



The *LYin* lying tendency scale: capturing individual differences in selfish, altruistic, and social-acceptance lying tendencies

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Abstract

Heterogeneity in lying behaviors is well documented in previous studies. However, previous assessment tools mainly lack consideration of various types of lies that would substantially change the nature of lies. The study developed the *LYin* Lying Tendency Scale (LTS) to assess individuals' behavioral tendencies in telling selfish, altruistic, and social-acceptance lies. The test–retest reliability, construct, convergent, and discriminant validity were examined in Studies 1–3. Criterion validity was tested by conducting a lying game in Study 4 and measuring participants' moral decisions and speculations on three types of lying contexts in Studies 5 and 6. Study 5 with three substudies measured participants' personal decisions in hypothetical daily-life situations and their self-report lying frequency. Study 6 provided hypothetical daily-life situations and measured participants' speculations of others' choices. All six studies provided sufficient psychometric support for the *LYin* LTS. Our study provides a sound assessment tool to measure three types of lying tendencies and sheds light on how individuals' variations in honesty traits, self-centered, other-regarding, and need-to-belong characteristics link to variations in lying tendencies. Our findings suggest that an individual's honesty-associated characteristics are various in terms of the consideration of honesty as a moral virtue and the application of deception as a strategy to achieve diverse purposes.

Keywords Altruistic lies · Selfish lies · Social acceptance lies · Assessment

Introduction

Deception, serving as a social strategy to achieve diverse purposes, is a widespread phenomenon that prevails in daily life across different cultures (Cohn et al., 2019; Gächter & Schulz, 2016). While lies are often linked to self-serving motives, previous studies mainly focus on selfish lies (Gerlach et al., 2019) due to their perceived immorality and negative impact (Wiltermuth et al., 2015; Yin & Weber, 2016), leaving other common types of lies relatively underexplored. The lack of development of valid and diverse assessment tools substantially restricts our ability to effectively screen (dis)honest features and extract core characteristics (Gerlach et al., 2019; Hilbig, 2022). This limitation could

impede the advancement of research in the (dis)honesty domain, especially in neuroimaging studies aimed at exploring individual differences in dishonesty, where obtaining reliable metrics is crucial (Farah et al., 2014; Yin & Weber, 2019; Yin et al., 2021).

Selfish, altruistic, and social-acceptance lies are commonly seen in daily life (Cohn et al., 2019; Gächter & Schulz, 2016; Verigin et al., 2019). *Selfish lies* are the deliberate manipulation of information with the aim of psychologically or financially benefiting the deceiver at the expense of the benefit of the deceived. Selfish lies are the type of lie that is out of self-serving motives even at the expense of others (Erat & Gneezy, 2012), reflecting more selfish characteristics of an individual and therefore a distinctive feature compared to pro-self lies that are harmless or even beneficial to receivers. The actor bears a self-concerning motive if he/she lies to benefit oneself psychologically or financially (Schindler & Pfattheicher, 2017). As one of the common types of lies, people are inclined to serve their self-interests (Gerlach et al., 2019; Grolleau et al., 2016) even at the cost of scarifying the honesty principle (Effron et al., 2015; Köbis et al., 2019; Speer et al., 2022), tend to make

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egocentric moral judgments of deception (Levine et al., 2018), and would like to switch the interpretation of dishonest behaviors in the self-benefiting directions (Chance et al., 2011).

Different from Selfish lies, *altruistic lies* are the deliberate manipulation of information with the aim of psychologically or financially benefiting the deceived at the expense of the deceiver's benefit. Telling an altruistic lie arises from concerns for others' welfare (Erat & Gneezy, 2012). The social mechanism, including the consideration of how lies would affect others, is one of the mechanisms that produce and influence individuals' dishonest behaviors (Jacobsen et al., 2018). People differ in their propensity to consider others' welfare (Kerschbamer et al., 2019) and large heterogeneity in social preference brings variations in individuals' decisions to lie for others' interests. Altruistic lies involve the transmission of information misleading and benefiting a target (Levine & Schweitzer, 2014, 2015) but are told with the desire to protect others psychologically or financially (Levine & Lupoli, 2022), even at the expense of liars' benefits. Studies found that people have an aversion toward lies (Gneezy et al., 2013), but altruistic and cooperative tendencies negatively correlated with the aversion to altruistic lies and positively correlated with the aversion to lies that benefit both the liars and the recipients (Biziou-van-Pol et al., 2015). Therefore, altruistic lies possess other-concerning motives considering that potential outcomes of lies would be against liars' interests.

Social-acceptance lies are the deliberate manipulation of information to fit in a group or seek acceptance from others. Social-acceptance lies, as a social lubricant in daily interactions, and has been rarely investigated yet commonly observed in daily life (Verigin et al., 2019). Social-acceptance lies are told out of approval motivation to fit in with others (McLeod & Genereux, 2008) and are beneficial in facilitating social networks (Liu et al., 2021), reflecting the desire to get along with the group, fulfill the group's expectations, and gain acceptance from group members. The need for belonging and acceptance by others is a fundamental drive to form and maintain interpersonal relationships (Baumeister & Leary, 1995).

Researchers commonly capture individual differences in honesty with the use of self-report scales and economic games. In behavioral experiments, individuals' deceptive/honest decisions are observed or captured in a specific context (usually an economic game) that provides lying opportunities (Gerlach et al., 2019; Rosenbaum et al., 2014). Behavioral experiments improve the knowledge of social sciences and observations in these tasks could predict unethical behaviors in real-life (Dai et al., 2018). However, these behavioral experimental paradigms usually measure individual differences in lying behaviors in a specific context

or sometimes cannot identify whether a specific actor lies in the games like coin flip, matrix, and die roll (Gerlach et al., 2019). Indexes from these tasks might suffer from the problems of cross-situation variety (Gerlach et al., 2019).

The existing measures of lying tendencies are limited in two ways. First, to our best knowledge, there still lacks a psychometrically sound measure for assessing lying tendencies toward the above-mentioned three common types of lies. The HEXACO Personality Inventory (Ashton & Lee, 2009) is a standardized and self-report scale measuring honesty traits. However, it measures the overall dishonest level without distinguishing motives underlying different deceiving behaviors. As we introduced above, deception is usually considered a strategy to achieve goals in real-life situations and various motivations substantially influence people's judgment, decisions, and neural processes of lying (Mei et al., 2020; Yin & Weber, 2016; Yin et al., 2017). Another Lying in Everyday Situations scale (Hart et al., 2019) contains the relational lying subscale ("avoiding relational conflict by concealing misdeeds or lying when sharing the truth would lead to conflict") and the antisocial lying subscale ("lying to harm others or lying in a vindictive manner"). However, the scale only captures two types of lies. Antisocial lies are more linked to big lies that are less often observed in daily life and it might limit the contexts where the scale could be useful. Relational lies are conceptually different from altruistic lies (a more virtuous form of lies) and social-acceptance lies (a more acceptance-chasing form of lies) as we proposed.

Second, limited examinations of validity are provided in some previous lying scales. Despite that the Lying in Everyday Situations scale (Hart et al., 2019) covers two types of lies, the validation of the scale was tested by examining the correlations of the revised Lie Acceptability Scale, Lying in Amorous Relationships Scale, Cole Partner Deception Scale, Social Desirability Scale, and Machiavellian scales, without incorporating deceptive decisions in the validation process. To bolster the robustness of evaluation and enhance its effectiveness in future applications, it is important to incorporate diverse validation methodologies, including behavior prediction. Thus, employing a more varied validation approach would offer comprehensive psychometric support.

The current study developed the *LYin* Lying tendency scale (LTS) for assessing selfish, altruistic, and social-acceptance lying tendencies. Our scale addresses the existing limitations in two ways. First, three major and common types of lying tendencies are measured and this categorization contributes valuable insights into the motivations behind different types of lies, enriching our understanding of the complexities of dishonesty. Three main lying motivations, including self-benefiting, other-benefiting, and demanding

acceptance, trigger different types of lies. Selfish lies have been extensively investigated and are triggered by selfish/self-benefiting motives in contexts where participants are provided opportunities to lie to gain more for themselves (Gerlach et al., 2019; Rosenbaum et al., 2014). The validation of selfish lying tendency would focus on selfish/self-benefiting motives by testing theoretical constructs of Machiavellianism (Cui et al., 2017; Daiku et al., 2021; Wilson et al., 1996), egocentric (“a single-minded attentional focus on the self”) and pathological (“hard selfishness in which others are harmed for self-advancement”) selfishness (Raine & Uh, 2019). Altruistic lies are a type of prosocial behaviors (Biziou-van-Pol et al., 2015) that are found to be associated with altruism (Pfattheicher et al., 2022), empathy concerns (Van Lange, 2008), willingness to help (Masten et al., 2011). Previous studies found that altruists might lie less, but they lie less when lies hurt others, and no evidence supports that they lie less when lies have no harmful effects on others (Kerschbamer et al., 2019). Substantial people would lie to increase others’ payoff even at the cost of their benefits (Erat & Gneezy, 2012). These findings strengthen the importance of differentiating expected outcomes in the measurement of lying tendency. People with high prosocial motives might lie less if lies harm others but are more willing to lie if lies benefit themselves. Last, social-acceptance lies are linked to the need to fit in a group that bears the mutual benefits for both the deceiver and the deceived, and these lies can be triggered by both selfish and prosocial motives (Cui et al., 2017; Gino et al., 2013; Kim & Kim, 2021). Social bonding can increase group-serving dishonesty but may have no effects on self-serving lies (Shalvi & De Dreu, 2014), highlighting the role of bonding in shaping dishonesty in group settings. Previous studies also found children would lie to be polite (Talwar & Lee, 2002) or pretend to like an undesirable gift to avoid others being angry (Xu et al., 2010), showing children’s increasing regulations of behaviors that conform to social conventions. Besides, social-acceptance lies would display an individual’s dual motives of both pro-self motives (Cohen et al., 2009) and pro-other motives, such as protecting group members’ feelings or boosting group interest (Hildreth & Anderson, 2018). It, on one hand, helps liars to fit in a group, on the other hand, bares the concerns of group members’ feelings and reflects the agent’s recognition of social norms in the community (Ellemers & van Nunspeet, 2020). Social-acceptance lies fall in between altruistic lies as the most acceptable types of lies and self-gain lies that are less acceptable (McLeod & Genereux, 2008), suggesting the mixed nature. However, there is still a lack of a valid assessment tool to measure

this type of lying tendency. Predicted relationships among measurements are illustrated in Table 1. Based on the above illustrations, strong correlations with selfish lying tendency would be expected if the theoretical concepts measure selfish features. Similarly, strong correlations are expected between altruism associated constructs and altruistic lying tendency. Social-acceptance lying tendency would be strongly related to concepts reflecting social bonding and acceptance, while they might show moderate or weak correlations with constructs measuring selfish or altruistic nature.

Second, in validating our scale, in addition to traditional validating methods such as EFA, CFA, test–retest validity, construct validity, and so on, we incorporated behavioral measurements and hypothetical daily contexts to evaluate the behavioral prediction of the *LYin* LTS. Studies also accounted for confounding factors like social desirability and impression management, enhancing the reliability of lying tendency measurements. We first tested the latent structure and construct validity of the *LYin* LTS in Study 1. In Studies 2 and 3, we examined construct validity, convergent validity, and discriminant validity by using self-report scales. Study 4 tested the criterion validity of the scale by linking it to individuals’ self-gaining and other-gaining in a lying game. Studies 5 and 6 tested criterion validity. Study 5 with three substudies measured participants’ personal decisions in hypothetical daily-life situations and their self-report lying frequency. Similarly, Study 6 provided hypothetical daily-life situations but measured participants’ speculations of others’ choices. In addition, in Studies 2, 3, and 5, we tested social desirability tendency and impression management which are confounding factors that would mar the validity of the measure of lying tendency since dishonest participants might be dishonest about their dishonesty (Hilbig, 2022).

Study 1: *LYin* LTS items generation, EFA, CFA, construct validity, and test–retest reliability

Original items of the *LYin* LTS were generated based on three types of lying tendencies, namely selfish, altruistic, and social-acceptance lies (Study 1a). The latent structure of the *LYin* LTS was examined using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Meanwhile, the construct validity was tested by testing the relationships between the *LYin* LTS and theoretically related concepts: Machiavellianism, altruism, empathic concern, and approval motivation. One-month test–retest reliability was tested in Study 1b.

Table 1 Instruments used in all 6 studies and predicted relationships for the *LYin* LTS

Study No	Instruments		Instrument types	Validity types	The <i>LYin</i> LTS			
					Selfish lying tendency associated	Altruistic lying tendency associated	Social-acceptance lying tendency associated	
Study 1a (N=263)	Machiavellism		Self-report scales	Construct validity	++	o	+	
	Self-report altruism				o	++	o	
	Empathy concern				-	++	o	
	Approval Motivation				o	+	++	
Study 2 (N=334)	Moral Identity	Internalized willingness to help			-	++	o	
		Internalized gregariousness			o	+	++	
		Internalized honesty			Convergent validity	-	o	-
	HEXACO_Honesty-Humility	-				-	-	
	BIDR: impression management				Discriminant validity	-	o	-
Study 3 (N=284)	Selfishness	egocentric		Construct validity	++	o	+	
		adaptive			++	+	+	
		pathological			++	o	ns	
	Need to belong	o			+	++		
	Lying in Everyday Situations	relational lying			Convergent validity	++	++	++
		antisocial lying				++	o	+
	Moral foundation: Harm				Construct validity	-	+	+
Social desirability		Discriminant validity	-	o	-			
Study 4 (N=126)	Revised sender-receiver lying game	self-gaining	Lying game	Criterion validity	++	o	o	
		other-gaining			o	++	o	
Study 5a (N=313)	Hypothetical moral decisions	selfish lying likelihood	Moral decisions		++	+	+	
		altruistic lying likelihood			+	++	+	
		Social-acceptance lying likelihood			+	+	++	
Study 5b (N=402)	Hypothetical moral decisions	selfish lying likelihood			++	+	+	
		altruistic lying likelihood			+	++	+	
		Social-acceptance lying likelihood			+	+	++	
		HEXACO_Honesty-Humility			Self-report scales	Incremental validity	-	-
Social desirability	-	o	-					
Study 5c (N=317)	Hypothetical moral decisions	selfish lying likelihood	Moral decisions	Criterion validity	++	+	+	
		altruistic lying likelihood			+	++	+	
		Social-acceptance lying likelihood			+	+	++	
	Weekly lying frequency	selfish lying	Self-report scales			++	+	+
		altruistic lying				+	++	+
		Social-acceptance lying				+	+	++
	Lying in Everyday Situations	relational lying		Incremental validity	++	++	++	
antisocial lying		++			o	ns		
Social desirability					-	o	-	

Table 1 (continued)

Study No	Instruments	Instrument types	Validity types	The <i>LYin</i> LTS			
				Selfish lying tendency associated	Altruistic lying tendency associated	Social-acceptance lying tendency associated	
Study 6 (<i>N</i> =282)	Hypothetical moral speculations	selfish lying judgment	Moral speculations	Criterion validity	++	+	+
		altruistic lying judgment			+	++	+
		Social-acceptance lying judgment			+	+	++

+: positive correlations; ++: high positive correlations; - negative correlations; -- high negative correlations; o: no significance predicted; ns: no sufficient evidence to support prediction

Study 1a. Methods

Items development

First, we operationally defined three types of lies. *Selfish lies* are lies aimed to benefit the deceiver psychologically or financially at the expense of the benefit of the deceived. *Altruistic lies* are lies aimed to benefit the deceived psychologically or financially at the expense of the deceiver's benefit. *Social-acceptance lies* are lies aimed to fit in a group or seek acceptance from others. Second, with a comprehensive literature review (Gerlach et al., 2019; Köbis et al., 2019; Rosenbaum et al., 2014; Suchotzki et al., 2017), we generated an original item pool ($n=15$) in Chinese. Items were written in behavioral terms, and meanings of deception were expressed through different phrases or words to reduce response consistency. Then, we invited three university professors in social psychology to review and modify the items. Items with weak face validity, weak correlations to the intended constructs, or ambiguous wordings were modified. The final version included 15 items with 5 items in each subscale (Supplementary Material).

Participants and procedures

Participants were recruited on social media. They completed the questionnaires online and were excluded if their response time was shorter than three minutes or longer than 30 min, or if they failed the attention-check questions (Huang et al., 2011). The final sample consisted of 263 participants (162 females; age = 20.33 ± 2.37 y; 209 of them had a Bachelor's degree). The sample size taken, more than 15 times of LTS items, was sufficient (Kyriazos, 2018). All participants completed the newly developed *LYin* LTS first and then four measures of related constructs.

Measures

Construct validity measures

Lying tendencies Three types of lying tendencies were measured by our newly developed the *LYin* Lying Tendency Scale which includes 15 items with 5 items in each subscale (Supplementary Material). Using a seven-point Likert scale (1 = Not at all true about you, 7 = Very true about you), individuals reported their behavioral tendencies of telling three types of lies. A higher score indicated a higher level of lying behavioral tendency correspondingly.

Machiavellism Machiavellism was measured by the Machiavellism subscale from the dark Triad scale (Jonason & Webster, 2010), assessing the cunning and duplicity constructs that were expected to be highly correlated with selfish lying tendency. On a five-point Likert scale, individuals reported on four items about their attitudes toward achieving goals by unfair means or foul (e.g., "I have used deceit or lied to get my way"; Cronbach's $\alpha=0.788$).

Altruism and empathy concerns Prosocial constructs related to altruistic lying tendency were measured by two scales. One was the self-report altruism scale (SRA), measuring the desire to help others. Individuals were asked to rate the frequency of their engagement in described behaviors using a four-point Likert scale across 20 items (e.g., "I have done volunteer work for a charity"; Cronbach's $\alpha=0.848$). Another measure was the empathic concern scale (EC) (Davis, 1980). On a five-point Likert scale, individuals reported on seven items about their tendencies of showing care for others' warmth and compassion (e.g., "I am often quite touched by things that I see happen"; Cronbach's $\alpha=0.572$).

Social approval motivation Social approval motivation constructs related to social-acceptance lying tendency were measured by a short form of the Revised Martin-Larsen

Approval Motivation scale (RMLAM) (Martin, 1984). On a five-point Likert scale, individuals reported on five items about their needs or desires for social approval (e.g., “I am willing to argue only if I know that my friends will back me up”); Cronbach’s $\alpha = 0.683$).

Data analysis

EFA, using maximum likelihood (ML) with GEOMIN oblique rotation, was conducted to explore the underlying domains in the newly developed *LYin* Lying Tendency Scale to determine the appropriate number of factors to retain. Then CFA was utilized to further examine the hypothesized domains in EFA. A single-factor model with all items loading on one latent factor was fit as a baseline comparison. The measurement invariance analyses were examined by configural invariance, metric invariance, scalar invariance, and variance–covariance invariance. The analyses were conducted with Mplus 8.4. To further assess the construct validity of the *LYin* LTS, correlation analyses between LTS and its related concepts (Machiavellism, Altruism and empathy concerns, and Social approval motivation) were assessed in SPSS 26.0.

Study 1a. Results

Internal reliability for the scales were as follows: selfish lying tendency: 0.85, altruistic lying tendency: 0.79, social-acceptance lying tendency: 0.89; total: 0.85. The mean scores fell in the range between 2.15 and 5.07. Skewness and kurtosis ranged from -0.61 to 1.45 and -0.86 to 2.01, indicating good normality.

Exploratory factor analysis

The Kaiser-Meyer Olkin (KMO) index was 0.850 (> 0.80) and Bartlett’s test of sphericity was significant ($p < 0.001$), indicating items are appropriate for principal component analysis. The EFA extracted three factors, which eigenvalue exceeded 1, with a total variance explained of 63.279%. The model comparison showed that the three-factor model fit the data significantly better than the two-factor model ($\chi^2 = 221.336$, $df = 13$, $p < 0.001$), and the four-factor model showed no convergence. The interpretability of the resultant factors was good. All items were properly loaded on the factor (> 0.3 ; Table 2) they were originally designed to represent. Overall, the three-factor model was the optimal model, which had good fit indices ($CFI = 0.943$, $TLI = 0.905$, $RMSEA = 0.079$, $SRMR = 0.034$). Consistent with our hypothesized goals, factors 1 to 3 represented

selfish, altruistic, and social-acceptance lying tendencies, respectively.

Confirmatory factor analysis

The three-factor model of *LYin* LTS was tested by using CFA. Results of CFA showed that the single-factor model had poor model-data fit ($CFI = 0.54$, $TLI = 0.46$, $RMSEA = 0.19$, $SRMR = 0.16$; Table S1). The hypothesized three-factor model demonstrated good model-data fit ($CFI = 0.93$, $TLI = 0.92$, $RMSEA = 0.08$, and $SRMR = 0.05$). By allowing LTS item intercorrelation (see Supplementary Material), the model resulted in a slightly improved model-data fit ($CFI = 0.97$, $TLI = 0.96$, $RMSEA = 0.05$, and $SRMR = 0.05$). For ease of interpretation, we only focused on the three-factor model without correlations between residual variances in the following analyses. Measurement invariance results are reported in Supplementary Material (Table S2, Table S3).

Table 2 Factor loadings of the finalized three-factor model of *LYin* LTS (Study 1)

	F1	F2	F3
1. I will provoke others with lies to make myself feel better	0.480*		
2. I will achieve my goals with lies which cause losses to others	0.491*		
3. To ease my burden, I will lie to shift the responsibility to others	0.718*		
4. I will make excuses for my mistakes so that others get punished instead of me	0.776*		
5. To feel superior, I will tell lies to hurt others	0.684*		
6. I will lie to protect others’ interests at the price of sacrificing mine		0.647*	
7. I will lie and pay the price in order to help those in need		0.688*	
8. I will pretend to be fine in order to assure others, although doing so makes my situation even worse		0.844*	
9. I will hide the truth and suffer alone to make others feel better		0.868*	
10. To make others feel less guilty, I will lie to comfort others and bear the negative consequences myself		0.839*	
11. To blend in with other people, I will lie about being interested in the topic they are discussing			0.621*
12. To get along with peers, I will speak against my conscience			0.816*
13. I will lie about conforming with other people’s opinion in order to blend in			0.761*
14. I will lie about enjoying activities held by peers in order to be accepted			0.800*
15. I will lie about agreeing with peers’ decisions in order to be accepted			0.649*

F1: Factor 1 (selfish lying tendency), F2: Factor 2 (altruistic lying tendency), F3: Factor 3 (social-acceptance lying tendency); Values $< .40$ are omitted. * $p < .05$

Construct validity

Significant positive correlations were found between selfish lying tendency and Machiavellism ($r=0.491, p<0.001$; Table 3); between altruistic lying tendency and self-report altruism ($r=0.206, p=0.001$), and empathic concerns ($r=0.294, p<0.001$); and between social-acceptance lying tendency and approval motivation scores ($r=0.567, p<0.001$). Significant negative correlation was found between selfish lying tendency and empathic concerns ($r=-0.287, p<0.001$). All three variants correlated significantly at some level with corresponding construct validity measures. Selfish lying tendency showed a significant positive correlation with self-report altruism at a low level ($r=0.170, p=0.006$). This association was significantly weaker than the association between selfish lying tendency and Machiavellism ($z=4.17, p<0.001$).

Study 1b. Test-retest reliability

Study 1b was conducted to test the test–retest reliability of the *LYin* LTS, examining if it was stable across time. One hundred and twenty-two participants (62 females, $Mean_{age} \pm SD_{age} = 20.82 \pm 2.2$ y) were recruited to fill out the *LYin* LTS online at two time points (intervals ranging from 23 to 34 days). The correlations between the two time points of the three subscales were from 0.63 to 0.75 ($ps < 0.001$; Table S4), suggesting satisfactory test–retest reliability. There were no significant differences observed between the means at the two time points (Table S5; $ps \geq 0.18$).

Study 2: Moral identity, honest personality, and impression management

Study 1 examined the structural validity and test–retest reliability of the *LYin* LTS. Additionally, Study 1 tested several constructs that are associated with the selfish, altruistic, and belonging needs represented by three types of lies. To further test its construct validity, convergent validity, and discriminant validity, Study 2 measured the moral identity and honest personality. We expected that altruistic and social-acceptance lying tendencies were related to the moral identity of helpfulness and gregariousness respectively. In addition, the moral identity of honesty and the HEXACO Honesty personality were measured to test the convergent validity of the *LYin* LTS. Last, participants' impression management was also measured and used in discriminant validity testing.

Method

Participants

The sample consisted of 334 participants (164 females). The mean age of participants was 22.57 years ($SD=4.11$). They first filled out the *LYin* LTS, then completed the Moral Identity test and HEXACO personality scale, and finally reported demographic information.

Measures

Construct validity

Self identity Constructs related to self-identities of helping others and social integration were measured by a revised version of the moral identity test (Aquino & Americus Reed, 2002). Symbolized self identity represents the degree to which the listed traits are reflected in the actions in the world, while internalized identity represents the degree to which the traits are central to the self-concept. The identity scale was revised, with 9 traits from the original version replaced by the words “honesty”, “willingness to help”, and “gregariousness”, separately, aiming at distinct types of self-identity. Participants reported how well each of the statements described them (e.g., “I strongly desire to have the honest characteristic.”) on five-point Likert scales ranging from 1 (not true of me) to 5 (completely true of me; Cronbach's α were 0.742, 0.752 and 0.838 respectively). The self-identities of willingness to help and gregariousness were served in the construct validity testing. And the moral identity of honesty was used in the convergent validity testing.

Convergent validity

HEXACO_Honesty-Humility The Honesty-Humility subscale of the HEXACO-60 personality scale captures individuals' honesty traits (Ashton & Lee, 2009). On a five-point Likert scale (1 = strongly disagree, 5 = strongly agree), participants reported on statements (e.g., “I wouldn't pretend to like someone just to get that person to do favors for me”; Cronbach's $\alpha = 0.724$).

Discriminant validity

Impression management Impression management may distort self-report measures (Sassenrath, 2019). Thus, the socially desirable responding tendency was measured by the impression management subscale from the Balanced Inventory of Desirable Responding (BIDR) scale (Paulhus,

Table 3 Correlation results in all 6 studies

	(1)	(2)	(3)	(4)	(5)	(6)
Study 1a (N=263)						
<i>Liyin</i> LTS: Selfish lying tendency (1)	.065					
<i>Liyin</i> LTS: Altruistic lying tendency (2)	.191**	.483***				
<i>Liyin</i> LTS: Social-acceptance lying tendency (3)	.491***	.081	.224***			
Machiavellism (4)	.170**	.206**	.074	.044		
Self-report altruism (5)	-.287***	.294***	.086	-.164**	.140*	
Empathy concern (6)	.067	.332***	.567***	.127*	.008	.166**
Approval Motivation (7)						
Study 2 (N=334)						
(1) Bivariate corr.		(2) Bivariate corr.	(3) Bivariate corr.	(4) Bivariate corr.	(5) Bivariate corr.	(6) Bivariate corr.
(1) Bivariate corr.		(2) Bivariate corr.	Partial corr.†	Partial corr.†	Partial corr.†	Partial corr.†
<i>Liyin</i> LTS: Selfish lying tendency (1)	.224***	.097				
<i>Liyin</i> LTS: Altruistic lying tendency (2)	.523***	.369***	.416***			
<i>Liyin</i> LTS: Social-acceptance lying tendency (3)	-.532***	-.404***	.167**	-.240***	-.059	
Internalized honesty (4)	-.007	.132**	.178**	.185**		
Symbolized honesty (5)	-.525***	-.376***	.218**	.753***	.173**	
Internalized willingness to help (6)	-.076	.202***	.280**	.195***	.757***	.279***
Symbolized willingness to help (7)	-.312***	-.291***	.279***	.362***	.240***	.394***
Internalized gregariousness (8)	.082	.346***	.356***	.0691	.521***	.088
Symbolized gregariousness (9)	-.472***	-.167**	-.013	.429***	.090	.410***
HEXACO: Honesty-Humility (10)	-.531***	-.272***	-.463***	.415***	.217***	.223***
BIDR_IM (11)	(1) Bivariate corr.	(2) Bivariate corr.	(3) Bivariate corr.	(4) Bivariate corr.	(5) Bivariate corr.	(6) Bivariate corr.
Study 3 (N=284)						
(1) Bivariate corr.		(2) Bivariate corr.	Partial corr.†	Partial corr.†	Partial corr.†	Partial corr.†
<i>Liyin</i> LTS: Selfish lying tendency (1)		-.016	.127*	.223***	.454***	.575***
(1) Bivariate corr.		(2) Bivariate corr.	Partial corr.†	Partial corr.†	Partial corr.†	Partial corr.†
<i>Liyin</i> LTS: Selfish lying tendency (1)						

Table 3 (continued)

<i>LYin</i> LTS: Altruistic lying tendency (2)	.152[*]																									
<i>LYin</i> LTS: Social-acceptance lying tendency (3)	.386^{***}	.546^{***}																								
Egocentric selfishness (4)	.432^{***}	-.014	.248^{**}	.127[*]																						
Adaptive selfishness (5)	.419^{***}	.170^{**}	.404^{***}	.305^{***}	.747^{***}																					
Pathological selfishness (6)	.521^{***}	.099	.396^{***}	.293^{***}	.775^{***}	.785^{***}																				
MFQ_Harm (7)	-.252^{***}	.196^{**}	.215^{***}	.176^{**}	-.248^{***}	-.093	-.151[*]																			
Need to belong (8)	-.129[*]	.189^{**}	.200^{**}	.280^{***}	-.171^{**}	-.035	-.056	.412^{***}																		
Relational lying (9)	.361^{***}	.322^{***}	.324^{***}	.483^{***}	.403^{***}	.540^{***}	.534^{***}	.080	.015																	
Antisocial lying (10)	.669^{***}	.039	.285^{***}	.202^{**}	.543^{***}	.491^{***}	.625^{***}	-.088	-.154^{**}	.547^{***}																
Social desirability (11)	-.364^{***}	-.060	-.292^{***}		-.482^{***}	-.542^{***}	-.562^{***}	.220^{***}	.138[*]	-.382^{***}	-.357^{***}															
Study 4 (N=126) Selfish lying tendency (1)																										
Altruistic lying tendency (2)	.180[*]																									
Social-acceptance lying tendency (3)	.424^{***}	.384^{***}																								
self-gaining (4)	.299^{**}	-.031	.158																							
other-gaining (5)	.052	.274^{**}	.104																							
Study 5a (N=313) <i>LYin</i> LTS: Selfish lying tendency (1)																										
<i>LYin</i> LTS: Altruistic lying tendency (2)	.409^{***}																									
<i>LYin</i> LTS: Social-acceptance lying tendency (3)	.592^{***}	.681^{***}																								
Selfish lying likelihood (4)	.591^{***}	.213^{***}	.381^{***}																							
Altruistic lying likelihood (5)	.121[*]	.346^{***}	.191^{**}	.214^{***}																						
Social-acceptance lying likelihood (6)	.299^{***}	.429^{***}	.451^{***}	.393^{***}	.491^{***}																					
Study 5b (N=402) Bivariate corr.	(1)	Bivariate corr.	(2)	Bivariate corr.	(3)	Bivariate corr.	(4)	Bivariate corr.	(5)	Bivariate corr.	(6)	Bivariate corr.	(7)	Partial corr.+												
Partial corr.+ Bivariate corr.																										

Table 3 (continued)

	(1)	(2)	(3)	(4)	(5)
Study 6 (N=282)					
<i>LYin</i> LTS: Selfish lying tendency (1)					
<i>LYin</i> LTS: Altruistic lying tendency (2)	.392***				
<i>LYin</i> LTS: Social-acceptance lying tendency (3)	.666***	.511***			
Selfish lying judgment (4)	.407***	.195**	.352***		
Altruistic lying judgment (5)	-.152*	.212***	.020	.032	
Social-acceptance lying judgment (6)	.212***	.183**	.450***	.296***	.258***

* $p < .05$, ** $p < .01$, *** $p < .001$. *BIDR_IM*: the impression management subscale from the Balanced Inventory of Desirable Responding scale.[#]: controlling for *BIDR_IM*; +: controlling for social desirability

1984). Participants judged how much they agreed with the statements (e.g., “My first impression of people usually turns out to be right.”) ranging from 1 (not true of me) to 7 (completely true of me) (Cronbach’s $\alpha = 0.759$).

Results

Factor analysis of self-report scales used in Study 2 showed 33.07% of the variance accounted for by one general factor.

Construct validity

Bivariate correlations are shown in Table 3. Internalized willingness to help showed positive correlations with altruistic lying tendency after controlling for impression management ($r = 0.218$, $p < 0.001$), but no significant correlations with social-acceptance lying tendency ($r = 0.018$, $p = 0.737$). Internalized gregariousness positively correlated with both altruistic ($r = 0.279$, $p < 0.001$) and social-acceptance lying tendencies ($r = 0.167$, $p = 0.002$). Based on the above results, the altruistic and social-acceptance lying tendency subscales of the *LYin* LTS correlated significantly at some level with corresponding construct validity measures in the expected manner. Besides, the selfish lying tendency was negatively correlated with both internalized gregariousness and willingness to help.

Convergent validity and discriminant validity

Here, we tested whether the *LYin* LTS would correlate with impression management at a relatively low level. The results showed that the correlations among them were medium to high ($r = -0.272$ to -0.531). To test the extent to which the *LYin* LTS provided increased knowledge on honesty personality and moral identity of honesty over impression management, we conducted linear regression analyses. The results showed that a modest significant extra-contribution of the *LYin* LTS was obtained after controlling for impression management in the prediction of honesty personality (R^2 change = 0.081, $p < 0.001$; Table 4), internalized honesty (R^2 change = 0.343, $p < 0.001$), and symbolized honesty (R^2 change = 0.135, $p < 0.001$).

Study 3: Need to belong, moral foundation, selfishness, social desirability, and lying in everyday situation

Study 2 confirmed the construct, convergent, and discriminant validity from the viewpoint of personality and moral identity. However, the *LYin* LTS captures the characteristics

Table 4 Linear regression results in Studies 2–6

Studies	Dependent variables	BIDR_IM (Study 2) or SDR (Study 3, 5b)	HEXACO: Honesty- Humility (Study 5b) or LiES (Study 5c)		LYin LTS			R^2 (c: R^2 change)
					Selfish lying tendency	Altruistic lying tendency	Social- acceptance lying	
Study 2	Honesty-Humility	.575***						.330***
		.404***			-.138*	.106*	-.272***	.081***c
	Internalized honesty	.415***						.172***
Study 3	Symbolized honesty	.229***			-.461***	.192***	-.015	.343***c
		.217***						.047***
	Antisocial lying	.319***			.184*	.306**	-.170*	.135***c
Study 4	Relational lying	-.357***			.633***	-.072	.001	.127***
		-.131**						.340***c
	Self-gaining	-.382***			.090	.083	.384***	.209***c
Study 5a	Other-gaining	-.232***			.286**	-.114	.080	.102**
	Moral decisions				.003	.274**	-.002	.075*
Study 5b	Selfish lying likelihood				.564***	-.093	.111	.355***
	Altruistic lying likelihood				.009	.404***	-.09	.124***
	Social-acceptance lying likelihood				.048	.226**	.269**	.232***
Study 5c	Selfish lying likelihood	-.212***						.045***
		.027	-.605***					.308***c
		.032	-.294***		.442***	-.050	.157***	.174***c
Study 5c	Altruistic lying likelihood	.293***						.086***
		.221***	.181***					.028***c
		.211***	.217***		-.020	.345***	.023	.124***c
Study 5c	Social-acceptance lying likelihood	-.147**						.022**
		-.029	-.297***					.074***c
		.052	.027		.083	-.042	.656***	.328***c
Study 5c	Selfish lying likelihood	-.318***						.101***
		-.090	.185**	.455***				.262***c
		-.063	.022	.108	.478***	.101	.091	.110***c
Study 5c	Altruistic lying likelihood	.156**						.024**
		.251***	.321***	-.165**				.075***c
		.113*	-.035	-.004	-.171*	.520***	.038	.198***c
Study 5c	Social-acceptance lying likelihood	-.236***						.056***
		.038	.516***	.124**				.262***c
		.008	.036	.019	.067	.065	.654***	.263***c
Study 5c	Weekly lying frequency	-.361***						.130***
		-.193**	.169**	.287***				.125***c
		-.162**	.043	.227**	.014	.188**	.377***	.056***c
Study 5c	Altruistic lying	-.011						<.001
		.151*	.305***	.072				.091***c
		.085	.159	.198*	-.152	.218**	.021	.040***c
Study 5c	Social-acceptance lying	-.309***						.095***
		-.133*	.282***	.148**				.107***c
Study 5c		-.138*	.082	.201*	-.139	-.108	.427***	.070***c

Table 4 (continued)

Studies	Dependent variables		BIDR_IM (Study 2) or SDR (Study 3, 5b)	HEXACO: Honesty- Humility (Study 5b) or LiES (Study 5c)	LYin LTS			R^2 (c: R^2 change)
					Selfish lying tendency	Altruistic lying tendency	Social- acceptance lying	
Study 6	Moral speculations	Selfish lying judgment			.309***	-.002	.147	.177***
		Altruistic lying judgment			-.325***	.295***	.086	.144***
		Social-acceptance lying judgment			-.153*	-.052	.578***	.218***

Values represent standardized regression coefficients. *BIDR_IM*: the impression management subscale from the Balanced Inventory of Desirable Responding scale. *SDR*: social desirability. * $p < .05$, ** $p < .01$, *** $p < .001$

of behavioral tendencies. To match this nature, Study 3 used a scale that could capture daily lies (the Lying in Everyday Situations scale) to further demonstrate the convergent validity of the *LYin LTS*. Besides, Study 3 measured the need to belong, moral foundation, and selfishness to provide additional tests of the construct validity. Last, participants' social desirability was measured and used to test discriminant validity.

Methods

Participants and procedures

Two hundred and eighty-four participants (130 females, age = 23.37 ± 5.07 y) were recruited online. They first filled out the *LYin LTS*, then completed the Need to Belong Scale, Moral Foundation Questionnaire, Selfishness Questionnaire, Marlowe-Crowne social desirability scale, and Lying in Everyday Situations (LiES) scale and finally reported demographic information.

Measures

Construct validity

Selfishness Participants with high selfish lying tendencies would be expected to have a high level of selfishness. Construct related to selfishness was assessed by the Selfishness Questionnaire with three subtypes: pathological, egocentric, and adaptive (Raine & Uh, 2019). Pathological selfishness emphasized antisocial behaviors driven by self-advancement (Cronbach's $\alpha = 0.811$), egocentric selfishness stressed the strength of focusing on oneself (Cronbach's $\alpha = 0.780$), and

adaptive selfishness was defined as a “softer” form of selfish behavior with an eye on others (Cronbach's $\alpha = 0.815$).

Moral Foundation_Harm Construct related to the motivation to care for the pain of others and to protect others from harm was assessed by the Care/Harm subscale in the Moral Foundation Questionnaire (Graham et al., 2011). Each item (e.g., “Whether or not someone suffered emotionally”; Cronbach's $\alpha = 0.616$) was answered on a five-point Likert scale.

Need to belong Participants with high social-acceptance lying tendencies would be expected to have a high level of belonging needs. The related construct was assessed by the Need to Belong Scale (Leary et al., 2013). Items like “I try hard not to do things that will make other people avoid or reject me” on a five-point scale measured the desire to be accepted and to belong to social groups (Cronbach's $\alpha = 0.671$).

Convergent validity

Relational and antisocial lying tendency The convergent validity was tested in Study 3 by measuring the relational lying tendency in the relational lying subscale (“avoiding relational conflict by concealing misdeeds or lying when sharing the truth would lead to conflict”) and antisocial lying tendency in the antisocial lying subscale (“lying to harm others or lying in a vindictive manner”) of the Lying in Everyday Situations scale (Hart et al., 2019). Participants were asked to respond to the items (antisocial lying: e.g., “I lie to punish people”, Cronbach's $\alpha = 0.908$; relational lying: e.g., “I lie to escape conflicts or disagreements with

other people”, Cronbach’s $\alpha=0.876$) on a seven-point scale ranging from 1 (strongly disagree) to 7 (strongly agree).

Discriminant validity

Socially desirable responding tendency The socially desirable responding tendency was measured by the Marlowe-Crowne social desirability scale (Strahan & Gerbasi, 1972). Dichotomous choices on 10 items (e.g., “I never resent being asked to return a favor”; Cronbach’s $\alpha=0.707$) were calculated.

Results

Construct validity

Selfish and social-acceptance lying tendencies of the *LYin* LTS were both positively correlated with three types of selfishness (egocentric, adaptive, and pathological; Table 3), while altruistic lying tendency was positively correlated with adaptive selfishness, not with egocentric selfishness and pathological selfishness.

The scores on the harm subscale of moral foundation, which underlay the virtue of kindness, showed a negative correlation with the selfish lying tendency ($r=-0.189$, $p=0.001$), a positive correlation with altruistic ($r=0.215$, $p<0.001$) and social-acceptance lying tendency ($r=0.176$, $p=0.003$) after controlling for social desirability.

Consistent with the hypotheses, the need to belong significantly correlated with social-acceptance lying tendency (not controlling for social desirability: $r=0.225$, $p<0.001$; controlling for social desirability: $r=0.280$, $p<0.001$). Selfish lying tendency showed significant negative correlations with the need to belong ($r=-0.129$, $p=0.030$) but the correlation was not significant after controlling for social desirability ($r=-0.085$, $p=0.151$).

Convergent and discriminant validity

As expected, relational lying had significant positive correlations with all three subscales of the *LYin* LTS ($ps<0.001$), while antisocial lying positively correlated with the selfish lying tendency ($r=0.669$, $p<0.001$) as well as social-acceptance lying tendency ($r=0.285$, $p<0.001$), not with the altruistic lying tendency ($r=0.039$, $p=0.513$).

We tested whether the *LYin* LTS would be correlated with social desirability at a relatively low level as we did in Study 2. The results showed that the correlation coefficients among them were from -0.060 to -0.364 . Similar to Study 2, to test the extent to which the *LYin* LTS provided increased knowledge on antisocial and relational lying tendencies

over impression management, we conducted linear regression analyses. Results showed that in addition to social desirability, selfish lying tendency significantly predicted antisocial lying and the *LYin* LTS provided an R^2 change of 0.340. Social-acceptance lying tendency significantly predicted relational lying and the *LYin* LTS provided an R^2 change of 0.209.

Study 4: Revised sender-receiver game

Despite that Study 3 showed selfish and social-acceptance lying tendencies predicted antisocial and relational lying in everyday situations, the Lying in Everyday Situations scale (Hart et al., 2019) is still a self-report scale and cannot capture actual dishonest decisions. Study 4 adopted a lying game to assess the criterion validity of the *LYin* LTS. The original version of the sender-receiver game could identify one’s lying extent by providing an opportunity to lie to a counterpart and increase one’s payoff (Gneezy, 2005). However, it was not designed to provide prosocial contexts where one could lie to benefit others. A modified version (Yin & Weber, 2016; Yin et al., 2017) was applied and tested whether self-concerning and other-concerning extent in a lying game (i.e., the self-gaining and other-gaining in the game) relate to selfish and altruistic lying tendencies of the *LYin* LTS respectively.

Methods

Participants and procedures

We invited 126 participants (74 females) online, with a mean age of 21.82 years ($SD=3.70$) and 83 (65.87%) of them holding a bachelor’s degree. We checked that all participants correctly comprehended the game’s rules and passed the attention check. Each participant completed the sender-receiver game and the LTS online.

Revised sender-receiver game

We revised the design of the sender-receiver game (Gneezy, 2005) to provide both pro-self and pro-other contexts where participants could decide to lie for their own or others’ benefit and rule out potential confounding factors about sophisticated deception (Volz et al., 2015). The game consisted of pro-self and pro-other conditions, with 10 trials in each condition that were presented in random orders (see Supplementary Material for details). To evaluate an individual’s pro-self and pro-other extent in the lying context, we calculated the ratio of the sender’s profit to the total payoff of

both players across 10 trials in the pro-self condition (i.e., self-gaining) and the ratio of the receiver's profit to the total payoff of both players across 10 trials in the pro-other condition (i.e., other-gaining). Correlations between self-/other-gaining and selfish/altruistic lying tendencies in LTS were calculated.

Results

Criterion validity

In the pro-self condition, senders gained significantly more profits than receivers ($t(125)=9.66$, $p<0.001$, Cohen's $d=1.63$). Whereas, senders gained significantly less than receivers in the pro-other condition ($t(125)=-7.19$, $p<0.001$, Cohen's $d=1.09$). Self-gaining correlated with the *LYin* LTS selfish lying tendency ($r=0.299$, $p=0.001$; Table 3), and other-gaining positively correlated with the *LYin* LTS altruistic lying tendency ($r=0.274$, $p=0.002$). The correlations between self-gaining and the *LYin* LTS altruistic lying tendency ($r=-0.031$, $p=0.727$), and between other-gaining and the *LYin* LTS selfish lying tendency ($r=0.052$, $p=0.567$) were not significant.

Study 5. Moral decision-making in hypothetical daily-life contexts

Study 4 adopted a lying game that could only reveal participants' self-concerning and other-concerning extent, which cannot offer lying opportunities for social acceptance. In Study 5, we generated three types of daily-life scenarios where participants were asked to choose the likelihood of lying.

Study 5a: Criterion validity testing

Methods

Participants and procedures

Three hundred and thirteen participants (169 females; age = 22.88 ± 4.02 y) were recruited to complete the task online. They first filled out the *LYin* LTS, then completed 12 imaginary scenarios, and finally reported demographic information. There were three types of condition (i.e., selfish lying, altruistic lying, and social-acceptance lying),

each with 4 different scenarios (Supplementary Material). The scenarios described contexts where participants could choose to lie for one's benefit, for the sake of others, and for conforming to a group. Participants rated their likelihood of making dishonest decisions on a seven-point scale (1: very unlikely, 4: neutral, 7: very likely).

Results

The differences in lying likelihood scores among the three conditions were significant ($F(2, 936)=42.316$, $p<0.001$). Post hoc analyses showed significant differences between every pair of conditions ($ps<0.001$; selfish lying: 3.939 ± 1.381 ; altruistic lying: 4.835 ± 1.092 ; social-acceptance lying: 4.451 ± 1.178).

Criterion validity

The highest positive correlations between the LTS subscales and lying likelihood scores in three conditions presented in the corresponding dyads (selfish lying: $r=0.591$, $p<0.001$; altruistic lying: $r=0.346$, $p<0.001$; social-acceptance lying: $r=0.451$, $p<0.001$; Table 3) and they were significantly higher than other non-corresponding correlation coefficients ($ps \leq 0.037$), except for no significant differences between the correlations of social-acceptance lying likelihood-altruistic lying tendency ($r=0.429$, $p<0.001$) and social-acceptance lying likelihood-social-acceptance lying tendency ($r=0.451$, $p<0.001$; $p=0.734$). Furthermore, the result of the linear regression showed that selfish and altruistic lying tendencies positively predicted selfish and altruistic lying likelihood respectively (selfish lying: $\beta=0.564$, $p<0.001$; altruistic lying: $\beta=0.404$, $p<0.001$; Table 4). Both altruistic and social-acceptance lying tendencies positively predicted social-acceptance lying likelihood (altruistic lying: $\beta=0.226$, $p<0.01$; social-acceptance lying: $\beta=0.269$, $p<0.01$).

Study 5b: Incremental validity testing

Study 5a supported that the *LYin* LTS could predict corresponding moral decisions satisfactorily. However, Study 5a did not measure social desirability. To check if the *LYin* LTS could contribute to the prediction of moral decisions in addition to social desirability and honesty traits, Study 5b was conducted similarly to the procedure of Study 5a except that social desirability and honesty traits were assessed as well.

Methods

Four hundred and two participants (175 females; age = 22.86 ± 3.59 y) were recruited to complete the task online. They first filled out the *LYin* LTS, completed 12 imaginary scenarios, filled out the Marlowe-Crowne social desirability scale (Cronbach's $\alpha = 0.684$) and Honesty-Humility subscale of the HEXACO-60 personality scale (Cronbach's $\alpha = 0.712$), and finally reported demographic information. The scenarios used in Study 5b were the same as those in Study 5a.

Results

Incremental validity

The corresponding dyads between the *LYin* LTS subscales and lying likelihood scores in three conditions had significantly strong positive correlations (selfish lying: $r = 0.650$, $p < 0.001$; altruistic lying: $r = 0.348$, $p < 0.001$; social-acceptance lying: $r = 0.637$, $p < 0.001$; Table 3) after controlling for social desirability. Furthermore, linear regressions result showed that in addition to social desirability and honesty traits, selfish, altruistic, and social-acceptance lying tendencies positively predicted selfish, altruistic, and social-acceptance lying likelihood respectively (selfish lying: $\beta = 0.442$, $p < 0.001$; altruistic lying: $\beta = 0.345$, $p < 0.001$; social-acceptance lying: $\beta = 0.656$, $p < 0.01$; Table 4). In the prediction of selfish, altruistic, and social-acceptance lying likelihood, the *LYin* LTS provided additional R^2 changes of 0.174, 0.124, and 0.328, respectively. These results showed that the *LYin* LTS has satisfactory incremental validity.

Study 5c: Incremental validity testing

Study 5c ran through a similar procedure as Study 5b, except for using the LiES to test the incremental validity and additionally measuring self-report lying frequency.

Methods

Thirty hundred and seventeen participants (133 females; age = 22.52 ± 3.23 y) completed the online questionnaire, including the *LYin* LTS, 12 imaginary scenarios, the LiES (Cronbach's $\alpha = 0.901$), weekly lying frequency, the Marlowe-Crowne social desirability scale (Cronbach's $\alpha = 0.621$), and demographic information in sequence. The 12 imaginary scenarios were the same as those in Study 5a and 5b.

The weekly lying frequency was measured by asking participants to disclose how many times they lied per week out of three primary motivations: protecting their interests and emotions (selfish lying frequency), safeguarding others' interests and emotions (altruistic lying frequency), and integrating into a collective or seeking acceptance from a group (social-acceptance lying frequency) on a seven-point scale (0, 1–4, 5–10, 11–16, 17–21, 22–35, over 35 times).

Results

Incremental validity

The *LYin* LTS subscales showed significantly strong positive correlations with lying likelihood scores in three conditions (selfish lying: $r = 0.612$, $p < 0.001$; altruistic lying: $r = 0.504$, $p < 0.001$; social-acceptance lying: $r = 0.740$, $p < 0.001$; Table 3) and lying frequency per week scores as well (selfish lying: $r = 0.322$, $p < 0.001$; altruistic lying: $r = 0.310$, $p < 0.001$; social-acceptance lying: $r = 0.409$, $p < 0.001$; Table 3) after controlling for social desirability. Moreover, linear regressions showed that in addition to social desirability and LiES, the subscales of the *LYin* LTS positively predicted lying likelihood correspondingly (selfish lying: $\beta = 0.478$, $p < 0.001$; altruistic lying: $\beta = 0.520$, $p < 0.001$; social-acceptance lying: $\beta = 0.654$, $p < 0.001$; Table 4) and lying frequency per week in altruistic lying ($\beta = 0.218$, $p < 0.01$) and social-acceptance lying ($\beta = 0.427$, $p < 0.001$), except for the selfish lying ($\beta = 0.014$, $p = 0.865$). In the prediction of selfish, altruistic, and social-acceptance lying likelihood, the *LYin* LTS provided significant additional R^2 changes of 0.110, 0.198, and 0.263 ($ps < 0.001$), respectively. In the prediction of weekly lying frequency, the *LYin* LTS provided significant additional R^2 changes of 0.056, 0.040, and 0.070 ($ps < 0.001$).

Study 6. Moral speculation in hypothetical daily-life contexts

Study 5 provided the first-perspective decisions related to three types of lying tendencies captured in the *LYin* LTS. In Study 6, we framed the scenario and questions from a third-party perspective to check if the tendency to speculate others telling different lies is associated with one's lying tendencies. Participants were asked to guess what the main characters in the scenarios would choose between truth-telling and lying. We expected to observe that participants with higher *LYin* LTS scores would speculate others to make more dishonest decisions correspondingly.

Methods

Participants and procedures

Two hundred and eighty-two participants (92 females; age = 23.81 ± 5.21 y) completed the task online. They first filled out the *LYin* LTS, then read and responded to the lying scenarios (Supplementary Material), reported their impression of characters, and provided demographic information. There were three types of condition (i.e., selfish lying, altruistic lying, and social-acceptance lying), each with five daily-life scenarios. For each type of condition, there was one main character who was faced with truth-telling and lying options. Participants read the scenarios and speculated whether the main character would lie or not.

Results

The differences in lying judgments among the three conditions were significant ($F(2,843) = 73.099$, $p < 0.001$). Post hoc analyses showed significant differences between every pair of conditions ($ps < 0.001$; selfish lying: 1.436 ± 1.306 ; altruistic lying condition: 2.926 ± 1.541 ; social-acceptance lying: 2.032 ± 1.556).

Criterion validity

The highest correlations between the *LYin* LTS subscales and lying judgments in three conditions presented in the corresponding dyads (Table 3) and they were significantly higher than other non-corresponding correlation coefficients ($ps \leq 0.021$) except for no significant differences between the correlations of selfish lying judgment-selfish lying tendency ($r = 0.407$, $p < 0.001$) and selfish lying judgment-social-acceptance lying tendency ($r = 0.352$, $p < 0.001$; $p = 0.448$). Results of linear regression showed that selfish lying tendency positively predicted selfish lying judgment ($\beta = 0.309$, $p < 0.001$; Table 4). Altruistic lying tendency positively ($\beta = 0.295$, $p < 0.001$) and selfish lying tendency negatively ($\beta = -0.325$, $p < 0.001$) predicted altruistic lying judgment. Social-acceptance lying tendency positively ($\beta = 0.578$, $p < 0.001$) and selfish lying tendency negatively ($\beta = -0.153$, $p < 0.001$) predicted social-acceptance lying judgment.

Discussion

The current study developed and validated a self-report 15-item scale, the *LYin* Lying Tendency Scale, for assessing behavioral tendencies in telling selfish lies, altruistic lies,

and social-acceptance lies. Overall, our results provided evidence of construct validity, convergent validity, discriminant validity, and criterion validity of the newly developed lying tendencies scale. Our findings supported that the newly developed *LYin* Lying Tendency Scale was a psychometrically sound measurement tool for lying tendencies.

Intercorrelations among three subscales of the Lying Tendency Scale

Our Study showed that the three lying tendencies were distinguishable but intercorrelated. Concerning the intercorrelations among three subscales of the *LYin* Lying Tendency Scale, the selfish lying tendency showed weak to moderate correlations with the altruistic lying tendency, while both selfish lying tendency and altruistic lying tendency showed moderate to strong correlations with the social-acceptance lying tendency. First, the relation between selfish and altruistic lying tendencies may be caused by individuals' differences in motives for telling lies and reflections of some other personality traits besides honesty. Evidences from neural research revealed that selfish lies increased as dishonest gains increased (Yin & Weber, 2019; Yin et al., 2017). Crucially, changes in functional connectivity between brain regions related to reward processing and self-referential processing are indicative of variations in honesty levels among both adults and children (Yin et al., 2021), implying a strong association between selfish lies and self-interest. On the contrary, altruistic lies are told to benefit the deceived psychologically or financially at the expense of the deceiver's benefit, rising from concerns for another's welfare (Erat & Gneezy, 2012). Altruistic and selfish motives for lying modulate lying aversion and behaviors (Cartwright et al., 2021). An altruistic goal of benefiting a charity increases lying behaviors and reduces the lying activity in the aversion-associated anterior insula compared with the self-serving goal of benefiting oneself (Yin et al., 2017). Therefore, individuals' variations in honesty, self-centeredness, and other-regarding characters would lead to higher variations in selfish and altruistic lying tendencies, resulting in weak to moderate correlations in observed samples.

Second, focusing on social-acceptance lies, given that social-acceptance lies are usually for the sake of harmonious interpersonal relationships and group cohesion, the tendency of social-acceptance lies was positively correlated with both selfish and altruistic lies. Ingroup favoritism is partly motivated by a consideration for the welfare of ingroup members (Everett et al., 2015), while it is also driven by the fulfillment of inner needs such as approval from others and protection of self-concept (Turner & Reynolds, 2001). Our findings are consistent with suggestions

from previous theories and findings that suggest the pro-self and pro-other nature of social-acceptance lies.

Social desirability

We applied two different measures to test social desirability. Results showed moderate to strong negative correlations between selfish lying tendency and social desirability, weak to moderate negative correlations between social-acceptance lying tendency and social desirability, but non-significant to weak correlations between altruistic lying tendency and social desirability. Social desirability is the tendency of presenting themselves in a favorable light, rather than giving the truth. Since the correlations between impression management scores and two other valid measures of honesty (HEXACO Honesty-Humility and Internalized honesty) were also high ($r=0.575$ and 0.415), the self-report measure of (dis)honesty might generally encounter the socially desirable responding problem. A previous study about selfishness showed that selfish individuals might not attempt to hide their socially undesirable characteristics (Raine & Uh, 2019). People who are high in the selfish lying tendency might not be concerned that much about positively managing their image. By conducting the linear regression analyses, besides social desirability, the *LYin* LTS still produced sufficient contributions in the prediction of honesty-associated traits, supporting that the *LYin* LTS still measures the core concept of honesty.

Contributions and implications

The *LYin* Lying Tendency Scale assesses the tendencies of telling three prevalent types of lies: selfish, altruistic, and social-acceptance lies. The approach addresses the limitations of assessing overall dishonesty without distinction. Such categorization offers insights into the motivations driving various types of lies, enriching our understanding of the complexities of dishonesty. Selfish lies, motivated by self-interest, are associated with theoretical constructs like Machiavellianism and selfishness. Altruistic lies, associated with prosocial behaviors, exhibit diverse patterns depending on the perceived benefits to others and potential harm to oneself. By assessing altruistic lying tendencies, the *LYin* LTS Scale offers insights into the nuanced interplay between prosocial motivations and deceptive behaviors, contributing to our understanding of the moral complexities regarding altruism. Social-acceptance lies, linked to group dynamics, involve dual motives of self-preservation and social cohesion, highlighting their multifaceted nature. Despite their prevalence in daily interactions, the lack of a reliable assessment tool for evaluating tendencies toward social-acceptance lying has been a notable gap in the literature. The

inclusion of this dimension in the *LYin* LTS Scale addresses this gap, allowing researchers to explore the dual motives of self-preservation and social bonding inherent in social-acceptance lies. Furthermore, the *LYin* LTS Scale acknowledges that lying behaviors often stem from a combination of self-serving, other-serving, and acceptance-seeking motivations. By measuring these on a unified scale, the *LYin* LTS Scale provides a comprehensive framework for understanding individuals' propensities for lying, rooted in distinct motivations. This holistic approach not only enhances our ability to accurately assess lying tendencies but also offers valuable insights into the moral underpinnings of deception in human behavior.

The study holds several practical implications. In developmental research, applying the *LYin* LTS in longitudinal studies can help find the connections between different types of lying tendencies and crucial developmental indices that are essential to children's moral development and social cognition, such as altruism, selfishness, antisocial behaviors, and peer relations. Considering the simplicity of the scale, it may serve as a valuable tool in numerous studies, especially large-scale research that endeavors to measure lying prevalence and conduct risk factor screening. For neuroimaging studies, the scale offers an alternative conceptual framework and factor structure for assessing dishonesty. Functional magnetic resonance imaging (fMRI) technology allows researchers to investigate individuals' neural patterns during tasks. Commonly used paradigms include tasks where researchers can simultaneously collect individuals' BOLD (blood oxygenation level dependent) signals and corresponding behavioral variables. Currently, fMRI studies on deception tend to use individuals' deceptive decisions in tasks that offer lying opportunities as indicators of their honesty levels (Yin & Weber, 2019; Yin et al., 2017). However, behaviors in a specific context are subject to numerous factors, and a single task may not fully capture an individual's overall dishonesty. Hence, establishing a multidimensional representation system for honesty levels is crucial to facilitate neuroimaging studies to identify dishonesty associated neural mechanisms (Yin et al., 2021). Taken together, the current study supports the validity and utility of the newly developed *LYin* LTS scale as a measure of lying tendencies. Further research along this trajectory can refine the accuracy of measuring lying tendencies, thereby contributing to a deeper understanding of dishonesty.

Limitations

The study bears limitations warranting discussion and further exploration. First, despite our efforts in applying various validation measures, the use of a self-report scale may

introduce response bias, particularly when participants are required to disclose socially undesirable thoughts or acts. While efforts were made to mitigate this bias by administering a measure of social desirability, the potential for unreliable responses remains. To address this issue, future studies could develop a more comprehensive measure incorporating a correction subscale to assess participants' tendencies to fake responses, thereby minimizing potential confounds.

Second, although efforts were made to recruit diverse samples with varied demographic characteristics, the generalizability of the three-factor model of lying tendencies to the entire Chinese population requires further investigation. It's also essential to consider the cultural factors on lying tendencies. Cultural differences in attitudes towards honesty and social norms surrounding deception may influence the validity of lying assessment and the prevalence of different types of lies. Therefore, future studies should explore how cultural context shapes lying behaviors and adapt assessment methods accordingly. It would be also beneficial to gather data from individuals across a spectrum of lying frequencies, including both exceptionally honest individuals and prolific liars (Serota & Levine, 2014).

Third, longitudinal studies could be conducted to investigate the stability of lying tendencies over time and the predictive validity for various life outcomes, such as interpersonal relationships and mental health. Such studies would provide valuable insights into the development and consequences of lying behaviors across the lifespan. Finally, by examining individual differences in lying tendencies and their underlying neural mechanisms, future research can provide a more nuanced understanding of neural signatures associated with heightened susceptibility to deceit or increased propensity for dishonesty.

Conclusions

The study developed the *LYin* Lying Tendency Scale to assess individuals' behavioral tendencies in telling selfish lies, altruistic lies, and social-acceptance lies. Our findings supported that the Scale was a psychometrically sound measurement tool for lying tendencies. The current study contributes to the research field of dishonesty in two ways. Practically, the scale serves as a convenient and valid tool for researchers to measure and understand the individual differences in telling three types of lies. Meanwhile, theoretically, an individual's honesty-associated characteristics are multidimensional in terms of the consideration of honesty as a moral virtue and the application of deception as a strategy to achieve diverse purposes.

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Data availability Data are available at: <https://github.com/YMorality/LTS-Data>.

Declarations

Ethics approval Approval was obtained from the institutional review board of the University. Informed consent to participate and publish was provided by all participants.

Competing interests The authors declare that they have no known conflict of interests.

References

- Aquino, K., & Americus Reed, I. (2002). The self-importance of moral identity. *Journal of Personality and Social Psychology*, 83(6), 1423–1440. <https://doi.org/10.1037//0022-3514.83.6.1423>
- Ashton, M. C., & Lee, K. (2009). The HEXACO–60: A short measure of the major dimensions of personality. *Journal of Personality Assessment*, 91(4), 340–345. <https://doi.org/10.1080/00223890902935878>
- Baumeister, R. F., & Leary, M. R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117(3), 497–529. <https://doi.org/10.1037/0033-2909.117.3.497>
- Biziou-van-Pol, L., Haenen, J., Novaro, A., OcchipintiLieberman, A., & Capraro, V. (2015). Does telling white lies signal pro-social preferences? *Judgment and Decision Making*, 10(6), 538–548. <https://doi.org/10.2139/ssrn.2617668>
- Cartwright, E., Xue, L., & Brown, C. (2021). Are people willing to tell Pareto white lies? A review and new experimental evidence. *Games*, 12(1), 1–23. <https://doi.org/10.3390/g12010001>
- Chance, Z., Norton, M. I., Gino, F., & Ariely, D. (2011). Temporal view of the costs and benefits of self-deception. *Proceedings of the National Academy of Sciences*, 108, 15655–15659. <https://doi.org/10.1073/pnas.1010658108>
- Cohen, T. R., Gunia, B. C., Kim-Jun, S. Y., & Murnighan, J. K. (2009). Do groups lie more than individuals? Honesty and deception as a function of strategic self-interest. *Journal of Experimental Social Psychology*, 45(6), 1321–1324. <https://doi.org/10.1016/j.jesp.2009.08.007>
- Cohn, A., Maréchal, M. A., Tannenbaum, D., & Zünd, C. L. (2019). Civic honesty around the globe. *Science*, 365(6448), 70–73. <https://doi.org/10.1126/science.aau8712>
- Cui, F., Wu, S., Wu, H., Wang, C., Jiao, C., & Luo, Y. (2017). Altruistic and self-serving goals modulate behavioral and neural responses

- in deception. *Social Cognitive and Affective Neuroscience*, 13(1), 63–71. <https://doi.org/10.1093/scan/nsx138>
- Dai, Z., Galeotti, F., & Villevall, M. C. (2018). Cheating in the lab predicts fraud in the field: An experiment in public transportation. *Management Science*, 64(3), 1081–1100. <https://doi.org/10.1287/mnsc.2016.2616>
- Daiku, Y., Serota, K. B., & Levine, T. R. (2021). A few prolific liars in Japan: Replication and the effects of Dark Triad personality traits. *PLoS ONE*, 16(4), e0249815. <https://doi.org/10.1371/journal.pone.0249815>
- Davis, M. H. (1980). A multidimensional approach to individual differences in empathy. *Journal of Personality & Social Psychology*, 10(85). <https://doi.org/10.4324/9780429493898>
- Effron, D. A., Bryan, C. J., & Murnighan, J. K. (2015). Cheating at the end to avoid regret. *Journal of Personality and Social Psychology*, 109(3), 395. <https://doi.org/10.1037/pspa0000026>
- Ellemers, N., & van Nunspeet, F. (2020). Neuroscience and the social origins of moral behavior: How neural underpinnings of social categorization and conformity affect everyday moral and immoral behavior. *Current Directions in Psychological Science*, 29(5), 513–520. <https://doi.org/10.1177/0963721420951584>
- Erat, S., & Gneezy, U. (2012). White lies. *Management Science*, 58(4), 723–733.
- Everett, J. A. C., Faber, N. S., & Crockett, M. (2015). Preferences and beliefs in ingroup favoritism. *Frontiers in Behavioral Neuroscience*, 9(15). <https://doi.org/10.3389/fnbeh.2015.00015>
- Farah, M. J., Hutchinson, J. B., Phelps, E. A., & Wagner, A. D. (2014). Functional MRI-based lie detection: Scientific and societal challenges. *Nature Reviews Neuroscience*, 15(2), 123–131. <https://doi.org/10.1038/nrn3665>
- Gächter, S., & Schulz, J. F. (2016). Intrinsic honesty and the prevalence of rule violations across societies. *Nature*, 531(7595), 496–499. <https://doi.org/10.1038/nature17160>
- Gerlach, P., Teodorescu, K., & Hertwig, R. (2019). The truth about lies: A meta-analysis on dishonest behavior. *Psychological Bulletin*, 145(1), 1–44. <https://doi.org/10.1037/bul0000174>
- Gino, F., Ayal, S., & Ariely, D. (2013). Self-serving altruism? The lure of unethical actions that benefit others. *Journal of Economic Behavior & Organization*, 93, 285–292. <https://doi.org/10.1016/j.jebo.2013.04.005>
- Gneezy, U. (2005). Deception: The role of consequences. *The American Economic Review*, 95(1), 384–394.
- Gneezy, U., Rockenbach, B., & Serra-Garcia, M. (2013). Measuring lying aversion. *Journal of Economic Behavior & Organization*, 93, 293–300. <https://doi.org/10.1016/j.jebo.2013.03.025>
- Graham, J., Nosek, B. A., Haidt, J., Iyer, R., Koleva, S., & Ditto, P. H. (2011). Mapping the moral domain. *Journal of Personality and Social Psychology*, 101(2), 366–385. <https://doi.org/10.1037/a0021847>
- Grolleau, G., Kocher, M. G., & Sutan, A. (2016). Cheating and loss aversion: Do people cheat more to avoid a loss? *Management Science*, 62(12), 3428–3438. <https://doi.org/10.1287/mnsc.2015.2313>
- Hart, C. L., Jones, J. M., Terrizzi, J. A., Jr., & Curtis, D. A. (2019). Development of the lying in everyday situations scale. *The American Journal of Psychology*, 132(3), 343–352. <https://doi.org/10.5406/amerjpsyc.132.3.0343>
- Hilbig, B. E. (2022). Personality and behavioral dishonesty. *Current Opinion in Psychology*, 47, 101378. <https://doi.org/10.1016/j.copsyc.2022.101378>
- Hildreth, J. A. D., & Anderson, C. (2018). Does loyalty trump honesty? Moral judgments of loyalty-driven deceit. *Journal of Experimental Social Psychology*, 79, 87–94. <https://doi.org/10.1016/j.jesp.2018.06.001>
- Huang, J., Curran, P., Keeney, J., Poposki, E., & DeShon, R. (2011). Detecting and deterring insufficient effort responding to surveys. *Journal of Business and Psychology*, 27(1), 99–114. <https://doi.org/10.1007/s10869-011-9231-8>
- Jacobsen, C., Fosgaard, T. R., & Pascual-Ezama, D. (2018). Why do we lie? A practical guide to the dishonesty literature. *Journal of Economic Surveys*, 32(2), 357–387. <https://doi.org/10.1111/joes.12204>
- Jonason, P. K., & Webster, G. D. (2010). The dirty dozen: A concise measure of the dark triad. *Psychological Assessment*, 22(2), 420–432. <https://doi.org/10.1037/a0019265>
- Kerschbamer, R., Neururer, D., & Gruber, A. (2019). Do altruists lie less? *Journal of Economic Behavior & Organization*, 157, 560–579. <https://doi.org/10.1016/j.jebo.2018.10.021>
- Kim, J., & Kim, H. (2021). Neural representation in MPFC reveals hidden selfish motivation in white lies. *The Journal of Neuroscience*, 41(27), 5937–5946. <https://doi.org/10.1523/jneurosci.0088-21.2021>
- Köbis, N. C., Verschuere, B., Bereby-Meyer, Y., Rand, D., & Shalvi, S. (2019). Intuitive honesty versus dishonesty: Meta-analytic evidence. *Perspectives on Psychological Science*, 14(5), 778–796. <https://doi.org/10.1177/1745691619851778>
- Kyriazos, T. A. (2018). Applied psychometrics: Sample size and sample power considerations in factor analysis (EFA, CFA) and SEM in general. *Psychology*, 9(8), 2207–2230. <https://doi.org/10.4236/psych.2018.98126>
- Leary, M. R., Kelly, K. M., Cottrell, C. A., & Schreindorfer, L. S. (2013). Construct validity of the need to belong scale: Mapping the nomological network. *Journal of Personality Assessment*, 95(6), 610–624. <https://doi.org/10.1080/00223891.2013.819511>
- Levine, E. E., & Lupoli, M. J. (2022). Prosocial lies: Causes and consequences. *Current Opinion in Psychology*, 43, 335–340. <https://doi.org/10.1016/j.copsyc.2021.08.006>
- Levine, E. E., & Schweitzer, M. E. (2014). Are liars ethical? On the tension between benevolence and honesty. *Journal of Experimental Social Psychology*, 53, 107–117. <https://doi.org/10.1016/j.jesp.2014.03.005>
- Levine, E. E., & Schweitzer, M. E. (2015). Prosocial lies: When deception breeds trust. *Organizational Behavior and Human Decision Processes*, 126, 88–106. <https://doi.org/10.1016/j.obhdp.2014.10.007>
- Levine, E., Hart, J., Moore, K., Rubin, E., Yadav, K., & Halpern, S. (2018). The surprising costs of silence: Asymmetric preferences for prosocial lies of commission and omission. *Journal of Personality and Social Psychology*, 114(1), 29–51. <https://doi.org/10.1037/pspa0000101>
- Liu, J., Shen, Q., Zhang, J., Beyens, U., Cai, W., Decety, J., & Li, H. (2021). The difference spotting task: A new nonverbal measure of cheating behavior. *Behavior Research Methods*. <https://doi.org/10.3758/s13428-020-01526-w>
- Martin, H. J. (1984). A revised measure of approval motivation and its relationship to social desirability. *Journal of Personality Assessment*, 48(5), 508–519. https://doi.org/10.1207/s15327752jpa4805_10
- Masten, C. L., Morelli, S. A., & Eisenberger, N. I. (2011). An fMRI investigation of empathy for ‘social pain’ and subsequent prosocial behavior. *NeuroImage*, 55(1), 381–388. <https://doi.org/10.1016/j.neuroimage.2010.11.060>
- McLeod, B. A., & Genereux, R. L. (2008). Predicting the acceptability and likelihood of lying: The interaction of personality with type of lie. *Personality and Individual Differences*, 45(7), 591–596. <https://doi.org/10.1016/j.paid.2008.06.015>
- Mei, D., Zhang, W., & Yin, L. (2020). Neural responses of ingroup “favoritism” and out-group “discrimination” toward

- moral behaviors. *Neuropsychologia*, 139, 107375. <https://doi.org/10.1016/j.neuropsychologia.2020.107375>
- Paulhus, D. L. (1984). Two-component models of socially desirable responding. *Journal of Personality and Social Psychology*, 46(3), 598–609. <https://doi.org/10.1037/0022-3514.46.3.598>
- Pfattheicher, S., Nielsen, Y. A., & Thielmann, I. (2022). Prosocial behavior and altruism: A review of concepts and definitions. *Current Opinion in Psychology*, 44, 124–129. <https://doi.org/10.1016/j.copsyc.2021.08.021>
- Raine, A., & Uh, S. (2019). The selfishness questionnaire: Egocentric, adaptive, and pathological forms of selfishness. *Journal of Personality Assessment*, 101(5), 503–514. <https://doi.org/10.1080/00223891.2018.1455692>
- Rosenbaum, S. M., Billinger, S., & Stieglitz, N. (2014). Let's be honest: A review of experimental evidence of honesty and truth-telling. *Journal of Economic Psychology*, 45, 181–196. <https://doi.org/10.1016/j.joep.2014.10.002>
- Sassenrath, C. (2019). "Let Me Show You How Nice I Am": Impression management as bias in empathic responses. *Social Psychological and Personality Science*, 11(6), 752–760. <https://doi.org/10.1177/1948550619884566>
- Schindler, S., & Pfattheicher, S. (2017). The frame of the game: Loss-framing increases dishonest behavior. *Journal of Experimental Social Psychology*, 69, 172–177. <https://doi.org/10.1016/j.jesp.2016.09.009>
- Serota, K. B., & Levine, T. R. (2014). A few prolific liars. *Journal of Language and Social Psychology*, 34(2), 138–157. <https://doi.org/10.1177/0261927x14528804>
- Shalvi, S., & De Dreu, C. K. (2014). Oxytocin promotes group-serving dishonesty. *Proceedings of the National Academy of Sciences*, 111(15), 5503–5507.
- Speer, S. P. H., Smidts, A., & Boksem, M. A. S. (2022). Cognitive control and dishonesty. *Trends in Cognitive Sciences*. <https://doi.org/10.1016/j.tics.2022.06.005>
- Strahan, R., & Gerbasi, K. C. (1972). Short, homogeneous versions of the Marlowe-Crowne social desirability scale. *Journal of Clinical Psychology*, 28, 191–193. [https://doi.org/10.1002/1097-4679\(197204\)28:2%3c191::AID-JCLP2270280220%3e3.0.CO;2-G](https://doi.org/10.1002/1097-4679(197204)28:2%3c191::AID-JCLP2270280220%3e3.0.CO;2-G)
- Suchotzki, K., Verschuere, B., Van Bockstaele, B., Ben-Shakhar, G., & Crombez, G. (2017). Lying takes time: A meta-analysis on reaction time measures of deception. *Psychological Bulletin*, 143(4), 428–453. <https://doi.org/10.1037/bul0000087>
- Talwar, V., & Lee, K. (2002). Emergence of white-lie telling in children between 3 and 7 years of age. *Merrill-Palmer Quarterly*, 48(2), 160–181. <https://doi.org/10.1353/mpq.2002.0009>
- Turner, J. C., & Reynolds, K. J. (2001). In R. Brown & S. L. Gaertner (Eds.), *The social identity perspective in intergroup relations: Theories, themes and controversies*. Blackwell. <https://doi.org/10.1002/9780470693421.ch7>
- Van Lange, P. A. (2008). Does empathy trigger only altruistic motivation? How about selflessness or justice? *Emotion*, 8(6), 766–774. <https://doi.org/10.1037/a0013967>
- Verigin, B. L., Meijer, E. H., Bogaard, G., & Vrij, A. (2019). Lie prevalence, lie characteristics and strategies of self-reported good liars. *PLoS ONE*, 14(12), e0225566. <https://doi.org/10.1371/journal.pone.0225566>
- Volz, K. G., Voegeley, K., Tittgemeyer, M., von Cramon, D. Y., & Sutter, M. (2015). The neural basis of deception in strategic interactions. *Frontiers in Behavioral Neuroscience*, 9(27), 1–12. <https://doi.org/10.3389/fnbeh.2015.00027>
- Wilson, D. S., Near, D., & Miller, R. R. (1996). Machiavellianism: A synthesis of the evolutionary and psychological literatures. *Psychological Bulletin*, 119(2), 285–299. <https://doi.org/10.1037/0033-2909.119.2.285>
- Wiltermuth, S. S., Newman, D. T., & Raj, M. (2015). The consequences of dishonesty. *Current Opinion in Psychology*, 6, 20–24. <https://doi.org/10.1016/j.copsyc.2015.03.016>
- Xu, F., Bao, X., Fu, G., Talwar, V., & Lee, K. (2010). Lying and truth-telling in children: From concept to action. *Child Development*, 81(2), 581–596. <https://doi.org/10.1111/j.1467-8624.2009.01417.x>
- Yin, L., & Weber, B. (2016). Can beneficial ends justify lying? Neural responses to the passive reception of lies and truth-telling with beneficial and harmful monetary outcomes. *Social Cognitive and Affective Neuroscience*, 11(3), 423–432. <https://doi.org/10.1093/scan/nsv127>
- Yin, L., & Weber, B. (2019). I lie, why don't you: Neural mechanisms of individual differences in self-serving lying. *Human Brain Mapping*, 40(4), 1101–1113. <https://doi.org/10.1002/hbm.24432>
- Yin, L., Hu, Y., Dynowski, D., Li, J., & Weber, B. (2017). The good lies: Altruistic goals modulate processing of deception in the anterior insula. *Human Brain Mapping*, 38(7), 3675–3690. <https://doi.org/10.1002/hbm.23623>
- Yin, L., Zhong, S., Guo, X., & Li, Z. (2021). Functional connectivity between the caudate and medial prefrontal cortex reflects individual honesty variations in adults and children. *NeuroImage*, 238, 118268. <https://doi.org/10.1016/j.neuroimage.2021.118268>

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