. The second category identified by Hare regards the *secondary psychopaths*, who are always characterized by an emotional deficit. Still, it is gained due to early socialization experience and has no biological basis. These individuals appear hostile and withdrawn socially, have high anxiety levels, and often have problems with the law. The third group is the *dissocial psychopaths*, who display various antisocial behaviors learned in their developmental environment.

1.3.2 Psychopathy Nowadays

In 1968 the DSM-II (APA) introduced the diagnosis of Antisocial Personality Disorder (ASPD) based on diagnostic criteria not too different from those identified by Cleckley (Smith et al., 2021). In fact, the DSM-II diagnostic criteria were mainly based on the

character deficits typical of psychopathic personalities, such as rough selfishness, callousness, and lack of guilt (Rogers & Dion, 1991). This diagnostic category was maintained until DSM-V, in which the diagnostic criteria were brought even closer to the concepts expressed by the PCL-R. The diagnostic criteria of ASPD in the DSM-V focus more on antisocial behavior than specific personality characteristics (such as the absence of guilt, presence of a glorious self, etc.), which instead are central to psychopathy (Fisher & Hany, 2021). ASPD and psychopathy should therefore be considered different but related constructs, as shown by Rutherford et al. study (1999), which found that only 20% of subjects diagnosed with ASPD scored high on Hare PCL-R. ASPD is a diagnosis, whereas psychopathy is not, so many individuals diagnosed with ASPD are not considered psychopaths, and the reverse is true (Hare, 2003). The crucial difference in understanding the distinction between psychopathy and ASPD is found in the PCL-R itself. Like many other instruments that investigate the presence of psychopathic personality, PCL-R analyzes two main aspects of psychopathy, referred to in the literature as *Factor 1* and *Factor 2*. The former reflects primary psychopathy (consisting of selfishness, insensitivity, lack of emotional life, and superficial charm), while the latter concerns lifestyle and antisocial behavior, identified as secondary psychopathy. Actually, *Factor 1* (which concerns affective, emotional, and interpersonal aspects of personality) seems to detect precisely psychopathic personality. At the same time, Factor 2 identified by the PCL-R reflects ASPD, being focused on socially deviant behaviors such as the failure to conform to social norms (Widiger, 1992). Furthermore, while psychopaths have high manipulative skills, antisocials generally are not good manipulators and have less ability to fascinate (Musumeci, 2012).

Although most studies on psychopathy have sampled subjects from prison environments, not all psychopaths are subject to prison measures. Considering psychopathy as a trait, there is a tendency to argue that secondary psychopathy (thus ASPD), rather than primary, is more prevalent in institutionalized offenders (McHoskey et al., 1998). Indeed, even if many authors believe that ASPD diagnosis is not synonymous with criminality, between 50% and 80% of incarcerated offenders meet ASPD criteria (Thoma et al., 2013). An association was also found between college students' PCL scores and sexual aggression, understood as the use of verbal pressure, alcohol or drugs, threats, and physical force, supporting the link between the presence of psychopathic traits and a propensity to engage in antisocial behaviors (Kosson et al., 1997). These results are in line with scientific evidence indicating the presence of structural and functional deficits in the amygdala and prefrontal lobes - particularly in the anterior cingulate and orbitofrontal and left dorsolateral prefrontal cortexes - in individuals who engage in violent and antisocial behaviors or with high psychopathic traits (Birbaumer et al., 2005; Yang & Raine, 2009). These structures are primarily involved in behavioral regulation, risk perception, and decision-making (Champod and Petrides, 2007; Hutcherson et al., 2012, MacDonald et al., 2000). Furthermore, Kiehl (2006) emphasizes how the affective-emotional atypia typical of psychopathy (such as lack of empathy and remorse) can be explained by cytoarchitectonic and functional anomalies concerning the limbic and paralimbic areas and their connections with the frontal lobes. Indeed, scientific evidence indicates that these areas are hypo- or dysfunctional and have a reduced volume in psychopathic subjects.

1.4 Sex Differences and Associations Between Dark Triad Traits

The Triad traits are considered distinct but often associated within the average population. In particular, empirical evidence indicates that (a) Machiavellianism is associated with psychopathy, (b) Machiavellianism is associated with narcissism, and (c) narcissism is associated with psychopathy (Paulhus & Williams, 2002). The distinction between these traits is indeed not unequivocally supported by scientists, as some researchers suggest the presence of a single construct underlying the Dark Triad (Jakobwitz & Egan, 2006). There are also proponents in the literature of possible overlap between Machiavellianism and psychopathy, especially for males. For example, Ray and Ray (1982) found a correlation between the Mach IV scores and the psychopathy scale of the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & McKinley, 1940) scores. According to this evidence, one should no longer speak of a “triad” but of a “dyad”, thus considering psychopathy-Machiavellianism on the one hand and narcissism on the other. The question seems to be clarified by a study from Harpur and colleagues (1988), which identifies Factor 1 investigated by PCL as Machiavellianism and Factor 2 as psychopathy. One characteristic that distinguishes Machiavellian from psychopathic personalities is the tendency to form coalitions: whereas Machiavellian personalities seek to build alliances strategically, psychopathic personalities abandon social bonds by acting impulsively (Jones & Paulhus, 2013).

Dark personalities are not static, nor are they the same in every individual. Still, they manifest themselves with higher or lower scores in the three factors of the Triad, and this may reflect different subgroups. Chabrol et al. (2015) identified multiple groups based on scores on the Dark Tetrad, a construct comprising the same personality traits included in the Dark Triad, plus sadism. In particular, a group with low traits, a sadistic-

Machiavellian group, a narcissistic-psychopathic group, and a group with high traits were identified. They also found that individuals with higher Dark Tetrad traits exhibit more antisocial behavior. On the other hand, Garcia and MacDonald (2017), based on an analysis of the Dark Triad traits, highlighted three groups (high malevolent, intermediate malevolent, and low malevolent) that showed differences precisely in terms of engaging in risky behaviors. Again, Maneiro et al. (2020) identified the following five further subgroups based on the associations of the three traits defining the Triad: Machiavellian-psychopathic (M-P), low Triad (LDT), Machiavellian-narcissistic (M-N), psychopathic (P) and narcissistic (N). Analyses of the composition of the groups revealed sex differences, as the LDT and N subgroups included more females. In contrast, M-N, P, and M-P subgroups were predominantly composed of males. The researchers also found that the M-P subgroup scored higher on the Reactive and Proactive Aggression Questionnaire (RPQ; Raine et al., 2006), whereas the groups' scores did not differ on substance use, including alcohol and tobacco. In other studies, men showed higher scores in all three components of the Triad than women (Azizli et al., 2016; Jonason & Krause, 2013; Jonason & Webster, 2010; Jonason, Jones & Lyons, 2013). Also Muris et al. (2017) found significant sex differences in all three Triad traits, highlighting that males exhibit higher levels of narcissism, Machiavellianism, and psychopathy. However, when the shared variance between the three triad traits was controlled, only psychopathy showed statistically significant sex differences (Muris et al., 2017).

1.5 How the Dark Triad Fits Into Personality Models

The most important personality models in the literature are the 5-factor model - or Big Five (McCrae & Costa, 1986) - and the 6-factor model - or HEXACO (Ashton et al., 2004). The former suggests five relatively independent factors underlying the different

personality types: Extroversion, Agreeableness, Conscientiousness, Neuroticism, and Openness. These dimensions have an opposite pole, which is, respectively: Introversion, Unpleasantness, Negligence, Emotional stability, and Closeness. Each personality can be located at a point on a continuum between the two extremes of each dimension. All five factors have at least one association with one of the Triad variables. The most evident link is the negative association between Dark Triad personalities and Agreeableness, Conscientiousness, and Neuroticism (Jonason et al., 2010).

The HEXACO model adds to the previous one the Honesty/Humility dimension with its opposite Dishonesty. This factor is significant for the analysis of the Dark Triad since, as already mentioned above, these individuals are used to lying and manipulating others to achieve their own goals. In recent years, it has been hypothesized that there are not several dimensions of personality at the basis of the Dark Triad but a single central construct. This idea arose from observing the high correlation present between the various dimensions of the HEXACO model in dark personalities. The candidates most likely to underlie the Triad are Unpleasantness, Dishonesty, or Lack of empathy (Egan & McCorkindale, 2007; Jakobwitz & Egan, 2006).

1.6 Effects of Dark Personalities on Behavioral Conduct

From a forensic point of view, the interesting thing about these personalities is their tendency to lie to achieve their personal goals (Jones and Paulhus, 2011a). Machiavellianism is indeed a strong predictor of self-serving lies (McLeod & Genereux, 2008). Machiavellian personalities are very adept at lying, so much so that they have no problem giving a false answer while looking their interlocutor in the eye (DePaulo et al., 1985). However, the tendency to lie is subject to sex differences, as it is more common among males than females (Gozna et al., 2001).

Scientific literature indicates that people with high levels of the Dark Triad are more likely to commit crimes and engage in dangerous behaviors, such as taking financial risks and using substances (Azizli et al., 2016; Sekścińska & Rudzinska-Wojciechowska, 2020). Some authors have identified psychopathy and narcissism as having the most significant association with behavioral dysregulation rather than Machiavellianism (Maneiro et al., 2020). However, other studies say the association between Dark Triad traits and dangerous behavior depends mainly on the activity involved (Furnham et al., 2013). The behavioral genetics study by Campbell et al. (2009) is also relevant since it shows a positive correlation between high levels of Machiavellianism and psychopathy and low levels of moral development and a negative correlation between high levels of psychopathy and high levels of moral development.

Two other elements contributing to the tendency of dark personalities to engage in criminal behavior are attentional deficits (mainly present in women) and a lack of self-control. These two characteristics are primarily typical of personalities with high psychopathic and Machiavellian traits, while they are not correlated with narcissism (Jonason & Tost, 2010).

1.6.1 Dark Personalities and Impulsiveness

The Dark Triad constituent traits have often been associated with impulsivity. Regarding the latter, there are two different schools of thought in the scientific community: there are those who argue that impulsivity is dysfunctional and associated with personality disorders, substance abuse, and crime (Barratt et al., 1997; De Wit, 2008; Moeller et al., 2001) and those, conversely, who believe that it can be functional, as it underlies rapid information processing, boldness, and spontaneity (Dickman, 1990). It is not difficult to see how the first thesis could easily explain the presence of dangerous,

maladaptive, and criminal behaviors among individuals with dark personalities. In contrast, the second one could provide an evolutionary explanation for the prevalence of these traits. Jones and Paulhus's (2011b) study investigated specifically the functionality/dysfunctionality of impulsivity in this population. Based on the knowledge that the Triad traits characterized by impulsivity are mainly narcissism and psychopathy, the authors found a strong association between psychopathy and dysfunctional impulsivity and between narcissism and functional impulsivity. Their analysis shows that psychopathic impulsivity arises from poor self-control, whereas narcissistic impulsivity involves bold social commitment.

Ambivalent functionality also emerged from analyses of work behavior in dark personalities. First, we must consider a popular theory that tries to explain all kinds of social relations (therefore also labor relations): the *Social Exchange Theory* (Blau, 1964). According to this theory, human relationships are based on cost-benefit analysis, whereby actions will be carried out if benefits - both direct and indirect - outweigh the costs. Thus, relationships between people are established and maintained if both parties receive more advantages than disadvantages. Applying it to the work environment, we can argue that employees work (cost) to gain money or benefits (direct benefit) and certain social status and satisfying relationships (indirect benefit). The distinctive characteristics of Triad personalities, such as impulsiveness, lack of emotional involvement, tendency to engage in risky and violent behavior, cynicism, and lust for power, have long been assumed to negatively influence working life and the dynamics therein. However, within the work setting, a high impulsivity level can be highly functional and equally dysfunctional. Harms et al. (2011) and O'Boyle et al. (2012) believe that the Triad inevitably results in counterproductive behaviors such as toxic leadership or negative influence in the case of

non-leaders. In contrast, Furnham (2010) says that in some instances, Triad traits can be functional, depending on the context and when combined with factors such as intelligence and physical attractiveness, so that some authors even speak of “successful psychopaths” or “successful narcissists” (Chatterjee & Hambrick, 2007; Paulhus et al., 2013).

1.6.2 Dark Personalities and Social Relationships

Several studies have investigated what these three personality traits have in common, concluding that they share characteristics typically considered undesirable, such as manipulation, impulsivity, emotional coldness, and exploitation (Furnham et al., 2013). In particular, Machiavellianism and psychopathy share characteristics such as antisocial behavior, egocentricity, and indifference, partly explaining the literature’s doubts about the overlap between these two personalities. These data agree with the evidence advanced by Brewer and Abell (2017). In a sample of 194 women in a loving relationship, they observed a positive association between scores on the Mach IV scale and scores on the emotional abuse scale. Similar results have been observed for psychopathy within the Dark Triad: primary psychopathy predicts destructive behaviors while secondary psychopathy is positively associated with forms of control (Brewer et al., 2018).

The benefits associated with the three constituent traits of the Dark Triad can be analyzed based on three criteria: desirability (how acceptable a specific trait is), consequences for oneself, and consequences for others. Rauthmann and Koalr (2012), following this logic, analyzed how “dark” other people rate the Dark Triad traits. This research showed that Machiavellianism and psychopathy are rated similarly and more “obscure” than narcissism. However, it should be emphasized that the above-mentioned study was based on abstract judgments, namely, on ratings that subjects gave to the different items of the Dirty Dozen questionnaire (DD; Jonason & Webster, 2010), and not

on people who actually show those traits. This last situation is more difficult to evaluate experimentally. Indeed there is a low concordance between the scores on the Mach IV, Narcissistic Personality Inventory-40 (NPI-40; Raskin & Terry, 1988), and Self-Report Psychopathy Scale-III (SRP-III; Paulhus et al., 2009) provided by the subject and the evaluations of people in close relationship with them (Lämmle et al., 2021).

1.6.2.1 Dark Triad, Partner Preference, and Parenting Styles

A dark personality can also influence the judgment of one's relationships: it has been observed that subjects who score the highest on the Mach IV scale perceive the functioning of their family as more chaotic, disorganized, and less cohesive. Scores on scales investigating Machiavellian personalities are also negatively associated with the subject's level of family satisfaction and perception of family communication (Láng & Birkás, 2014). There is also evidence in the literature of the influence of dark traits on partner preference and adopted parenting styles. In particular, Atari and Chegeni (2017) showed a negative association between psychopathy and appreciation for a partner's kindness and chastity and a positive association between narcissism and partner's attractiveness/sexuality and intelligence. Similarly, Birkás et al. (2018) found a negative relationship between women's Machiavellian traits and preference for loyal and warm partners. This evidence suggests that subjects with high Dark Triad traits may not emphasize sensitivity in love and parent-child relationships. That seems to be confirmed by Lyons et al. (2020). They showed a negative association between the psychopathic traits and a preference for adopting a loving parenting style by their partner, and a positive association between the women's Machiavellian traits and a preference for a controlling and unloving parenting style adopted by both their partner and themselves.

Considering the characteristics of dark traits in relation to social ties, it was hypothesized that these could influence the tendency to engage in vengeful behaviors towards former partners. A study by Clemente et al. (2019) considered three revengeful behaviors towards ex-partners (specifically: revenge through children or third parties, economic revenge, and revenge through communicative silence). This study showed an association between the Triad traits and the propensity to enact revengeful behaviors towards the ex-partner.

Given the above, the interest in the influence of the Dark Triad on the parenting style adopted by subjects showing high levels of dark traits arises spontaneously. It has recently been observed that Dark Triad traits correlate positively with authoritarian and neglectful parenting styles, while they are negatively associated with the authoritative parenting style (Geher et al., 2020). For example, Jonason et al. (2014) report a negative association between Machiavellianism and quality of parenting, which is associated with adverse effects on children. Indeed, these factors can be considered highly relevant given the abundant evidence in the literature of associations between non-optimal parenting styles and children's psychosocial development in the short and long term. Adverse effects of authoritarian parenting style on children's self-esteem and associations between the former and conduct problems have been reported (Hadi Kurniyawan et al., 2021; Jadon & Tripathi, 2017; Thompson et al., 2003). Similar evidence can be found for neglectful parenting style, which is associated with a higher occurrence of deviant behavior (Hoeve et al., 2011) and higher levels of depression in sons (Aunola et al., 2000). An association between authoritarian parenting style and depression in daughters has also been reported (Aunola et al., 2000).

1.7 Dark Triad in the Nature vs. Nurture Debate

The Nature vs. Nurture debate comprises several theses concerning influences on the ontogenetic development of the human being. As with any object of psychological interest, the Dark Triad has also entered the terms of this matter, which has been an open issue for centuries. Researchers have concluded that neither environment nor genetics can play an exclusive role in a person's psychosocial development (Stiles, 2011). The two-way interaction between genetic predisposition and environment results in an observable phenotype. However, genetics or environment may have a greater weight depending on the construct of interest. The Nature vs. Culture debate can be extremely simplified as follows: concerning a given behavior C, if the subject of interest is genetically predisposed (G+) and is set in an environment conducive to C (A+), then C will most likely occur. If the subject is not genetically predisposed (G-) or favored by the environment (A-), then the probability of C occurring is reduced. Finally, if the subject is not genetically predisposed (G-) and the environment does not favor C (A-), the probability of C occurring is even smaller. This explanation is undoubtedly very reductionist, but it makes it easy to understand the scientific community's current response to the Nature vs. Culture debate. Considering the complexity of the levels involved (from the genetic to the individual and environmental level, passing through the cerebral and social levels, etc.), the individual's development should not be viewed in deterministic but probabilistic terms. Gottlieb's concept of "probabilistic epigenesis" (1992) well encapsulates this interdependence between genetic and environmental factors. This concept is also valid for dark personalities. Since the Dark Triad is a very complex construct, it is unlikely to be entirely explainable by a small number of genes' interactions. For example, the previously mentioned genetic study by Campbell et al.

(2012) found a genetic basis for individual differences in the Dark Triad personalities in low levels of moral development, while differences in high levels of moral development were attributable solely to environmental factors. Many other studies have detected both genetic and environmental components in all three personality traits involved in the Triad, especially regarding Machiavellianism (Petrides et al., 2011; Vernon et al., 2008). In fact, we have already seen that the heritability of Machiavellianism is low (31%). It has also been observed that parents of children with manipulative behavior also exhibit high levels of Machiavellianism (Kraut & Price, 1976). Furthermore, a great deal of research has identified the involvement of certain genes in the alteration of serotonin metabolism and transport implicated in behaviors typical of psychopathic personalities. However, the specific mechanisms by which, from that particular genotype, one arrives at the phenotype characteristic of psychopathic personalities are still unclear (Finger et al., 2007; Hariri et al., 2002; Patrick, 2018; Raine, 2008). The distinctive behaviors of the Dark Triad are already observable at a young age, between 11 and 17 years (Lau & Marsee, 2012). In support of the influence of the environment on the dark personality, a predictive effect of parental control and empathic involvement on antisocial behavior has been observed. Specifically, higher levels of parental control and empathic involvement are associated with fewer antisocial problems (Marzilli et al., 2021). On the other hand, parental affection was found to be a moderator of antisocial behavior in 4 to 12 years old children with high levels of psychopathy (Psalich et al., 2011). Deng et al. (2020) observed that children with high levels of psychopathy are more often exposed to negative parenting behaviors than positive ones. The direction of the link between these two elements is better explained by a 2011 study by Fontaine and collaborators. It was observed that negative parenting behaviors measured when the child is four years old

predicted psychopathic/callous-unemotional (CU) traits at 7-12 years old. It is important to clarify that the term “callous-unemotional” in the literature generally refers to a lack of empathy, indifference to others, and disregard for one’s conduct (Frick et al., 2014). Children with high CU traits were also observed to be more likely to exhibit conduct problems later (Fontaine et al., 2011). Literature also claims that conduct problems and high psychopathy traits at 13 years of age expose individuals to an increased risk of psychopathological disorders in adulthood (Lynam et al., 2007). In contrast, exposing children to loving parenting practices can reduce psychopathic traits over the next four years (Frick et al., 2003). It has also been found that greater attachment problems are associated with higher levels of narcissism and emotional insensitivity in 6 to 12 year-olds children (Fite et al., 2008). It is thus clear that environmental influences, particularly family influences, can moderate personality development in the short and long term.

Parental interventions, such as promoting a more functional parenting style (e.g., characterized by greater involvement in children and greater use of praise and encouragement), may positively affect children’s insensitive traits and reduce the possibility of developing antisocial behaviors (Bjørnebekk & Mørkrid Thøgersen, 2022).

1.8 Survey Tools

In the early years of interest, the Dark Triad was investigated with classical personality tests (which we will see in Chapter 2) or specific questionnaires to detect narcissistic, psychopathic, or Machiavellian personalities (e.g., NPI, PCL). However, the latter are not always sensitive enough to detect the construct of interest (Furnham & Crump, 2005). This method is also too wordy: the Narcissistic Personality Inventory (Raskin & Terry, 1988) alone, in its classic version, contains 40 items. Therefore, there was a need to devise new tools for detecting the Triad that were both valid and concise. Nowadays, a couple

of short scales have been developed specifically for measuring the Dark Triad, such as the Dirty Dozen and the Short Dark Triad (SD3; Jones & Paulhus, 2013), consisting of 12 and 27 items, respectively. The former contains four items for each trait in the Triad inspired by the main personality tests investigating Machiavellianism, narcissism, and psychopathy: Mach IV, NPI-40, and SRP-III. More precisely, the items contained in the DD derive from a detailed analysis of the correlations of the items of the original questionnaires. Although this instrument shows a good correlation with longer measures of the Dark Triad and can boast high reliability, it has been criticized for being too short, as many authors believe that four items are not sufficient to investigate a personality trait (Jonason & Luévano, 2013; Jonason & Webster, 2010; Lee et al., 2013). That is one of the reasons why Jones and Paulhus (2013) devised SD3. The items of this scale were not taken from other personality questionnaires but were designed by the authors based on the core characteristics of the three traits of the Triad. As a consequence of four studies performed by the authors, they concluded that SD3 is also a reliable and valid measure of the Dark Triad.

CHAPTER 2

Simulation and Dissimulation

In this chapter we will discuss the question of lying in a forensic context, as it has always been a relevant issue in legal trials. Next, we will present the most widespread traditional methods for lie detection in questionnaires. Finally, we will discuss innovative lie detection methods at the level of single items and the entire questionnaire.

Malingering is understood as the intentional and dishonest production of symptoms (Tracy & Rix, 2017). DSM-5 adds to this definition a crucial aspect of this concept: gain (or profit). Indeed, lying production can be stimulated by advantages (such as a monetary reward or avoidance of a particular situation) (APA, 1994). Falsehood involves falsifying the answers of a test or diagnostic tool and can therefore distort the outcome of a consultation. It is crucial to notice that an erroneous narration is not necessarily a lie. To be able to speak of a lie, the intentionality of the subject in altering the report is essential: deliberate lying is therefore not a mental disorder. Notwithstanding, some psychopathologies may be associated with high levels of lie production. In some cases, falsehood can be a symptom of mental disease, but there may also be situations where the lying subject is only simulating. This last condition has been demonstrated particularly in psychopathic and Machiavellian personalities (Azizli et al., 2016).

In the neuropsychological-forensic field, people can lie about cognitive disorders or psychopathology. Since these are typically detected with different instruments, the detection of lying concerning cognitive impairments or psychopathological disorders tends to be based on different methodologies. In fact, for the former case the techniques

often compare the accuracy of the current performance with the one of subjects who actually have such a cognitive deficit. In contrast, for the latter case techniques are based on the declaration of rare or impossible symptoms.

2.1 Difference Between Simulation and Dissimulation and Prevalence

One of the main differences between psychology applied to the clinical field and psychology applied to the forensic field is precisely the presence of lying. It is assumed that the clinical context is free from lies or, when present, these can be included in the signs and symptoms to be considered for a more accurate diagnosis. It is believed that in this field the subject doesn't manifest a tendency to lie since this behavior affects the achievement of the ultimate goal, namely an accurate diagnosis and related therapy. Something quite different happens in the forensic context, where falsehood is widespread. Indeed, the subject could have much to gain from altering the truth in the forensic field. Let's consider the following example: someone, following a car accident, reports a mild head injury. The insurance company is obliged to provide them with an economic refund due to this damage. Despite this example being very simplistic, it is easy to sense how many people, in such a situation, can be inclined to lie about the accident consequences, reporting inexistent damages or amplifying the existing ones.

Another example could be considering someone who wants to avoid a prison sentence following a crime committed. Therefore, the person in question could pretend to suffer from a pathology. He could then be considered incapable of standing trial, thus altering the course of the action and the penalty in his favor.

It is often easy to recognize the motivation that may push people to alter the symptoms by analyzing the context. Some lie for financial purposes, others for interpersonal benefits, etc. In a trial, be it criminal or civil, the reasons for lying can be numerous.

Another important distinction in the forensic field is that between simulation and dissimulation. The former (also called “faking bad”) refers to the invention or exaggeration of physical or psychic symptoms. In contrast, dissimulation (or “faking good”) consists in reporting in a mitigated manner the symptoms or denying their existence in order to present a more favorable self-image (Quinn & Resnick, 1985; Sartori et al., 2017). Although the latter category is not present in classification systems such as the DSM, simulation and dissimulation can be considered two sides of the same coin.

These two types of lies are typical of different areas within the forensic context. For example, dissimulation can be observed more frequently in civil trials, such as custody cases or psychological assessments for driving fitness. At the same time, simulation is typical of criminal trials and civil lawsuits for damages. This difference is explainable by the different advantages obtainable from simulating or dissimulating in each of the two domains.

To fully understand the concept of lying, it is important not to consider it in a dichotomous way (i.e., it can only be present or absent). Lipman (1962) has indeed identified four main types of lies:

1. symptoms invention
2. description of previously experienced symptoms
3. exaggeration of real symptoms
4. attribution of real symptoms to a false cause

That clarifies why the simulation can be considered a continuous variable rather than dichotomic, particularly considering Lipman’s third typology. Rogers (2008) has, on the other hand, distinguished 10 main lying strategies that still support a non-dichotomous view and that can be grouped into two classes:

1. Unlikely representations (statement of rare symptoms, quasi-rare symptoms, unlikely symptoms, combination of symptoms, and spurious patterns of psychopathology)
2. Amplified representations (including reporting numerous symptoms indiscriminately, reporting high symptom severity, stating obvious symptoms, differences between reported symptoms and observable symptoms, and erroneous stereotypes about reporting symptoms).

Differently, Goffman (1974) distinguishes between benign lies -which benefit the other person or at least do not harm them- and “brazen” lies- where the liars are aware that they are altering the story in their favor and to the detriment of other people. Other taxonomies in the literature identify other types of lies based on their acceptability or purpose (Lindskold & Walters, 1983; McLeod & Genereux, 2008). Additionally, several kinds of lies can be of different severity and are explained by various motivations (Utz, 2005).

If we stop and think about our daily lives, we easily realize how lies are widespread. On average, it has been shown that we tell two or three lies in just 10 minutes (Feldman et al., 2002; Weiss & Feldman, 2006). However, when we think about the medico-legal field, our common sense gives us a very different idea, leading us to consider this setting as exempt from falsehood. Scientific data says otherwise. Other studies report variable percentages of lies. That may be linked to the different fields and methodologies involved in the research and cultural and sample factors. Tracy and Rix (2017) highlighted these differences in the falsehood prevalence. They examined the literature about lying on cognitive disorders and psychopathology, such as post-traumatic stress disorder, attention

deficit hyperactivity disorder, and psychosis. This work points out how the observed lie presence is also influenced by the methodology used for the disorder assessment.

Mazar et al. (2008) investigated how much the average person tends to lie. The experimental paradigm was straightforward: the subjects had to solve problems and were rewarded based on the number of correctly solved ones. Notably, there was no external examiner: the subjects assessed their own performance and thus attributed the reward to themselves. That allowed participants to lie about their performance, believing they would not have been caught. We can also notice how, in this paradigm, there's an incentive (in this case, economic) to lie, as often happens in the procedural context. This research shows that when people could cheat, they tended to do so. What is surprising is that they tended to lie, but not much: the magnitude of the lie varied between 6% and 16%. While the benefits of lying appear attractive, subjects are also attracted to the self-perception of honesty, which is negatively affected by lying. We can hypothesize that the conflict is solved by lying, but not too much. That would allow the subject to gain advantages while protecting their self-image. The authors also noted that strategies such as swearing and continuously reminding them to be fair reduce the rate of lying.

Analog results emerged from Fischbacher and Heusi's study (2008), which reports a maximum of 22% of subjects who completely lied. DePaulo (1996) says that people lie in 20-30% of their social interactions. Concerning the forensic context, it has been observed that 29% of personal injury cases, 30% of disability cases, 39% of mild head injury cases, and 31% of chronic pain cases are likely to be faked, i.e., symptoms are either non-existent or amplified (Mittenberg et al., 2002). This percentage can increase up to 64,5% in the case of prisoners trying to obtain benefits, and the simulation rate varies with the severity of the crime in subjects judged unable to stand trial (McDermott

et al., 2013). Instead, it may account for 20% to 74% of forensic evaluations of parenting skills in civil trials, in which subjects dissimulate by improving the image they present of themselves (Baer & Miller, 2002). Although the above-reviewed literature reports similar percentages, most studies are conducted in contexts different from the trial one. Therefore, in forensic practice, the actual prevalence of lying is unknown, representing thus an important problem (Lande & Williams, 2013). Indeed, some disorders are more difficult to simulate as the subject rarely experienced them, making simulation easily detectable. However, other disorders, such as depression, are more critical for the clinician because all people had experienced a depressive mood or had at least a moment in life when their mood was particularly low. Thus, simulating these disorders tends to be more straightforward and plausible.

2.2 Personality Disorders Simulation and Dissimulation

As explained above, people may take advantage from simulating and dissimulating cognitive or psychopathological disorders, especially within a judicial context. We also said that falsehood could sometimes be a sign of psychopathology. In particular, the DSM-IV invites clinicians to consider disorder simulation whenever symptoms are reported within the forensic context and whenever the Antisocial Personality Disorder diagnostic criteria are met. Scientific literature provides little evidence supporting this thesis (Kucharski et al., 2006). Numerous studies have focused precisely on the relationship between this disorder (given its characteristics) and simulation, leading to conflicting results (Pierson et al., 2011; Kucharski et al., 2006). Simulation is sometimes associated with *Factor 1* assessed by the PCL-R (Kucharski et al., 2006), sometimes with *Factor 2* (Cima & van Oorsouw, 2013), and sometimes with neither (Pierson et al., 2011).

Therefore, similar disagreement can be observed in the relationship between falsehood and psychopathy (Cima et al., 2008; Freeman & Samson, 2012).

On the other hand, fewer studies analyze the relationship between other personality disorders and lying. In this regard, we recall a study from Grillo et al. (1994), which showed an association between altered symptoms reporting and the Antisocial, Avoidant, Passive-Aggressive, and Borderline Personality disorders. The above-mentioned personality disorders were associated with an exaggeration of symptoms rather than reduction. Wise (2002) also recorded a relationship between Cluster B personality disorders, characterized by dramatic and eccentric behavior, and a tendency to exaggerate symptoms. That is in contrast with a 2016 study showing no relationship between the personality traits of individuals involved in civil litigation and simulation (Young et al., 2016).

It must be noticed that the cognitive component of empathy is positively associated with the extreme pathology exaggeration and negatively with the referred symptomatology credibility (Di Girolamo et al., 2021). Additionally, the (negative) relationship between EI or empathy and various psychopathological traits, such as antisocial, borderline, and narcissistic personality traits, has been highlighted in the literature (Sheinin, 2018; Jonason & Krause, 2013). Also, Ali et al. (2009) and Petrides et al. (2011) found a negative correlation between EI and Machiavellianism and psychopathy, although Petrides' group (2011) highlighted a positive correlation between EI and narcissism. Therefore, in the future, it could be helpful to consider the subject's emotional abilities to better comprehend the relationship between psychopathological disorders and symptomatology alteration.

2.3 Methodologies for detecting faking in questionnaires

Given the prevalence of lying and its importance, especially in the forensic field, there has long been a need to identify ways of detecting simulation. Although the idea that falsehood is detectable by the clinician through the interview without using empirical techniques is still widespread, it has been demonstrated that the accuracy in distinguishing a truthful story from a lied one without the aid of specific tools is around 50-60%, so very close to a random guess (DePaulo et al., 2003; Vrij, 2000). Techniques for false answers detection can involve different methodologies depending on the methods chosen for the facts survey used in the various judicial proceedings. The following section will focus on lie detection methods applied to questionnaires. Nowadays, at least two affirmed lie detection questionnaire-based approaches can be identified (Goldstein, 2003). We will explain them in the following sections.

2.3.1 Standard Tests for the Detection of Simulated Psychopathology

Nowadays, the most common approach for detecting simulation or concealment of psychopathology is based on traditional tests and measures. The advantage of using this approach is that while it applies empirically tested strategies for mental disorders detection (the purpose for which the tests belonging to this category were created), it simultaneously allows falsehood detection. These tests are characterized by clinical scales that are to be interpreted keeping in the count of the scores in the lie control scales.

One example is the Minnesota Multiphasic Personality Inventory, one of the most famous personality tests. It was first published in the Forties and quickly became a popular tool for diagnosing medical and psychiatric disorders. Subsequently, it was revised, resulting in two versions of the test: one for adults (MMPI-II; Butcher et al., 1989) and one for adolescents (MMPI-A; Butcher, 1992). The MMPI-II is much used in

the clinical-forensic field because, other than being useful for personality disorders diagnosis, it contains three main control scales: the *L* scale, the *K* scale, and the *F* scale. In particular, the *L* scale highlights dissimulation attempts since it indicates the subject's propensity to admit unfavorable aspects of themselves. Therefore, high scores on the *L* scale point out that the subject is probably showing themselves as more functionally adapted than they are. The *K* scale highlights the presence of defensive answers and the tendency to minimize problems. The scores in this scale allow to correct the scores obtained in other clinical scales of the test based on the evasiveness of the subject in reporting their health. Finally, the *F* scale measures the presence of infrequent or atypical answers, which indicate the subject's tendency to exaggerate the answers to extreme items. Therefore this scale includes items concerning extremely rare or bizarre symptoms and thus reveals simulation attempts. Two other scales were developed from the *F* scale: the *F Back* scale, which assesses possible atypical or random responses in the last part of the test, and the *F Psychopathological* scale, which analyzes the veracity of the symptoms reported by the subject (Butcher, 2010). Whenever the *F* scale score is high and the *K* scale score is low, it is assumed that the person accentuates or mimics symptoms, as an increased number of rare symptoms are unlikely to occur in the same person. The subject probably dissimulates psychopathology when the *F* scale score is low and the *K* scale score is high. Apart from the presence of the control scales, the MMPI-2 is challenging to simulate as it contains a very high number of items (567). The MMPI-2 shows good accuracy in discriminating liars from honest ones: the test's specificity and sensitivity are both 76% (Di Donato et al., 2010; Rogers et al., 2003). Among the questions included in the test, some are clearly associated with symptoms of a disorder. In contrast, others are very subtle, making it hard for the subject to guess the related disorder. These two types

of questions are also helpful to know whether the subject is simulating, as obvious questions could indicate evident psychopathology while subtle questions could instead indicate a picture of normality. Sometimes the *Ego Strength* (Es) scale, a scale initially developed to predict the prognosis of psychotherapy, can also be used to detect simulation attempts. This scale score can be compared with the subject's daily functioning to detect discrepancies between the actual efficiency and the declared one (Lees-Haley, 1992). Finally, the *VRIN* (Variable Response Inconsistency Scale) and *TRIN* (True Responsive Inconsistency Scale) scales, which indicate the contradictory nature of the subject's responses, can also be helpful (Butcher, 2010).

As well as the MMPI-II, even the Millon Clinical Multiaxial Inventory-III (MCMC-III; Millon et al., 1997) is a personality questionnaire that allows to pinpoint simulation and dissimulation attempts. The MCMI-III is a self-report questionnaire composed of 175 dichotomous response items that allow to measure 10 clinical syndromes and 14 personality disorders. The structure of its items is based mainly on the DSM-IV diagnostic criteria. It also includes four scales for score correction, lie detection, and random response detection, which are the *X*, *Y*, *Z*, and *V* scales, respectively. The former is an openness index and assesses how much the subject is reluctant to talk about themselves. The second one measures social desirability and is therefore an index of dissimulation, while the *Z* scale is an index of self-assessment, which indicates simulation. Finally, the *V* scale consists of only three items and is considered a validity index. Interestingly, the *X* and *Z* scale scores correlate positively to the simulation scale score and negatively to the dissimulation scale score of the 16 Personality Factor Questionnaire (Cattell et al., 1993). The latter is a personality questionnaire composed of 200 items identifying 16

personality traits combinable in five factors evaluating more general personality characteristics (Ashton, 2013).

A new version of the MCMI has been recently published, the MCMI-IV (Millon et al., 2015), containing 195 items composing 15 personality scales, 15 syndromic scales, and five validity scales. In particular, in MCMI-IV the four MCMI-III control scales are supplemented by the *W* scale, namely the inconsistency scale. This scale reveals possible discrepancies in responses to pairs of items that assume a similar reply and may indicate a simulation attempt, a random response mode, or a lack of attention during the test. Although there aren't many works investigating the MCMI capability to discriminate between simulators and honest, this seems to be between 70 and 80% (Daubert & Metzler, 2000; Schoenberg et al., 2003).

Finally, among the methodologies for lie detection in questionnaires, there is the Personality Assessment Inventory (PAI; Morey, 1991). The latter is meant to evaluate the personality and detect psychopathology thanks to its double calibration, which makes it possible to identify the subject's distance from the average of the individuals belonging to the typical sample and from the average of the pathological subjects. Unlike MCMI and MMPI-II items, which are dichotomous response items, the 334 items composing PAI provide a four-point Likert scale answer. The control scales are four in this case:

- *Inconsistency*;
- *Infrequency*;
- *Positive Impression*;
- *Negative Impression*.

The first scale concerns the consistency of the subject's answers to the various questionnaire items since it is based on positively or negatively correlated items. The

Infrequency scale indicates the subject's tendency to answer randomly. Lastly, the *Negative Impression* and *Positive Impression* scales reveal the subject's tendency to give an extremely unfavorable and simulated impression of themselves and the disorder, and the propensity to provide an extremely favorable and disorder-free impression. These scales allow the detection of simulation with an accuracy of 90% (Morey & Lanier, 1998). The PAI also identifies an *Illness Simulation Index* based on responses frequently observed in simulators and more rarely in honest patients. It also identifies functions, such as the *Cashel Discriminant Function* and the *Rogers Discriminant Function*, that capture attempts to simulate and alter one's image (Morey, 2016).

2.3.2 Specific Tests for the Detection of Simulated Psychopathology

The second approach to lie detection in questionnaires, slightly different from the logic underlying personality questionnaires previously explained, is called "specialized" and is based on questionnaires specifically designed to detect deliberate falsification of answers. These tools are based uniquely on reporting rare or impossible symptoms without investigating the psychopathology's real presence. One of the best-known tests based on this approach is the Structured Interview of Reported Symptoms (SIRS; Rogers, 1986). SIRS is a self-report questionnaire composed of 156 dichotomous responses. They compose eight scales providing information on how the subject is altering their psychopathological symptoms:

- *Rare Symptoms;*
- *Symptom Combinations;*
- *Improbable and Absurd Symptoms;*
- *Blatant Symptoms;*
- *Subtle Symptoms;*

- *Selectivity of Symptoms;*
- *Severity of Symptoms;*
- *Reported Versus Observed Symptoms.*

Given its high accuracy, around 90% (Rogers et al., 1991), it is one of the most widely used lie-detection tests in the forensic field (Rogers, 2010).

Similar to the SIRS, the Structured Inventory of Malingered Symptomatology (SIMS; Smith & Burger, 1997) consists of 75 dichotomously answered items regarding symptoms that are anatomically impossible or rare even in the clinical population. SIMS allows the psychologist to detect lie attempts in five domains:

- *Low Intelligence (LI);*
- *Affective Disorders (AF);*
- *Neurological Impairment (N);*
- *Psychosis (P);*
- *Amnestic Disorders (AM).*

The LI questions aim to identify the degree of simulation or exaggeration of intellectual deficits, while the *AF* scale detects the declaration of atypical depressive or anxious symptoms. The *P* scale indicates bizarre psychotic symptoms that are not typical of the psychiatric reference population, and the *N* scale identifies the declaration of atypical or illogical neurological symptoms. Finally, the *AM* scale assesses the reference of non-existent mnesic deficits. The SIMS's accuracy in discriminating between truthful and simulated responses varies from 73% to 95%, depending on the scales considered (Smith & Burger, 1997).

2.3.3 Recent and Innovative Methodology

A common limitation of the above-described methods is the inability to detect which specific item the subject lied to. In fact, they provide information about the alteration of the test but not of the single items. This limitation is partly overcome by new simulation detection techniques, although the latter are still in the implementation and validation phase.

2.3.3.1 Machine Learning and (Dis)Simulation.

Machine Learning (ML) is a branch of Artificial Intelligence that allows creating, through computational algorithms, systems that self-learn in interaction with the environment. ML algorithms operate by building a model, starting from input data. They modify the underlying architecture repetitively to increase the system's accuracy through a learning process, providing output data-driven predictions. ML mechanisms learn to isolate and capture relevant elements and extract relationships between variables starting from a real dataset. That allows ML algorithms to learn how to categorize. An undoubted advantage of the ML approach regards the mechanism driving the data distribution. Indeed, the latter is considered unknown. The focus is shifted towards predictive accuracy without dwelling on the degree of fitness of the data to the model (unlike, for example, statistical inference methods) (Orrù et al., 2019).

Within Machine Learning, two approaches can be distinguished based on the learning methods: *Supervised Machine Learning* and *Unsupervised Machine Learning*. In the first case, the input-output association is already present, and the algorithm only needs to learn to generalize the process (Regattieri & Calabrese, 2020). More specifically, this approach can be referred to as “learning with a teacher”: the model is provided with example inputs and their desired output (provided by a “teacher”) to create a map between the two. This

approach is based on mathematical calculations such as regression or classification (Ongsulee, 2017). Instead, there is no such initial correspondence between input and output in Unsupervised Learning. As the algorithm is provided only with input data, the system learns on its own (precisely, unsupervised) to find regularities in the input. Thus, it adapts based on the input characteristics and subsequently learns to generalize. The use of one approach rather than the other depends on the available data (Regattieri & Calabrese, 2020). Another characteristic of ML, shared with the human adaptation process, is precisely the generalization ability: ML models can adapt to new, previously unseen input data. Indeed, the ML approach aims at simulating how living beings manage to process stimuli in order to achieve a goal (Naqa & Murphy, 2015).

One branch of ML is Deep Learning (DL). The latter allows studying algorithms with more than one hidden layer between input and output. That architecture allows to implement multiple levels of representation that correspond to different levels of abstraction (Ongsulee, 2017). This ML mechanism is convenient for simulating how the human brain processes perceptual stimuli, such as images or sounds (LeCun et al., 2015).

The entry of ML into psychological practice is marked by a study in 2013 that demonstrated how this technique could predict individual traits with high accuracy, based on the analysis of online behavior on the Facebook social network (Kosinski et al., 2013). ML is increasingly used to study simulation and dissimulation detection, given the above-described potential. Indeed, since lying involves an anomalous/inconsistent response, ML mechanisms, being able to extract regularities and make predictions, can potentially be extremely useful in detecting falsehood. ML is mainly exploited in association with electrophysiological and neuroimaging techniques such as EEG, fMRI, and EMG, leading to very encouraging results (Davatzikos et al., 2005; Gao et al., 2013; Xiong et

al., 2013). In particular, the approach to lie detection seems promising as the accuracy of this method in discriminating between simulation and truthful response can reach up to 96% (Monaro, Galante, et al., 2018; Monaro, Toncini, et al., 2018; Xiong et al., 2013).

Within this discussion, it may be relevant to investigate the use of ML for lie detection in questionnaires, given their relevance within the forensic context and the ease with which they can be altered (Mazza et al., 2019). In addition to the associated use of ML and electrophysiological and neuroimaging techniques, favorable evidences suggest using this technique with behavioral indexes, such as reaction time and kinematics. Indeed, in a study by Monaro, Toncini, et al. (2018), ML proved to be helpful in discriminating between honest subjects with depression and simulators who had filled in questionnaires to investigate depressive disorder and cognitive deficits. In particular, this study used ML algorithms combined with mouse tracking while subjects were filling in the questionnaire. The accuracy reached was 96%, a value higher than the one obtainable on average with the control scales of the questionnaire (Monaro, Toncini, et al., 2018). Indeed, as Duran et al. (2019) and Hibbeln et al. (2014) point out, the joint use of ML and mouse tracking has made it possible to show that lying responses can be evidenced by several parameters, such as motor onset time, decreased speed of movement, and more left clicks on the mouse.

Similarly, Mazza et al. (2019) demonstrated the effectiveness of ML in detecting dissimulation in the MMPI-2-Restructured Form (Ben-Porath & Tellegen) by exploiting as input parameter the reaction time and reaching an accuracy of 90%. Finally, ML also allowed to create a short version of the SIMS containing 10 items instead of 75, which maintains high accuracy (87.5) in discriminating between simulators and honest subjects (Orrù et al., 2021).

CHAPTER 3

Method

This chapter outline the objectives and method of this research work.

3.1 Research Project

3.1.1 *Research Goals*

We've already discussed the associations between the Dark Triad and non-optimal parenting styles, the associations between the latter and children's psychosocial development (see Chapter 1), and the prevalence of simulation and dissimulation within civil trials (see Chapter 2). Within this framework, this study aims to assess whether Machine Learning is an effective methodology for detecting altered responses to the Dirty Dozen. This questionnaire evaluates subclinical levels of Machiavellianism, narcissism, and psychopathy, i.e., the Dark Triad of personality. The peculiarity of this work lies in the attempt to detect lying at the single item level, in line with the new methodologies for simulation detection.

3.2 Materials and Method

The methods, materials, and procedures used in the research are outlined below.

3.2.1 *Participants*

Data were collected from 761 subjects. One hundred sixty-one of them were excluded. In particular, the inclusion criteria consisted of the correct answer to the control questions (Appendix A and Appendix B), used as an index of understanding of the instructions. Therefore, control questions made it possible to exclude subjects who did not understand

the instructions correctly and thus would have likely displayed a random response style to the questionnaire items. The composition of the sample is shown in Table 3.1.

Table 3.1

Sample's Composition

	<i>n</i>	%
Age (years)		
18-29	459	76.5%
30-39	70	11.7%
40-49	29	4.8%
50-59	29	4.8%
60-69	11	1.8%
≥80	2	0.3%
Schooling (years)		
8	5	0.8%
13	155	25.8%
16	176	29.3%
18	202	33.7%
≥19	62	10.3%
Sex		
Women	404	67.3%
Men	196	32.7%
Marital status		
Single	210	35%
Common-law	66	11%
Divorced	5	0.83%
Engaged	57	9.5%
In a relationship	183	30.5%
Separated	6	1%
Married	57	9.5%
Civilly united	1	1.67%
Widow/er	3	0.5%

Of all the participants, 85 (14.7%) declared they had at least one child. Subjects were divided into twelve groups of 50 participants each, and each group was given a different questionnaire version. As explained in more detail later, the difference between the questionnaire versions relies only on the choice of the question in which subjects were asked to lie (marked in red). The groups' composition is shown in Table 3.2.

Table 3.2*Groups' Composition*

		Group											
		1	2	3	4	5	6	7	8	9	10	11	12
		<i>n</i>											
Age (years)													
	18-29	47	41	43	33	40	37	45	44	20	33	33	43
	30-39	2	4	5	3	1	22	3	2	17	11	9	1
	40-49	0	3	0	7	7	0	2	0	7	1	2	0
	50-59	0	2	2	7	2	1	0	4	5	2	2	2
	60-69	1	0	0	0	0	0	0	0	1	3	2	4
	≥80	0	0	0	0	0	0	0	0	0	0	2	0
Schooling (years)													
	8	1	0	0	0	0	0	0	2	0	0	2	0
	13	22	16	12	21	9	3	20	6	1	13	17	15
	16	16	20	20	21	13	17	14	6	7	11	17	14
	18	9	12	17	5	24	18	14	36	21	20	10	16
	≥19	2	2	1	3	4	12	2	0	21	6	4	5
Sex													
	Women	38	35	33	36	32	39	34	24	43	13	40	37
	Men	12	15	17	14	18	11	16	26	7	37	10	12

This study is approved by the University of Padua (Department of General Psychology) and the experimental procedures comply with the standards of the regional ethics committee.

3.2.2 Experiment Procedure

The subjects were recruited voluntarily using various social networks (Facebook, Instagram, and Whatsapp), and they were given the link to one of the twelve questionnaires randomly. The questionnaires were developed on the JotForm platform (Jotform®), making the procedure faster and less cumbersome.

Before completing the questionnaire, informed consent was made available (Appendix C and Appendix D). To view the questionnaire and proceed with completion, subjects

were required to sign the informed consent form. Subsequently, subjects were given the following instructions (here translated in English; Italian version in Appendix E):

“To the questions **written in black, answer truthfully** (even if this means admitting negative aspects of yourself), while to the question written in red (**and only to that one**), answer as if you were in the situation described below:

Imagine you and your wife/husband are getting divorced and are arguing about the custody of the children (answer even if you do not have children).

You are in the context of a consultation requested by the judge, who must decide on the best conditions for child custody. The psychologist in charge asks you to fill in this test that will be used to assess your parental characteristics. To answer, read each statement and decide whether you agree or disagree and to what extent.

So, answer the question in red to make yourself look good by hiding behavior or thoughts that are generally considered negative. You aim to get custody of the children and look better than your wife/husband in the eyes of the judge. Try to give a positive image when you read the question written in red, even if it means lying.”

Before completing the questionnaire, the subjects were asked to provide personal data (corresponding to those described in Table 3.1) and answer four control questions (Appendix A and Appendix B). This procedure, as described above, made it possible to exclude the data of the subjects who did not answer the control questions correctly, as it is assumed that they did not understand the instructions or they responded randomly. Each participant then completed the DD questionnaire (described in more detail in Chapter 1 and the following section), but the question to which they were asked to lie differed for each group. In particular, Group 1 read item 1 written in red, Group 2 saw the second

item labeled in red, and so on. That made it possible to create an experimental condition where the only independent variable is the question asked to lie. All answers to questions flagged in red will be addressed as “dishonest condition” (DC) answers. In contrast, answers to the item written in black will be addressed as “honest condition” (HC) answers.

3.2.3 Measures and Tools

Participants were asked to complete the DD, a self-report questionnaire assessing the Dark Triad developed by Jonason and Webster (2010), consisting of 12 items. The content of the items and the order in which they were presented can be seen in Appendix F and Appendix G. The DD total scores for each trait can be obtained by calculating the average scores of the items belonging to the scale of interest.

In this study, participants were asked to provide a response based on a 5-point Likert scale, including the following options:

- never;
- rarely;
- sometimes;
- often;
- always.

Jonason and Webster's original questionnaire does not include a Likert scale response with a specific number of points. In some studies, a 5-point Likert scale is used; in others, a 7-point scale; and in others, a 9-point scale (Jonason & Webster, 2010; Pechorro et al., 2021; Webster & Jonason, 2013; Jonason, Kaufman, et al., 2013). Our methodological choice was dictated by the presence of other studies conducted by the Department of General Psychology that involve the use of the Dirty Dozen with answers on a 5-point

Likert scale. Another reason for choosing this response range is the use of Machine Learning. In fact, Machine Learning algorithms (and, more generally, lie detector tools) detect anomalies better when the response options are reduced to a narrower number. Therefore, our research project has been aligned with others already in progress to facilitate the eventual comparison of results in the future.

The participants' answers were converted into a numerical scale during analysis, where the correspondences are as follows:

- never = 1;
- rarely = 2;
- sometimes = 3;
- often = 4;
- always = 5;

As the questionnaire is designed to investigate the subclinical presence of specific traits, there are no discrimination cut-offs. The questionnaire takes about seven minutes to be completed.

Regarding Machine Learning models, we relied on two models of Supervised Machine Learning: Regressor Chain and Multiclass Classification. Both these models require to be provided with a portion of the dataset to learn. Successively, they test themselves with the rest of the dataset. For the training dataset, the models were provided with 420 subjects randomly selected from the whole sample. The test dataset was composed of the remaining 180 subjects. The Regressor Chain combines regressions in a multi-label model that exploits correlations between data. Each chain model makes a prediction in the order specified by the chain using all the available features. More specifically, the first stage of the training process consists of fitting a model for the first output. Thus, the

model makes a prediction of the output from the input feature. Next, the second stage consists of fitting another model for the second output based on the input and the first model output. This logic proceeds until the end of the chain (Pedregosa et al., 2011). The training dataset of this model required a “condition column” next to each item answer, where the values 1 (lied) or 0 (honest) were entered to allow the algorithm to gain information. During the test phase, the algorithm ignores the condition columns and predicts values on its own. Next, it compares its prediction to the original values of the condition columns.

On the other hand, the Multiclass Classifier classifies several targets by applying one classifier per class, where each label can only be marked as one class (Pedregosa et al., 2011). In our case, this results in the fact that each subject belongs to only one group. Each group is labeled as one of the 12 possible classes. That also allows the algorithm to gain information about the class by inspecting its classifier. The algorithm needs to be provided with a classifier (in this case, the group to which each subject belongs) during the training set in order to learn. In the test set, it ignores classifiers and predicts them on its own. At the end of the process, it compares its predictions to the actual classes of the data.

3.2.4 Research Hypothesis

In Chapter 1 we have discussed the adverse effects of dark personalities on parenting styles and the consequences of the latter on child development. Instead, in Chapter 2 we have focused on the relevance of dissimulation within the legal process and its possible influence on the process outcome. Moreover, we discussed recent and innovative lie detection methods. Given the above, our research was driven by two hypotheses.

- 1) The first hypothesis (H1) regards the presence of sex differences in the traits making up the Triad, according to literature data (see Azizli et al., 2016; Jonason & Krause, 2013; Jonason & Webster, 2010; Jonason, Jones & Lyons, 2013; and Muris et al., 2017 in Chapter 1). Therefore, it is hypothesized to find higher scores in all three Triad traits in men than in women.
- 2) The second hypothesis (H2) states that raw data and total scores of traits are significantly lower in the dishonest condition than in the honest one.

Several elements interested our research but without any a priori hypotheses. The first concerns correlations between the items of the different scales that make up the Triad. Starting from the conflicting opinions in the literature regarding the distinction or overlap of the three traits (Harpur et al., 1988; Jakobwitz & Egan, 2006; Ray & Ray, 1982), our study wants to investigate the presence of correlation among the traits that make up the Triad.

In addition, we want to analyze whether the position of the item being asked to lie influences the honest responses to the other items.

Finally, our research also wants to investigate whether it is possible to distinguish the false responses from the honest ones using ML mechanisms.

The hope is that this work can further shed light on new techniques applicable in the forensic field in order to improve the assessment of parenting skills of individuals involved in court-appointed child custody consultations. In such a way, appropriate interventions could be implemented, and the psychological well-being of all individuals involved could be increasingly protected.

CHAPTER 4

Data, Analyses, and Results

4.1 Graphical representation of raw data

First, the graphical representation of collected data is proposed. Figure 4.1 and Table 4.1 show the average scores for each questionnaire item in the two conditions (honest and dishonest). Scores in the dishonest condition are obtained by averaging the scores of the answers to items in which each group was asked to lie. Thus, the mean score of item 1 in the dishonest condition is obtained by averaging the responses of Group 1 to item 1. The mean score of item 2 in the DC is obtained by averaging the responses of Group 2 to item 2, and so on. As shown in Figure 4.1 and Table 4.1, there is a clear difference in average raw scores between the two conditions for all the questionnaire items except for item 1. Indeed, the average score of item 1 in the DC is very close to that given to the same item in the HC. Mean scores indicate a general tendency to give lower scores to the questions when asked to lie. That means that participants' attempt to dissimulate the questionnaire item flagged in red was mainly successful. Table 4.1 also shows a greater variability of scores for the DC in all items of the questionnaire except for item 6 and item 10, in which the HC's responses show greater variability. Although item 1 shows a higher mean in the DC than in the HC, and although the standard deviations of the DC of items 6 and 10 are smaller than in the HC, the total mean scores and standard deviations are generally higher and lower, respectively, for the HC. That indicates that when subjects are asked to lie, they provide lower and more variable scores on the DD items.

Figure 4.1

Graphic Representation of Each Item Raw Data for Both Honest and Dishonest Condition.



Table 4.1

Scores Means and Standard Deviations

Item	M(D)	SD(D)	M(H)	SD(H)
1	2.84	1.58	2.82	0.90
2	1.98	1.06	3.15	0.95
3	1.52	1.07	2.14	0.92
4	1.74	1.16	2.09	0.93
5	1.32	0.86	1.66	0.79
6	1.26	0.75	1.80	0.86
7	2.16	1.12	2.46	1.04
8	1.94	1.27	3.13	1.07
9	1.32	0.91	1.71	0.80
10	1.68	0.89	2.40	1.10
11	1.60	1.11	1.87	0.81
12	1.90	1.25	2.10	0.94
M(Tot)	1.77	1.09	2.82	0.92

Note. D = Dishonest; H = Honest.

4.2 Descriptive statistics

4.2.1 Scores Correlation and Raw data distribution and group effect

First, we investigated correlations between items scores and between traits scores. These exploratory analyses were based on literature's evidence of correlations between the Dark Triad traits. We had no a priori prediction, but our purpose was only to bring more knowledge about the distinction/overlap of the component traits of the Triad. We thus analyzed correlations between items scores and traits scores in the honest condition. Results are reported in Table 4.2 and Table 4.3, showing several statistically significant correlations between the same and different scale items. There are also statistically significant positive correlations between traits total scores.

Table 4.2

Correlations Between Honest Items Scores

Trait	Item	P	N	P	M	P	M
		1	2	3	4	5	6
Pearson's <i>r</i>							
P	1	—					
N	2	0.025	—				
P	3	0.28	-0.073	—			
M	4	-0.090*	0.055	0.045	—		
P	5	0.036	-0.045	0.076	0.080	—	
M	6	0.036	-0.025	0.097*	0.085*	0.161***	—
N	7	-0.106*	0.016	0.015	0.077	-0.014	0.210***
N	8	-0.085*	0.002	0.066	0.042	-0.048	0.139**
M	9	-7.174e-4	-0.071	0.052	0.048	0.121**	0.283***
P	10	0.047	0.022	0.104*	-0.012	0.092*	0.056
M	11	0.083	0.005	0.011	0.098*	0.079	0.263***

Trait		N	N	M	P	M	N
	Item	7	8	9	10	11	12
Pearson's <i>r</i>							
N	12	0.024	0.064	0.036	0.168***	0.017	0.158***
Trait		N	N	M	P	M	N
	Item	7	8	9	10	11	12
Pearson's <i>r</i>							
P	1						
N	2						
P	3						
M	4						
P	5						
M	6						
N	7	—					
N	8	0.224***	—				
M	9	0.216***	0.186***	—			
P	10	0.087*	0.059	0.140***	—		
M	11	0.169***	0.138**	0.278***	0.123	—	
N	12	0.121**	0.224***	0.178***	0.109	0.209***	—

Note. P = psychopathy. N = Narcissism. M = Machiavellianism.

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

Table 4.3

Correlations Between Honest Traits Total Scores

Trait	Psychopathy	Narcissism	Machiavellianism
Pearson's <i>r</i>			
Psychopathy	—		
Narcissism	0.134**	—	
Machiavellianism	0.302***	0.525***	—

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

Next, we conducted some analyses of variance to investigate if the position of the faked item influenced the response to the other items. Before running these analyses, examining the answers' distribution was necessary. To do that, we performed the Shapiro-Wilk test and observed kurtosis and skewness values of the distribution. A Shapiro-Wilk p-value $< .05$ and kurtosis and skewness values that deviate from 0 are indicators of a non-normal distribution. For this purpose, visual analysis of distribution plots and Q-Q plots can also be helpful: these allow a better understanding of how much the distribution of interest differs from a normal distribution. Distribution plots display values distributions: if the latter look like bells, they are more likely approximable to normal distribution. Q-Q plots instead compare quantiles from empirical data belonging to a normal distribution. Data corresponding to a normal distribution would lay on the diagonal reference line of Q-Q plots, while data belonging to a non-normal distribution would lay above or under the line. We, therefore, performed these analyses of descriptive statistics. The distributions of the responses to the questionnaire items are not approximable to normal distributions, as can be seen from Table 4.4 and two examples in Figure 4.2 and Figure 4.3, showing the distribution plots and Q-Q diagrams of two of the representative items of the questionnaire. However, it is important to note that the Shapiro-Wilk Test is most sensitive in the case of small sample sizes, which is not the present case since our sample consists of 600 subjects.

Table 4.4

Descriptive of Items' Distribution

Descriptive	ITEM					
	1	2	3	4	5	6
Mode	3.00	3.00	2.00	2.00	1.00	1.00
Median	3.00	3.00	2.00	2.00	2.00	2.00

Descriptive	ITEM					
	1	2	3	4	5	6
Mean	2.83	3.16	2.14	2.10	1.67	1.80
SD	0.91	0.87	0.89	0.90	0.79	0.86
Skewness	0.06	-0.03	0.38	0.36	1.31	0.78
Skewness SE	0.10	0.10	0.10	0.10	0.10	0.10
Kurtosis	-0.67	-0.27	-0.34	-0.62	2.27	0.09
Kurtosis SE	0.20	0.20	0.20	0.20	0.20	0.20
Shapiro-Wilk	0.89***	0.89***	0.87***	0.87***	0.76***	0.82***
Minimum	1.00	1.00	1.00	1.00	1.00	1.00
Maximum	5.00	5.00	5.00	5.00	5.00	5.00

Descriptive	ITEM					
	7	8	9	10	11	12
Mode	3.00	4.00	1.00	2.00	2.00	2.00
Median	2.00	3.00	2.00	2.00	2.00	2.00
Mean	2.47	3.13	1.71	2.41	1.87	2.09
SD	1.03	0.98	0.78	1.09	0.77	0.94
Skewness	0.10	-0.45	0.79	0.23	0.51	0.43
Skewness SE	0.10	0.10	0.10	0.10	0.10	0.10
Kurtosis	-0.81	-0.24	0.05	-0.85	-0.27	-0.63
Kurtosis SE	0.20	0.20	0.20	0.20	0.20	0.20
Shapiro-Wilk	0.90***	0.89***	0.80***	0.90***	0.83***	0.86***
Minimum	1.00	1.00	1.00	1.00	1.00	1.00
Maximum	5.00	5.00	5.00	5.00	5.00	5.00

***p-value < .001.

Figure 4.2

Item 3 and Item 4 Responses Distribution

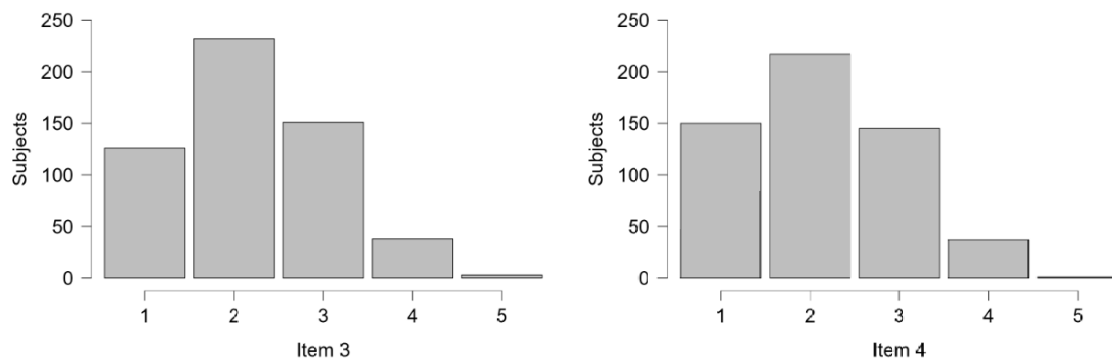
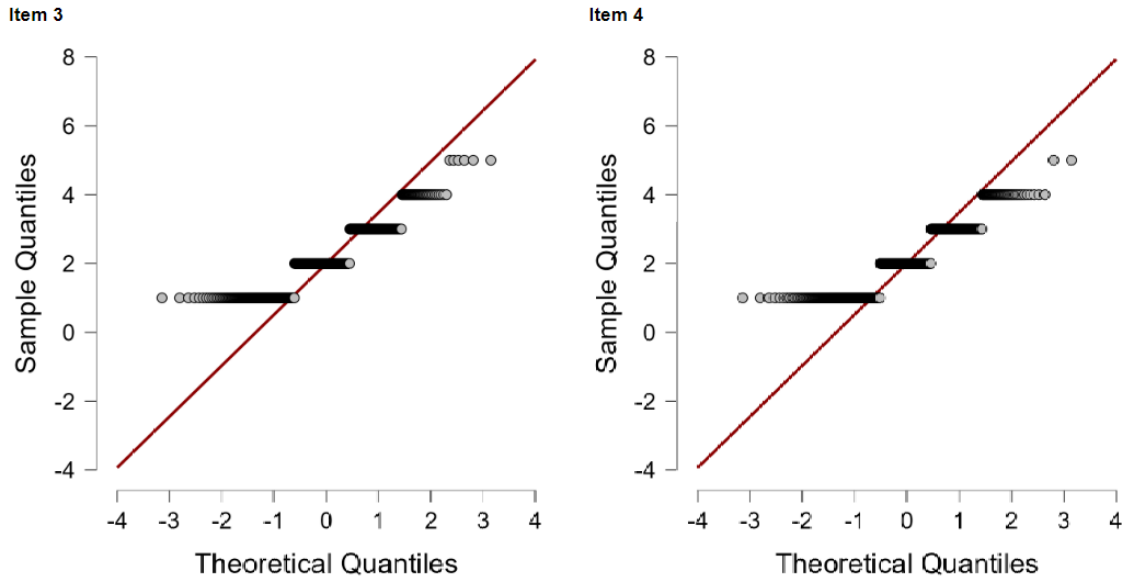


Figure 4.3

Item 3 and Item 4 Distribution Q-Q Plots.



With this knowledge in mind, we ran analyses of variance using the Kruskal-Wallis test to investigate any effects of the position of the red-marked item on other items. The Kruskal-Wallis is analogous to the ANOVA (“analysis of variance”), but it is used with data belonging to non-normal distributions. Kruskal-Wallis test compares groups’ ranks instead of groups’ means. These analyses allow to detect statistically significant differences in the responses of different groups to the various items. A Kruskal-Wallis p-value < .05 indicates a statistically significant difference in the experimental groups’ responses to a particular item. This analysis revealed statistical significance for all questionnaire items except a few items (see Table 4.5).

Although the scores of the various items are distributed non-normally, we also decided to run ANOVAs and Post-Hoc Tests using multiple types of corrections (Tuckey, Sheffé, Bonferroni, Holm, Šidák) to identify which comparisons were significant. That is justified by the fact that ANOVA results mostly resemble those of the analyses using the Kruskal-

Wallis test. We thus ran an ANOVA for each questionnaire item, comparing each time all groups' answers to each item investigated. Results are shown in Table 4.5. These analyses approximately mirrored the results of the Kruskal-Wallis tests, except for item 4 and item 11, which did not show statistical significance using ANOVA. In contrast, they had shown statistical significance with the Kruskal-Wallis test (Table 4.5). We then run Post Hoc Tests for each ANOVA significant comparison. Even though all the Post-hoc Tests we used assume that the normal distribution assumption is respected, since they are based on comparisons between averages (as ANOVA), we decided to rely on these anyway. Indeed, we are not interested in the average rank of one group compared to another (which is what Kruskal-Wallis Test compares, as previously explained) but in groups' mean scores (which are compared by the ANOVA and the Post Hoc Test). Since all types of corrections gave almost equivalent results, from now on we will only consider the Post-hoc Test with Tukey correction.

This procedure allowed us to discover that the significance observed in many of the Kruskal-Wallis analyses is probably due to the statistically significant difference of the comparisons between the group that had to lie to the item investigated by the test and other groups. For example, considering item 2, we found a statistically significant difference only between Group 2 (that was required to lie to item 2) and other experimental groups (required to answer honestly to item 2). If this were the case, this would not indicate an effect of the lying position on honest answers, as one group's lied response would be expected to be statistically different from another group's honest response. Thus, by not considering comparisons between the group that lied to the item under investigation and other groups, only a few analyses were significant in the Post Hoc Test. See Table 4.5 and Table 4.6 for results.

Table 4.5*Kruskal-Wallis Tests and ANOVAs for Group Differences in Items' Responses*

ITEM	Kruskal-Wallis	ANOVA	
	Statistic	<i>F</i>	η^2
1	11.71	0.93	0.02
2	85.87***	10.77***	0.17
3	55.78***	4.29***	0.07
4	19.97*	1.23	0.02
5	34.31***	2.63**	0.05
6	50.30***	3.64***	0.06
7	17.80	1.58	0.03
8	56.58***	7.92***	0.13
9	45.42***	2.94***	0.05
10	50.08***	4.89***	0.08
11	23.89*	1.40	0.03
12	21.40*	1.60	0.03

p* < .05. *p* < .01. ****p* < .001.**Table 4.6***Post-Hoc Tests on ANOVA's Significant Comparisons*

ITEM	Comparisons	<i>t</i>	<i>d</i>
	Groups		
2	1 v 2	7.99***	1.60
	2 v 3	-7.31***	-1.46
	2 v 4	-7.89***	-1.58
	2 v 5	-5.37***	-1.07
	2 v 6	-8.34***	-1.67
	2 v 7	-7.42***	-1.48
	2 v 8	-8.45***	-1.69
	2 v 9	-7.19***	-1.44
	2 v 10	-6.28***	-1.26
	2 v 11	-8.22***	-1.64
	2 v 12	-6.28***	-1.26
	3	1 v 3	4.46***
3 v 5		-5.12***	-1.03
3 v 6		-3.79**	-0.76
3 v 7		-4.23**	-0.85
3 v 10		-5.01***	-1.00
3 v 11		-4.68***	-0.94
5	4 v 5	4.38***	0.88
	4 v 9	3.87**	0.77

ITEM	Comparisons		<i>t</i>	<i>d</i>
	Groups			
6	3 v 6		3.91**	0.78
	4 v 6		4.98***	1.00
	6 v 7		-4.03**	-0.81
	6 v 10		-3.23*	-0.67
	6 v 11		-4.98***	-1.00
8	1 v 8		6.07***	1.21
	2 v 8		7.07***	1.41
	3 v 8		5.87***	1.17
	4 v 8		6.77***	1.35
	5 v 8		5.87***	1.17
	6 v 8		7.76***	1.55
	7 v 8		6.67***	1.33
	8 v 9		-5.47***	-1.10
	8 v 10		-7.07***	-1.41
9	8 v 11		-6.87***	1.37
	8 v 12		-5.57***	-1.11
	4 v 9		4.07**	0.82
	8 v 11		-3.69*	-0.74
10	9 v 11		-4.58***	-0.92
	1 v 10		4.24**	0.85
	2 v 10		3.58*	0.72
	3 v 9		3.39*	0.68
	3 v 10		4.52***	0.90
	5 v 9		4.05**	0.81
	5 v 10		5.18***	1.04
	6 v 9		4.14**	0.83
	6 v 10		5.27***	1.05
	7 v 10		4.05**	0.81
	10 v 11		-3.86**	-0.77
	10 v 12		-3.58*	-0.72

Note. Only significant comparisons are represented. Significant comparisons that don't involve lying groups are in bold. *d* is Cohen's *d* for effect size.

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

Note that η^2 and Cohen's *d* are indexes of effect size. Cohen's *d* values between 0.2 and 0.5 or η^2 values between 0.01 and 0.059 indicate a small effect size; Cohen's *d* values between 0.5 and 0.8 or η^2 values between 0.059 and 0.138 denote a medium effect size;

finally, d values greater than 0.8 and η^2 values greater than 0.138 indicate a large effect size.

In general, it can be assumed that there is no substantial effect of the position re-marked item on the responses to the other items. Moreover, these analyses already seem to suggest that there are significantly different responses associated with the DC in the single items. However, more in-depth analyses are needed (as we shall see later).

4.2.2 *Effect of age on total scores of traits*

We then conducted correlational analyses on single traits to investigate possible correlations between honest trait scores (i.e., calculated averaging only the honest answers of each subject) and subjects' age and schooling. These analyses were not carried out based on a priori hypotheses but aimed to analyze the characteristics of the sample.

As shown in Table 4.7, no significant correlation was found between traits total scores and subjects' schooling. In contrast, a significant negative correlation was found between each traits total score and participants' age (Table 4.7). That means that as the age of the subjects increases, the Dark Triad scores of traits decrease.

Importantly, Pearson's coefficient r indicates a small correlation for r values between .100 and .243; medium for values between .243 and .371; finally, r values higher than .371 indicates a strong correlation. Thus, all the correlations found between traits' total scores and subjects' age are small (Table 4.7).

Table 4.7

Correlations Between Traits Total Scores and Subjects' Age and Schooling

Trait	Age	Schooling
Psychopathy	-.150***	-.079
Narcissism	-.156***	-.052

Trait	Age	Schooling
Machiavellianism	-.109**	-.045

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

4.2.3 *Effect of condition and sex on total scores and single items*

Before conducting the analyses considering the average score of traits, we investigated the distributions of total scores. Since total scores of each trait are obtained by averaging several raw scores, we can suppose that their distribution is different from the one of single items responses. Therefore, we performed a Shapiro-Wilk test and observed the kurtosis and skewness of the traits. These analyses were conducted using the subjects' mean scores for each subscale. The scores at each subscale were calculated by averaging the subjects' scores (both honest and dishonest) given to the items belonging to each trait. As can be seen from Table 4.8, the Shapiro-Wilk test indicates statistical significance for all three traits. Still, the kurtosis and skewness values are not excessively distant from 0 (value indicating a normal distribution). It is also important to note that each trait's mean, mode, and median values are not too dissimilar. For example, considering narcissism, the mean is equal to 2.70, the median is 2.75, and the mode is 3.

Table 4.8

Descriptive of Total scores of traits Distributions

	Psychopathy	Narcissism	Machiavellianism
Mode	2.00	3.00	2.00
Median	2.25	2.75	1.75
Mean	2.26	2.70	1.88
SD	0.64	0.76	0.65
Skewness	0.22	0.03	0.63
SE of Skewness	0.09	0.10	0.10
Kurtosis	0.17	-0.30	-0.06
SE of Kurtosis	0.19	0.19	0.19

	Psychopathy	Narcissism	Machiavellianism
Shapiro-Wilk	0.98***	0.99***	0.95***
Minimum	1.00	1.00	1.00
Maximum	5.00	5.00	4.00

***p-value < .001.

As the violations are small, we assumed that it is possible to approximate the distributions of the traits to normal distributions. This approximation is best understood by looking at the traits' distribution and Q-Q plots (see Figure 4.4 and Figure 4.5 for an example).

Figure 4.4

Narcissism Total Score Distribution Plot

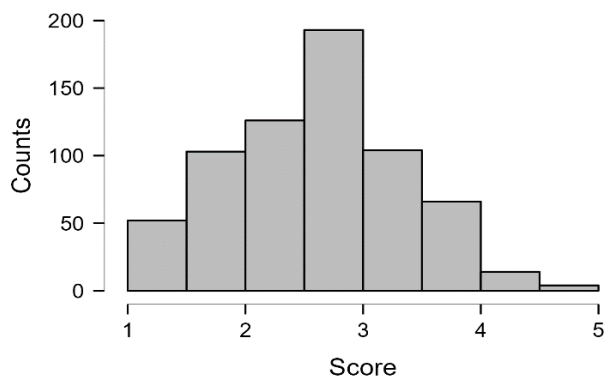
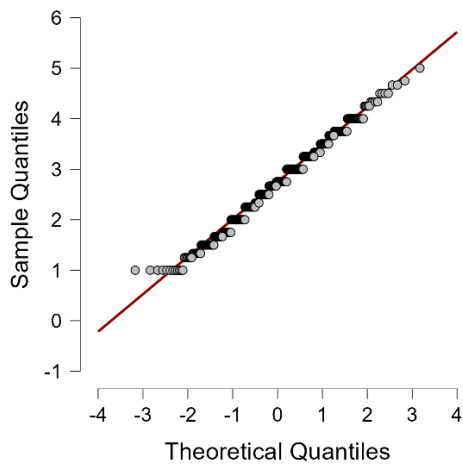


Figure 4.5

Narcissism Total Score Q-Q Plot



We then conducted several independent samples t-tests to detect statistically significant differences between scores related to sex, condition, and their interaction at the trait level. These analyses were conducted using the subjects' mean scores for each subscale. The scores at each subscale were calculated by averaging the scores given to the items belonging to each trait. To do that, the subjects were first divided according to sex. After that, the score on each scale was calculated based on the honest answers of each participant. Thus, for each subject, the total score on one of the three traits was calculated based on the average of three answers, while the total scores on the other two traits were calculated based on the average of the answers to four items. That allowed us to obtain the subjects' total scores for each trait in the HC, dividing the sample based on sex. The total scores in the DC were calculated slightly differently. As for the HC, participants' data were first divided according to sex. The DC responses of each group were then entered into a matrix as if they were the responses of n subjects to the twelve items composing the questionnaire. That was done for men and women separately. Based on this organization, the total score at each subscale was then calculated as for the HC. Since the sex distribution was not homogeneous among the various experimental groups (as shown in Table 3.2), some DC total scores were calculated based on the answers to four items. Others were calculated using the answers to three or fewer items. Descriptive statistics of total scores of traits for both conditions are reported in Table 4.9.

Table 4.9

Descriptive Statistics of Total scores of traits in Dishonest and Honest Conditions

	Psychopathy		Narcissism		Machiavellianism	
	D	H	D	H	D	H
Mode	1.00	2.00	2.50	3.00	1.00	2.00
Median	2.00	2.25	1.75	2.75	1.25	2.00

Mean	1.92	2.31	2.03	2.77	1.48	1.91
SD	0.86	0.59	0.81	0.72	0.61	0.64
Minimum	1.0	1.00	1.00	1.00	1.00	1.00
Maximum	5.0	4.25	5.00	4.75	4.00	4.00

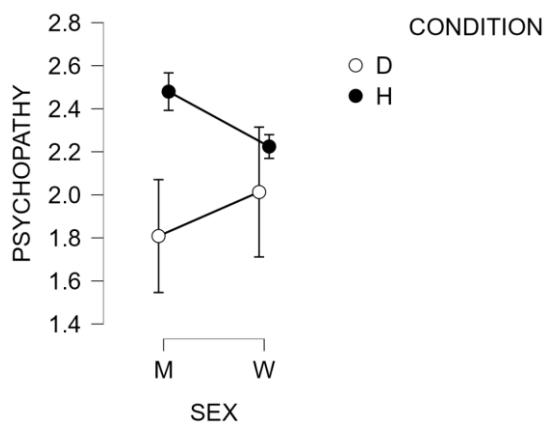
Note. D = Dishonest; H = Honest.

4.2.3.1 Psychopathy

T-tests showed statistically significant differences related to sex, condition, and several sex-condition interactions on the total score of psychopathy (Figure 4.6). In particular, all comparisons showed statistically significant differences except for the “DW v DM” comparison. (Table 4.10). These analyses indicated lower scores in the women sample and in the DC. Furthermore, condition-related differences are present in both sexes, whereas no sex-related difference occurs in the DC. The effect sizes of the significant comparisons are mostly small, except for the “Dishonest v Honest” (D v H) and the “Dishonest Men v Honest Men” (DM v DH) comparisons, which show a medium and large effect sizes, respectively. Figure 4.6 best illustrates these results.

Figure 4.6

Graphic Representation of Total Scores of Psychopathy



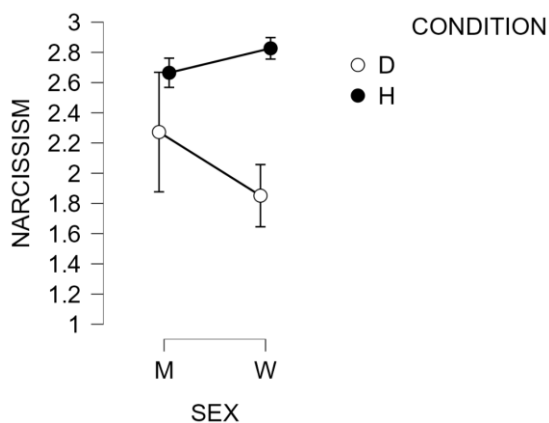
Note. M = Men; W = Women; D = Dishonest; H = Honest.

4.2.3.2 Narcissism

Regarding the total score of narcissism, t-tests showed significant effects related to sex, condition, and sex-condition interactions indicating statistically lower scores in the DC and in the men sample for the HC (Table 4.10). Sex-related differences in the DC were associated with lower scores in the women sample. That means that women score more than men when completing the questionnaire honestly, but they lower their answers much more than men when they lie (Figure 4.7).

Figure 4.7

Graphic Representation of Total Scores of Narcissism



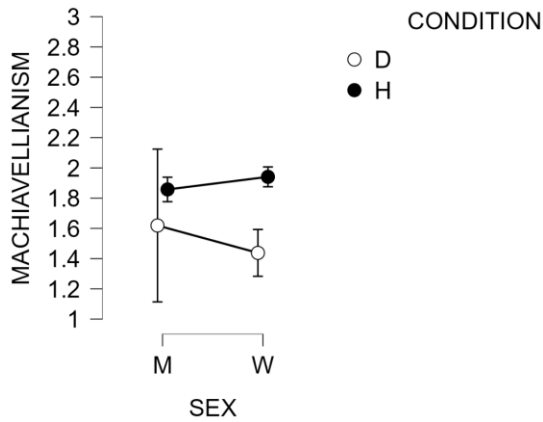
Note. M = Men; W = Women; D = Dishonest; H = Honest.

4.2.3.3 Machiavellianism

Regarding the Machiavellian trait, t-tests showed only significant effects related to the condition and the “Dishonest Women v Honest Women” (DW v HW) comparison, resulting in lower scores in the DC (Table 4.10 and Figure 4.8).

Figure 4.8

Graphic Representation of Machiavellianism Total Score



Note. M = Men; W = Women; D = Dishonest; H = Honest.

Table 4.10

Sex, Condition, and Sex-condition Interaction on Total Scores of Traits

Variable	Trait	<i>t</i>	<i>df</i>	<i>d</i>
Sex				
W v M	Psychopathy	-3.24***	672	-0.26
	Narcissism	2.02*	660	0.17
	Machiavellianism	0.933	654	0.08
Condition				
D v H	Psychopathy	-5.15***	672	-0.63
	Narcissism	-7.78***	660	-1.03
	Machiavellianism	-4.88***	654	-0.68
Interactions				
DM v HM	Psychopathy	-5.78***	231	-1.04
	Narcissism	-2.59*	220	-0.54
	Machiavellianism	-1.44	208	-0.40
DW v HW	Psychopathy	-2.07*	439	-0.35
	Narcissism	-7.90***	438	-1.36
	Machiavellianism	-4.78***	444	-0.77
HW v HM	Psychopathy	-5.04***	597	-0.44
	Narcissism	2.61**	597	0.23
	Machiavellianism	1.50	597	0.13
DW v DM	Psychopathy	1.04	73	0.24
	Narcissism	-2.09*	61	-0.54

Variable	Trait	<i>t</i>	<i>df</i>	<i>d</i>
	Machiavellianism	-0.96	55	-0.30

Note. *d* is Cohen's *d* for effect size. DW = Dishonest Women; HW = Honest Women;

DM = Dishonest Men; HM = Honest Men.

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

We then investigated the effects of sex, condition, and sex-condition interactions at a single item level to identify in which specific item the subjects' answers were statistically influenced by lying. Since the item distribution is non-normal, we ran Mann-Whitney Tests. Mann-Whitney test can be considered analogous to the t-test, but it is implementable with non-normal distribution. Like Kruskal-Wallis Test, Mann-Whitney Test relies on ranks differences of groups and not on means differences. Effect size is identified by rank-biserial correlation in the Mann-Whitney test and is interpreted the same as Pearson's *r*. Thus, rank-biserial correlation is an effect size where < .100 is trivial, .100 - .243 is a small effect, .243 - .371 a moderate effect, and > .371 a large effect.

In order to analyze the above-mentioned factors, we ran several t-tests for each item. Analyses and results are reported in Table 4.11.

Table 4.11

Sex, Condition, and Sex-condition Interaction Effects on Items' Scores

Variable	Trait	Item	Mann-Whitney	Rank-biserial Correlation
Sex				
W v M	Psychopathy	1	34513.50**	-.13
		3	32962.00***	-.17
		5	36547.50	-.08
		10	36413.00	-.08

Variable	Trait	Item	Mann-Whitney	Rank-biserial Correlation		
Condition D v H	Narcissism	2	45328.50**	.15		
		7	38180.00	-.03		
		8	41852.50	.06		
		12	43111.00	.09		
	Machiavellianism	4	42221.00	.07		
		6	40804.00	.03		
		9	37878.00	-.04		
		11	40628.00	.03		
		Condition DM v HM	Psychopathy	1	13302.00	-.03
				3	7043.50***	-.49
				5	9525.00***	-.31
10	7983.00***			-.42		
Narcissism	2		4553.50***	-.68		
	7		11145.50*	-.20		
	8		6028.00	-.56		
	12		11021.50*	-.20		
Machiavellianism	4		9685.50***	-.29		
	6		7736.00***	-.44		
	9		8414.00***	-.39		
Interactions DM v HM	Psychopathy	11	9438.50***	-.30		
		1	799.00	-.28		
		3	616.50***	-.60		
		5	1035.50**	-.35		
	Narcissism	10	1527.50***	-.48		
		2	629.50***	-.54		
		7	1441.00	6.944e-4		
		8	1396.00**	-.37		

Variable	Trait	Item	Mann-Whitney	Rank-biserial Correlation	
DW v HW	Machiavellianism	12	1261.50	.06	
		4	771.00**	-.40	
		6	500.50**	-.51	
		9	591.50	-.11	
	Psychopathy	11	779.00	-.16	
		1	7327.50	.06	
		3	3442.00***	-.44	
		5	4235.00**	-.29	
		10	1301.00**	-.49	
		Narcissism	2	1793.00***	-.72
			7	4519.00**	-.28
			8	1144.00***	-.75
12	4816.00**		-.29		
HW v HM	Machiavellianism	4	490.50**	-.26	
		6	4117.00***	-.42	
		9	441.50***	-.43	
		11	4688.00***	-.34	
	Psychopathy	1	28303.00**	-.16	
		3	26714.00***	-.19	
		5	30231.00	-.08	
		10	26179.00**	-.16	
		Narcissism	2	39333.50***	.18
			7	32877.50	-.01
			8	34103.50	.06
			12	37842.00*	.13
Machiavellianism	4	35711.00	.07		
	6	35332.00	.05		
	9	34102.00	.00		
	11	35801.00	.06		

Variable	Trait	Item	Mann-Whitney	Rank-biserial Correlation
DW v DM	Psychopathy	1	252.00	.11
		3	279.00	-.01
		5	276.00	-.04
		10	213.50	-.11
	Narcissism	2	221.00	-.16
		7	185.00	-.32
		8	219.00*	-.30
		12	175.00	-.27
	Machiavellianism	4	284.00	.13
		6	234.50	.09
		9	105.00*	-.30
		11	169.50	-.13

Note. M = Men; W = Women; H = Honest; D = Dishonest; MH = Men Honest;

WH = Women Honest; MD = Men Dishonest; WD = Women Dishonest.

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

These results are in line with those of the trait level analyses, showing three pieces of evidence. The first is that sex differences highlighted in literature are found only in a few items and in two out of three traits regarding psychopathy and narcissism, with men scoring higher than women in the former and lower in the latter. Instead, Machiavellianism doesn't show sex differences in the HC neither at trait level nor at the level of single items (see sections "W v M" and "HW v HM" in Table 4.10 and Table 4.11). The second evidence is that almost every item and trait shows an effect of condition in both men and women (see "D v H", "DM v HM", and "DW v HW" in Table 4.10 and Table 4.11). Indeed, scores of the items and traits where subjects were required to lie are

significantly lower than those of the items and traits in which participants were required to be honest. That is in line with our H2 prediction.

The last evidence, linked to the first two, is that two traits out of three and all items except two do not show sex differences in the dishonest condition (see “DW v DM” in Table 4.11). That means that men and women score mostly the same when faking not only on a trait level (only for psychopathy and Machiavellianism) but also on a single item level.

4.3 Machine Learning

In this section, we examine the effectiveness of Regression Chain and Multiclass Classifier in identifying faked responses to the test items. Each model was first trained on 420 randomly selected subjects (training set) and then tested on the remaining 180 subjects (test set). To do that we implemented several Machine Learning classifiers. Since the latter are based on different logics and exploit different patterns to perform the classification, their accuracy might vary.

The first model we run is the so-called Regressor Chain, a multi-label model that arranges regressions into a chain. Each model predicts in the order specified by the chain using all of the available features provided to the model and the predictions of models earlier in the chain. See Chapter 3 (pp. 56-57) of this essay for a more in-depth discussion of the model.

In the Regression Chain, we used the following classifiers: AdaBoost, Decision Tree, Random Forest, and XGBoost (XGBC). This model aimed to identify for each subject which answer was faked or not. Test dataset results among different classifiers are reported in Table 4.12.

Table 4.12*Classifiers applied to Regression Chain model.*

Classifier	Faked items identified ^a	% of faked items identified ^b	Accuracy ^c
AdaBoost	50	28	0.88
Decision Tree	43	24	0.87
Random Forest	43	24	0.93
XGBC	41	23	0.92

Note. These results refer to analyses performed on the test dataset.

^a The total number of faked questions in the test dataset is 180. ^b Indicates the percentage of the number of correctly predicted faked items related to the number of total faked items in the test dataset ($n = 180$). ^c Indicates the ratio of all correctly predicted items to the total number of items in the test dataset ($n = 2160$).

Multiclass Classification implementation involved the following classifiers: Decision Tree, Random Forest, Support Vector Machine (SVC), and XGBC. This model was implemented to classify each subject into a class (corresponding to the experimental group). Unlike the Regressor Chain model, which had to assign one of the two conditions (faked-honest) to each answer, Multiclass Classifiers had to classify a whole set of responses to one of the twelve experimental groups (which, as explained in pp. 54-55 of this essay, faked different questionnaire items). For a more in-depth discussion of the model, see Chapter 3 (pp. 57) of this text. Test dataset results of the algorithms applied to the Multiclass Classifier are reported in Table 4.13.

Table 4.13

Classifiers applied to Multiclass Classifier model.

Classifier	Accuracy
Decision Tree	0.39
Random Forest	0.41
SVC	0.33
XGBC	0.40

Note. These results refer to analyses performed on the test dataset.

The accuracy of algorithms involved in Multiclass Classification was much lower than that of Regression Chain classifiers. That is due to the different number of answer options each model was provided. Regressor Chain only had to assign “faked” or “honest” to each answer, while Multiclass Classification had to choose between 12 different classes. Thus, the Multiclass Classification probability of guessing an answer by randomly answering is 8.33%. We, therefore, performed several Chi-square tests to analyze whether the accuracy of different algorithms and the probability of guessing with a random guess is statistically different. The correct classification achieved using all ML models is significantly above chance. Indeed, Chi-square test statistics are as follows:

$$\text{Decision Tree} = (\chi^2 = 46.59, p < 0.001);$$

$$\text{Random Forest} = (\chi^2 = 51.96, p < 0.001);$$

$$\text{SVC} = (\chi^2 = 32.93, p < 0.001);$$

$$\text{XGBC} = (\chi^2 = 49.25, p < 0.001).$$

In light of this, the achieved results can be considered very successful.

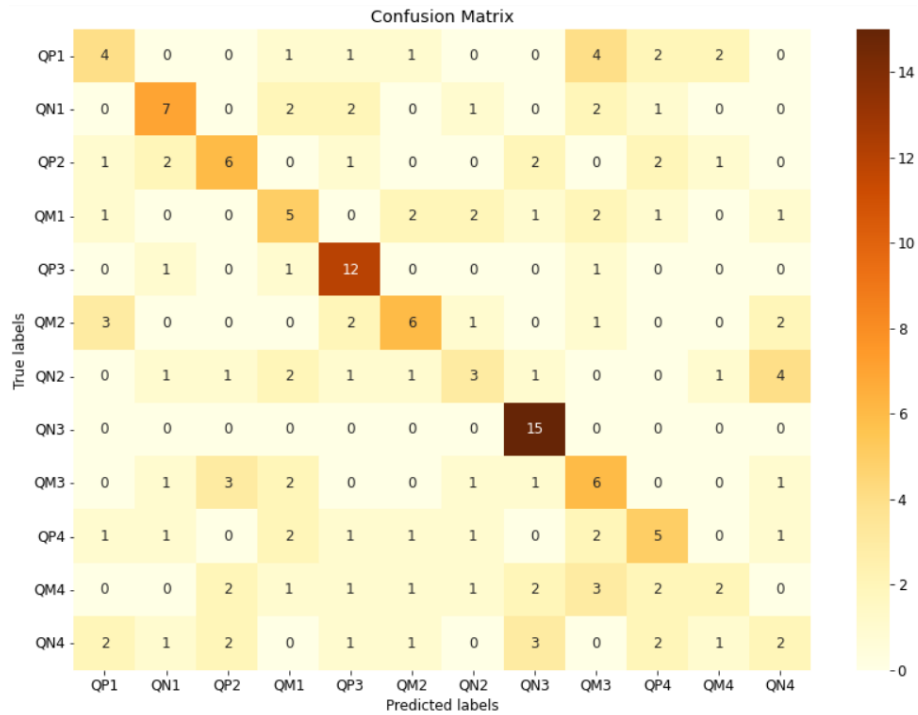
We then examined whether the classification errors of the Multiclass Classifier were due to misattribution within the same scale. To be more explicit, let us consider the

following example. The model misclassified group 1 (which lied to a psychopathy item), classifying it instead as group 3 (which also lied to a psychopathy item). This situation could still lead to interesting thoughts. If, on the other hand, the model misclassified group 1, classifying it as group 8 (which lied to an item on narcissism), the situation would be quite different. To analyze that, we relied on the classifier that had provided the higher accuracy: Random Forest Classifier. Its confusion matrix is shown in Figure 4.9. On the x-axis of the matrix there are the classifications predicted by the algorithm. On the y-axis there are the original classes to which the response sets belonged. Darker boxes indicate a greater number of attributions or class memberships. As can be seen, there is a line of darker boxes running diagonally across the matrix (Figure 4.9). These indicate the correct predictions made by the model. On the other hand, looking at the off-diagonal elements (which are the incorrect predictions), we cannot see only intra-trait errors, as the algorithm also classified subjects as a group that lied to a different trait. That could be due to the several correlations between items belonging to the same or different scale (see pp. 63-64 of this paper).

To better understand this question, let us consider item 8, which is the third item of the narcissism scale (NQ3). Looking at Figure 4.9, we see that the algorithm predicted (x-axis) "QN3" 15 times, and this prediction was correct, as the value 15 is also shown corresponding to QN3 in the y-axis. On the other hand, there is an intra-trait error the 3 times the algorithm predicted (x-axis) "QN3" but the correct category (shown on the y-axis) was QN4, which is the fourth item belonging to the narcissism scale. Finally, there is an inter-trait error as much as the algorithm predicted (x-axis) 2 times "QN3" but the correct response (y-axis) expected to categorize that response set as "QM4," i.e., the fourth item belonging to the Machiavellian scale.

Figure 4.9

Random Forest Confusion Matrix – Multiclass Classifier Model



Note. The acronyms “QP”, “QN”, and “QM” preceding a number stand for “psychopathy question”, “narcissism question”, and “Machiavellianism question”, respectively. The number following this abbreviation indicates whether it is the scale's first, second, third or fourth item in order of presentation.

CHAPTER 5

Discussion and Conclusion

In the present chapter, it will first be offered a summary of the approach, briefly recalling the state of the art of the Dark Triad and lying in legal contexts. We will also recall the methodology and aim of this research. We will then give an account of the analyses carried out in Chapter 3 and the validation or rejection of our research hypotheses. Finally, we will discuss this work's conclusions, limitations, and future perspectives.

5.1 A Summary of the Approach

This study aimed to investigate several aspects related to dissimulation and to test whether Machine Learning is an effective methodology for detecting dissimulation attempts in questionnaires. In particular, we examined lying attempts in the Dirty Dozen questionnaire. The latter is a handy tool for analyzing the Dark Triad (described in detail in Chapter 1). The Dark Triad (i.e., subclinical levels of Machiavellianism, narcissism, and psychopathy) is mainly characterized by adverse behaviors and often results in dysfunctional parenting styles (Jonason et al., 2014; Thompson et al., 2003), which negatively influence children's psychosocial development (Hadi Kurniyawan et al., 2021; Jadon & Tripathi, 2017). Thus, the Dark Triad may become relevant in forensic practice when dealing with parental separation and child custody trials. As lying is widespread in legal contexts, it becomes crucial to find many methods to detect the alteration of the truth with a high degree of accuracy. Unlike other studies, this work aims to detect

dissimulation attempts at a single item level rather than at the whole questionnaire level. This distinctive feature was pursued precisely through the ML.

Machine Learning is a branch of Artificial Intelligence that is increasingly widespread in different fields due to its potential. Since ML algorithms can learn to generalize their prediction ability, they can be implemented as anomaly detectors. It is important to clarify that “anomaly” is relative to a reference population. ML can detect lying attempts at a single item level, making it an innovative approach. Indeed, many lie detection approaches can only catch a general trend to lie through control scales within traditional questionnaires. Some researchers have already demonstrated the effectiveness of ML algorithms in doing this (Duran et al., 2019; Monaro, Galante, et al., 2018; Monaro, Toncini, et al., 2018; Hibbeln et al., 2014; Mazza et al., 2019; Purpura et al., 2022)

The ML technique has been implemented on participants' responses to the items of the Dirty Dozen questionnaire. Participants were asked to answer honestly to every item written in black (11 items) and dissimulating to obtain child custody to the item written in red. In this research, the reference needed to detect the anomaly is the honest answers. Instead, the anomaly is the dissimulation attempt implemented in the red-marked item.

Six hundred subjects took part in this study.

5.2 Discussion

5.2.1 Traits Correlations and Groups Differences in Raw Data

We first investigated correlations between single items and between traits total scores. These analyses highlighted significant correlations between items belonging to the same or different scales. Also, each trait was positively correlated with the others (as already supported by Paulhus & Williams, 2002; Jakobwitz & Egan, 2006). These results are in line with studies that suggest that the traits that make up the Dark Triad cannot be clearly

separated. Then, since each group was required to dissimulate to a different item, the groups' raw data were analyzed using the Kruskal-Wallis Test and ANOVA. First, it was necessary to examine the distribution of the answers. Unsurprisingly, the subjects' answers did not follow a normal distribution. Despite that, we performed both parametric and non-parametric analyses, and the results mostly agreed. Thus, we obtained more information on the effect's characteristics. While an initial analysis seemed to indicate an effect of the position of the item in which lying was required on other items mean raw scores, further analyses showed that this was probably due to an influence of the lied response. In particular, analyses performed to investigate which groups differed and the direction of this phenomenon indicated that almost all significant differences involved the group required to lie in the item analyzed. The groups that lied to the investigated items showed lower raw scores than those required to answer honestly to the same item. That suggests that the experimental manipulation affected the participants' answers. Graphical representation of honest and dishonest conditions means raw data supported this idea since dishonest condition distributions mostly had lower scores.

5.2.2 Analysis of Total Scores of Traits

Analyses of the total scores of traits were performed to identify any variable that may influence them.

We first investigated the distribution of the total scores. Since they derive from a composite score, we can hypothesize they may follow a different distribution from that of the items. Indeed, they were approximable to normal distributions. Therefore, we investigated whether certain socio-demographic characteristics of the sample influenced the total scores of traits.

No correlation was found between subjects' schooling and total scores of traits. In contrast, although the correlation was small, each trait negatively correlated with the subjects' age.

More in deep analyses were then carried out. These allowed us to reveal other variables influencing the total scores of traits. Indeed, sex was found to influence narcissism and psychopathy total scores. We highlighted that Honest men scored higher than Honest women in psychopathy total score and lower in narcissism. Machiavellian trait did not reveal any sex difference. That is partially in contrast with our first hypothesis that expected to detect higher scores in all three traits in men (in line with Azizli et al., 2016; Jonason & Krause, 2013; Jonason & Webster, 2010; Jonason, Jones & Lyons, 2013; Muris et al., 2017). We also found that all the Triad traits show a global effect of condition, resulting in lower scores in the DC. That is partially in line with our H2 prediction. However, the condition didn't lead to significant differences in Machiavellianism in the men sample. Although slightly different from our predictions, the above-mentioned results allowed us to discover that sex differences in trait scores do not occur in the psychopathy total score when subjects are asked to lie. Indeed, men and women do not differ in the DC. At least two possible explanations for this phenomenon can be formulated. The first is that men and women actually lie providing similar answers, thus resulting in the absence of significant sex differences in the psychopathic trait. The second instead considers a possible floor effect. As the scale of responses given to participants is a 5-point Likert scale, this may not be sufficiently broad to reveal sex differences in this trait when subjects try to dissimulate. If so, this would not indicate an absence of sex differences in psychopathy in the dishonest condition but an inability of the experimental paradigm to detect them. In contrast, the DC showed sex differences in

narcissism, with dishonest women scoring lower than dishonest men. The fact that there are sex differences in the DC for narcissism but not for psychopathy may be related to the fact that the former exhibited higher scores than the latter in the HC. Therefore, this explanation is not inconsistent with the possibility of a floor effect for psychopathy in the DC.

We then analyzed the effects of the above-mentioned factors at a single item level. These analyses are consistent with the analyses of traits. In particular, in the HC, men scored higher than women in three items of the psychopathy scale and lower in two items of the narcissism scale. The items related to Machiavellianism showed no sex differences. We also found that almost every item showed an effect of condition, resulting in the DC showing lower scores than the HC. In addition, sex differences in the DC emerged only in the third item of the narcissistic scale and in the third item regarding Machiavellianism, with women scoring lower than men.

5.2.3 *Machine Learning*

We applied two Machine Learning models with several classifiers to the subjects' answers. The first model is the Regressor Chain, and among the two it is the most suitable to analyze the data at a single item level. For this model we exploited four classifiers, and all achieved positive results, detecting a maximum of 28% false answers with a global accuracy of 87%.

The second Machine Learning model we applied, on the other hand, analyzes the pattern of answers given by each subject in order to identify the group they belong to (and thus the lying item). Again, four algorithms were implemented, the best of which achieved an accuracy of 41%. The classification errors were not only intra-trait errors (e.g., classifying a subject who lied on the first psychopathy item as someone who lied to

the second, third or fourth psychopathy item) but also inter-traits errors. That may be related to correlations found between the Triad traits, which may have therefore made it more difficult for the algorithm to distinguish between the different groups.

It is important to note that although the accuracy of the last implemented Machine Learning model seems lower than the one of the Regressor Chain, it must be considered that the former chose between 12 possible options. The latter, on the other hand, had only two choices.

5.3 Limitations and Directions for Future Research

The present study benefited from a satisfactory sample for most analyses. However, some limitations are present.

Firstly, there was a non-negligible difference in numerosity between women and men. In fact, our sample was predominantly composed of women. This inhomogeneity in the distribution of sex is found at the level of the entire sample and at the level of single groups. This issue is even more relevant in light of the sex differences in the Triad traits described in the literature and those detected by our analyses. The difference in sex distribution between the various groups also meant that the total scores of the traits of each subject were calculated based on a varied number of items. That is especially true for the DC, which was calculated by pooling the lying responses of the various groups, first dividing the sample according to sex. Some total scores of traits were thus calculated based on only three or fewer answers.

Furthermore, we should point out that only a small percentage (14.7%) of the sample stated that they have children. If we also consider that only some participants (11%) declared they were married, divorced, widowed, or civilly united, the ecological validity of our study appears even smaller. In fact, the instructions given to the subjects before

completing the questionnaire required them to imagine that they were divorcing their partner and that they were involved in a legal case for the custody of their children. Therefore, greater ecological validity would have required the participation of more subjects with one of the civil statuses listed above and more subjects having children.

Another significant limitation is that each group was only required to lie to one question without being asked to answer the same question truthfully. It would have been more appropriate to have had the subjects also answer truthfully to the item in which they had to lie. Even better would have been to ask subjects to first fill in the questionnaire honestly and then fill it in again by concealing. That would have allowed to compute the total scores of traits in the DC for each subject without pooling together the answers of several subjects. That would have also increased the ecological validity, although these paradigms could lead to a priming effect.

The Likert scale available to the subjects was based on a 5-level response range. As explained in Chapter 3, this methodological choice is linked to the better ability of lie-detection methods (such as ML) to detect the anomaly when the number of options is reduced. On the other side, we cannot be sure of the actual absence of sex differences in psychopathy when subjects dissimulate, as we mentioned earlier. Suppose future works are interested in investigating both Dark Triad dissimulation at a single item level and sex differences in the DC. In that case, they should either conduct separate studies or widen the response range just enough to allow possible sex differences in dissimulation to emerge while keeping the accuracy of lie detection techniques acceptably high.

In addition, we cannot exclude the possibility that giving the instructions on dissimulation before the whole questionnaire may have influenced all honest answers in the same way for all groups. Indeed, it could be that by requiring subjects to lie in only

one question, they unintentionally “accentuated” honesty in the others. Therefore, they may have provided higher scores when asked to be honest. Future studies could solve this problem in two ways. The first is to equip the research project with a control group that completes all items truthfully. That would allow comparing the control group’s answers with the honest answers of the various experimental groups to ensure that there is no rebound effect on the honest items. Another possibility is to have the subjects fill in the questions in which sincerity is required first, without mentioning lying in the instructions, and place the instructions on concealment and the item in which lying is required at the end of the questionnaire.

Although our work has had more than encouraging results regarding Machine Learning, there are still many things to improve and investigate. Given the sex differences in the Triad, it would have been more functional to divide the subjects according to sex and then apply the models to the new dataset. Alternatively, one could also simply add the feature “sex” among those given as input to the model and let it learn also on the basis of sex differences. That would most likely increase the accuracy of this method.

5.4 Conclusions

Despite these limitations, our study expands the line of research surrounding both the Dark Triad and the utility of the ML in reliably detecting single-item faked responses.

First, we detected correlations between the Triad traits and sex differences in the traits. Although not in agreement with our predictions, this finding increases the not entirely unanimous literature on sex differences in the Dark Triad.

We have also shown that, albeit to varying degrees, the dissimulation of Machiavellianism, narcissism, and psychopathy is associated with a significant decrease in scores both at the level of single items and at the level of total scores.

Finally, two Machine Learning models were able to flag lied answers with good accuracy (88% and 41%).

Our results represent an important step forward for the study of lie detection techniques at the level of both single items and entire questionnaires. The outcome of this study could facilitate the identification of dissimulation attempts within the field of forensic psychology, increasing the degree of accuracy and reliability of its tools.

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Appendix A

Control Questions- Italian Version

In base alle istruzioni ricevute fino ad ora, come devi rispondere alle 12 domande?
(solo un'alternativa è corretta) *

- Dovrò sempre dire la verità.
- Dovrò sempre mentire
- Dovrò essere sincero nelle domande in nero e rispondere in modo da fare bella figura nella domanda in rosso
- Dovrò essere sincero nelle domande e in rosso e mentire nella domanda nera

In base alle istruzioni lette ora, in che situazione dovrai immaginare di trovarti per rispondere alla domanda scritta in rosso? *

- io e mia/o moglie/marito vogliamo adottare un bambino
- io e mia/o moglie/marito stiamo divorziando e stiamo litigando per l'affido dei figli
- ho commesso un reato e mio figlio verrà dato a mia/o moglie/marito

In base alle istruzioni lette ora, in che modo devi rispondere alla domanda scritta in rosso? *

- nasconderò pensieri e comportamenti per fare bella figura anche se questo vuol dire mentire
- sarò onesto/a anche se questo vuol dire mostrare lati negativi di me

In base alle istruzioni lette ora, in che modo devi rispondere alle domande scritte in nero? *

- nasconderò pensieri e comportamenti per fare bella figura anche se questo vuol dire mentire
- sarò onesto/a anche se questo vuol dire mostrare lati negativi di me

Appendix B

Control Questions – English Version

According to the instructions received so far, how should you answer the 12 questions? (only one alternative is correct) *

- I will always have to tell the truth.
- I will always have to lie.
- I will have to be honest in the black questions and answer in a way that makes a good impression in the red question.
- I will have to be truthful in the red question and lie in the black question.

Based on the instructions you have just read, in what situation should you imagine yourself to be in in order to answer the question written in red? *

- my wife/husband and I want to adopt a child.
- my wife/husband and I are getting divorced and are fighting over custody of the children.
- I have committed a crime and my child will be given to my wife/husband.

According to the instructions read out now, how should you answer the question written in red? *

- I will hide thoughts and behaviours to make myself look good even if it means lying.
- I will be honest even if it means showing negative sides of myself.

According to the instructions read out now, how should you answer the questions written in black? *

- I will hide thoughts and behaviours to make myself look good even if it means lying.
- I will be honest even if it means showing negative sides of myself.

Appendix C

Informed Consent- Italian Version

Benvenuto/a!

Ti proponiamo di partecipare ad una ricerca rispondendo ad un breve questionario online. Lo scopo della ricerca è quello di individuare nuove misure per il riconoscimento e la correzione della dissimulazione in ambito forense.

Il questionario si compone di un'unica parte ed il tempo previsto per la compilazione è di circa 5 minuti. **Non ci sono rischi legati alla partecipazione a questa ricerca, tuttavia è possibile interrompere la partecipazione in qualsiasi momento**, senza fornire spiegazioni, senza alcuna penalità e ottenendo il mancato uso dei tuoi dati. I dati sono completamente anonimi e in nessun modo si potrà risalire alla tua identità. I dati saranno analizzati in modo aggregato e unicamente a scopo di ricerca.

Tutte le informazioni raccolte saranno trattate nel pieno rispetto delle norme vigenti sulla privacy (Decreto Legislativo 196/2003 come modificato dal Decreto Legislativo 101/2018 in seguito al Regolamento UE n.2016/679) e del Codice Deontologico degli Psicologi Italiani. Il responsabile della ricerca è il professor Giuseppe Sartori, docente ordinario e ricercatore presso l'Università degli studi di Padova, dipartimento di Psicologia Generale. Per avere informazioni più dettagliate sugli obiettivi dello studio è possibile contattare il responsabile della sperimentazione al seguente indirizzo email: giuseppe.sartori@unipd.it o in alternativa è possibile scrivere alla mia email: alice.paggetti@studenti.unipd.it

Accettando il seguente modulo dichiara:

- 1) di aver letto e compreso quanto sopra riportato;
- 2) di essere stato informato/a riguardo alle finalità e agli obiettivi della ricerca in questione;
- 3) di essere a conoscenza del fatto di avere la possibilità di porre ulteriori domande al termine dello studio;
- 4) di avere ricevuto soddisfacenti rassicurazioni sulla riservatezza delle informazioni ottenute dall'esame della propria persona;
- 5) di essere consapevole di potersi ritirare in qualsiasi fase dello studio;
- 6) di aver liberamente dato il consenso alla partecipazione a questo studio.

DICHIARO DI AVER LETTO E COMPRESO I MIEI DIRITTI E DI ESSERE MAGGIORENNE

*

Accetto

Appendix D

Informed Consent- English Version

Welcome!

We would like to invite you to participate in a research project by answering a short online questionnaire. The aim of the research is to identify new measures for the recognition and correction of concealment in the forensic field.

The questionnaire consists of only one part and the time required to complete it is about 5 minutes. **There are no risks involved in participating in this research, however you can stop participating at any time**, without giving any explanation, without penalty and by not having your data used. The data is completely anonymous and in no way can your identity be traced. The data will be analysed in an aggregate manner and solely for research purposes.

All information collected will be treated in full compliance with current privacy regulations (Legislative Decree 196/2003 as amended by Legislative Decree 101/2018 following EU Regulation n.2016/679) and the Deontological Code of Italian

Psychologists. The person in charge of the research is Professor Giuseppe Sartori, ordinary professor and researcher at the University of Padua, Department of General Psychology. For more detailed information on the objectives of the study you can contact the person in charge of the experiment at the following email address:

giuseppe.sartori@unipd.it or alternatively you can write to my email address:

alice.paggetti@studenti.unipd.it

By accepting the following form you declare

- 1) I have read and understood the above;
- 2) that I have been informed of the aims and objectives of the research in question;
- 3) that I am aware that I will have the opportunity to ask further questions at the end of the study;
- 4) that I have received satisfactory assurances that the information obtained from the examination of my person will be kept confidential
- (5) that they are aware that they may withdraw at any stage of the study
- 6) have freely given consent to participate in this study.

I DECLARE THAT I HAVE READ AND UNDERSTOOD MY RIGHTS AND THAT I AM OF LEGAL AGE *

I agree

Appendix E

Research Instructions- Italian Version

Alle domande **scritte in nero rispondi sinceramente** (anche se questo vuol dire ammettere aspetti negativi di te stesso), mentre alla domanda scritta in rosso (**e solo a quella**) rispondi come se ti trovassi nella situazione descritta qui sotto:

Immagina che tu e tua/o moglie/marito stiate divorziando e stiate discutendo per l'affido dei figli (rispondi anche se non hai figli). Siete nel contesto di una consulenza richiesta dal Giudice che deve decidere sulle migliori condizioni di affido dei figli. Lo psicologo incaricato vi chiede di compilare questa prova che sarà usata per valutare le vostre caratteristiche di genitore. Per rispondere, leggi ogni affermazione e decidi se sei d'accordo o in disaccordo e in quale misura. **Rispondi quindi alla domanda in rosso in modo da fare bella figura, nascondendo comportamenti o pensieri generalmente considerati negativi. Il tuo obiettivo è ottenere l'affido dei figli e risultare migliore di tua/o moglie/marito agli occhi del Giudice. Cerca di dare un'immagine positiva quando leggi la domanda scritta in rosso, anche se questo vuol dire mentire.**

Appendix F

Content of the questionnaire items – Italian Version

Tratto	Contenuto	Posizione
Machiavellismo		
	Ho usato l'adulazione per ottenere ciò che volevo.	4
	Tendo a manipolare gli altri per ottenere ciò che voglio.	6
	Tendo a sfruttare gli altri per i miei scopi.	9
	Ho usato l'inganno o la menzogna per ottenere ciò che volevo.	11
Psicopatia		
	Tendo a non provare rimorso.	1
	Tendo ad essere freddo o insensibile.	3
	Tendo a non interessarmi della moralità delle mie azioni.	5
	Tendo ad essere cinico.	10
Narcisismo		
	Tendo a volere che gli altri mi diano attenzione.	2
	Tendo a cercare prestigio o potere.	7
	Tendo a volere che gli altri mi ammirino.	8
	Tendo ad aspettarmi favori speciali dagli altri.	12

Note. Items of the Dirty Dozen questionnaire by Jonason and Webster (2010).

Appendix G

Content of the questionnaire items – English Version

Trait	Content	Position
Machiavellianism		
	I have use flattery to get my way.	4
	I tend to manipulate others to get my way.	6
	I tend to exploit others towards my own end.	9
	I have used deceit or lied to get my way.	11
Psychopathy		
	I tend to lack remorse.	1
	I tend to be callous or insensitive.	3
	I tend to be unconcerned with the morality of my actions.	5
	I tend to be cynical.	10
Narcissism		
	I tend to want others to pay attention to me.	2
	I tend to seek prestige or status.	7
	I tend to want others to admire me.	8
	I tend to expect special favors from others.	12

Note. Items of the Dirty Dozen questionnaire by Jonason and Webster (2010)