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3   Predicting cooperation in competitive conditions: The role of sportspersonship, moral

4   competence, and emotional intelligence

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7   John L. Perry[1]

8   &

9   Peter J. Clough[2]

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11   [1]Corresponding Author: Department of Sport, Health and Exercise Sciences, University of Hull,

12   Cottingham Road, Hull, HU6 7RX, UK. Email: john.perry@hull.ac.uk

13   [2]Department of Psychology, Manchester Metropolitan University, 53 Bonsall Street, Manchester

14   M15 6GX, UK. Email: p.clough@mmu.ac.uk

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1   **Abstract**

2   *Objectives:* The purpose of the present study was to examine the predictive capabilities of

3   sportspersonship, moral competence, and emotional intelligence on cooperation in varying

4   competitive conditions. *Design:* An experimental study was conducted, examining responses in a

5   prisoner's dilemma game with manipulated conditions. *Method:* Forty-three participants were

6   randomly assigned to an accumulative or competitive condition, in which they contested 10

7   rounds of choosing to cooperate or defect. *Results:* Whether the condition was accumulative or

8   competitive did not significantly predict cooperation. In the final round of each contest however,

9   cooperation was significantly reduced. Sportspersonship predicted a significant amount of

10   cooperation percentage, while final round cooperation was predicted by emotional intelligence.

11   *Conclusions:* Cooperation is in part determined by individual levels of sportspersonship in all

12   conditions except when actions are free of future consequence. In such conditions, emotional

13   intelligence appears to be a stronger indicator of cooperation. The implications of the study are

14   that researchers and practitioners should consider how to develop sportspersonship and

15   emotional intelligence to boost cooperation in various domains.

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17   Keywords: Cooperation; Game Theory; Sportspersonship; Morality; Emotional Intelligence

1   Predicting cooperation in competitive conditions: The role of sportspersonship, moral

2   competence, and emotional intelligence

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4   Cooperation is essential for ensuring that individuals are able to work together to

5   maximise individual and team performance in a variety of domains. Despite this, research into

6   the personal characteristics beyond the Big 5 personality traits that predict cooperation is

7   relatively scarce. Simpson's paradox (1951) refers to findings demonstrating that most

8   participants choose to cooperate more than defect in a prisoner's dilemma game (Flood, 1952),

9   despite that to defect is more fruitful (Dawes & Thaler, 1988). There are several competing

10   explanations for observed cooperation. Chater, Vlaev, and Grinberg (2008) explain that people

11   will continue to cooperate because of the higher average payoff. Two further competing

12   explanations include strong reciprocity and evolutionary legacy perspective. Strong reciprocity

13   (e.g., Fehr & Gintis, 2007; Gintis, 2000) suggests that a social norm evolves whereby

14   cooperation is expected and therefore adhered to. In trying to extract the determinants of

15   cooperation, Yang, Li, and Zheng (2013) found that reciprocity, perceived control, and risk

16   taking all accounted for a relatively equal proportion of variance.

17   The strong reciprocity explanation has been vehemently rejected by some researchers.

18   Burnham and Johnson (2005) and Hagen and Hammerstein (2006) suggest that the only real

19   explanation for electing to cooperate is because they have not truly understood the game.

20   Rather, they propose that evolutionary legacy hypothesis means behavioural anomalies are

21   caused by human ancestral and modern conditions, whereby conserved brain systems misfire

22   to motivate behaviour that are no longer relevant to a modern society (Burnham & Hare,

1   2007). This theory has received partial support from Kanazawa and Fontaine (2013), who

2   found a positive correlation with general intelligence and defection.

3   The purpose of the present study was to examine the extent to which participants

4   cooperate or defect in a prisoner's dilemma game under varying conditions, and how this was

5   predicted by sportspersonship, moral competence, and EI. Research examining cooperation in

6   sport settings is scarce. One would expect that an individual's level of sportspersonship would

7   likely pre-dispose them towards cooperative behavior, but this has not previously been

8   empirically examined. To determine if sportspersonship is a meaningful predictor of

9   cooperation, we identified two concepts that have previously been identified as predictors of

10 cooperation and tested the extent to which sportspersonship was able to explain variance in

11 cooperation over and above these. Specifically, we assessed emotional intelligence, which

12 Nelissen, Dijker, and De Vries (2007) reported as indicative of cooperation, and moral

13 competence, which has been associated with cooperative moral decision making (Kutnick &

14 Brees, 1982).

15   Participants took part in an accumulative condition, whereby prizes were awarded

16 relative to total points accrued, or a competitive condition, whereby prizes were awarded relative

17 to league table position. The final round of each contest presented a situation whereby there was

18 no consequence. This represented the final round of a prisoner's dilemma match against an

19 opponent, where there is no opportunity for revenge tactics should a participant suffer from

20 defection. We hypothesized the following:

21   1. Participants cooperate more frequently in a cooperative condition than a competition

22   condition

1   2. Sportspersonship, EI, and moral competence significantly predict cooperation in

2   accumulative but not competitive conditions

3   We made no hypothesis regarding cooperation or the predictors of it in the final round of

4   each contest.

5   **Methods**

6   **Participants**

7   Forty-three participants (males = 32; females = 11) aged from 18 to 40 years ($M = 20.33$,

8     $SD = 3.60$), who indicated that they participated in competitive team ($n = 36$) and individual ($n =$

9   7) sports with an average playing experience of 10.86 years ($SD = 6.07$) volunteered to take part

10   in the study.

11   **Measures**

12   *Sportspersonship* was measured using the 24-item compliant and principled

13   sportspersonship scale (CAPSS; Perry et al., 2015). Subscales represent compliance towards

14   officials, towards rules, not legitimising injurious acts, respect for opponent, and game

15   perspective. Items are graded on a 4-point Likert-type scale anchored at 1 = *strongly disagree*

16   and 4 = *strongly agree*.

17   *Trait EI* was assessed using the 153-item trait emotional intelligence questionnaire

18   (TEIQue; Petrides & Furnham, 2003), which includes 15 facets of EI and four higher-order

19   factors; wellbeing, self-control, emotionality, and sociability. Participants are required to

20   respond to each item on a 7-point Likert-type scale from 1 = *completely disagree* to 7 =

21   *completely agree*.

22   *Moral competence* was assessed using the moral competence test (MCT; Lind, 1998,

23   2008), which presents participants with two moral dilemmas. Each dilemma presents a short

1   background story culminating in a moral action. The participant must then indicate the extent

2   to which they accept or reject (-3 = *I strongly reject*, +3 = *I strongly accept*) the action and six

3   arguments supporting and six rejecting arguments the protagonist's solution. Each argument

4   presents a moral orientation aligned to Kohlberg's stages of moralisation (1976). A moral

5   judgement competence score (C-score; 1-100) is calculated as an individual's total response

6   variation.

7   **Procedure**

8   Following ethical approval from a higher education institution in the UK, data

9   collection took part on four separate days, two of which were designated as accumulative, and

10   two were competitive. In the accumulative condition, participants received three pence for

11   every point they scored over the course of the day. In the competitive condition, the following

12   award structure was used: First: £50, Second: £25, Third: £10. Those who finished outside of

13   the top three places did not receive a prize. Points for cooperation (C) and defection (D) were

14   awarded as follows: CvC: 3,3; DvD: 2,2; CvD: 1,4; DvC: 4,1.

15   Between eight and 13 participants took part on each day. After providing informed

16   consent and completing the psychometric measures, participants were assigned to separate

17   holding rooms to ensure that they were not aware of their opponent. A round-robin tournament

18   then took place. Each fixture consisted of 10 rounds, each requiring the participants to choose

19   to cooperate or defect by holding up a card with a printed "C" or "D", both visible to the lead

20   researcher, would then read the results with appointed scores to both participants. In total,

21   there were 218 fixtures of 10 rounds each and therefore 2180 rounds in total. Each day took

22   approximately four hours to complete.

1   **Data Analysis**

2   　　　Analyses included screening data, conducting an independent-samples and paired-

3   samples *t*-test to test condition and tactical effects respectively, and bivariate correlations

4   examined the strength of relationship between CAPSS subscales, EI, moral competence and

5   cooperation in both conditions. To examine the predictive properties of condition and personal

6   characteristics, cooperation was inserted as a dependent variable in a multiple linear regression

7   model. Given the moderate sample size for type of analyses undertaken, post-hoc power

8   analyses were conducted for each *t*-test and multiple regression and are reported as 1-β.

9   <div align="center">**Results**</div>

10   **Descriptive Statistics**

11   　　　Tests for normality revealed no issues with skewness or kurtosis (< 2) for all dependent

12   variables. Internal consistency reached satisfactory levels for all variables ($\alpha \geq .70$). There were

13   no significant correlations with moral competence and any dimension from the CAPSS or the

14   TEIQue. Correlations between sportspersonship and EI are presented in Table 1. To correct for

15   type 1 error as a result of multiple comparisons in all statistical analyses, Benjamini-Hochberg *q*

16   was derived from calculating the False Discovery Rate (FDR; Benjamini & Hochberg, 1995).

17   The null hypothesis was rejected if and only if $p < q$ and the 95% confidence interval did not

18   contain zero. The strength of the relationships between sportspersonship factors and emotionality

19   was considered worthy of further exploration. Therefore, bivariate correlations were calculated

20   between sportspersonship factors and the emotionality subscales. Relationships existed

21   throughout the sportspersonship and emotionality correlation matrix but the largest relationships

22   were found between emotionality factors and game perception.

23   **Hypothesis 1: Condition Effects**

1   An independent-samples *t*-test examined the condition effects by testing for differences

2   in all dependent variables in accumulative and competitive conditions. Sportspersonship, moral

3   competence, and trait EI variables were included to screen for potential sampling effects. No

4   significant differences indicated that results were not brought about by one group coincidentally

5   obtaining individuals higher in sportspersonship, EI, or moral competence. The only significant

6   difference between groups was in sociability ($t(40) = 2.30$, $p < .05$, $d = .71$, $1\text{-}\beta = .61$). Contrary

7   to the hypothesis, no significant differences were detected for cooperation between groups.

8   However, there was a significant difference ($t(28.20) = 2.85$, $p < .01$, $d = .87$, $1\text{-}\beta = .79$) in the

9   final round, as cooperation was significantly higher in the accumulative condition. Similarly,

10   those in the accumulative condition were significantly more likely to cooperate after being

11   suckered in the previous round ($t(37) = 2.52$, $p < .05$, $d = .79$, $1\text{-}\beta = .71$) than participants in the

12   competitive condition. Overall, a greater proportion of the total points available were achieved in

13   the accumulative condition than the competitive condition ($t(27.21) = 4.50$, $p < .001$, $d = 1.43$, 1-

14    $\beta > .99$). A paired samples *t*-test to examine the condition effects between the first round

15   cooperation and final round cooperation revealed a large significant difference ($t(42) = 8.74$, $p <$

16    $.001$, $d = 2.67$, $1\text{-}\beta > .99$).

17   **Hypothesis 2: Sportspersonship, EI, and Moral Competence Effects**

18   Clear positive correlations between sportspersonship subscales and the overall

19   percentage of cooperation were evident, with all correlations significant except compliance

20   towards rules (Table 2). Although there was a trend to suggest a positive relationship between

21   sportspersonship and first round cooperation, there was not enough certainty to reject the null

22   hypotheses. There was no relationship between sportspersonship and cooperation after being

23   suckered. Moral competence correlated positively with cooperation but only significantly so

1   with first round cooperation. EI was positively correlated with cooperation in the final round.

2   The clearest relationship between cooperation and EI was on the emotionality subscale, which

3   as identified earlier, is most closely linked to sportspersonship.

4   To test the predictive capabilities of sportspersonship, moral competence, and EI

5   effects, while controlling for condition effects, we examined a linear multiple regression

6   model. The condition was entered at Step 1, moral competence and trait EI were entered at

7   Step 2, and sportspersonship was entered at Step 3 to determine the variance predicted by it

8   over and above other variables. In total, four regression models were examined (Table 3) with

9   overall, first round, final round cooperation as the dependent variables presenting a significant

10   effect after step 3 (cooperation percentage: $F(4, 37) = 5.44$, $p < .01$, $R^2 = .37$, $p < .01$, $1-\beta >$

11   .99; first round: $F(4, 37) = 2.64$, $p < .05$, $R^2 = .22$, $p < .05$, $1-\beta > .99$; final round: $F(4, 37) =$

12   4.87, $p < .01$, $R^2 = .35$, $p < .01$, $1-\beta > .99$). The condition had no effect on overall or first round

13   cooperation, but explained a significant amount of variance in the final round cooperation

14   ($F(1, 40) = 7.51$, $p < .01$, $R^2 = .16$, $p < .01$, $\beta = -.45$, $1-\beta = .73$). Moral competence explained

15   some variance in first round ($\beta = .27$) cooperation, but not with enough certainty to reject the

16   null hypothesis. Trait EI explained significant variance in final round cooperation ($\beta = .43$),

17   and sportspersonship explained a significant proportion of variance in overall cooperation ($\beta =$

18   .54).

Discussion

20   The primary purpose of this study was to examine the predictive capabilities of

21   sportspersonship, moral competence, and EI on cooperation in varying competitive conditions.

22   The results indicated that these characteristics had a greater influence on the cooperation than

23   situation factors, with the exception of when responding to being suckered. Essentially, in

1   accumulative and moderately competitive conditions, cooperation is reasonably well predicted

2   by sportspersonship. However, in a situation where there is no future consequence, EI is the

3   greatest predictor. It appears that emotionality is the gateway towards understanding cooperation

4   in such circumstances.

5   It was notable that the condition had no effect on overall or first round cooperation. This

6   suggests that the extent to which the situation is competitive does not influence how people

7   approach it, but it does impact on how they respond to events during competition. In first round

8   cooperation, moral competence, EI, and sportspersonship all predicted a statistically insignificant

9   amount of variance. However, in the final round of each game, emotional intelligence became

10   the key indicator. This suggests that moral decision-making is governed more by how people

11   engage with emotion when, at least in competitive game scenarios, they are in a vulnerable

12   position.

13   Sportspersonship, moral competence, and EI are complex psychological structures,

14   requiring a level of reflection that demonstrates sophisticated cognitive functioning. They are

15   also all positively associated with cooperation. This result, plus the finding that cooperation

16   deteriorates with competition, questions Burnham and Hare's (2007) suggestion that

17   cooperation is a lack of understanding of the situation, although the increased reliance upon EI

18   in the final round could be construed as indicative of logical misfiring. The significance of

19   empathy means that the concept of strong reciprocity (Fehr & Gintis, 2007), is a seemingly

20   plausible explanation of cooperation in the final round.

21   This study was able to predict substantive variance in cooperation, however, it does

22   have some limitations. Firstly, the data collection procedure required approximately four hours

1   of participant time, which reduced the potential for a large sample. It also used a fairly

2   homogenous sample in terms of age.

3   This study has implications for enhancing cooperation. By improving sportspersonship,

4   for which Perry, Clough, and Crust (2013) provide some applied recommendations, we can

5   enhance cooperation. Researchers specifically interested in cooperation should strive to

6   examine the role of emotionality more specifically, empathy in competitive conditions.

7   In sum, the condition was only an indicator of cooperation when participants were

8   responding to a change in situation, sportspersonship is a significant predictor of cooperation

9   generally and emotion is a key indicator of cooperation in extremely competitive

10   circumstances.

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1 *Table 1.*

2 **Bivariate correlations between sportspersonship and trait EI factors**

Variable	Officials	Rules	Injurious Acts	Opponent	Game Perspective	Sportspersonship
Emotional Intelligence						
Wellbeing	-.16 (-.47, .19)	-.26 (-.49, .01)	-.06 (-.36, .26)	-.16 (-.46, .17)	-.20 (-.43, .02)	-.18 (-.47, .13)
Self-control	.17 (-.17, .51)	-.03 (-.37, .30)	.05 (-.29, .39)	.00 (-.39, .42)	.12 (-.21, .43)	.10 (-.27, .46)
Emotionality	.45* (.13, .68)[1]	.39 (.10, .62)[1]	.46* (.12, .77)[1]	.38 (.09, .59)[1]	.59* (.35, .77)[1]	.55* (.25, .77)[1]
Sociability	-.05 (-.38, .24)	-.19 (-.48, .10)	-.24 (-.50, .04)	-.05 (-.37, .28)	-.18 (-.48, .11)	-.16 (-.45, .13)
Global EI	.12 (-.21, .42)	-.08 (-.33, .17)	.05 (-.27, .38)	.06 (-.25, .38)	.06 (-.21, .32)	.07 (-.26, .37)
Emotionality subscale						
Emotion perception	.18 (-.14, .49)	.09 (-.20, .38)	.17 (-.17, .50)	.08 (-.23, .36)	.32* (.01, .63)[1]	.22 (-.15, .54)
Emotion expression	.40* (.11, .63)[1]	.34 (.08, .57)[1]	.31 (.00, .61)[1]	.24 (-.05, .48)	.37* (.14, .56)[1]	.40* (.14, .62)[1]
Trait empathy	.31 (.04, .52)[1]	.29 (-.05, .54)	.38 (.12, .61)[1]	.32 (.04, .56)[1]	.46* (.21, .66)[1]	.42* (.18, .63)[1]
Relationships	.25 (-.01, .50)	.24 (-.08, .52)	.34 (.06, .60)[1]	.33 (.04, .58)[1]	.40* (.07, .65)[1]	.38* (.08, .64)[1]

3 *Statistically significant at $p < q$. 95% bias-corrected confidence intervals are presented in parentheses

4 [1]Confidence interval does not contain zero.

5

1   *Table 2.*

2   **Pearson correlation coefficients for sportspersonship and cooperation**

Variable	% cooperation	First round cooperation	Final round cooperation	Cooperation after suckered
Officials	.52* (.30, .69)[1]	.33 (.00 .61)[1]	.10 (-.19, .37)	.23 (-.13, .59)
Rules	.25 (-.04, .51)	.14 (-.14, .43)	.12 (-.23, .41)	.00 (-.31, .31)
Injurious acts	.43* (.17, .63)[1]	.16 (-.11, .43)	.21 (-.15, .49)	.03 (-.35, .38)
Opponent	.43* (.17, .62)[1]	.15 (-.21, .45)	.11 (-.30, .49)	-.03 (-.46, .37)
Game perspective	.45* (.16, .68)[1]	.20 (-.11, .57)	.12 (-.33, .50)	.00 (-.38, .45)
Sportspersonship	.51* (.26, .70)[1]	.25 (-.06, .53)	.16 (-.26, .50)	.08 (-.35, .45)
Moral competence	.29 (-.02, .65)	.36 (.10, .62)[1]	.17 (-.09, .47)	.16 (-.12, .49)
Wellbeing	.18 (-.18, .53)	.03 (-.32, .38)	.33 (.03, .57)[1]	.20 (-.13, .51)
Self-control	.20 (-.18, .53)	.21 (-.13, .53)	.34 (-.02, .67)	.23 (-.17, .60)
Emotionality	.60* (.39, .78)[1]	.57* (.35, .75)[1]	.40 (.12, .62)[1]	.32 (.02, .58)[1]
Sociability	-.02 (-.39, .29)	-.01 (-.36, .30)	.24 (-.03, .47)	.27 (-.03, .53)
Global EI	.32 (-.01, .60)	.31 (-.01, .57)	.51* (.18, .72)[1]	.40 (.05, .66)[1]

3   *Statistically significant at $p < q$. 95% bias-corrected confidence intervals are presented in parentheses

4   [1]Confidence interval does not contain zero.

1   *Table 3.*
2   **Predictors of cooperation**

	B (95% CI)	SE B	β	t	p	R^2
Dependent variable = Cooperation percentage						
Step 1						.01
Condition	-.27 (-17.09, 16.57)	8.33	-.01	-.03	.98	
Step 2						.09
Moral competence	.34 (-.26, .94)	.30	.18	1.16	.26	
Trait EI	17.60 (-5.71, 40.92)	11.52	.24	1.53	.14	
Step 3						.37**
Sportspersonship	26.96 (13.41, 40.50)[1]	6.68	.54	4.03	< .001	
Dependent variable = First round cooperation						
Step 1						.00
Condition	4.05 (-17.19, 25.30)	10.51	.06	.39	.70	
Step 2						.15
Moral competence	.63 (-.10, 1.37)	.36	.27	1.75	.09	
Trait EI	23.84 (-4.79, 52.47)	14.14	.26	1.69	.10	
Step 3						.22
Sportspersonship	17.90 (-1.14, 36.94)	9.40	.28	1.91	.07	
Dependent variable = Final round cooperation						
Step 1						.16**
Condition	-22.07 (-38.34, -5.80)[1]	8.05	-.40	-2.74	< .01	
Step 2						.30**
Moral competence	.22 (-.33, .78)	.27	.11	.83	.42	
Trait EI	34.81 (12.66, 56.96)[1]	10.89	.43	3.20	< .01	
Step 3						.35
Sportspersonship	11.20 (-3.35, 25.75)	7.18	.21	1.56	.13	
Dependent variable = Cooperation after suckered						
Step 1						.04
Condition	-9.92 (-25.72, 5.88)	7.82	-.20	-2.23	.21	
Step 2						.13
Moral competence	.14 (-.42, .70)	.28	.08	.50	.62	
Trait EI	20.41 (-1.48, 42.29)	10.81	.29	1.89	.07	
Step 3						.14
Sportspersonship	3.87 (-11.32, 19.07)	7.50	.08	.52	.61	

3   *Statistically significant ΔR^2 at $p < .05$, **$p < .01$.
4   [1]Confidence interval does not contain zero.
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