

Original Article

Adaptive significance of low levels of self-deception and cooperation in depression

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Abstract

Consciousness and self-awareness, juxtaposed by the ability to self-deceive, are legacies of our evolutionary heritage. As a purposive outgrowth of modularity, self-deception may serve to isolate threatening thoughts from consciousness and facilitate cooperation. The primary goal of the present investigation was to determine if individuals with depression exhibit both low levels of self-deception and cooperation. Relationships between the tendency to self-deceive and the conscious attributions typical of depression or promoting cooperation were also examined. Eighty undergraduate participants completed measures of self-deception, impression management, depression, and attributional styles. Cooperation was assessed by responses to social dilemmas based on the prisoner's dilemma game. Results indicated that, as expected, high self-deceivers cooperated more and exhibited lower levels of depression than low self-deceivers. Self-deception scores were significantly associated with several attributional styles but independently predicted depressive symptomology. That individuals with depression displayed both reduced levels of self-deception and cooperation is discussed in light of several models of the evolutionary significance of depression, especially E. H. Hagen's bargaining model of depression [The functions of postpartum depression. *Evolution and Human Behavior*, 20, 325–359, 1999; Depression as bargaining: The case postpartum. *Evolution and Human Behavior*, 23, 323–336, 2002; The bargaining model of depression. In P. Hammerstein (Ed.), *Genetic and cultural evolution of cooperation* (pp. 95–123). Cambridge, MA: MIT Press, 2003].

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1. Introduction

The conscious and intentional processing of information, associated with the expansion and retooling of the neocortex, is a hallmark of human evolution. Rationalism and awareness of one's own and another's thoughts provide numerous fitness benefits. The enhanced communication skills afforded by language, a concomitant of consciousness, coupled with deliberate remembering, planning, and "theory of mind," accommodated the high level of sociality and technology so central to our species' success (e.g., Baron-Cohen, 1995; Dunbar, 1996, 1998, Pinker, 1997). Consciousness, however, is not without costs, and there are limits to its benefits. In particular, the greater our intelligence and insight, the more vivid our awareness of our own flaws and of the unpleasant, injurious aspects of our world.

Presumably, both conscious processes and those relegating information inaccessible to consciousness, such as self-deception and repression, have been subject to the forces of natural selection (Alexander, 1974, 1987, Badcock; 1995; Krebs, Denton, & Higgins, 1988; Lockard, 1978; Nesse & Lloyd, 1992; Trivers, 1985). The result is a human psychology distinguished by the unique coexistence of heightened self-awareness and an apparent proficiency for self-deception. The presence of processes akin to self-deception is evident; however, *how* and *why* they occur remain the subjects of debate and skepticism. Gur and Sackeim (1979) described self-deception as a process whereby two contradictory beliefs are held at different levels of consciousness, with the act deciding which belief is held in consciousness being a motivated act. Mele (1997) rejected the conjecture that a person can hold two opposing beliefs at the same time and proposed the cognitive biases adequately explain self-deception. Hence, self-deception is often broadly defined in the social cognitive literature as the

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avoidance of unpleasant information or the unintentional, unconscious tendency to view oneself, one's friends, and relatives or one's situation in an unrealistically positive way (Baumeister & Cairns, 1992; Fiske & Taylor, 1991; Robinson & Ryff, 1999).

Trivers (1976, 1985) theorized that the ability to self-deceive originally evolved during the evolutionary arms race between the ability to deceive and the necessity to detect deception. By keeping the selfish motives of a deceiver from consciousness, self-deception facilitated successful deception by eliminating the guilty signs of self-knowledge, such as shifty eyes and sweaty palms. He defined self-deception as the "active misrepresentation of reality to the conscious mind" or "biased information flow within an individual" (Trivers, 2000, p. 114). More recently, Kurzban and Aktipis (2007) suggest that what is classically labeled "self-deception" is essentially a by-product of modularity, where contradictory representations of reality and the self coexist as a result of information encapsulation. They propose that the Social Cognitive Interface (SCI), a system with the function of storing representations relevant to social interactions, has evolved to preferentially access self-representations with a positive spin, providing an edge in social interactions. This model describes a process whereby the most advantageous of a set of "multiple selves" is represented in consciousness, successfully avoiding the conundrum of how one can deceive oneself. From this point of view, "self-selection" or "selves-deception" (Trivers, 2000) may more aptly describe the process classically referred to as "self-deception." This general modular view of self-deception, as an outcome of the preferential accessing of overly positive representations or biased perceptions of reality in favor of more realistic depictions, is advanced here. However, rather than being a mere by-product of modularity, self-deception is more likely a purposive outgrowth of modularity and the evolution of mechanisms regulating access to information, such as those in the SCI. Hence, self-deception, as employed herein, is construed as the preferential accessing of overly positive or idealized representations or perceptions of the self, others, and the world by evolved regulatory mechanisms.

Humans are typically unrealistic optimists (Weinstein, 1980), viewing life through rose-colored glasses, seeing the glass as half-full rather than half-empty, ostensibly floating through life in a self-deceptive bubble. Keeping threatening thoughts from consciousness while facilitating continued performance, motivation, and optimism in adverse conditions appears to be one of the current functions of self-deception (Taylor & Brown, 1988). Although self-deception may have originally arisen in the arms race between the ability to deceive and detect deception (Trivers, 1985), it may have undergone further selection for additional functions. Abramson and Martin (1981) and Sackeim (1983) suggested that individuals with depression, who ruminate on negative cognitions to the detriment of daily functioning, lack the normal capacity to self-deceive.

Findings of a significant negative relationship between scores on the Self-Deception Questionnaire (SDQ; Sackeim & Gur, 1978) and the Beck Depression Inventory (BDI; Beck, 1967) support this proposal (Roth & Ingram, 1985; Sackeim & Gur, 1979).

The reported lack of self-deception in depression is compatible with a number of evolutionary theories of depression. Adaptationist models of depression have existed for at least six decades. In Bowlby's (1969) model of attachment, depression is viewed as a reaction to loss of a significant (fitness-relevant) relationship or source of resources, such as the mother. Depression has also been described as an adaptive means to conserve resources or energy when subjected to uncontrollable aversive stimuli, so they can be later redirected into activities with better fitness payoffs (Klinger, 1975; Nesse, 2000). Welling (2003) suggests that reduced activity levels associated with depression may provide a time-out during which a person's cognitive maps or schemas and coping strategies may be updated. Price (1967), drawing on his familiarity with dominance hierarchies in primates, focused on the utility of low mood in responses to defeat or threats of defeat. The social competition model of depression (Price, 1972; Price, Sloman, Gardner, Gilbert, & Rohde, 1994) describes depression as a mechanism employed by the losers of social competitions. Depressive reactions are likened to the adoption of subordinate behaviors and the acceptance of lower rank in order to reduce further attacks from the winner. Gilbert (2006) similarly suggests that depression serves to reduce further challenges to dominant individuals and indicates that an individual in a subordinate role is not a threat. Allen and Badcock's (2003) social risk hypothesis proposes that depression serves to reduce the risk of social exclusion. Social exclusion or ostracism is a threat to fitness because it reduces an individual's access to the protection and resources afforded by group living, as well as access to mates (Spoor & Williams, 2007). Depressed mood may reduce the risks of social exclusion in individuals who perceive they have low social status or who have already experienced social rejection by reducing behaviors, such as aggression, that could put their social relationships at further risk (Allen & Badcock, 2003). Hagen (2002, 2003) also focuses on the role of depression in the dynamics of group living. He views depression as means of bargaining, in which the individual with depression withdraws his or her contribution to the group as a means of both advertising their neediness and leveraging increased resources or assistance from group members. Hagen (1999) sees postpartum depression as a special case whereby women's depressive symptomology and apparent inability to cope signal their need for greater investment from their mate or kin. Watson and Andrews (2002) and Andrews and Thomson (2009) also consider the persuasive, leveraging aspects of depression and make an additional contribution. They propose that ruminations, a cognitive hallmark of depression, may indicate an increased conscious focus on

problem solving, especially in the domain of social relationships. Intrusive and repetitive thoughts about problems in social relationships are typical of depression, as are negative social cognitive or attributional styles (Abramson, Seligman, & Teasdale, 1978; Beck, 1967; Brewin, 1985; Sweeney, Anderson, & Bailey, 1986). Andrews and Thomson (2009) suggest the former could represent the shifting of cognitive resources for the purpose of ameliorating social relationships. Hence, some of the more recent models construe depression as a means of attending, regulating, maintaining, or resolving social relationships with others who may not have identical fitness interests yet whose support is crucial to an individual's survival and reproductive opportunities. This conception of depression links it to other mental processes potentially involved in human cooperation and social exchange, such as self-deception.

In addition to being co-opted as a means of protecting individuals from threatening thoughts, several authors have suggested that self-deception currently plays a more beneficent role in human social relations by facilitating the initiation and maintenance of reciprocal altruism (e.g., Alexander, 1987; Nesse & Lloyd, 1992). Individuals may be more disposed to exhibit cooperative behaviors if they are unable to access their own and others' selfish motives (Nesse & Lloyd, 1992) and assume a norm of reciprocity. In particular, a degree self-deception would be useful in maintaining cooperative and supportive relationships with allies and family members whose fitness interests may be overlapping but not completely aligned with one's own. In support of this, Surbey and McNally (1997) reported that individuals with heightened dispositions toward self-deception, as measured by the SDQ, reported greater intentions to cooperate in hypothetical social situations based on the Prisoner's Dilemma (PD) game.

The PD game serves both as a model for the evolution of reciprocal altruism (Axelrod, 1984) and as a measure of cooperation. The game represents social situations where two individuals are confronted with the choice of cooperating with each other or defecting. The payoffs are dependent on the choice made by one's competitor, with the relative values $T > R > P > S$. In one-trial games, high levels of defection are expected because it is associated with the highest reward (T, temptation to defect) and avoidance of the sucker's payoff (S). However, over many trials or iterations, where mutual cooperation (R) results in the highest fitness for both parties ($R > (S+T)/2$), high levels of cooperation are expected. An essential feature of the PD game is that it involves mixed motives: On a single trial of a game, the best option is to defect, but over many trials, the best option is to cooperate because the payoff for mutual cooperation exceeds that of continual defection. But how, at a psychological level, can a cooperative relationship ever be initiated if, on any first or single trial of a game, it is always better to defect?

Surbey and her colleagues (Surbey & McNally, 1997; Surbey & Rankin, 2010; Surbey, 2004; Surbey, Alvius, &

Biggs, 2005) proposed that the tendency to self-deceive is involved in overcoming this psychological hurdle. To initiate a long-term cycle of cooperation with another, one's own selfish motives must be put aside, while the possibility that the recipient of one's generosity may not return the favor is downplayed. This would involve accessing positively biased representations of self and others, instead of more realistic, cynical representations. In support of this, Surbey and colleagues reported that high levels of self-deception and repression predicted heightened intentions to cooperate on PD games presented as either hypothetical written social dilemmas or as computerized games where individuals believed they were playing against another person. Correlations between self-deception (measured by the SDQ) and intentions to cooperate reached $r = .38$, with self-deception accounting for up to 12% of the variance in intentions to cooperate. At a conscious level, beginning a game by cooperating may involve the optimistic belief that your partner will also cooperate, the feeling that you have some control in the outcome of the game, or the belief that a cooperative move on your part will increase the probability of your partner cooperating (Morris, Sim, & Giotto, 1998; Surbey, 2004). High levels of self-deception may promote cooperation on PD games by increasing conscious feelings of optimism, personal control, or internal locus of control (Surbey, 2004).

1.1. Goals of the present study

The present study was based on the premise that a moderate tendency to self-deceive is functional, promoting optimism and mental health, and reasonable levels of cooperation. The initial goal was to retest the proposition that individuals with depression exhibit reduced levels of self-deception (Roth & Ingram, 1985; Sackeim & Gur, 1979), employing two different measures of self-deception: the SDQ and the Self-Deceptive Enhancement (SDE) scale of the Paulhus Deception Scales (PDS; Paulhus, 1998). The PDS was included to address psychometric concerns about the SDQ (see Paulhus, 1998) by separating the unconscious tendency to give inflated positive self-descriptions (SDE scale) from the conscious tendency to create a favorable impression on others (Impression Management [IM] scale). The IM scale exhibits low correlations with SDE and was employed as a means of controlling for impression management.

In addition, whether self-deception underlies or is correlated with the attributional styles or the conscious feelings typically associated with depressive symptomology was also examined. Beck's (1967) cognitive model, and its reformulation in terms of learned helplessness theory (Abramson et al., 1978), suggests that individuals with depression exhibit distinct cognitive styles: They are more likely to attribute negative events to internal, stable, and global causes. In addition, an overall external locus of control, reflecting the belief that even positive outcomes

are due to chance rather than an individual's actions or abilities, is reliably associated with depression (Strickland, 1978). In contrast, a general self-enhancing style (the tendency to attribute positive events to internal causes and negative events to external causes), attributional optimism (the tendency to attribute positive events to more stable causes than negative events), high levels of personal control, and dispositional optimism would be expected to be negatively related with depression. If depression is functional, the conscious cognitive characteristics of depression may serve as the proximate sources of strategic behavior. For example, Price et al. (1994) suggest that the pessimistic cognitive distortions of depression facilitate the maintenance or acceptance of a subordinate status. Andrews and Thomson (2009) and Watson and Andrews (2002) propose that the conscious ruminations of individuals with depression represent increased attempts at solving problems in social relationships. Furthermore, if self-deception serves to regulate the flow of information between the subconscious and consciousness in a positively biased manner, we might expect that at least some of the typical content of depressive thought, such as ruminations or negatively biased cognitive or attributional styles, would at least be associated with, if not largely explained by, low levels of self-deception.

Another goal was to replicate previous findings of an association between self-deception and cooperation (e.g., Surbey & McNally, 1997) and extend them by examining the roles of attributional styles and dispositional optimism and pessimism in predicting levels of cooperation. It was expected that high self-deceivers, and participants with heightened optimism, internality, and feelings of personal control would exhibit higher levels of cooperation. Finally, a primary goal of this study was to examine the relationship between depression and cooperation in social dilemmas based on the PD game. If individuals with depression exhibit low levels of self-deception, they would be expected to cooperate less in PD games than others. A number of findings suggest that induced negative mood or depression is related with reduced helping behavior and cooperation in other types of games or activities (Aderman, 1972; Hertel, Neuhof, Theuer, & Kerr, 2000; Isen & Levin, 1972), but there appears to be only one investigation of the responses of adult individuals with depression in PD games. Hokanson, Sacco, Blumberg, & Landrum, (1980) had nondepressed "normal" individuals compete in PD games against depressed individuals and others with mental health problems. The games were purely economic, with payoffs involving points, rather than social or fitness-relevant benefits. Rather than responses being made simultaneously, they were made sequentially, with the player responding second being in a higher power position. Results revealed that individuals with depression in the higher power position were more likely to defect on a cooperating normal partner than were normal individuals, but they did not differ when they played first in the lower power position. While these

results were suggestive, the use of a sequential game with nonsocial payoffs did not permit assessment of tendencies of individuals with depression independent to cooperate or defect in mixed-motive social dilemmas. Therefore, the present study employed written social dilemmas based on the PD game as a means of assessing predispositions of individuals with depression to engage in cooperation and reciprocity. If individuals with depression engage in both less self-deception and cooperation than others, this would have implications for their social relationships, treatment, and recovery. Such implications are considered in light of evolutionary models of the origin and functional value of depression, especially Hagen's (1999, 2002, 2003) bargaining model of depression.

2. Methods

2.1. Participants

Eighty undergraduate students (27 men and 53 women) attending university in Queensland, Australia, voluntarily completed questionnaire packages in order to receive course credit. Participants ranged in age from 17 to 47 years ($\text{mean} \pm \text{S.D.} = 22.01 \pm 6.63$ years) and were predominantly of European descent with middle-class backgrounds. After giving informed consent, participants completed questionnaires in group settings where both confidentiality and anonymity were ensured.

2.2. Measures

The questionnaire package included demographic items (age, sex, ethnicity, and SES, based on fathers' educational attainment) and the following measures:

The Self-Deception Questionnaire (SDQ) (Sackeim & Gur, 1978) consists of 20 psychologically threatening, but generally true, items of which participants indicate their personal relevance using a seven-point Likert scale (from 1=*never* to 7=*always*). Responses are scored dichotomously or on a continuous scale. Sample items include "Have you ever made a fool of yourself?" and "Were your parents ever mean to you?" Consistent denial of the personal relevance of the items indicates self-deception. Sackeim and Gur (1979) reported a high test-retest reliability (.81) and SDQ scores are highly intercorrelated with those on the Byrne Repression-Sensitization Scale, Weinberger's Repressive Coping Scale, the Weinberger Adjustment Inventory, Miller's Monitoring and Blunting Scale, and Paulhus' SDQ, suggesting a high external validity (see Turvey & Salovey, 1993–1994). The SDQ appears to tap a general tendency to deny negative or unflattering information in a number of social realms, including information about the self, one's parents, social taboos, and others' thoughts. In the present study, responses were scored on a continuous scale, then reversed and averaged, resulting in high scores signifying a greater tendency to self-deceive.

The Paulhus Deception Scales (PDS) (Paulhus, 1998) is a 40-item self-report measure of two major forms of socially desirable responding: SDE and IM. The SDE scale measures subconscious tendencies to provide an agreeable yet inaccurate view of oneself, for example, “I never regret my decisions” and was employed as a second measure self-deception. The IM scale taps the conscious tendency to respond to items in an attempt to create a favorable impression on others and was utilized as a means of controlling for impression management. A sample item is “I always obey laws, even if I’m unlikely to get caught.” Employing a seven-point Likert scale (from 1=*totally* disagree to 7=*totally* agree), respondents indicated their agreement with each item. After reversing and totaling the relevant items, high scores on the individual scales indicated higher levels of self-deception and impression management. The sum of the two scales (total PDS score) was also calculated.

The Attributional Style Questionnaire (ASQ; Peterson et al., 1982) asks participants to provide causal interpretations for 12 hypothetical situations. Six events involve relationships with other people and six involve a personal achievement; half of each type result in a positive outcome and the other half are negative (e.g., “You meet a friend who acts hostilely towards you,” “You do a project that is highly praised.”). Respondents indicate their perception of the major cause of the event representing the locus of control (from 1=*totally* due to other people or circumstances to 7=*totally* due to me), stability (from 1=*will* never again be present to 7=*will* always be present) and globility (from 1=*influences* just this particular situation to 7=*influences* all situations in my life). An additional item measuring personal control (from 1=*not* at all controlled by me to 7=*totally* due to me) designed by N. Higgins (personal communication, 2002) was added to the original scale to address the concern that personal controllability is an important, but unassessed, attributional dimension in the ASQ (see Hessling, Anderson, & Russell, 2002). Controllability was also expected to be an important factor in predicting levels of cooperation. Seven attributional styles were calculated from the responses to the original items in the ASQ including *Internal Negative (IN)*, the tendency to attribute negative events to internal causes; *Stable Negative (SN)*, the tendency to attribute negative events to stable causes; *Global Negative (GN)*, the tendency to attribute negative events to global causes vs. specific causes; *Internal Locus of Control (IC)*, the overall tendency to attribute events to internal causes vs. external causes; *Self-Enhancing (SE)*, the tendency to attribute positive events to internal causes and negative events to external causes (vs. *Self-effacing*, the tendency to attribute negative events to internal causes and positive events to external causes); and *Optimism (OP)*, the tendency to attribute good events to more stable causes than negative events (vs. Pessimism, attributing negative events to more stable causes than positive events) (see Crittenden, 1991; Peterson et al., 1982, for details in calculating each style). A composite negative

score, *CONEG*, consisting of the sum of the three attributional styles for negative events (*IN*, *SN* and *GN*) that are most central to learned helplessness theory, was also calculated. The composite negative score appears to be more reliably related with depression than the individual attributional styles (Hessling et al., 2002; Robins, 1988). Scores for the additional dimension of controllability were totaled and averaged across all 12 scenarios to produce a measure of *personal control (PC)* or the degree to which participants felt both positive and negative events were under their control.

The Beck Depression Inventory II (BDI-II (Beck, Steer, & Brown, 1996), is the newest revision of the BDI (Beck, 1967), and is a 21-item test measuring the severity of depressive symptoms. A sample item is “I do not expect things to work out for me.” Participants indicate their agreement with each item by selecting from a list of four statements arranged in increasing order of severity, worth from 0 to 3 points, respectively. Points are summed, with a high total score indicating greater depressive symptomology. The reliability of the BDI-II is high (coefficient $\alpha=.93$ for a sample of college students) (Beck et al., 1996).

The Life Orientation Test — Revised (LOT-R; Scheier, Carver, & Bridges, 1994) is a brief 10-item measure (including four filler items) of dispositional optimism and pessimism. Respondents indicate their agreement to items (e.g., “If something can go wrong for me, it will”) employing a five-point scale (from 1=I agree a lot to 5=I disagree a lot). Separate subscales for optimism (LOPT) and pessimism (LPSS) may be computed, or an overall optimism score may be calculated by reversing responses to items measuring pessimism and summing all responses. The present study employed individual subscale scores in addition to the total score (LOT-R) as an indication of participants’ overall level of dispositional optimism.

Prisoner’s dilemma game vignettes were employed in order to assess participants’ intentions to cooperate. Four vignettes describing hypothetical situations relevant to undergraduate students and conforming to the classic PD game format (payoffs: T>R>P>S) were designed according to the method of Surbey and McNally (1997). Participants were asked to read each vignette and imagine they were involved in the social situation described therein. Employing a six-point Likert scale, participants indicated how they would respond to each dilemma (responses ranged from those indicating 1=complete defection to 6=maximum cooperation). Responses to all four social dilemmas were totaled and averaged, with high scores representing heightened intentions to cooperate.

3. Results

3.1. Intercorrelations and preliminary analyses

Zero-order intercorrelations for all demographic factors and psychological measures were examined (Table 1).

Table 1

Intercorrelations among demographic variables, attributional styles, dispositional optimism, self-deception, impression management, depression, and cooperation

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1. AGE	–	–.18	.17	–.04	–.04	.02	.03	–.19	.06	.00	.14	–.12	–.31**	–.10	.10	.16	.18	–.01	.08
2. SES	–	–	–.18†	–.05	–.16†	–.17†	.13	.30*	.10	.12	.13	.10	.01	.14	.05	–.16	–.09	–.17	–.02
3. IN	–	–	–	.50***	.31**	.73****	.56****	–.59****	–.35***	.41****	–.06	–.04	–.03	–.08	–.02	–.08	–.07	.15†	.03
4. SN	–	–	–	–	.47****	.81****	.13	–.36***	–.61****	.24*	–.15	–.10	.19*	–.21*	–.19*	–.18	–.24*	.49****	–.23**
5. GN	–	–	–	–	–	.82****	.18	–.14	–.23*	.15	–.07	.04	.13	–.14	–.14	–.38***	–.35**	.30**	–.11
6. CONEG	–	–	–	–	–	–	.35**	–.43****	–.48****	.32**	–.11	–.03	.12	–.18†	–.15†	–.30**	–.30**	.40***	–.14
7. IC	–	–	–	–	–	–	–	.16	.13	.58****	.16	.28**	–.17	.16†	.10	–.04	.03	–.02	.17†
8. SE	–	–	–	–	–	–	–	–	.52****	.02	.30**	.40***	–.21†	.24*	.26**	.09	.22†	–.24*	.15†
9. OP	–	–	–	–	–	–	–	–	–	.06	.40**	.34**	–.42****	.19*	.24*	.03	.16	–.47****	.28**
10. PC	–	–	–	–	–	–	–	–	–	–	.04	.17	–.06	.14	–.05	.00	–.03	.01	.05
11. LOT-R	–	–	–	–	–	–	–	–	–	–	–	.68****	–.72****	.05	.22*	.00	.12	–.36***	.14
12. LOPT	–	–	–	–	–	–	–	–	–	–	–	–	–	–.40****	.18†	.38***	–.04	.19†	–.45****
13. LPRESS	–	–	–	–	–	–	–	–	–	–	–	–	–	–.04	–.35***	.00	–.20†	.33**	–.22**
14. SDQ	–	–	–	–	–	–	–	–	–	–	–	–	–	–	.29**	.27*	.36**	–.38***	.11
15. SDE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	.18	.71****	–.40***	.14
16. IM	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	.83****	–.21†	.20†
17. PDS	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–.38***	.23*
18. BDI	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–.19*
19. COOP	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Note. Attributional styles (measured by the ASQ): IN=Internal Negative, SN=Stable Negative, GN=Global Negative, CONEG=Composite Attributional Style for Negative Events, IC=Internal Locus of Control, SE=Self-Enhancing, OP=Optimism, PC=Personal Control; Dispositional Optimism: LOT-R=Total Life Orientation Test — Revised score, LOPT=Optimism subscale, LPRESS=Pessimism subscale; SDQ = Self-Deception Questionnaire; Paulhus Deception Scales: SDE=Self-Deceptive Enhancement scale, IM=Impression Management scale, PDS=Total score; BDI=Beck Depression Inventory II; COOP=average level of cooperation across PD vignettes. $N=70-80$.

† $p<.1$.* $p<.05$.** $p<.01$.*** $p<.001$.**** $p<.0001$.

Generally, demographic variables were not significantly related with psychological measures, except that older participants had significantly lower dispositional pessimism (LPESS) than younger participants and SES was positively correlated with attributional self-enhancement (SE). Sex differences concerning the psychological measures and level of cooperation were not predicted or identified in a series of *t* tests ($p > .05$) and were not explored further. One-tailed tests were employed in the testing of *a priori* directional predictions, whereas nondirectional post hoc examinations and exploratory analyses employed two-tailed tests.

3.2. Relationships among measures of self-deception, impression management, and depressive symptomology

As expected, participants exhibiting high levels of depressive symptomology had reduced levels of self-deception, according to scores on both the SDQ and the SDE (Table 1). Scores on the SDQ and SDE were modestly but significantly and positively intercorrelated. Additional two-tailed tests revealed that the total score on the PDS was significantly and negatively correlated with scores on the BDI-II, and there was a tendency for those scoring highly on impression management to report reduced levels of depression ($p < .06$).

3.2.1. Interrelationships among self-deception, impression management, attributional styles, dispositional optimism and pessimism, and depression

As predicted, high levels of the negative attributional styles (SN, GN, CONEG, and LPESS) and low levels of the positively biased cognitive styles (SE, OP, and LOPT) were significantly associated with increased depressive symptomology (Table 1). A positive correlation between internal attributions for negative events (IN) and BDI-II scores approached significance ($p < .09$). Contrary to predictions, more depressed participants did not exhibit reduced overall internal locus of control or personal control. High scores on the SDQ and SDE were significantly correlated with high SE, OP, and a reduced tendency to attribute negative events to stable causes (SN). Additionally, high SDE scores were significantly associated with high LOPT and low LPESS scores. High SDQ scores were marginally correlated with high LOPT, SE, and IC, ($p < .06$, $p < .08$, and $p < .08$, respectively). Impression management was significantly and negatively related with GN and BDI scores and positively correlated with scores on the SDQ and SDE. Personal control was not significantly related with either measure of self-deception, impression management, or BDI scores, but was positively related with some of the other attributional styles. Hence, in accordance with predictions and previous findings, several of the attributional styles and dispositional optimism were significantly related with depression. The two measures of self-deception were significantly correlated with some, but not all, of the attributional styles and with dispositional optimism.

3.3. Hierarchical regression to identify unique predictors of depression

A hierarchical regression procedure was employed to determine if the attributional styles accounted for a significant proportion of the variance in BDI-II scores beyond that accounted for by the SDQ and PDS scales and thus to identify the best independent predictors of depression. The first block included both measures of self-deception and impression management. The noncomposite attributional styles (IN, SN, GN, IC, SE, and OP) derived from the ASQ comprised the second block. Multivariate outliers were not identified, and relatively high tolerances for all three predictors in the final model indicated that multicollinearity would not compromise interpretation of the solution. In the first step, the two measures of self-deception and impression management together accounted for 22% of the variance in BDI scores, $R^2_{adj} = .22$, $F_{3,72} = 8.06$, $p < .0001$. Only the two measures of self-deception were significant predictors [SDE, $\beta = -.32$, $t_{72} = 2.96$, $p < .004$, and SDQ, $\beta = -.27$, $t_{72} = 2.50$, $p < .02$]. Adding the attributional styles in the second step produced a significant change in the variance explained in BDI-II scores, $\Delta R^2_{adj} = .15$, $\Delta F_{6,66} = 3.94$, $p < .002$. Of the attributional styles entered in the block, only SN was a significant predictor of depression scores, $\beta = .34$, $t_{66} = 2.41$, $p < .02$. The measures of self-deception remained significant predictors [SDE, $\beta = -.22$, $t_{66} = 2.13$, $p < .04$, and SDQ, $\beta = -.22$, $t_{66} = 2.18$, $p < .03$]. In the final model, these three factors together accounted for 37% of the variance in BDI scores, $R^2_{adj} = .37$, $F_{6,66} = 5.97$, $p < .0001$. In summary, reduced levels of each measure of self-deception and the tendency to attribute negative events to stable causes (SN) independently predicted greater depressive symptomology. After the effects of both measures of self-deception and SN had been accounted for, the remaining attributional styles failed to contribute significantly to the regression model.

3.4. Relationships among self-deception, impression management, and intentions to cooperate on PD games

Although in the predicted direction, correlations between the measures of self-deception and intentions to cooperate did not achieve significance. Median split analyses were conducted to further examine if individuals scoring highly on the SDQ and SDE scales exhibited heightened intentions to cooperate in PD games. Results showed that high self-deceivers, according to scores on the SDQ, exhibited significantly greater intentions to cooperate (mean = 5.03) than low self-deceivers (mean = 4.69), $F_{1,78} = 4.08$, $M.S. = 2.3$, $p < .02$, $\eta^2 = .05$. A parallel median split analysis comparing cooperation in participants with high scores on the SDE scale (mean = 4.91) to low scorers (mean = 4.80) did not achieve significance, $F_{1,78} = .39$, $M.S. = .23$, *n.s.* Exploratory analyses (Table 1) showed that participants with high total PDS and IM scores generally exhibited greater intentions to cooperate than those with low scores ($p < .04$ and $p < .07$, respectively).

3.5. Relationships among attributional styles, dispositional optimism and cooperation

Low levels of SN and LPESS and high OP and IM were related with heightened intentions to cooperate, but level of personal control was not significantly correlated with intentions to cooperate (Table 1).

3.6. Hierarchical regression to identify unique predictors of cooperation

A hierarchical regression employing relatively the same blocks of variables in the previous section was conducted to determine if cognitive styles accounted for a significant proportion of the variance in cooperation, beyond that accounted for by self-deception and impression management. In this model, SDQ, SDE, and IM scores were dummy-coded and dispositional optimism was added to the final block of variables. A multivariate outlier was identified and the case removed from the analysis. A high tolerance for the predictor remaining in the final model indicated that multicollinearity would not complicate the solution. The first block of variables (SDQ, SDE, and IM) did not account for a significant portion of the variance in cooperation, R^2 adj. = .05, $F_{3,73}=1.38$, *n.s.* The second block of variables produced a significant change in R^2 adj., ΔR^2 adj. = .17, $\Delta F_{7,66}=3.23$, $p<.005$. In the final step, attributional optimism (OP) was the only significant predictor of cooperation, $\beta=.44$, $t_{66}=2.84$, $p<.006$, accounting for 19% of the variance in cooperation, R^2 adj. = .19, $F_{10,66}=2.77$, $p<.007$. Of the other variables, the tendency to attribute negative events to internal causes (IN) and impression management approached significance, $\beta=.44$, $t_{66}=1.85$, $p<.07$, $\beta=.22$, $t_{66}=1.89$, $p<.06$, respectively. The measures of self-deception, however, were not significant predictors of cooperation in the final model.

3.7. Relationship between depressive symptomology and cooperation

Scores on the BDI-II, the measure of depression, ranged from 0 to 38 out of a total possible score of 63 points. The average score, mean \pm S.D.=11.64 \pm 8.30, falls in the class of “minimal” depression, with individuals scoring less than the cutoff value (13) in this class described as nondepressed in the BDI-II scoring manual (Beck et al., 1996). This mean score was considerably lower than the cutoff value of 29, indicating “severe” depression in the range of clinical depression. A formal diagnosis of depression, however, requires that the American Psychiatric Association (2000) diagnostic criteria be met. Based on a six-point scale, where 1=complete defection and 6=maximum cooperation, participants exhibited an overall tendency to cooperate in the PD vignettes, mean \pm S.D.=4.86 \pm 0.77. As expected, participants with more severe depressive symptomology reported significantly reduced intentions to cooperate on the PD games (Table 1).

4. Discussion

While most people exhibit unrealistic optimism, seeing the world in an overly positive and idealistic light (Weinstein, 1980; Taylor & Brown, 1988), individuals with depression appear to view reality and its unpleasantness all too clearly. The current findings replicate and extend previous demonstrations of an association between a reduced tendency to self-deceive and depression (Roth & Ingram, 1985; Sackeim & Gur, 1979), while controlling for impression management. Related findings suggest that high self-deceivers perceive less physical pain (Jamner & Schwartz, 1986) and overlook anomalous information more than others (Peterson, Driver-Linn, & DeYoung, 2002). Peterson and colleagues (2002) found that high self-deceivers exhibited an impaired ability to process anomalies, as indicated by the greater number of trials it took to accurately describe a playing card with a reversed color of suit. High self-deceivers mistakenly identified a four of hearts colored black as the four of spades or described the heart as red. It was as if they were consciously “blind” to the anomaly or had accessed an ideal representation of the card, perceiving it as it should have been, rather than as it was. Individuals with depression, with their low levels of self-deception, would be expected to have greater access to physical and psychological pain and reduced access to idealistic representations than others. Experimental studies employing mood induction techniques lend some interesting examples of the latter. Forgas (2007) found that people in a sad mood were more skeptical about people’s genuineness and better able to detect deceptive individuals. Badcock and Allen (2003), employing a version of the Wason Selection Task, found that people with induced depressed mood were better able to reason about and detect violations in social rules. Forgas, Varga, and Laham (2005) found that people with negative affect were better able to pick out false/misleading information and had more accurate eyewitness memory than those in positive moods. Social anomalies and infractions that people in a positive mood seem to miss, ignore, or gloss over are the details of which those in depressed moods seem acutely aware.

Sackeim (1983), reflecting on the clinical implications of low levels of self-deception in depression, suggested that therapies aimed at adjusting cognitions to closer fit with reality may be misplaced. Kinney (2000) prescribed that the cognitive change produced by Cognitive Behavior Therapy should contain a self-deceptive component. According to the findings of Anderson and Green (2001), not thinking about adverse thoughts, even if they are consonant with reality, could be a better means of positively restructuring consciousness than rehashing negative cognitions. Hence, hypothetically, it may be possible to retrain the regulatory mechanisms fundamental to self-deception to preferentially access positively biased information. This may not necessarily be desirable, however, if depression signals problems

in one's social environment that need attending. As described by a number of authors (e.g., Andrews & Thomson, 2009; Cline-Brown & Watson, 2005), if the social problems triggering depression are not resolved, most treatments may have only short-term success.

Although the SDQ and SDE are overlapping constructs, they independently predicted BDI-II scores, whereas IM was not a significant predictor. According to Sackeim (1983), self-deception involves both enhancing positive characteristics and denying threatening thoughts. The SDE taps self-enhancement (Paulhus, 1998), whereas the SDQ places greater emphasis on denial. In a factor-analytic investigation, Roth and Ingram (1985) found that items in the SDQ loaded on to five factors, but it was the three factors concerning denial of (a) negative thoughts about parents, (b) unpleasant emotions and (c) engaging in taboo behaviors that predicted BDI scores. That items on the SDE and SDQ tap two different facets of self-deception may partially explain why they are only moderately intercorrelated ($r=.29$) and why both independently predict BDI-II scores. In addition, while all of the items on the SDE pertain to self-enhancement, SDQ may be a better indicator of a broader tendency to access positively biased representations across a number of crucial social domains, including those concerning one's parents, siblings, mate value, or the social and personality characteristics of others. Although IM, SDE, and SDQ scores were positively and significantly intercorrelated, it is noteworthy that impression management played little role in predicting depression when all potential predictors were considered. These findings argue against the proposition that self-deception is equivalent to other-deception and support Paulhus' (1998) distinction between the self-deceptive and impression management components of socially desirable responding.

In accordance with Beck's (1967) cognitive model of depression, increased tendencies to attribute negative events to stable, global, and internal causes, and low attributional self-enhancement and optimism were associated with increased depressive symptomology. That scores on the SDQ and SDE were significantly correlated with a number of these attributional styles supports the proposition that a reduced ability to self-deceive may result in the cluster of conscious attributions typical of depression. Furthermore, when all relevant predictors were entered into a hierarchical regression, both measures of self-deception and the SN attributional style together explained 37% of the variance in BDI-II scores, with self-deception subsuming the predictive ability of the remaining attributional styles. Hence, lack of self-deception appears to explain or underlie the conscious attributions typical of the thinking of individuals with depression. It would be interesting to know if a lack of self-deception is also related to other content typical of depressive ruminations, such as negative views of social relationships and others, as described by the analytical rumination hypothesis (Andrews & Thomson, 2009). It seems reasonable to expect that negative attributions of

individuals sharing close or crucial relationships with those with depression would be related to low self-deception and, perhaps, largely explained by it. The mechanisms regulating what content appears in consciousness should both track problems in one's environment that need to be tackled and direct increased cognitive effort toward solving them.

The latter findings could be interpreted as supporting the view that both low levels of self-deception and the SN attributional style are *vulnerability* factors in the development of depression. Alternatively, the belief that negative events are due to stable causes (SN) could be an realistic indication of long-term exposure to negative life events (Robins, 1988) that, when combined with dispositional low self-deception, precipitates depression. An additional interpretation is that levels of self-deception are altered by life experiences (Surbey & McNally, 1997). An individual may commence life with a moderate level of self-deception that becomes eroded through extraordinary exposure to negative life events. Serial confrontations with the negative aspects of one's reality could burst the self-deceptive bubble. From an adaptationist perspective, the facultative adjustment of self-deceptive tendencies makes sense: While it may be generally adaptive to be oblivious to negative cognitions and circumstances and soldier on, this tactic may only be useful up to a point. When circumstances become so dire that denial becomes maladaptive, confronting reality may be the only means of adjusting behavior accordingly. Hence, under some conditions, evolved regulatory mechanisms may shift the focus of consciousness to more realistic and pessimistic representations.

In a replication of previous findings, high self-deceivers, according to scores on the SDQ, exhibited greater intentions to cooperate on the PD games than low self-deceivers (Surbey, Alvius, & Biggs, 2005; Surbey & McNally, 1997; Surbey & Rankin, 2010). This finding did not hold employing the SDE as a measure of self-deception and was less robust than in previous investigations. A larger sample size may have strengthened or clarified these results. However, as discussed previously, the SDQ and SDE may tap different facets and realms of self-deception and thus, may not be equally related with intentions to cooperate on PD games. High levels of cooperation may be more closely related to denying negative thoughts (e.g., the possibility that your partner will defect if you cooperate) as measured by the SDQ, rather than self-enhancement, as measured by the SDE. This possibility is in keeping with Nesse and Lloyd's (1992) original proposition that self-deception may enhance cooperation by facilitating the relegation of a partner's selfish motivations outside of consciousness.

In contrast to the regression model predicting depression, conscious attributions appeared to subsume measures of self-deception in predicting intentions to cooperate. When entered into a hierarchical regression, along with the attributional styles and dispositional optimism, neither SDQ nor IM scores remained significant predictors of levels of cooperation. Instead, the hierarchical regression showed

that individuals who possessed heightened attributional optimism (OP), or attributed good events to more stable causes than negative events, cooperated more. Individuals high on impression management or less likely to attribute negative events to internal causes (IN) also tended to be more cooperative ($p < .07$). Although replication of the latter findings with a larger sample is advisable, they suggest that those concerned with how defection may be viewed by others and who felt they had control over negative events (e.g., their partner defecting) are more likely to cooperate. These results may parallel those indicating that if people feel they can control their partner's moves in PD games, they are more likely to cooperate. Morris, Sim, and Giroto (1998) examined the roles of the control and matching heuristics in decisions to cooperate on one-trial PD games. They were especially interested in the influence of "illusions of control" — that people make decisions as though their actions could influence an outcome — when control over the outcome is not possible. They examined people's cooperative behavior in one-trial PDs, where participants did not know their partner located at a distant location and had no knowledge of whether they would cooperate or defect in the future. They found that participants appeared to cooperate under these conditions in an illusory attempt to control or influence their partner's behavior when in fact this was not possible. Self-deception may involve promotion of "illusions of control" that, in turn, are related to both tendencies toward cooperation and depression. Depressed individuals do not exhibit the illusion of control (Abramson & Alloy, 1981; Alloy, Abramson, & Viscusi, 1981) and instead perseverate about their inability to control their lives.

That a moderate tendency to self-deceive is functional, promoting both mental health and reasonable levels of cooperation, was a basic premise of this study. The finding that mild depressive symptomology was related to both low levels of self-deception and cooperation supports this view. One interpretation of this finding, consistent with the view of Nettle (2004), is that depression represents a maladaptive consequence of low dispositional self-deception. An alternative view is that under some circumstances, low mood or depression could serve a number of adaptive functions (e.g., Allen & Badcock, 2003; Andrews & Thomson, 2009; Gilbert, 2006; Hagen, 2002, 2003; Klinger, 1975; Nesse, 2000; Price et al., 1994; Watson & Andrews, 2002; Welling, 2003). Of the adaptationist models of depression, the most relevant to the current results are those that consider depression as a means of maintaining or renegotiating social position or social contracts or solving problems within social relationships. In particular, Hagen (1999, 2002, 2003) suggested that in a closed interdependent social system, where the cooperation of all members of a group is crucial, depression might act like a union strike serving to highlight the worth of a worker not receiving an adequate share of the benefits of their labor. Benefits may be inadequate as a result of newly encountered environmental exigencies (e.g., death of a spouse or inadequate support) or the intentional

monopolizing of benefits by powerful members of the group. By withdrawing productivity or reciprocity a depressed individual draws attention to their value within the group. This may provide them with the bargaining power necessary to renegotiate the social contract in their favor and increase the assistance they receive from others (Cline-Brown & Watson, 2005; Hagen, 1999, 2002, 2003; Watson & Andrews, 2002). The present findings provide both evidence that depression involves the withholding of reciprocity in social relationships and a basis for generating further testable predictions. For example, if depression represents a useful bargaining tactic, people should be more forgiving of defecting individuals who are perceived as depressed. Similarly, the triggering of cheater detection mechanisms (e.g., Cosmides & Tooby, 1992) should be moderated by a putative cheater's perceived level of depression. In other words, gleeful defectors and cheaters should be more readily detected, and dealt with more severely, than depressed defectors and cheaters. In the tit-for-tat strategy of the PD game, defecting after a partner has defected is a retaliatory act, serving to punish cheaters (Axelrod, 1980), but less retaliation would be expected when playing against someone who is depressed. Hokanson and colleagues (1980) found that nondepressed individuals in a high-power position were more likely to cooperate with depressed partners than individuals with depression in the same position, suggesting normal individuals were displaying greater trust and forgiveness toward distressed partners. Furthermore, whereas high dispositional self-deception may promote optimism and cooperation, repeated exposure to negative events, including social cheating, may reduce levels of self-deception, increasing both depression and defection. In this sense, both depression and defection could be seen as related strategies for dealing with adverse social conditions through the withdrawal of reciprocity.

In conclusion, adaptationist models provide interesting explanations for reported links among low self-deception, depression, and reduced cooperation, placing these phenomena within a cohesive and greater context. First, if moderate levels of self-deception function to isolate threatening thoughts from consciousness, depression should involve a reduced ability to self-deceive. Second, if self-deception results from the inaccessibility of one's own and another's selfish motivations in favor of access to positive representations of self and others, self-deception should be positively associated with cooperation. Finally, if depression represents a bargaining tool in social relationships or is triggered when individuals find themselves in adverse circumstances beyond denial, then individuals with depression should exhibit both low levels of self-deception and withhold cooperation.

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