

The Structure of Deception: Validation of the Lying Profile Questionnaire

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14

Abstract

15 While deception is considered as a common phenomenon with important implications, its
16 conceptualization and study as a dispositional trait is under-represented in the literature.
17 Critically, and despite scientific evidence supporting the existence of individual differences
18 in lying, a validated measure of dispositional deception is still lacking. This study aims to
19 explore the structure of dispositional deception by developing and validating a short and
20 reliable 16-item questionnaire to characterize the lying pattern of individuals. Our findings
21 suggest the existence of four distinct latent dimensions to lying, namely frequency, ability,
22 negativity, and contextuality. We establish the convergent validity of our measure of lying
23 by showing significant relationships with social desirability, malevolent traits, cognitive
24 control deficits, normal and pathological personality traits, as well as demographic
25 variables such as sex, age, and religiosity. Overall, the present study introduces a general
26 framework to understanding deception as a dispositional trait which future deception
27 studies can build on, accounting for the inter-individual variability in lying.

28 *Keywords:* deception, lying, questionnaire, psychopathy, personality

29 Word count: 7189

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31 The scientific study of deception and lying has had a turbulent history, nourishing key de-
32 velopments in ethics and philosophy, and sometimes being (*mis*)used for forensic or political
33 purposes. Although often put at the forefront of public attention through a criminologi-
34 cal or psychopathological lens, the topic remains at the crossroads of different fields even
35 within psychology. For example, although deception is a common phenomenon, practiced
36 by virtually all (Kashy & DePaulo, 1996), the emphasis has often been placed on lie detec-
37 tion or pathological cases. Thus, it seems that a general framework for understanding this
38 phenomenon at the population level is still lacking.

39 Using an integrative framework, we propose to conceptualize deception as the process of
40 achieving an inaccurate experience of a piece of information in relation to its objective
41 qualities. This definition is neutral to the nature of the object and its cause, i.e., not limited
42 for instance to verbal information (visual illusions could be interpreted as a form of sensory
43 deception), humans (deceptive behaviours being documented in other species; e.g., Hirata,
44 1986; Waal, 2005) nor specific purposes (e.g., being necessarily beneficial for the deceiver,
45 as suggested by Bond & Robinson, 1988). As such, the study of this form of reality-bending
46 could benefit from being placed within a larger framework of the sense of reality and its
47 naturally connected neurocognitive functions such as perception, emotions or consciousness
48 (Makowski, 2018; Makowski, Sperduti, Nicolas, & Piolino, 2017; Riva et al., 2007; Seth,
49 Suzuki, & Critchley, 2012).

50 Lying is a form of intentional deception. It includes the creation and delivery of information
51 that is believed to be inaccurate, with the aim of making it believed to be accurate (note
52 that both deception and lying are used interchangeably in the context of this study). While
53 lying is often studied as an act, involving but not limited to its production or reception,
54 lying could also be understood and investigated as a dispositional trait, i.e., as a metastable
55 characteristic of personality. In fact, one of the motivations supporting this perspective is

56 the emergence of evidence supporting the existence of inter-individual variability in lying.

57 Since lying can be described as a common and potentially universal phenomenon (Kashy &
58 DePaulo, 1996), one naive hypothesis could be that individual differences are less relevant
59 than situational factors (Aquino & Becker, 2005). However, empirical evidence has recently
60 rebutted the assumption of ubiquitous lying behaviors, suggesting that the extent to which
61 people engage in lying varies considerably from one individual to the next (Gozna, Vrij, &
62 Bull, 2001; Kashy & DePaulo, 1996). For instance, differences have been observed between
63 participants in the frequency of lying, their (perceived) ability to tell and detect lies, the
64 emotions associated with lying (e.g., guilt) or the moral attitude toward it (Serota & Levine,
65 2015; Serota, Levine, & Boster, 2010). Importantly, these patterns have been shown to be
66 related to other interindividual variables (e.g., sex and age differences, with men and younger
67 people lying more frequently; DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996; Jensen,
68 Arnett, Feldman, & Cauffman, 2004). In spite of this evidence, most experimental research
69 on deception has overlooked trait-like interindividual variability, and has instead focused on
70 the behavioral and neural correlates of lying and lie detection. Critically, it is possible that
71 the absence of such control of trait-deception in experimental studies is related to a lack of
72 validated questionnaires made to assess individual variations in lying.

73 Indeed, while “lie scales” are common in psychometric research, they often refer to social de-
74 sirability measures (e.g., the LIE subscale in the Eysenck Personality Questionnaire; Eysenck
75 & Eysenck, 1975) rather than to validated questionnaires reliably measuring different aspects
76 of deception. Existing developments in lie scales are also often limited to measures that are
77 created and used in studies targeting deception as a dependent or independent variable (as
78 opposed to an exploration of the dimensionality to trait-deception). For instance, Azizli et
79 al. (2016) assessed the tendency to lie in a high-stake deception using the in-house created
80 *Propensity To Lie Questionnaire*. The first part of this questionnaire included questions
81 about the general subjective tendency to lie, while the second part includes items pertain-
82 ing to two short scenarios describing hypothetical lying situations. The findings reported a

83 relationship between the tendency to lie and antisocial tendencies (Machiavellianism, nar-
84 ciissm, and psychopathy). Unfortunately, this study did not report normative data nor
85 a factor structure analysis of the questionnaire. Similarly, El Haj, Saloppé, and Nandrino
86 (2018) created a five-item scale, adapted from the *Impression Management* subscale of the
87 *Balanced Inventory of Desirable Responding* (BIDR; Paulhus, 1991), assessing the tendency
88 to lie (or rather, to impress others), and showed that people with a higher trait tendency to
89 lie have a higher ability to remember to whom they have told a piece of information. More in
90 line with our dimensional approach to trait-deception, Zvi and Elaad (2018) developed the
91 *Lie-Truth Ability Assessment Scale* to measure different facets related to lying, such as the
92 ability to tell lies, to perceive lies, to tell the truth, and also to believe others. Although the
93 factor structure and internal reliability of the scale were not thoroughly tested, the study re-
94 ported a positive relationship between lying ability and narcissism. Nonetheless, the authors
95 emphasize the need to develop a reliable and valid lie scale.

96 Using a different approach, Serota and Levine (2015) investigated how participants can
97 be grouped into different “profiles” based on the number of lies they tell per day. They
98 suggested the existence of two distinct groups, everyday liars, the majority of the general
99 population, and prolific liars, who possess a significantly higher tendency to lie and whose
100 dishonest behaviors are often associated with serious matters. This is in line with the studies
101 suggesting that manipulativeness, sociability, anxiousness, and impression management are
102 features related to a stronger self-reported lying ability (Elaad & Reizer, 2015; Gozna et al.,
103 2001; Kashy & DePaulo, 1996; Panasiti, Pavone, Merla, & Aglioti, 2011). Unfortunately,
104 methodological limitations of the study (the absence of statistically-driven cluster analysis)
105 underline the necessity to further investigate this interesting profile perspective.

106 One of the challenges for validating a lying questionnaire is the identification of relevant
107 related constructs to assess convergent validity. Although the literature on trait-deception
108 described above is rather sparse, experimental and observational research investigating how
109 deceptive behaviors relate to other inter-individual characteristics can be used as a starting

110 point to establish specific and testable hypotheses. For instance, a large body of research
111 has investigated how lying relates to normal personality traits (Gozna et al., 2001), with
112 evidence suggesting that extraversion is related to a higher lying frequency (Weiss & Feldman,
113 2006), contrary to conscientiousness which tends to be related to honesty (Gillath, Sesko,
114 Shaver, & Chun, 2010). Perceived ability to tell lies shares a positive relationship with
115 extraversion and openness and a negative relationship with agreeableness (Elaad, 2018; Elaad
116 & Reizer, 2015; Kashy & DePaulo, 1996). The hypothesized underlying link is that people
117 with higher extraversion and openness are more likely to engage in social events, offering
118 more opportunities to lie (Kashy & DePaulo, 1996), which in turn boosts the frequency
119 of - as well as their confidence in - lying. On the other hand, agreeable and conscientious
120 individuals are less likely to lie (and arguably more honest about themselves), consequently
121 describing themselves as being less skilled at it (Gillath et al., 2010).

122 Another personality dimension related to deception is narcissism (Zvi & Elaad, 2018), a
123 trait involved in several personality disorders and one of the facets of the socially malevo-
124 lent personality profile coined as the “dark triad” (Paulhus & Williams, 2002). Given that
125 narcissists value power and are endowed with a grandiose sense of self, their primary motive
126 to lie is for self-gain and self-enhancement (e.g., portraying themselves in a dominant and
127 attractive fashion; Jonason, Lyons, Baughman, & Vernon, 2014; Dike, Baranoski, & Griffith,
128 2005). Another possible mechanism at play could be the role of grandiosity in supporting
129 self-deception in the context of negative feedback, which would subsequently facilitate lying
130 to others (Uziel, 2014; Wright, Berry, Catmur, & Bird, 2015).

131 Naturally, deception is most commonly studied in relationship with antisocial and antago-
132 nistic traits, such as psychopathy (Hare & Forth, 1985), which is positively correlated with
133 lying frequency (Halevy, Shalvi, & Verschueren, 2014), with self-reported lying ability and
134 with the tendency to lie without reason (Jonason et al., 2014). Neuroimaging evidence dur-
135 ing a deception task has suggested that specific aspects of psychopathy, namely fearlessness
136 and coldheartedness, were associated with lower activity in the orbitofrontal and temporal

137 cortex, respectively (Fullam, McKie, & Dolan, 2009). These findings emphasize the potential
138 role of social and emotional sensitivity and control in modulating deceptive behaviors.

139 More specifically, it is plausible that the relationship between higher-order antisocial traits
140 and deception could be supported by lower-order processes, such as self-control which has
141 been shown to be correlated with the “dark triad” (Jonason & Tost, 2010). This is in line
142 with theoretical and empirical evidence suggesting the implication of cognitive control in
143 lying (Abe, 2009; Debey, Verschuere, & Crombez, 2012; Lee et al., 2009; Poletti, Borelli, &
144 Bonuccelli, 2011), supporting processes such as decision-making, taking others’ perspectives,
145 maintaining consistency of the fabricated story or inhibiting previously learned content or
146 true responses. This is consistent with neuroscientific findings underlining the role of pre-
147 frontal regions in deception (e.g., Christ, Van Essen, Watson, Brubaker, & McDermott, n.d.;
148 Karim et al., 2010) as well as with individuals reporting greater cognitive effort when hav-
149 ing to lie as compared to telling the truth (Vrij & Semin, 1996). Nonetheless, as most of
150 the evidence presented above was gathered in experimental settings, it remains unclear how
151 these variables are related to dispositional deception.

152 Thus, this study aims primarily at investigating the factor and cluster structure of lying as
153 a trait. To achieve these two respective aims, this study explores how questions about lying
154 map onto latent factors related to deception, and whether groups of individuals emerge in the
155 uncovered multidimensional space of deception facets. This will be accomplished through
156 the validation of a short yet reliable questionnaire on the general population, which will
157 allow future deception studies to account for the inter-individual variability in the natural
158 disposition to lie.

159 In line with the evidence presenting deception as a phenomenon supported by a neurocogni-
160 tively distributed network of processes, we hypothesized the questions related to deception to
161 preferentially fit a multidimensional structure, composed of different distinct latent factors.
162 Regarding convergent validity, we expect deception to be positively related to malevolent and

163 antisocial traits, such as psychopathy, antagonism, and narcissism. Correspondingly, we also
164 predict a negative link with benevolent traits, such as agreeableness or the recently defined
165 “light triad” traits (Kaufman, Yaden, Hyde, & E, 2019). A relationship is also expected with
166 normal personality dimensions, such as extraversion, openness and honesty-humility, as well
167 as to traits related to potential deficits of cognitive control, such as impulsivity (Enticott,
168 Ogleff, & Bradshaw, 2006; Fino et al., 2014) and emotion regulation (Kohn et al., 2014;
169 Makowski, Sperduti, Lavallée, Nicolas, & Piolino, n.d.; Ochsner & Gross, 2005; Sperduti et
170 al., 2017). Notably, beyond its use as a mere proxy of cognitive control, difficulties in emo-
171 tion regulation might impact lying in another way, as the engagement in deception might be
172 dependent on one’s ability to cope with the emotional states related to lying (e.g., stress)
173 and its consequences (e.g., guilt or shame) (Arndt, Hoglund, & Fujiwara, 2013; Carlson &
174 Wang, 2007). Related to this emotional component of deception, we also included a mea-
175 sure of interoception (the sensitivity to internal signals and bodily states; Garfinkel, Seth,
176 Barrett, Suzuki, & Critchley, 2015; Füstös, Gramann, Herbert, & Pollatos, 2012; Kever, Pol-
177 latos, Vermeulen, & Grynberg, 2015), - itself directly involved in cognitive control (Azevedo,
178 Garfinkel, Critchley, & Tsakiris, 2017; Makowski et al., 2019d), to delineate the possible role
179 of sensitivity and regulation of bodily reactions. Critically, due to the inherent nature of the
180 measured construct, we also expect a strong relationship with social desirability.

181

Methods

182 The study plan was preregistered (<https://osf.io/3kv7f>). In the spirit of open and hon-
183 est science, the raw data, as well as the entire analysis script as **Supplementary Ma-**
184 **terials 1** (including details and additional analyses) can be found at <https://github.com/>
185 *DominiqueMakowski/2020structure*. An interactive web application to compute the scores
186 of the questionnaire is available at <https://neuropsychology.shinyapps.io/proflier>.

¹⁸⁷ **Participants**

¹⁸⁸ One thousand and eleven participants from the general population were initially recruited
¹⁸⁹ via posters and flyers, as well as online social media platforms (e.g., Facebook). Inclusion
¹⁹⁰ criteria included residing in Singapore, as well as an absence of neurological and psychiatric
¹⁹¹ history. Participants were reimbursed 5 Singapore Dollars in cash or vouchers upon survey
¹⁹² completion. The study was approved by the Institutional Review Board (Reference Number:
¹⁹³ IRB-2019-02-026) of Nanyang Technological University (NTU).

¹⁹⁴ Due to the presence of a monetary incentive, as much as to the nature of the investigated
¹⁹⁵ construct, a strict procedure was used in order to ensure and maximize data quality. 5 par-
¹⁹⁶ ticipants were excluded due to missing data, followed by 141 participants with a completion
¹⁹⁷ time outside the 90% percentile [< 10.95 min and > 61.94 min]. In addition to completion
¹⁹⁸ time (which is considered as the best indicator of data quality, Leiner, 2013), we applied a
¹⁹⁹ stringent combination of 8 different outliers detection methods (see **Supplementary Ma-**
²⁰⁰ **terials 1** for details) to detect and remove 103 participants.

²⁰¹ The final sample included 762 participants (Mean age = 25.42, SD = 7.76, range = [19.02,
²⁰² 73.51]; 56.04% females; Mean education in years relative to high school = 3.51, SD = 2.00,
²⁰³ range = [-7, 10]).

²⁰⁴ **Procedure**

²⁰⁵ Participants completed an online questionnaire created via the Qualtrics[©]platform. After
²⁰⁶ informed consent was obtained, participants responded to items on visual analog scales or
²⁰⁷ Likert scales (adapted to screen size). Items from 9 existing questionnaires, as well as our
²⁰⁸ Lying Profile Questionnaire (LIE), were included (see below). The presentation order of
²⁰⁹ these 10 inventories was randomized. Note that while items within the LIE inventory were
²¹⁰ presented in a randomized order, all existing questionnaires were presented following their
²¹¹ original validation, and scores for their dimensions were calculated accordingly (by averaging

212 or summing, see **Supplementary Materials 1**). Participants then responded to questions
213 about demographics at the end of the questionnaire. A transcript of the complete survey
214 presentation is available in **Supplementary Materials 2**.

215 **Measures**

216 **Lying.** Based on the theoretical literature and the existing scales on lying, we outlined 3
217 general domains related to lying relevant for a questionnaire; lying frequency, ability, and
218 accompanying features, such as motives and reactions. From there, we developed an initial
219 pool of items later refined for face validity, ambiguous wording, jargon, or poor phrasing
220 in focus group discussions. The final Lying Profile Questionnaire (LIE) included 44 items
221 phrased in statements such as “I lie more often than most people do” or “I find lying diffi-
222 cult”, presented on visual analog scales with “Disagree” and “Agree” as the two extremities.
223 While the LIE items required relative subjective judgments, we also included two questions
224 pertaining to the *Absolute Frequency* of lying (asking how many lies one tells per day and
225 per week). We averaged these two items into one score expressed in lies/day.

226 **Social Desirability.** The 16-item Balanced Inventory of Desirable Responding (BIDR-16)
227 self-report questionnaire (Hart, Ritchie, Hepper, & Gebauer, 2015) was included to control
228 for related biases in responding such as over-reporting positive traits and under-reporting
229 lying tendencies. This scale includes 2 distinct dimensions, *Self-Deceptive Enhancement* (par-
230 ticipants’ deception of themselves with a tendency towards positive traits), and *Impression
231 Management* (participants’ intention to deceive for the sake of pleasing others).

232 **Psychopathy.** The 58-item Triarchic Psychopathy Measure self-report questionnaire (TriPM;
233 Patrick (2010)) was used to assess the 3 dimensions suggested by the triarchic model of
234 psychopathy (Patrick, Fowles, & Krueger, 2009), namely *Boldness* (fearlessness, social dom-
235 inance, and the tendency to engage in adventure-seeking behaviors), *Disinhibition* (the lack
236 of behavioral restrain, manifesting as impulsivity, disregard for social conventions, and ag-
237 gression) and *Meanness* (the unempathetic and instrumental treatment of others).

238 **Narcissism.** The short version of the Five-Factor Narcissism Inventory (FFNI-SF; Miller
239 et al., 2013; Sherman et al., 2015) was used to measure 9 specific traits, namely *Acclaim*
240 *Seeking* (preoccupation with achieving acclaim, status, and/or fame), *Entitlement* (expec-
241 tations of special and self-serving treatment), *Need for Admiration* (excessive need for the
242 admiration and approbation of others), *Manipulativeness* (a disposition to deceptively ma-
243 nipulate the feelings and/or opinions of others), *Lack of Empathy* (failure to be aware of,
244 appreciate, or acknowledge the feelings of others), *Indifference* (lack of self-consciousness or
245 self-doubt in response to criticism or rebuke), *Thrill Seeking* (excessive excitement-seeking
246 that leads to high-risk behavior for the sake of thrills and excitement), *Distrust* (maladaptive
247 low level of trust concerning the intentions and motivations of others), and *Exploitativeness*
248 (a disposition for instrumental treatment of others, i.e., to exploit or take advantages of
249 others).

250 **Normal Personality.** The 24-item Mini-IPIP6 was used to measure the Big Six “normal”
251 (as opposed to pathological) personality traits based on the HEXACO Personality Model
252 (Ashton & Lee, 2009; Sibley et al., 2011), namely *Extraversion* (the tendency to engage in
253 social behaviors such as exhibiting leadership and sociability), *Openness* (the extent to which
254 one is open-minded in terms of imagination and curiosity), *Agreeableness* (how cooperative
255 and tolerant one is of others, with individuals high on this trait often being perceived as warm,
256 forgiving, and kind), *Conscientiousness* (being diligent, meticulous and organized during task
257 execution), *Neuroticism* (the tendency to experience a persisting negative emotional state),
258 and *Honesty-Humility* (being honest, sincere, and fair during social exchanges).

259 **Pathological Personality.** The 25-item Personality Inventory for DSM-5 (PID-5-BF)
260 Brief Form was used to assess 5 pathological personality traits [Hopwood, Thomas, Markon,
261 Wright, and Krueger (2012); al2016psychometric], namely *Negative Affect* (the frequency
262 and intensity of negative emotional experiences such as anxiety, anger, and depression),
263 *Detachment* (social withdrawal and diminished affective experiences), *Antagonism* (manip-
264 ulativeness, deceitfulness, callousness and hostility) *Disinhibition* (engagement in impulsive

265 behaviors for immediate gratification), and *Psychoticism* (eccentric or incongruent behaviors
266 and cognitions, such as hallucinations and delusions).

267 **Light Triad.** The 12-item Light Triad Scale (LTS; Kaufman et al., 2019) was used to
268 measure prosocial and morally positive traits (as opposed to antisocial or antagonistic ones),
269 including *Faith in Humanity* (the belief and trust that individuals are fundamentally good
270 in nature), *Humanism* (the extent to which one places value on the dignity and worth of
271 others), and *Kantianism* (the treatment of individuals as means to themselves rather than
272 using them instrumentally).

273 **Impulsivity.** The 20-item Short UPPS-S Impulsive Behaviour Scale (Cyders, Littlefield,
274 Coffey, & Karyadi, 2014; Whiteside & Lynam, 2001) was used to measure 5 facets of impul-
275 sivity, namely *Negative Urgency* and *Positive Urgency* (one's propensity to act impulsively
276 under negative and positive emotional states, respectively), *Lack of Perseverance* (the inabil-
277 ity to focus on tasks of a boring or difficult nature), *Lack of Premeditation* (the propensity
278 to act without thinking), and *Sensation Seeking* (the inclination towards partaking in novel
279 and thrilling experiences).

280 **Emotion Regulation.** The 18-item Difficulty in Emotions Regulation Scale (DERS; Vic-
281 tor & Klonsky, 2016) was used to measure 6 facets of emotion regulation deficits, namely
282 *Awareness* (lack of recognition and appreciation of one's emotions), *Clarity* (difficulties in
283 giving meaning to emotions), *Goals* (difficulties in engaging in goal-directed cognition and
284 behavior when distressed), *Impulse* (lack of control when distressed), *Non-Acceptance* (un-
285 willingness to accept certain emotional responses), *Strategies* (lack of access to strategies for
286 feeling better when distressed).

287 **Interoception.** We used 11 items from the Multidimensional Assessment of Interoceptive
288 Awareness, Version 2 (MAIA-2; Mehling, Acree, Stewart, Silas, & Jones, 2018) to specifi-
289 cally measure 2 facets of interoception, namely *Noticing* (the conscious awareness of bodily
290 sensations), and *Body Listening* (he ability and tendency for active listening to the body for

291 insight).

292 **Demographic.** Participants provided demographic information related to their *Education*
293 (highest academic qualification achieved or the qualification they are currently pursuing),
294 *Sex*, *Age*, and their socio-economic status (SES) which was operationalized as the average
295 monthly household *Income* per capita. Two items related to religious *Faith* were presented
296 on Likert scales, pertaining to how religious the participants perceive themselves to be and
297 how actively engaged in religious activities they are.

298 Data Analysis

299 Data processing was carried out with R (R Core Team, 2019) and in particular the *psych*
300 (Revelle, 2018) and the *lavaan* (Rosseel, 2012) packages, as well as the *easystats* ecosystem
301 (Lüdecke, Waggoner, & Makowski, 2019; Makowski et al., 2019a). The raw data, as well
302 as the full reproducible analysis script (along with complementary results and figures), are
303 available in **Supplementary Materials 1**.

304 Results

305 Factor Structure

306 The 46 initial items were deemed suitable for factor analysis ($KMO = 0.95$; Bartlett's test of
307 sphericity $\chi^2(946) = 16257.03, p < .001$). The factor number exploration using the method
308 agreement procedure (see the `n_factors` function in the *parameters* package; Makowski et
309 al., 2019c) suggested 3 optimal factor solutions: seven factors, four factors, and one latent
310 factor, respectively accounting for 48.98%, 44.18% and 25.42% of variance of the dataset.
311 However, the seven-factors solution appeared as spurious (one of the factors being loaded by
312 only one item, "I never tell lies", which is likely to be representing social desirability than
313 genuine lying behavior). We therefore decided to keep the unique and four-factors models
314 and submitted their simple structure to Confirmatory Factor Analysis (CFA).

³¹⁵ The CFA favoured the four-factors solution ($\chi^2_{4-factors} = 3598.15$, $AIC_{4-factors} = 143606.92$,
³¹⁶ $BIC_{4-factors} = 143744.21$, $RMSEA_{4-factors} = 0.06$, $CFI_{4-factors} = 0.83$, $SRMR_{4-factors}$
³¹⁷ $= 0.09$) over the one-factor ($\chi^2_{1-factor} = 8006.07$, $AIC_{1-factor} = 148002.84$, $BIC_{1-factor} =$
³¹⁸ 148131.37 , $RMSEA_{1-factor} = 0.10$, $CFI_{1-factor} = 0.55$, $SRMR_{1-factor} = 0.11$).

³¹⁹ We then compared the four-factors solution with the initial hypothetic three-dimensional
³²⁰ model with which we built the scale, which favoured the four-factors model ($\chi^2_{hypothetic} =$
³²¹ 4976.26 , $AIC_{hypothetic} = 144979.03$, $BIC_{hypothetic} = 145111.94$, $RMSEA_{hypothetic} = 0.08$,
³²² $CFI_{hypothetic} = 0.74$, $SRMR_{hypothetic} = 0.09$).

³²³ Finally, we compared the full four-factors model (including all items) with short forms re-
³²⁴ taining only the 3, 4 or 5 most loading items for each of the 4 dimensions. The 3-items
³²⁵ version ($\chi^2_{3-items} = 115.10$, $AIC_{3-items} = 38448.70$, $BIC_{3-items} = 38492.52$, $RMSEA_{3-items}$
³²⁶ $= 0.04$, $CFI_{3-items} = 0.98$, $SRMR_{3-items} = 0.04$) outperformed all versions, including 4-
³²⁷ items ($\chi^2_{4-items} = 320.59$, $AIC_{4-items} = 50692.77$, $BIC_{4-items} = 50748.27$, $RMSEA_{4-items} =$
³²⁸ 0.05 , $CFI_{4-items} = 0.96$, $SRMR_{4-items} = 0.05$) and 5-items ($\chi^2_{5-items} = 623.33$, $AIC_{5-items} =$
³²⁹ 63472.44 , $BIC_{5-items} = 63539.63$, $RMSEA_{5-items} = 0.06$, $CFI_{5-items} = 0.94$, $SRMR_{5-items}$
³³⁰ $= 0.06$). Nonetheless, as 3-items per construct is the bare minimum for adequate reliability,
³³¹ we decided to keep the second best performing version with 4-items per factor, which also
³³² displayed excellent indices of fit.

³³³ The final version of the LIE questionnaire assesses 4 latent dimensions measured with 4 items
³³⁴ each (16 items in total). Based on the most loading items (see **Table 1**), we labeled these
³³⁵ factors *Ability* (representing one's subjective ability and ease to create and deliver believable
³³⁶ lies), *Frequency* (representing one's subjective and relative assessment of lying frequency),
³³⁷ *Negativity* (the unwillingness to lie related to negative internal factors such as moral val-
³³⁸ ues and/or emotional reactions associated with lying) and *Contextuality* (the flexible and
³³⁹ context-driven willingness to lie depending on external factors such as stakes, necessity and
³⁴⁰ alternative options). These factors were significantly correlated together (see **Figure 1**),

Table 1

All initial item loadings from the Exploratory Factor Analysis (EFA). The final item selection (the 4 most loading items of each dimension) also has the corresponding regression coefficients from the Confirmatory Factor Analysis (CFA) model that were used to calculation individual scores (between brackets).

Item	Label	Ability	Frequency	Negativity	Contextuality
Q10	I can lie well	0.84 [1.05]	0.24	-0.11	0.19
Q9	I am a good liar	0.80 [1.00]	0.26	-0.15	0.17
Q14	It is hard for others to detect my lies	0.75 [0.77]	0.15	-0.06	0.17
Q18	It is easy for me to make up clever lies	0.75 [0.87]	0.25	-0.10	0.17
Q11	I am good at deceiving others	0.74	0.29	-0.12	0.12
Q12	I can lie effectively if I want to	0.73	0.15	-0.06	0.25
Q13	Others can easily tell when I'm lying	-0.69	0.08	0.18	-0.07
Q17	I find lying difficult	-0.64	-0.09	0.39	-0.12
Q15	I almost never get caught lying	0.62	0.11	-0.04	0.19
Q20	I do not have to prepare much for a lie	0.54	0.24	-0.15	0.13
Q19	I find it taxing to come up with a good lie	-0.54	-0.07	0.33	0.07
Q16	My lies often arouse suspicion from others	-0.47	0.27	0.09	-0.07
Q4	I have a tendency to lie	0.16	0.76 [1.01]	-0.20	0.09
Q5	I lie more often than most people do	0.19	0.72 [0.92]	-0.24	0.05
Q23	I find it difficult to refrain myself from lying	0.06	0.72 [0.82]	-0.12	0.01
Q1	I lie frequently	0.17	0.72 [1.00]	-0.31	0.13
Q22	I find myself lying without any reason	0.07	0.69	-0.17	-0.01
Q6	I lie more frequently than what I expect myself to	0.11	0.68	-0.08	0.11
Q7	I lie more than I think I should	0.09	0.68	-0.02	0.11
Q2	I lie in many situations	0.24	0.61	-0.31	0.14
Q26	I enjoy lying	0.24	0.56	-0.32	-0.01
Q29	I lie whenever it's convenient	0.15	0.53	-0.19	0.26
Q8	Others lie less often than I do	0.15	0.51	-0.15	0.02
Q21	I have to try hard to avoid lying	0.01	0.47	0.10	-0.05
Q31	I lie if it's the most direct way to get what I want	0.14	0.44	-0.17	0.31
Q24	It is easy to hold back from telling lies	0.10	-0.36	0.13	0.11
Q28	I feel satisfied when others believe my lie	0.26	0.32	-0.16	0.29
Q41	Lying is against my principles	-0.22	-0.18	0.63 [1.30]	-0.22
Q25	I feel guilty after lying	-0.30	-0.08	0.59 [1.00]	-0.06
Q44	It is bad to lie	-0.14	-0.14	0.58 [1.07]	-0.12
Q34	I always avoid lying if I can	-0.08	-0.40	0.57 [0.86]	0.05
Q27	I feel tense whenever I have to lie	-0.47	0.00	0.50	0.01
Q36	I prefer to tell the truth even if it gets me into trouble	-0.14	-0.22	0.43	-0.16
Q37	I would never lie for trivial matters	-0.05	-0.18	0.33	-0.01
Q38	I would never lie in serious contexts	-0.07	-0.18	0.32	-0.03
Q43	It is okay to lie sometimes	0.16	0.04	-0.23	0.71 [1.21]
Q33	I lie when necessary	0.15	0.11	-0.03	0.70 [1.00]
Q42	It is acceptable to lie depending on the context	0.20	-0.02	-0.13	0.61 [1.03]
Q39	I would lie if something important was at stake	0.15	0.06	0.01	0.48 [0.78]
Q40	I would only lie if it is harmless	0.07	-0.05	0.11	0.46
Q32	I lie when telling the truth is too troublesome	0.06	0.31	-0.16	0.44
Q30	I lie when it's easier than telling the truth	0.06	0.32	-0.11	0.41
Q35	I would only lie if I have no other choice	-0.04	-0.12	0.31	0.37
Q3	I never tell lies	-0.12	0.01	0.23	-0.36

³⁴¹ with *Ability*, *Frequency* and *Contextuality* showing positive relationships, and *Negativity* be-
³⁴² ing negatively associated with them.

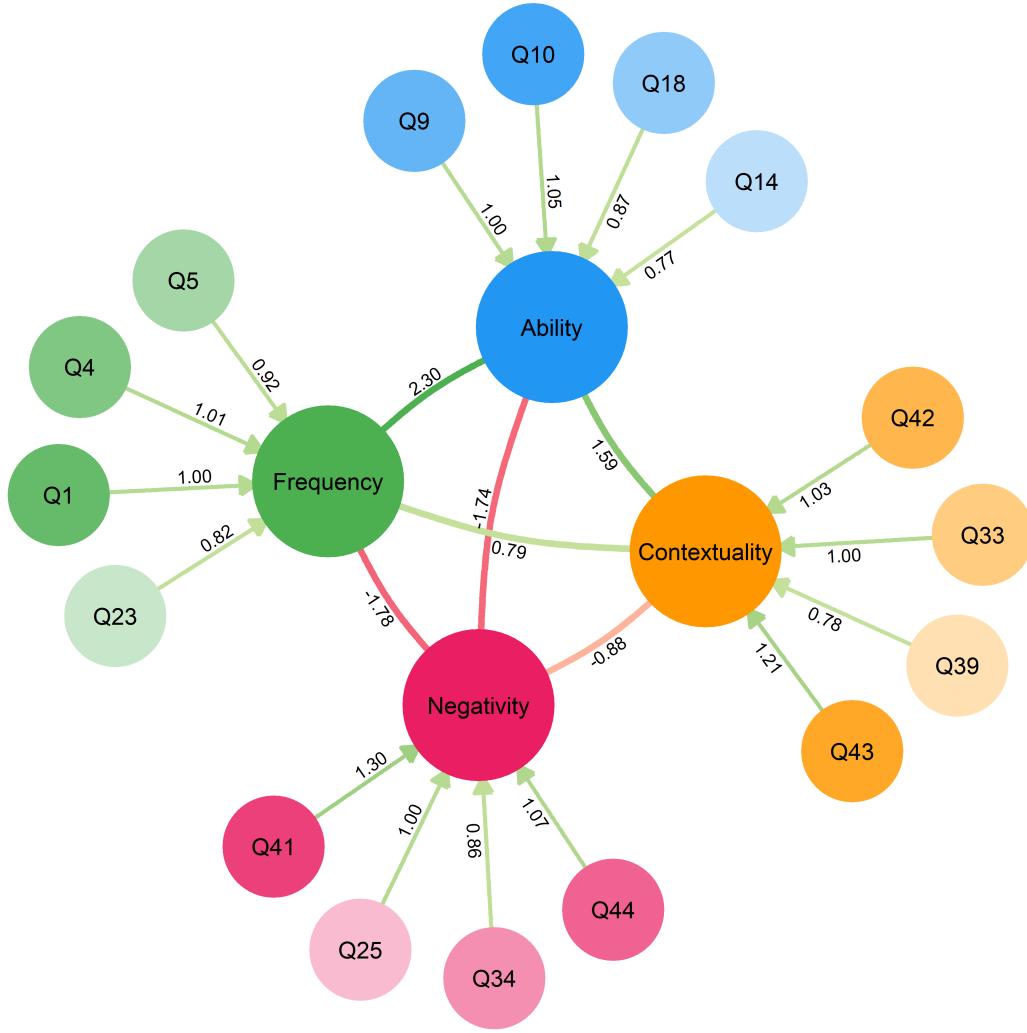


Figure 1. Confirmatory structure of the deception scale items and the correlation between the latent factors. Red links represent negative correlations and green links represent positive correlations. The green arrows represent the loadings of the items onto their respective factors. The numbers correspond to the regression coefficients from the Confirmatory Factor Analysis (CFA).

³⁴³ In line with recent recommendations, we assessed the multidimensional reliability by means
³⁴⁴ of omega coefficients (Green & Yang, 2015; Watkins, 2017), suggesting in general a high reli-

ability of the 16 items ($\omega_{total} = 0.83$) as well as for each dimension ($\omega_{total}^{Ability} = 0.91$; $\omega_{total}^{Frequency} = 0.87$; $\omega_{total}^{Contextuality} = 0.76$; $\omega_{total}^{Negativity} = 0.75$). Importantly, the analysis confirmed that the 4 dimensions cannot be considered as only reflecting a unique underlying general factor ($\omega_{hierarchical} = 0.36$).

349 Cluster Structure

After obtaining the 4 factors scores for each participant based on the CFA model, we investigated the presence of higher-density regions in the four-dimensional space of the LIE factor structure. The dataset was deemed suitable for clustering (Hopkins' $H = 0.24$), and the method agreement procedure (aggregating 33 methods to estimate the optimal number of clusters; see **Supplementary Materials 1**), supported the existence of 2 (12/33) or 3 (11/33) clusters. We then applied k-means clustering, which revealed that grouping the participants in 2 and 3 clusters would account for 44.92% and 57.58% of the total variance of the four dimensions of the questionnaire, respectively. Thus, we decided to go ahead with the latter solution and assign each participant to its nearest cluster (see **Figure 2**), labeling them as *Average* (41.86% of the sample; people that report an average lying ability, slightly lower than average frequency, average negativity and contextuality), *Trickster* (35.04% of the sample; people with high reported lying ability, frequency, low negative experience associated with deception and above-average flexibility in its implementation), and *Virtuous* (23.10% of the sample; people with very low reported lying ability and frequency, strong negative emotions and moral attitude associated with lying and high rigidity in their (non-)usage of deception).

366 Convergent Validity

Bayesian Regressions (from which we will report the 89% Credible Interval (CI) and the probability of direction pd , a Bayesian equivalent of the p -value; see Makowski et al., 2019b),

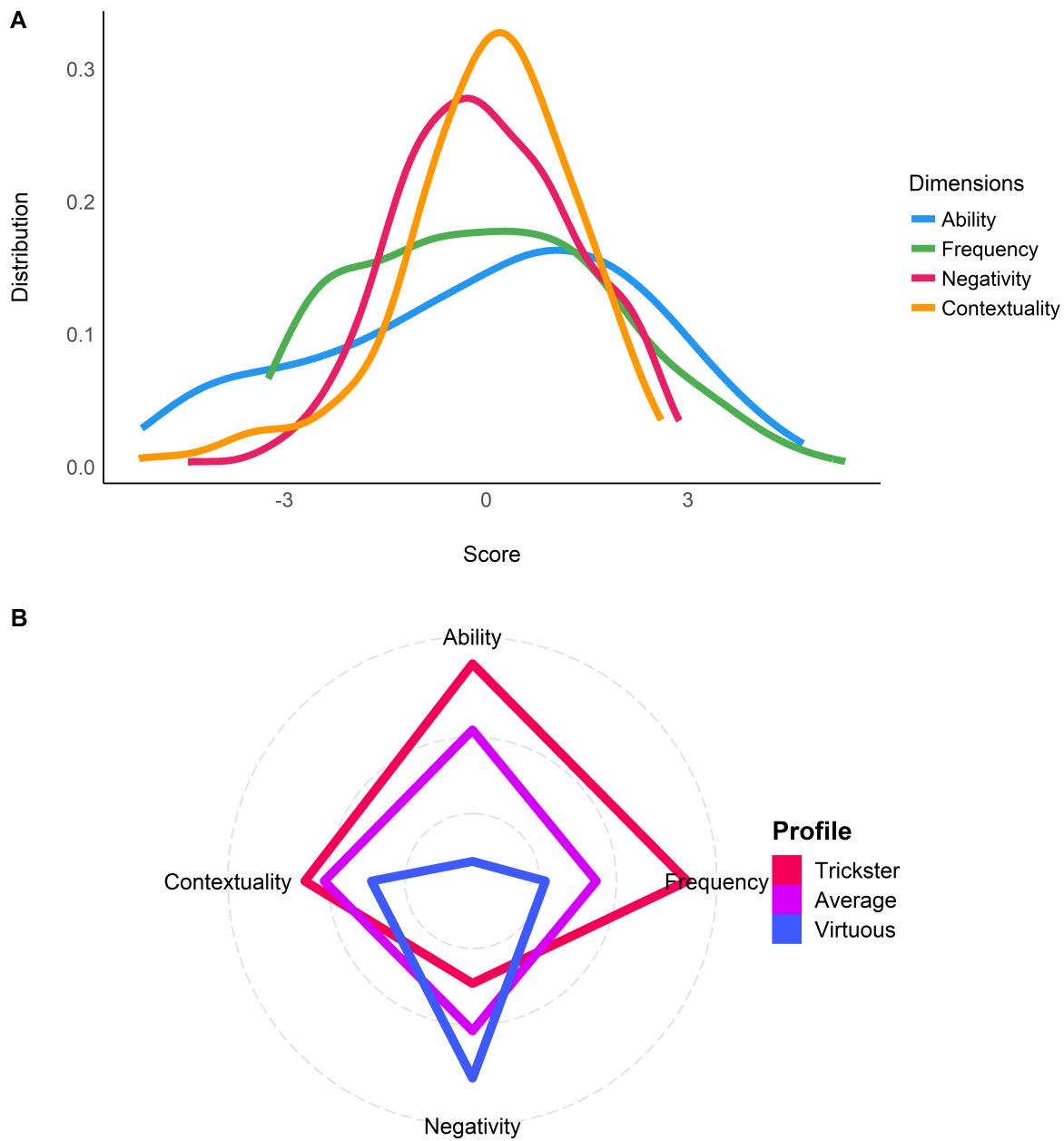


Figure 2. The distribution of the LIE dimensions (A) and the centre values of the 3 clusters of participants.

³⁶⁹ using both the LIE dimensions and profiles were used to assess the role of demographic vari-
³⁷⁰ ables, and Gaussian Graphical Models (GGMs; Epskamp, Borsboom, & Fried, 2018), i.e.,
³⁷¹ networks based on partial correlations, were used to assess the links between the LIE dimen-

372 sions and other theoretically related constructs. As the details of the analyses are available
373 in **Supplementary Materials 1**, we will only report in the manuscript the significant links
374 (Bonferroni corrected and $p < .001$ for the GGMs to control for spurious links).

375 **Demographics.**

376 **Sex.**

377 We fitted two Bayesian logistic regressions to predict *Sex* with the lying profile (offering a
378 simpler combined and integrated perspective), and the 4 lying dimensions (to assess the un-
379 derlying driving effects independently of one another). These revealed that men, as opposed
380 to women, were more likely to be *Tricksters* than *Average* (coefficient = 0.42, 89% CI [0.16,
381 0.68], pd = 99.52%), and *Average* than *Virtuous* (coefficient = 0.48, 89% CI [0.79, 0.16], pd
382 = 99.35%). This effect was likely to be driven by *Ability*, the only dimension significantly
383 sensitive to sex (coefficient = 0.14, 89% CI [0.07, 0.20], pd = 100%), reported as higher by
384 men than by women.

385 **Age.**

386 The Bayesian linear mixed models predicting *Age* were adjusted for *Sex* (entered as random
387 factor), *Income* and *Age* (entered as fixed effects). *Age* was higher for the *Virtuous*, relative
388 to the *Average* profile (coefficient = 2.83, 89% CI [1.75, 3.82], pd = 100%). This effect was
389 again likely to be driven by *Ability*, the only dimension significantly and negatively related
390 to age (coefficient = -0.35, 89% CI [-0.58, -0.11], pd = 99.08%), suggesting that younger
391 people report themselves as better at lying.

392 **Socio-Economical Status.**

393 The Bayesian linear mixed models predicting *Income* were adjusted for *Sex* (entered as
394 random factor), *Education* and *Age* (entered as fixed effects). Although the profiles were not
395 different in terms of *Income*, *Ability* was still the only dimension significantly and positively
396 related to income (coefficient = 184.52, 89% CI [14.68, 318.99], pd = 97.45%).

397 **Faith.**

398 Due to their strong correlation ($r = 0.86, p < .001$), we collapsed the two religion-related
399 items into one *Faith* variable. The Bayesian linear mixed models predicting *Faith* were
400 adjusted for religion type (entered as a random factor). *Faith* was stronger for the *Virtuous*,
401 relative to *Average* profile (coefficient = 0.66, 89% CI [0.28, 1.01], pd = 99.85%) and stronger
402 for *Average* relative to the *Tricksters* (coefficient = 0.37, 89% CI [0.67, 0.02], pd = 96.95%).
403 This effect was likely driven by the fact that all lying dimensions - except *Ability* - were
404 associated with *Faith*. Stronger *Faith* was related to higher *Negativity* (coefficient = 0.53,
405 89% CI [0.37, 0.69], pd = 100%), lower *Contextuality* (coefficient = -0.25, 89% CI [-0.36,
406 -0.12], pd = 99.92%) and higher *Frequency* (coefficient = 0.25, 89% CI [0.15, 0.35], pd =
407 100%).

408 **Absolute Lying Frequency.** The Bayesian linear models predicting absolute lying fre-
409 quency (in lies told per day; adjusted for social desirability) revealed that *Tricksters* reported
410 a higher (coefficient = 0.41, 89% CI [0.29, 0.54], pd = 100%), and the *Virtuous* a lower (co-
411 efficient = -0.24, 89% CI [-0.37, -0.11], pd = 99.92%) absolute lying frequency than the
412 *Average*, respectively. Specifically, the dimensional model suggested that relative *Frequency*
413 (coefficient = 0.14, 89% CI [0.10, 0.19], pd = 100%), as measured by the questionnaire, was
414 significantly predicting the absolute *Frequency* of lies told per day (see **Figure 4**).

415 **Social Desirability.** The GGM network suggested that *Self-Deceptive Enhancement* was
416 positively associated with reported lying *Ability* ($r = 0.21, 95\% \text{ CI} [0.14, 0.28]$) and negatively
417 with lying *Frequency* ($r = -0.20, 95\% \text{ CI} [-0.27, -0.13]$). On the other hand, active *Impression*
418 *Management* was positively associated with *Negativity* ($r = 0.12, 95\% \text{ CI} [0.05, 0.19]$) and
419 negatively with *Frequency* ($r = -0.13, 95\% \text{ CI} [-0.20, -0.06]$) and *Contextuality* ($r = -0.17, 95\%$
420 $\text{CI} [-0.24, -0.10]$). The relationship between lying *Frequency* and *Contextuality* also changed
421 from positive (in the previous analyses) to negative ($r = -0.17, 95\% \text{ CI} [-0.23, -0.10]$).

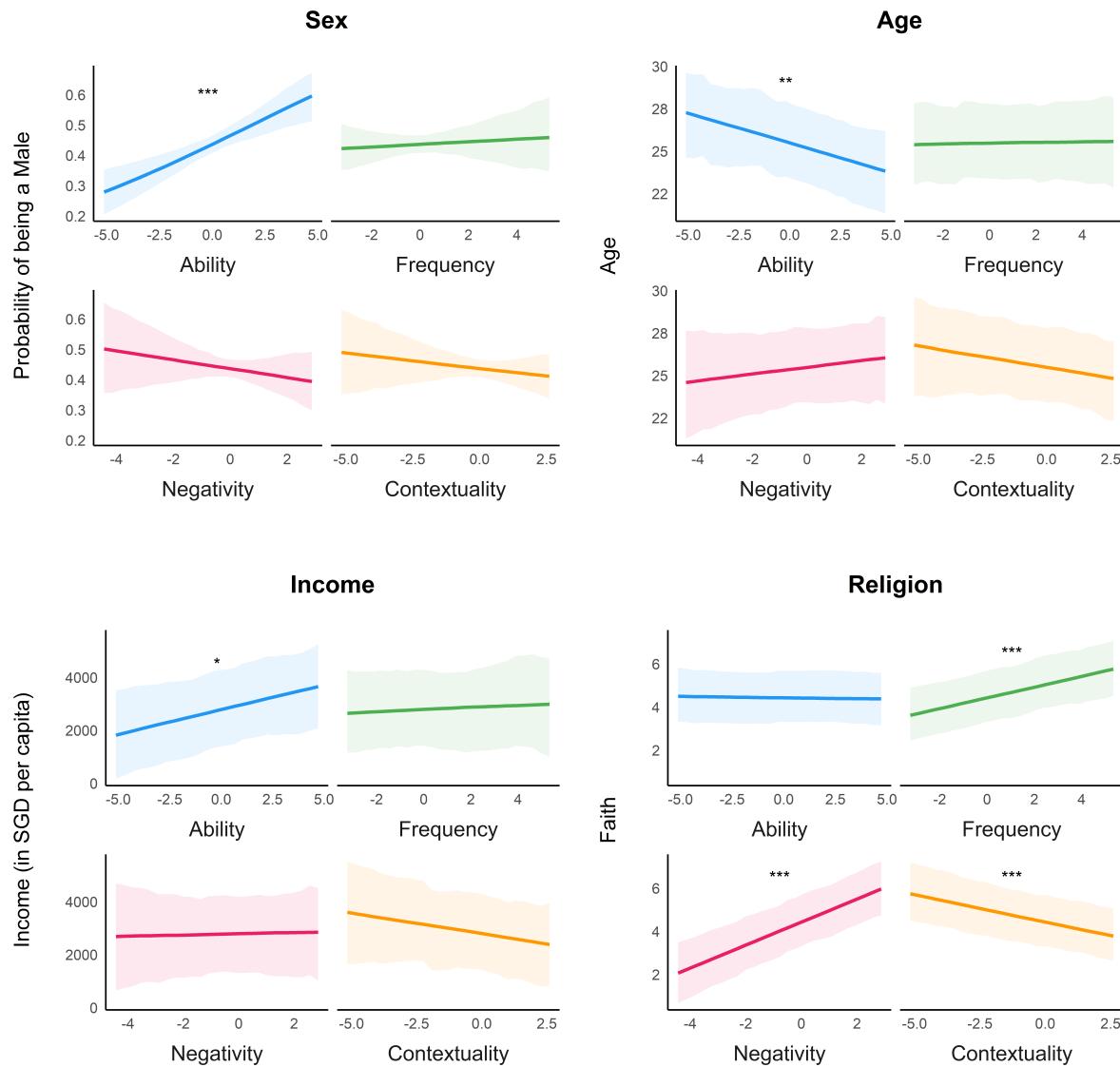


Figure 3. The linear relationship between lying dimensions and demographic variables. Asterisks represent effects with a significant probability of existence (* > 97%, ** > 99%, *** > 99.9%).

⁴²² **Psychopathy.** To avoid contamination of the following models by previously identified
⁴²³ mediators, we adjusted LIE scores by regressing out social desirability, age and sex. The
⁴²⁴ GGM network investigating the relationship with psychopathy suggested that lying *Ability*
⁴²⁵ was positively associated with *Boldness* ($r = 0.23$, 95% CI [0.16, 0.30]), that *Frequency* was

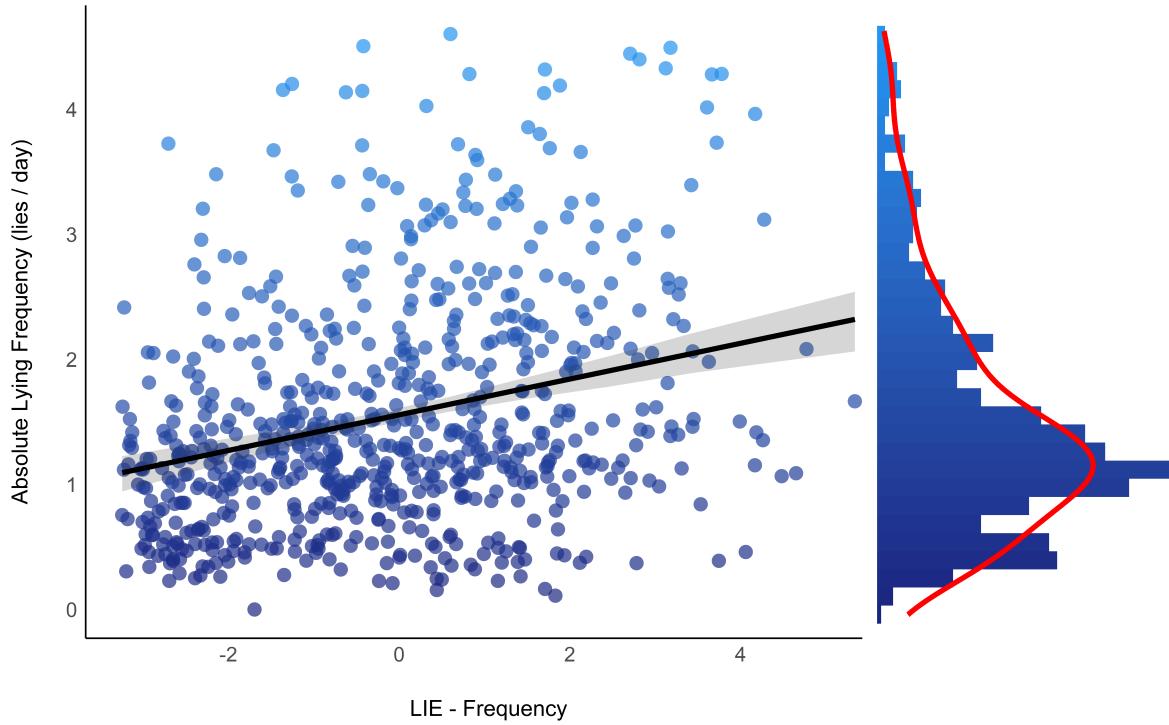


Figure 4. The relationship between the reported absolute frequency (the number of lies told per day, which distribution is showed on the right) and the Frequency dimension of the questionnaire.

⁴²⁶ positively associated with *Disinhibition* ($r = 0.23$, 95% CI [0.17, 0.30]) and that *Negativity*
⁴²⁷ was negatively associated with *Meanness* ($r = -0.19$, 95% CI [-0.26, -0.12]) but also positively
⁴²⁸ with *Disinhibition* ($r = 0.15$, 95% CI [0.08, 0.22]).

⁴²⁹ **Narcissism.** The GGM network suggested that lying was mainly associated with two core
⁴³⁰ components of narcissism. Lying *Ability* was positively associated with *Manipulativeness* (r
⁴³¹ = 0.35, 95% CI [0.29, 0.42]) and *Negativity* was negatively associated with *Exploitiveness* (r
⁴³² = -0.13, 95% CI [-0.20, -0.05]).

⁴³³ **Normal Personality.** The GGM network suggested that lying was mainly associated
⁴³⁴ with two dimensions of normal personality. Lying *Ability* was positively associated with
⁴³⁵ *Openness* ($r = 0.15$, 95% CI [0.08, 0.22]) and *Negativity* was negatively associated with
⁴³⁶ *Honesty/Humility* ($r = -0.15$, 95% CI [-0.22, -0.08]).

437 **Pathological Personality.** The GGM network suggested that lying was mainly associated
438 with two dimensions of pathological personality. Lying *Ability* was positively associated with
439 *Antagonism* ($r = 0.19$, 95% CI [0.12, 0.26]) and *Frequency* was positively associated with
440 *Disinhibition* ($r = 0.13$, 95% CI [0.05, 0.20]).

441 **Light Triad.** The GGM network suggested that lying was independent of the prosocial
442 and morally positive Light Triad facets.

443 **Impulsivity.** The GGM network suggested that lying *Frequency* was positively associated
444 with *Positive Urgency* ($r = 0.16$, 95% CI [0.09, 0.23]) and that *Negativity* was negatively
445 associated with the *Lack of Premeditation* ($r = -0.15$, 95% CI [0.21, -0.08]).

446 **Emotion Regulation.** The GGM network suggested that lying *Frequency* was positively
447 associated with deficits of *Impulse* control in emotional contexts ($r = 0.13$, 95% CI [0.05,
448 0.19]).

449 **Interoception.** The GGM network suggested that lying was independent of the sensitivity
450 to bodily signals.

451 Discussion

452 This study aimed at investigating the structure of dispositional deception and its personality
453 correlates by validating a lying questionnaire on a diverse sample. Using a cognitive perspec-
454 tive, we attempted to decompose lying as a high-level phenomenon, and explore the distinct
455 underlying mechanisms that contribute to it. Our findings suggest that deception, taken as a
456 trait, comprises of four latent dimensions, namely ability (the reported proficiency and ease
457 to create and deliver believable lies), frequency (the reported tendency to lie), negativity (the
458 negative perception of lying related to internal factors, such as emotions or moral values),
459 and contextuality (flexibility of one's willingness to lie related to external factors such as
460 stakes, necessity or alternative options). Although this multi-dimensionality was shown to
461 be robust and reliable, the consistent residual inter-correlation between the four dimensions

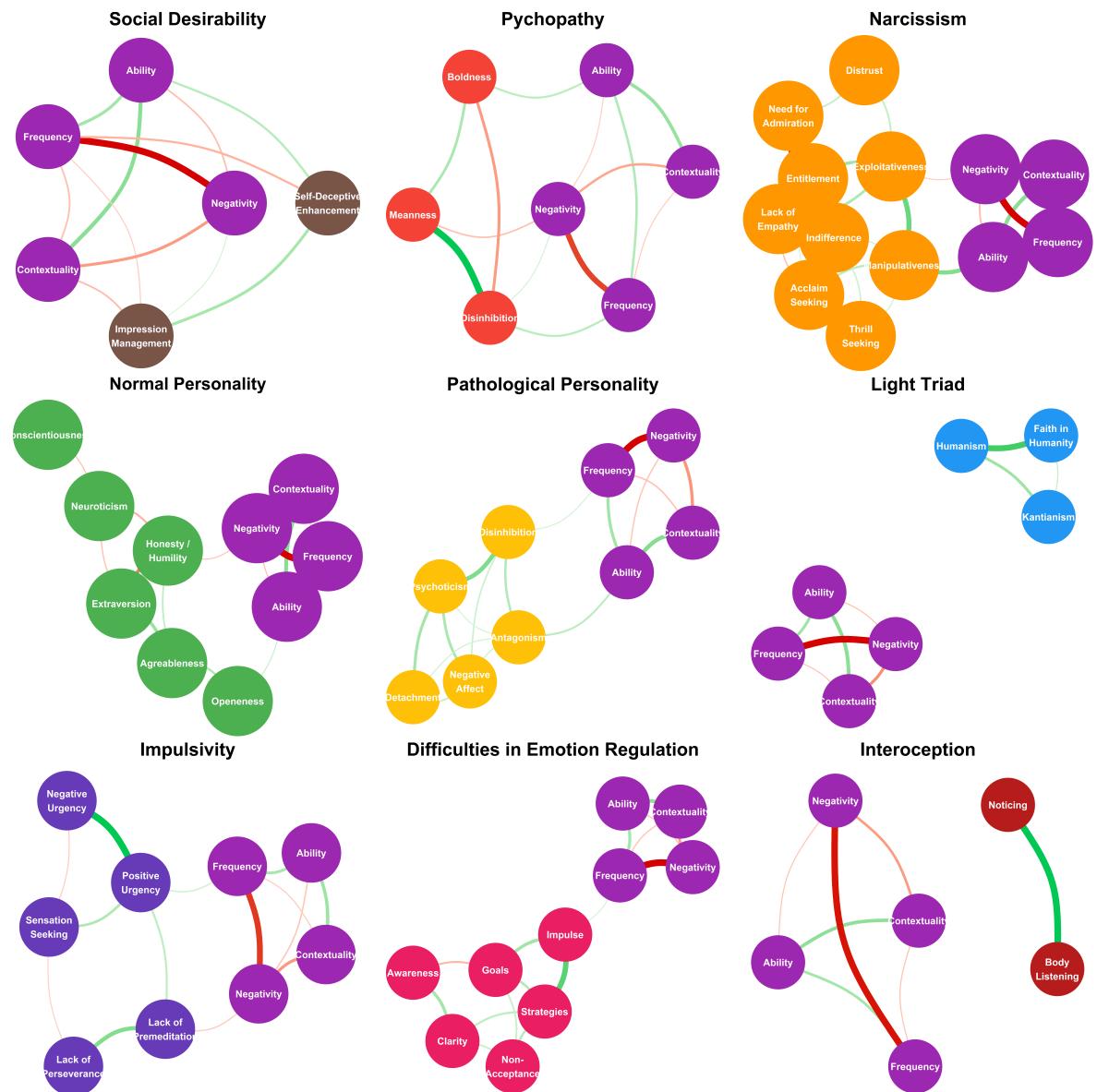


Figure 5. Gaussian Graphical Models (GGMs) for convergent validity with other constructs.

The relationships with the lying dimensions were, for all networks except the first, adjusted for social desirability, age and sex. Red and green links represent negative and positive correlations, respectively.

- 462 is nonetheless be compatible with the existence of an underlying over-arching general factor.
- 463 Such general inclination towards lying also manifests in the existence of distinct lying pro-
- 464 files, i.e., clusters of specific patterns of the dimensional structure. This, in turn, underlines
- 465 the specificity and distinctiveness of lying as a phenomenon, suggesting its conceptualization

466 as a special action and context that requires, triggers and recruits a specific combination of
467 - and interaction between - a specific set of distinct general-purpose mechanisms. In other
468 words, the different facets of lying share a common core component that is specific to its
469 object and purpose. Thus, it appears that deception can hardly be reduced to the sum of its
470 underlying mechanisms, and that a global perspective is required to appropriately capture
471 this phenomenon.

472 Importantly, we also investigated how these facets of deception are related to other disposi-
473 tional characteristics. In line with our hypotheses, we found a significant relationship with
474 antisocial traits. Specifically, individuals presenting with antagonistic attributes, such as
475 fearlessness, boldness, and manipulativeness, reported high deception abilities and low nega-
476 tivity related to lying. However, our results also underscore a distinction between antagonism
477 and malevolence (the philosophical or moral stance that is intrinsically ill-intentioned towards
478 others i.e., the desire to do harm) - specifically, individuals who scored high on meanness
479 and exploitiveness were primarily only more likely to report low negativity associated with
480 lying.

481 Following the positive association between deception and malevolent characteristics, we were
482 initially expecting to find the opposite relationship with markers of a benevolent nature.
483 However, we found no evidence in favor of a link between deception and pro-social traits.
484 This is in line with recent studies showing a relative independence of benevolence traits in
485 relation to malevolent traits (Kaufman et al., 2019; Tortoriello & Hart, 2019), or a more
486 complex and subtle pattern of the relationship between the (seemingly) opposite extremes
487 of human nature. For instance, narcissism, traditionally considered as one of the pillars of
488 antisociality, has been found to show an independent, positive correlation to benevolent traits
489 (Kaufman et al., 2019). Aside from further challenging the notion of a clear and relevant
490 dichotomy between so-called “dark” and “light” sides of personality, our findings suggest
491 that a pro-social attitude and nature can co-exist with all types and forms of dispositional
492 deception.

493 Our study also confirmed links with specific dimensions of normal personality. In particular,
494 lying ability was positively related to one's openness to experiences. This link might be
495 mediated by the increased tendency of exposure to complex, new and uncertain contexts,
496 such as social situations, that would in turn create more opportunities for lying (e.g., for
497 preserving others' impression of themselves), thus nurturing confidence in one's ability to
498 lie. Interestingly, we also found that honesty-humility was negatively associated with the
499 negative perceptions of lying. Though this link might appear contradictory initially, one
500 possible explanation is that honest individuals tend to approach deception with a more
501 neutral stance. They may circumvent any moral judgment that typically comes with it
502 and instead perceive deception as an objectively common phenomenon with no intrinsic nor
503 absolute moral value.

504 One striking finding of the present study is the relationship between specific aspects of
505 dispositional deception and markers of cognitive control (more exactly, proxies of cognitive
506 control deficits). We showed that individuals with difficulties in cognitive control tend to have
507 a higher lying frequency, indicating the involvement of executive functions (e.g., inhibition
508 and flexibility) in the controlled delivery of lies and manipulation of reality. Importantly,
509 this pattern was consistently found across different measures, such as impulsivity, emotion
510 regulation deficits, and disinhibited behavior. Further and more direct investigations of the
511 differential role of executive functions in deception are necessary to cast more direct light on
512 the mechanisms at stake.

513 Interestingly, another facet of impulsivity, namely the lack of premeditation, was inversely
514 related to the negative perception of lying. This suggests that the ability to consider the
515 emotional and practical implications of one's actions plays a significant role in deception.
516 A greater tendency to weigh the consequences of lying enhances perceptions of negativity
517 towards lying as an act. However, while we would have expected negative perception to be
518 more pronounced in individuals with low emotion regulation skills and high interoceptive
519 sensibility, we found no evidence in favor of this hypothesis. Nevertheless, it is important

520 to note that embodied constructs, such as interoceptive and emotion regulation abilities,
521 are only partially measured via self-reported questionnaires (Barrett, Quigley, Bliss-Moreau,
522 & Aronson, 2004; Garfinkel et al., 2015). Thus, we suspect that the tools used in the
523 present study were not sufficiently sensitive, or simply not appropriate, which prevents us
524 from drawing any definite conclusions regarding the absence of associations between these
525 dimensions. Future studies should investigate the role of such embodied aspects of cognition
526 through more direct means.

527 Finally, we emphasize the importance of measuring - and controlling for - social desirability
528 when attempting to measure morally or socially loaded constructs, such as lying, through
529 self-reported questions. Our findings suggest a strong yet subtle relationship, revealing
530 that individuals who perceive themselves more favorably rated themselves as better, yet less
531 frequent, liars. Additionally, people who tend to consciously and actively portray themselves
532 in a socially desirable manner are both more likely to report stronger negativity towards lying
533 and being less influenced by external factors in their decision to lie. In line with this pattern,
534 they also report lying less frequently, which can be observed using different types of measures,
535 such as the absolute frequency of lying (i.e., the number of lies told a day). It is interesting
536 to note that after controlling for social desirability, the relationship between lying frequency
537 and context-driven willingness to lie shifted from positive to negative. Consistent with our
538 other results, we suggest that a common cognitive basis might be driving this relationship.
539 In particular, cognitive control, which allows and supports the control and inhibition over
540 the tendency to lie, would also be necessary for facilitating flexible and context-driven usage.
541 Thus, people who tend to lie a lot in general also use this strategy in a less parsimonious
542 and adaptive manner.

543 Importantly, we found that lying behavior is also modulated by demographic variables.
544 Consistent with previous findings (Elaad, 2018), individuals who are young, male, and have
545 a higher income reported a higher ability to lie. This concurs with research showing that
546 malevolent traits are negatively associated with age, being female, and income (Kaufman et

547 al., 2019). The age- and sex-related links with honesty, social desirability, and boldness, as
548 well as the relationship between income and self-control (Duckworth, 2011; Moffitt et al.,
549 2011), are likely to mediate such effects.

550 In addition, we found that people with high religiosity tend to perceive lying as intrinsically
551 negative (possibly related to more absolute or immanent moral values) and are less pres-
552 sured by the external context necessitating lying (suggesting a stronger role of these moral
553 values). However, our findings also suggest that religiosity is positively correlated with ly-
554 ing frequency. Although surprising, this effect could be mediated by an increased honesty
555 of religious people, as well by the fact that the greater negativity (and therefore saliency)
556 of lies enhances the encoding and ease of retrieval of these events, leading in turn to an
557 overestimation of their frequency.

558 **Limitations and Future Directions**

559 It is important to note that lies are not all alike and that different types exist, from “harmless”
560 white lies in daily social interactions to more serious and high stakes attempts, for instance
561 to conceal an act of law violation. Moreover, lying is arguably not, in most cases, the
562 end goal but rather the means to attain given goals, which vary extensively across the
563 population. Lying types and motives, although not the focus of the present study, are
564 potentially relevant aspects to gain a comprehensive understanding of this phenomenon.
565 However, one of the main challenges of investigating lying motives is the validation of a robust
566 and usable framework for the classification of lies. For instance, Weber (2017) suggested the
567 existence of 11 types of lies while Zvi and Elaad (2018) emphasized 3 motives (self-gain,
568 altruism, and lying for no reason). Their study further shows that vanity and exhibitionism,
569 two facets of narcissism, were respectively predictive of self-beneficial lies and lying for no
570 reason. Though exploring deception-related motivations is beyond the scope of the present
571 study, these previous findings suggest that the extent of one’s motivation to lie (and the
572 type of motive) might be sensitive to personality traits, supporting its relevance within a

573 dispositional approach to deception. This serves as a potential avenue of exploration for
574 studies to further delineate the mechanisms involved in deception.

575 Another interesting and complementary approach could focus on the reception of lies, rather
576 than how individuals perceive themselves as liars. Prior work suggests that extroverts are
577 more proficient at telling lies as well as detecting lies (Elaad & Reizer, 2015), and that
578 frequent liars are more likely to perceive themselves as good lie detectors (Zvi & Elaad,
579 2018), underlining this issue as a promising topic for investigation.

580 Treading on more methodological concerns, it is important to highlight that many psychology
581 studies, including task and questionnaire validations, have been criticized for their over-
582 representation of a biased subset of participants (referred to as “WEIRD” samples - Western
583 Educated Industrialised Rich and Democratic; Henrich, Heine, & Norenzayan, 2010). The
584 predominantly non-western population included in this study, being additionally diverse in
585 terms of age, SES, culture and religion, is certainly a unique strength of our present study.
586 Nevertheless, all the participants resided in Singapore. However, although in theory, a
587 (paradoxically) homogeneous multicultural and multi-influenced population confers a highly
588 suitable terrain for psychological investigations, this specificity should raise extra caution on
589 any claims of generalization. It is thus critical that future studies investigate intercultural
590 differences and carry out a cross-cultural validation of the structure of deception.

591 Finally, it is crucial to corroborate questionnaire scores with actual behavior (Serota et al.,
592 2010) to support the validity of such self-reported measures. However, behavioral experi-
593 ments have been lacking in ecological validity due to paradigms that fail to elicit realistic
594 lying from participants in a way that is self-motivated and spontaneous (e.g., participants
595 are sometimes instructed to lie). The use of games with monetary incentives seems to be a
596 promising approach to investigate whether actual lying behaviors are consistent with self-
597 reported measures of lying (Levine, Kim, & Hamel, 2010).

598 In conclusion, this study attempted to investigate the trait-like aspect of deception. Our

599 findings underline lying as a specific yet multi-faceted phenomenon, related to (and modu-
600 lated by) a variety of inter-individual characteristics. Importantly, the brief questionnaire
601 validated in this study will allow for including this measure in future experiments on decep-
602 tion to obtain a more complete and accurate picture of its behavioral and neural correlates.
603 Nevertheless, further investigation is warranted to understand how lying behavior varies
604 across different motivating factors, contexts and implications, as well as specific populations
605 defined by factors like culture, pathology, and criminality.

606 **Data Availability**

607 The data and the R script for analysis are available on GitHub at [https://github.com/
608 DominiqueMakowski/2020structure](https://github.com/DominiqueMakowski/2020structure). The complete statistical report is available in **Supple-
609 mentary Materials 1** and a transcript of the complete survey is available in **Supplemen-
610 tary Materials 2**. An interactive web application to compute the scores of the questionnaire
611 is available at <https://neuropsychology.shinyapps.io/proflier>.

612 **Ethics Statement**

613 The study was approved by the Institutional Review Board (Reference Number: IRB-2019-
614 02-026) of Nanyang Technological University (NTU).

615 **Author Contributions**

616 DM conceived the study. DM, TP and ZL participated in the study design, statistical
617 analysis, data interpretation and manuscript drafting. DL and AR provided input and
618 expertise for the face validity of the items. AC coordinated the study, provided input to the
619 survey construction and performed a critical review of the manuscript. All authors read and
620 approved the final manuscript.

621

Conflict of Interest Statement

622 The authors declare that the research was conducted in the absence of any commercial or
623 financial relationships that could be construed as a potential conflict of interest.

624

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626 Ghose and Arvind A. S. for their support and insights in the early stages of this study, as
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628

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