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Competitively Contingent Rewards and Intrinsic Motivation: Can Losers Remain Motivated?[1]

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We explored the effects on intrinsic motivation and ego-involved persistence of winning versus losing a competitively contingent reward and, for losers, the additional effects of receiving either positive performance feedback or performance-contingent rewards. Winners were more intrinsically motivated than losers. Losers given an explicit normative standard who received positive feedback for meeting the standard were more intrinsically motivated than losers who did not receive the additional standard and feedback. Losers who received a performance-contingent reward for reaching the same explicit standard displayed less intrinsic motivation behaviorally assessed than did losers who got positive feedback, but the two groups did not differ on self-reported enjoyment. Effects on enjoyment were mediated by perceived competence, but effects on free-choice behavior were not. People who lost the competition showed more ego-involved persistence than people who won or did not compete.

KEY WORDS: competition; rewards; intrinsic motivation.

Competition between individuals or teams is a central aspect of most sports and of many other life activities in our modern culture. In some competitive situations, people's goal is simply to win either because winning is enjoyable and exiciting for them or, alternatively, because it helps them bolster their fragile egos. In other competitive situations, people's goal may include not only winning but also obtaining

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additional outcomes such as symbolic or monetary rewards that have been made contingent upon winning. It is common, for example, to see professional athletes compete in tournaments where the purse runs into tens of thousands of dollars, and the real plum for winning may be product endorsements that yield many times the value of the purse.

Remarkably, financial inducements have even made their way into amateur athletics. Some parents offer financial incentives to their children for winning at sports or other competitive activities, and the use of incentives for amateurs has, to some extent, become institutionalized. Many college athletes receive large scholarships based only on their athletic accomplishments and potentials, and further, for example, in some amateur Belgian soccer leagues, players as young as 16–17 years of age can earn monetary rewards equivalent to about $100 when their team wins a game.

Financial incentives are not the only source of pressure on individuals to win competitions. Parents of even very young athletes may become highly ego involved in the outcome of their children's little league or high-school games, pressuring the children to try harder and, perhaps, to win at whatever cost. As well, fans and televisions audiences can add to the stress that some college athletes feel to win big games. It seems that, for some people, playing well is not enough.

Research on Competition, Rewards, and Intrinsic Motivation

Given the importance in modern culture of competition and rewards made contingent upon winning a competition, studies have begun to examine the effects of these factors on people's intrinsic motivation for the activity at which they compete. The following gives an overview of the types of research that have been done.

When people compete against each other, either individually or as teams, doing the same activity at the same time with each side trying to win, it is referred to as direct competition. The current study involved direct competition and previous competition studies that are herein reviewed were also of that type. In experiments of direct competition, the three most basic between-group comparisons that can be made are (1) winners can be compared to losers; (2) either winners or losers can be compared to participants in a control group where participants did the same activity alone, without competing and without any performance feedback (i.e., a no-competition/no-feedback control group); and (3) either winners or losers can be compared to participants in a control group where participants worked in the presence of another person (typically an experimental accomplice) who did the same activity with participants being told simply to do their best, with no mention of trying to win (i.e., a no-competition/implicit-feedback control group). In this third case, the control-group participants get feedback in the sense that they see (or are told) which participant did the activity more quickly (or, in some other way, did it better). Using the former type of control group allows investigators to determine the

combined effects of the competition and the competitive outcome (e.g., competing and winning), whereas the latter type of control group allows investigators to determine the effects of the competition independent of the competitive outcome.

Studies of competition can be further complicated by the addition of rewards. For example, as is frequently done in the real world, participants can be told that the winner of a competition will receive a reward. Such rewards are referred to as competitively contingent rewards (Ryan, Mims, & Koestner, 1983), and in real situations with competitively contingent rewards some people are winners and some are losers. Thus, with competitively contingent rewards, the participants (a) compete, (b) have a competitive outcome—that is, they either win or lose the competition, and (c) either receive or do not receive the desired reward.

Competitively contingent rewards differ from performance-contingent rewards (Ryan et al., 1983), which is another relevant reward contingency, in the following way. Performance-contingent rewards are given to people for doing well at a task. This contingency is frequently instantiated by telling participants that they will get a reward if they perform well according to some normative standard—for example, if they perform better than 80% of the other participants who have done the task. Thus, whereas competitively contingent rewards are given for beating an opponent in a direct competition, performance-contingent rewards are given for doing better than an implicit or explicit normative standard. Both a competitively contingent reward condition and a performance-contingent reward condition can be compared to either (a) controls group that do not get feedback comparable to that which is implicit in winning (or losing) a competitively contingent reward or in receiving (or not receiving) a performance-contingent reward; or (b) control groups that do get either expected or unexpected feedback that is comparable to the feedback that reward-group participants received implicitly.

An additional complexity of the competition and reward studies is that the interpersonal context within which people compete or get rewards can either be relatively pressuring and controlling or relatively nonpressuring and informational (Deci & Ryan, 2000). That is, the individuals administering the competition or rewards can pressure people either to win or to do well enough to get a reward, or the individuals can be relatively nonpressuring, giving people the opportunity to choose for themselves how hard to try to win or to earn a reward.

Finally, studies of intrinsic motivation have employed two different measures of intrinsic motivation as a dependent variable. Some have used the so-called free-choice measure in which, following the experimental period, participants are left alone in the experimental room with the freedom to either do more of the target activity or to do alternative activities, including just day dreaming. The amount of time they spend with the activity is generally considered a measure of their intrinsic motivation (Deci, 1971). The second assessment approach uses self-reports. Because intrinsic motivation for a target activity is assumed to be based in the interest people have for that activity, people's reports of how interesting and enjoyable they find the activity is also used as a measure of their intrinsic

motivation. In the literature review that follows, in all cases when we refer to the effect of some independent variable on intrinsic motivation, the effect has been found with the free-choice behavioral measure (and in some cases, also with the self-report measure) unless we say otherwise.

There have been a number of studies relating competition (either with or without rewards) to intrinsic motivation, and four findings have emerged that are directly relevant to the formulation of the current study.

First, a study by Deci, Betley, Kahle, Abrams, and Porac (1981) found that when two individuals worked in the presence of each other on the same puzzle-solving activity, those participants who had been told to try to beat their opponent at solving the puzzles displayed less subsequent intrinsic motivation for the puzzle-solving activity than did those who had simply been told to do their best and solve the puzzles as quickly as they could, with no mention being made of winning or doing better than the other person. Importantly, in that study, participants in the competitive group won the competition and participants in the comparison group got the same implicit positive feedback because they could see that they had solved the puzzles faster than the other participant, who was an experimental accomplice. As such, the comparison group was a no-competition/positive-feedback control group, so the conclusion was that winning a direct, face-to-face competition decreased intrinsic motivation relative to doing the same task in the presence of the other and receiving implicit positive feedback about one's performance. In short, when working in the presence of another and receiving positive performance information were held constant, competition undermined intrinsic motivation, suggesting that competition itself, independent of the competitive outcome, is controlling.

There is some recent evidence that personality factors such as level of achievement motivation may, to some extent, moderate the detrimental effect on intrinsic motivation of direct competition (Epstein & Harackiewicz, 1992; Tauer & Harackiewicz, 1999). However, the detrimental main effects has been replicated by various researchers (e.g., Vallerand, Gauvin, & Halliwell, 1986) and the moderation effect has been found only with self-reports of enjoyment. Thus, it does appear that there is a detrimental main effect for competition when the information implicit in the competitive outcome is held constant.

The second relevant finding was that the interpersonal climate within which a competition occurred moderated the competition's effects on intrinsic motivation (Reeve & Deci, 1996). Specifically, when participants won a competition within a controlling, pressuring interpersonal context, their intrinsic motivation was undermined relative to that of participants who won the competition in a context that did not pressure them to beat the opponent. Thus, a pressuring interpersonal context has a negative main effect on intrinsic motivation when competition and the competitive outcome are held constant. Further, the Reeve and Deci study introduced a no-competition/no-feedback control group where participants worked alone rather than in the presence of another. Results showed that winning a competition in a context that was not pressuring enhanced intrinsic motivation relative

to a no-competition/no feedback control group, whereas winning the competition in a pressuring context resulted in the same level of intrinsic motivation as being in the no-competition/no-feedback control group.

When the Reeve and Deci (1996) study is considered together with the Deci et al. (1981) study, the findings indicate that winning a competition tends to undermine intrinsic motivation relative to a no-competition/positive-feedback control group where the presence of another and the positive information implicit in winning a competition are held constant. Further, competing in a pressuring interpersonal context can make the experience even more controlling. However, winning a competition does not undermine intrinsic motivation relative to not competing and not receiving any positive feedback; in fact, winning a competition can lead to more intrinsic motivation than this no-competition/no feedback control condition if the competition occurs in a nonpressuring context. In short, then, competition itself (independent of the information contained in the competitive outcome) tends to undermine intrinsic motivation; positive competence feedback contained in winning or doing well tends to enhance intrinsic motivation; and the interpersonal context can influence which effect is more dominant.

The third relevant finding is that participants who lost a competition had less subsequent intrinsic motivation than those who won (Reeve, Olson, & Cole, 1985; Vallerand & Reid, 1984). In other words, when competition itself was held constant across conditions, the competitive outcome (i.e., the information contained in winning vs. losing) significantly affected intrinsic motivation. Further, compared to a no-competition/no-feedback control group, those who lost a competition in a nonpressuring setting showed diminished intrinsic motivation whereas those who won the competition in a nonpressuring setting showed enhanced intrinsic motivation (Reeve & Deci, 1996). Thus, positive competence feedback inherent in winning tends to enhance intrinsic motivation whereas negative competence feedback inherent in losing tends to diminish it relative to a no-competition/no-feedback control condition.

The fourth relevant finding was that, when participants within a group setting competed against the other members of the group to win a tangible monetary reward, the average intrinsic motivation of all participants was less than that of the control group members who did not compete for a reward (Pritchard, Campbell, & Campbell, 1977). In other words, when the winners and losers were considered together, these competitively-contingent rewards undermined intrinsic motivation (relative to a no-competition/no-feedback/no-reward control group). The effect size on intrinsic motivation was very large (see Deci, Koestner, & Ryan, 1999). However, because the data were collapsed across winners and losers, it is unclear whether the effects of competing for a reward had the same effect for winners as for losers. In other words, it has not been determined whether the negative effect on intrinsic motivation of a competitively contingent reward condition (relative to a no-competition/no-feedback/no-reward control group) applies to both winners and losers.

Winning Versus Losing a Reward

Because it has seemed clear that failing to get a reward could imply incompetence and lack of control over outcomes and thus undermine motivation, the vast majority of experiments examining the effects of rewards on intrinsic motivation have allowed all participants in the experimental condition to receive the rewards. This way, any negative effects could not be a function of failing to attain the target goal. In all of the approximately 100 tangible-rewards experiments included in the Deci et al. (1999) meta-analysis of tangible-reward effects on intrinsic motivation, every participant in every reward condition received a tangible reward.

The Pritchard et al. (1977) study is the one reward study where not every participant in the experimental group received a reward, and it also happened to be the only study where the reward contingency involved direct competition (i.e., where the reward was competitively contingent). Thus, it is the only study that included some participants who won the reward and some who lost it. As noted, however, because of the way the data were presented, the effects on intrinsic motivation of winning versus losing a competitively contingent reward were not examined.

Accordingly, in the present study we explored the effects of winning versus losing a competitively contingent monetary reward. While they were competing, participants knew that winners would get a $3 reward but that losers would not, and we examined the subsequent intrinsic motivation of winners relative to losers of this reward. Presumably, because winning a competition when no rewards were at stake led to higher intrinsic motivation than losing, winning a competitively contingent reward should also lead to more subsequent intrinsic motivation than losing the reward. Thus, we predicted that winners would display higher subsequent intrinsic motivation than losers.

Many real-world situations in which people compete for rewards tend to be relatively pressured—that is, beating the opponent and winning the reward tends to be fairly strongly emphasized. Accordingly, to increase ecological validity, in the competitive conditions of this study, the importance of winning was made quite salient, so it was more pressured than the low-pressure competition condition of the Reeve and Deci (1996) study but a bit less pressured than the high-pressure condition of that study. Further, in the present study, we compared the subsequent intrinsic motivation of those who won versus lost the competitively contingent reward to that of participants in a no-competition/no-feedback/no-reward control group similar to that used by Reeve and Deci. We expected that the difference in the intrinsic motivation of winners versus losers of the competitively contingent reward in this moderately pressured context would be primarily a function of the losers having less intrinsic motivation than the control group rather than the winners having more. That is, based on the results of the Reeve and Deci study, we expected that the intrinsic motivation of winners in the relatively pressuring context would not differ significantly from that of the control group.

Intrinsic Motivation and Ego Involvement

When people are intrinsically motivated for an activity, they do it volitionally and they willingly persist at the activity when no external contingencies are present, experiencing interest and enjoyment while doing so. People can, however, also be motivated by other internal processes that lead them to persist at an activity even in the absence of external contingencies. One such process is ego involvement (Ryan, 1982). When people's egos—that is, their feelings of worth—are contingent on some outcome such as doing well at a task, they may be very motivated to engage that task, with a sense of resolve and determination, feeling pressure and tension about having to do well. Ryan, Koestner, and Deci (1991) found that when people became ego involved and then failed to do well at the ego-involving activity, they tended to be persistent and insistent with respect to the activity—that is, they had a high level of ego-involved motivation. Accordingly, Reeve and Deci (1996) found that losers of a competition, although their intrinsic motivation for the task was significantly undermined, did have a high level of ego-involved motivation for the task. Apparently, the competition had gotten them ego involved in the task, and losing made them determined to get better at the task in order to prove their worth. As such, we expected that, in the current study, participants who lost the competitively contingent rewards would show an enhanced level of ego-involved motivation for the activity, needing to do better at in order to feel better about themselves.

Is There Any Hope for Losers' Intrinsic Motivation?

In the present study, we also examined possible ways of counteracting what we expected would be strongly negative effects on intrinsic motivation of losing the competitively contingent reward. We began by nothing that, with competitively contingent rewards, losers get the negative performance feedback implicit in losing and they also fail to get the desired rewards. Thus, we considered two possible approaches to counteracting the negative effects of losing the competitively contingent reward: (1) providing positive feedback on the quality of performance, and (2) providing a performance-contingent reward to make up for the competitively contingent reward they failed to win. Consider these in turn.

Positive Feedback for Losers

Positive performance feedback has generally been found to enhance intrinsic motivation (Deci et al., 1999). Further, the initial study of the effects of competition on intrinsic motivation (Deci et al., 1981) indicated that when people received implicit positive feedback, namely seeing that they solved puzzles faster than another participant, they were significantly more intrinsically motivated than people

who won a competition. Together these findings suggest that positive performance feedback can be a powerfully positive motivator.

We therefore hypothesized that, if losers of a competitively contingent reward received positive competence feedback about their actual performance at the activity, they would be significantly more intrinsically motivated than comparable losers who did not receive the positive feedback. In other words, the positive feedback should help to counteract the negative feedback implicit in losing a competitively contingent reward. In the present experiment, one of the groups of participants who were told they could win a competitively contingent reward but in fact lost it were also told at the beginning of the experiment that if they solved three out of the four puzzles, they would be doing very well because they would have performed better than 70% of previous participants. These participants, all of whom did in fact solve at least three puzzles, thus got positive feedback about their performance, and we expected them to show significantly higher intrinsic motivation than those who lost the competitively contingent reward but got no positive performance feedback.

Monetary Rewards for Losers

As noted, losing a competitively contingent reward means not only that participants get implicit negative feedback but also that they fail to attain their goal of receiving the reward. As such, it is possible that, even though they lose the competitively contingent reward, receiving a reward for doing well (i.e., a performance-contingent reward) that is comparable in magnitude to the reward they lost might counteract the negative effect of losing the competitively contingent reward.

Tangible rewards, collapsed across type of contingency, have been found meta-analytically to undermine both behavioral and self-report measures of intrinsic motivation (Deci et al., 1999). However, the meta-analysis showed that performance-contingent rewards undermined the behavioral measure of intrinsic motivation, but not self-reports of enjoyment. Our interpretation of this seemingly disparate result is based in the idea that people enjoy receiving a performance-contingent reward because it represents competence affirmation. Specifically, although tangible performance-contingent rewards tend to be experienced as controlling and thus to decrease self-initiation of the activity, the message of competence conveyed by the performance-contingent rewards promotes *enjoyment*. As such, a performance-contingent reward should be nearly as effective as positive feedback in terms of promoting enjoyment because in both conditions people will feel more competent. However, if people are controlled by a performance-contingent reward, they should not self-initiate the activity in the absence of an operative reward contingency, because research has shown that perceived competence does not enhance intrinsically motivated *behavior* if people do not feel autonomous (Fisher, 1978; Ryan, 1982). Accordingly, we hypothesized that performance-contingent rewards

given to the losers of a competitively contingent reward would lead to less intrinsic motivation behaviorally assessed than would positive feedback given to losers of the competitively contingent reward, but that the levels of enjoyment for the two groups would not differ.

Recently, although the evidence for this is relatively scant, Harackiewicz and Sansone (2000) argued that a condition in which participants get performance-contingent rewards for matching evaluative norms should yield higher levels of intrinsic motivation than a condition in which people are told their performance will be evaluated and are then given positive feedback for matching evaluative norms. (Those investigators made no distinction between the two measures of intrinsic motivation.) In the current study, losers in the positive-feedback condition and the performance-contingent rewards conditions were given evaluative norms before they began the puzzle solving. Thus, counter to our predictions that performance-contingent rewards (relative to positive feedback) would undermine free-choice behavior but that the two groups would not differ on enjoyment, if Harackiewicz and Sansone were correct, then the performance-contingent rewards condition should have a higher level of both free-choice behavior and self-reported enjoyment than would the positive feedback condition.

Summary and Hypotheses

The present study contained five experimental conditions. Condition 1 was a no-competition/no-feedback/no-reward control group in which participants worked alone on the target puzzle-solving activity used in all conditions. In the other four conditions, participants competed against an apparent other participant in the next room to try to win a $3 competitively contingent reward. In Condition 2, the first of the four competitively contingent reward conditions, participants were told that they won the competition and the $3 reward, whereas, in the other three competitively contingent reward conditions, participants were told that they lost the competition and the $3. In Condition 3, the first of the three losing conditions, participants experienced only the loss of the competitively contingent reward. In Condition 4, the second losing condition, participants lost the competitively contingent reward but received positive competence feedback for solving at least three out of the four puzzles, and thus performing better than 70% of previous participants. Finally, in Condition 5, the third losing condition, participants lost the $3 competitively contingent reward but they received a $3 performance-contingent reward for solving at least three out of the four puzzles and thus performing better than 70% of previous participants.

We made five primary predictions that were analyzed with contrasts and are shown in Table I. Specifically, we hypothesized that the intrinsic motivation of losers of the competitively contingent reward (with no positive feedback) would be significantly lower than that of winners of the competitively contingent reward

Table I. A priori Contrast Effects to be Tested

	No-competition, no-feedback, no-reward control group (Condition 1)	Winning c-c reward (Condition 2)	Losing c-c reward (Condition 3)	Losing c-c reward, receiving positive feedback (Condition 4)	Losing c-c reward, receiving p-c reward (Condition 5)
Intrinsic motivation as the dependent variable					
Losing c-c reward relative to winning c-c reward	0	1	−1	0	0
Losing c-c reward relative to no-competition, no-feedback, no-reward control group	1	0	−1	0	0
Losing c-c reward with positive feedback relative to just losing c-c reward	0	0	1	−1	0
Losing c-c reward, but getting p-c reward relative to losing c-c reward, but getting positive feedback	0	0	0	1	−1
Ego-involved persistence as the dependent variable					
Losing c-c reward versus winning c-c reward and no-competition, no-feedback, no-reward control group	3	3	−2	−2	−2

Note. c-c reward = competitively contingent reward; p-c reward = performance-contingent reward.

(Contrast 1) and of the no-competition/no-feedback/no-reward control group (Contrast 2). Next, we hypothesized that the intrinsic motivation of losers of the competitively contingent reward who received positive performance feedback would be significantly higher than that of losers with no positive feedback (Contrast 3). Further, we hypothesized that the free-choice behavior of losers of the competitively contingent reward who received performance-contingent rewards would be significantly lower than that of the losers of the competitively contingent reward who received positive performance feedback (Contrast 4), although the enjoyment of the two groups was not expected to differ. Finally, we expected the ego-involved motivation of the three groups of participants who lost the competitively contingent reward would be higher than that of the participants who won the competitively contingent reward and the participants in the no-competition/no-feedback/no-reward control group who would not have become ego involved (Contrast 5).

Measuring Intrinsic Motivation and Ego-Involved Persistence

As already noted, past experiments have used two different measures of intrinsic motivation. The behavioral measure assesses behavior during a so-called free-choice period subsequent to the performance period, and the self-report measure assesses participants' reports of interest/enjoyment for the activity, which is also done following the performance period. Consider the behavioral measure because it relates not only to intrinsic motivation but also to ego involvement that can be easily stimulated in competitive situations.

The free-choice behavioral measure involved leaving participants alone with the target activity and interesting alternative activities for a period of time when the participants assumed that no one would know what they were doing and they would not be asked to work more with the target activity (Deci, 1971). If participants spent time with the target activity, they were assumed to be intrinsically motivated. The number of seconds spent with the target activity was the measure of intrinsic motivation.

This free-choice behavioral measure has been widely used, and it worked extremely well to assess intrinsic motivation following an experimental manipulation in which an external contingency was presented and subsequently removed. However, it ran into problems when research began to investigate the effects of ego involvement on intrinsic motivation (Ryan, 1982). Specifically, when the experimenter did a manipulation that resulted in people's egos or feelings of self-worth becoming contingent on their performance at an activity, there was no easy way for the experimenter to remove the contingency. In other words, whereas an experimenter can make clear before the free-choice period begins that a tangible-reward contingency is no longer operative, there is no comparable way to terminate an ego-involvement contingency because it is within the person's psyche. Thus, following an experimental period in which people became ego involved in their

performance on a task, they may continue to work on the activity during a free-choice period in order to buttress a threatened sense of worth. Thus, the free-choice period behavior could reflect either intrinsic motivation or ego-involved persistence.

Two approaches have been used for dealing with this problem. First, Ryan et al. (1991) suggested that if free-choice behavior is really intrinsically motivated, the person should be experiencing interest/enjoyment while doing it; in other words, the free-choice behavior and self-reports of interest should be positively correlated. On the other hand, if the free-choice behavior is ego involved, free-choice behavior and self-reported interest should not be correlated. Ryan et al. further suggested that when ego-involved people do badly at a task, they will be driven to persist during the free-choice period in order to regain a sense of self-worth, whereas if they do well, they will not need to persist because their good performance will have confirmed their worth. The researchers did an experiment in which, in some conditions, any free-choice behavior was expected to be intrinsically motivated and in others (viz., those that were ego-involving where people did poorly) free-choice behavior was expected to be ego-involved persistence. Results indicated that in the conditions where intrinsic motivation was expected, free-choice behavior was significantly positively correlated with expressed interest; whereas, in the conditions where ego-involved persistence was expected, free-choice behavior was not correlated with expressed interest. As such, Ryan et al. were able to separate the two types of free-choice behavior. However, the disadvantage to this approach is that the free-choice period behavior was defined as either intrinsic motivation or ego-involved persistence at the level of the experimental condition rather than within individuals.

The second approach to distinguishing intrinsic motivation from ego-involved persistence during a free-choice period was suggested by Reeve and Deci (1996). They partitioned the free-choice measure into two categories: (a) working with new puzzle configurations, and (b) working with the previously encountered configurations. The reasoning was that, if people are intrinsically motivated for an activity, they would seek novelty and challenge because of interest, so working with new puzzles was considered an indicator of intrinsically motivated persistence. In contrast, if participant are working to regain their feelings of worth—for example, after having failed while ego involved—they would return to the puzzles on which they had done poorly in order to try to feel better about themselves. Thus, working with old (previously-encountered) puzzles was considered an indicator of ego-involved persistence.

As already mentioned, competition tends to promote ego involvement (Butler, 1989; Frederick & Ryan, 1995), and failing at a task in which one is ego involved can promote ego-involved persistence. It was thus necessary to have measures of both intrinsic motivation and ego-involved persistence in the current study. We used free-choice time spent with new puzzles as the primary measure of intrinsic motivation and we considered engagement with old puzzles a measure of ego-involved

persistence. As already noted, we hypothesized that ego-involved persistence (viz., time spent on old puzzles) would be greater in the lose conditions than in the win and control conditions.

METHOD

Participants

A total of 25 male and 55 female University of Rochester undergraduates volunteered for the experiment and received extra course credit for doing so. Most of the participants were Caucasian in the age range of 18–23 years old.

Experimental Task

The experimental task was a spatial-relations puzzle called Happy Cubes. Past studies with college students working on the Happy Cubes puzzle indicate that participants find it to be a highly interesting activity and persist at it during the free-choice period (e.g., Reeve et al., 1985; Reeve & Deci, 1996). Participants were provided with drawings of three-dimensional configurations that they were to reproduce with the mechanical puzzle.

Procedure

Participants arrived at a waiting area where they were welcomed by an experimenter and taken to the experimental room. The experimenter then went to an adjoining room from where he observed participants through a one-way mirror and communicated with them over an intercom. The experimenter explained that the purpose of the study was to examine motivation for working on a spatial-relations puzzle task. Participants were randomly placed in one of the five experimental conditions. Those in the four competitive conditions were told that their same-sex opponent had already arrived and was settled in the adjoining room. The experimenter used a sex-appropriate name to refer to that "other participant." In reality, there was no person in the next room, but the purpose of this pretext was to help create a competitive atmosphere. On the table in all five conditions were (a) the Happy Cubes puzzle, (b) two drawings of three-dimensional configurations that the participants would attempt to duplicate with the puzzle during a practice period, and (c) a selection of popular magazines that served as an alternative activity during a later free-choice period. The experimenter explained that there would be a series of six puzzles to solve. The first two of which were there on the table and would be the practice puzzles. The other four would be used subsequently as the actual performance puzzles.

Before starting the practice puzzles, participants received experimental instructions appropriate to their experimental condition. In the no-competition/no-feedback/no-reward control group (Condition 1) the experimenter simply asked the participants to work on the puzzles, "doing your individual best." In each of the four competitively contingent reward conditions, the experimenter told participants the following: "The purpose of this competition is to try to outperform the other person by solving your puzzles faster than he or she." Thus, participants were led to believe that they would to be competing against the same-sex participant who had been said to be in the adjacent room. "To win the game you will need to solve the puzzles more quickly than your opponent. You will have four puzzles to solve and you will have four minutes to solve each puzzle. It does not matter whether you figure out how the puzzle works, the important thing is to win the competition. So, focus your attention on being the winner." In all four competitively contingent reward conditions (Conditions 2–5), participants were told that "you can make $3 by winning the competitive game; in other words, you will get $3 if you solve more of the puzzles more quickly than your opponent." People in Conditions 4 and 5 were given the following additional instructions: "if you manage to solve three out of the four puzzles correctly, regardless of whether you are slower or faster than your opponent, you will have done better than 70% of the participants in our previous studies. So, the purpose of this competition is twofold: first, to try to beat the other person by solving your puzzles faster than he (or she) does, and second, to try to surpass the 70th percentile performance standard by correctly solving at least three of the four puzzles within the allotted time." People in Condition 5 were then given an additional instruction, namely that "if you meet the 70th percentile performance standard by correctly solving at least three out of the four puzzles, you will receive a $3 reward. So, there are two ways to earn a reward of $3; one way is through beating the other person and the other is by performing well, namely by solving three out of four puzzles correctly. If you solve three puzzles and win the game you will earn $6." In order to ensure that all participants in Conditions 4 and 5 would be able to solve at least three of the four puzzles we did extensive pretesting. Our aim was to find four puzzles that would be as challenging as possible but would allow all participants to solve at least three of the four.

The amount of money given for the performance-contingent reward was $3 just as the amount given for the competitively contingent reward was $3. This was done so the losers of the competitively contingent reward in Condition 5 would receive the same amount of money from the performance-contingent reward that the winners of the competitively contingent reward received in Condition 2, and also so the losers in Condition 5 would lose the same amount as the losers in Conditions 3 and 4 who ended up without any monetary reward. The losers in Condition 5 would have imagined that the winners had made three dollars more than they themselves received (because they would have believed that the winner

would get $3 for winning and $3 for solving at least three puzzles). Similarly, the losers in Conditions 3 and 4 would have imagined that the winners had made $3 more than they did from winning the competition (these participants would not have known anything about a performance-contingent reward). As such, for each comparison, the amount of money believed to have been won and/or lost was controlled across relevant comparisons.

Before starting the performance puzzles and after receiving the instructions, participants in all conditions were given two practice puzzles. After the first, participants in the four competitively contingent reward conditions (Conditions 2–5) were informed that their opponent had failed to solve the puzzle in the allotted time, so the participant would have won on that puzzle. After the second practice puzzle, participants were told that their opponent had solved the second puzzle faster than they did. Puzzles had been preselected so that the participants would not be able to solve the second practice puzzle within the allotted time, but could solve the first practice puzzle. This matching of practice outcomes in the competition conditions was intended to convey the impression that the two people were roughly of equal ability and was also intended to create the perception of a challenging game. After the two practice trials the experimenter told participants the practice period was over.

The experimenter then entered the room to remove the practice configurations and leave six more configurations. Four of these configurations were for the performance phase of the experiment and were put on one end of the table. The other two were placed on the other end of the table so participants could work on new puzzles during the subsequent free-choice period. The period of working on the performance puzzles then began. In each of the competitively contingent reward conditions, the experimenter provided comparison feedback after each trial by telling the participants over the intercom which of them (i.e., the participant or the "confederate" opponent) had won on that puzzle. The feedback that was provided had been predetermined according to condition. The win versus lose outcome was manipulated by the experimenter as follows. The score of the competitive set of four performance puzzles was always 3-1. Participants in the win condition (Conditions 2) were told they won the first, third, and fourth trial and the opponent had won the second trial. Participants in the lose conditions (Conditions 3–5) were told they lost the first, third, and fourth trial, but they had won the second trial. This way, the score after two trials was equal (1-1) in all competitively contingent reward conditions to further the feelings of competition and challenge. If participants won a puzzle, they had to wait an additional minute or so, in order to give the impression that their opponent was still working on the puzzle.

After the four performance puzzles were completed, participants in all competitive conditions were given the results of the competition, and those in Conditions 4 and 5 got additional feedback. Specifically, participants in Condition 2 were informed that they had won the competition and would receive their $3 for winning at the end of the experiment. Participants in Conditions 3, 4, and 5 were

informed that they had lost the competition and would not receive the competitively contingent reward. In Conditions 4 and 5, participants were told that, "although you lost the competition, you still managed to solve at least three out of the four puzzles correctly. I can tell you that you did very well because you reached the performance standard of doing better than 70% of the participants in previous experiments." For participants in Condition 5, the experimenter also said, "So, at the end of the experiment you will receive the $3 reward I promised you." Because the four performance puzzles had been pretested all participants were able to solve at least three of the puzzles within the allotted time, so all competitive losers in Condition 4 received the positive feedback and all competitive losers in Condition 5 receive the performance-contingent reward.

After the four performance trials, the experimenter entered the experimental room and told participants that the puzzle-solving phase of the experiment was over and that he needed to go to another room to get a final questionnaire for them. Because the appropriate questionnaire was to be prepared by the computer based on their performance, it would take him just a few minutes to get the two correct questionnaires and drop off the one for the opponent. The participants were left alone for a 6-min free-choice period, during which they could do whatever they wanted to do in the experimental room until the experimenter returned. During this period an observer recorded the amount of time the participants spent on the new and the old puzzle configurations. The observers had been trained to be able to look through the one-way window and identify whether particular puzzles were the performance-period puzzles (i.e., old puzzles) or the free-choice-period puzzles (i.e., new puzzles). After the free-choice period, the experimenter reentered the room, administered the postexperimental questionnaire, debriefed the participants, and gave the reward to those who had been told they would receive it.

Behavioral Measure

The behavioral measure of intrinsic motivation was taken during the 6-min free-choice period subsequent to the feedback that was provided at the end of the performance period. Specifically, the amount of time participants spent working with new puzzles during this free-choice period was recorded by the observer who was blind to the hypotheses and experimental conditions. The amount of free-choice time spent on previously-encountered (i.e., old) configurations was also recorded as the measure of ego-involved persistence.

Questionnaire Measures

Participants completed a questionnaire after the free-choice period. This post-texperimental questionnaire included 13 items (scored on 7-point scales), 7 items

measuring "enjoyment of the activity" (e.g., "I enjoyed doing this puzzle-solving task very much."; $\alpha = .90$) which was used as the self-report measure of intrinsic motivation; and 6 items measuring "perceived competence" (e.g., "I think I'm pretty good at this activity"; $\alpha = .93$) which was used as a manipulation check to ensure that winners felt more competent than losers and that losers who got positive feedback felt more competent than losers who did not. Also, because past studies have shown that preceived competence mediated the effects on intrinsic motivation of winning versus losing a competition and of positive feedback, its inclusion allowed us to test whether it would mediate any condition effects in this study.

RESULTS

Preliminary Analyses

We began by examining the effectiveness of the two approaches to differentiating intrinsic motivation from ego-involved persistence, namely, the within-person and the within-group approaches. We used as a criterion that free-choice behavior theorized to reflect intrinsic motivation would be correlated with enjoyment whereas free-choice behavior theorized to reflect ego-involved persistence would not. First, we considered the within-person approach by correlating self-reports of enjoyment with the two types of free-choice behavior—working with new puzzles versus working with previously-encountered puzzles. As in Reeve and Deci (1996), a significant positive correlation was found between working on new puzzles and enjoyment, $r(78) = .23$, $p < .05$, but working on old puzzles was not correlated with enjoyment, $r(78) = .05$, $p < .64$, thus suggesting that time spent working on new puzzles is a good index of intrinsic motivation (see Table II).

Second, we examined the group-level approach by correlating total free-time behavior (the sum of the time spent working on new puzzles and old puzzles) with self-reported enjoyment in Conditions 1 and 2 versus Conditions 3–5 to examine whether total free-choice behavior would tend to be more reflective of intrinsic motivation in the former two conditions and of ego-involved persistence in the latter

Table II. Correlations Among All Variables

	1	2	3	4	5
1. Perceived competence	—				
2. Enjoyment	.56**	—			
3. Time spent on new puzzles	.17	.23*	—		
4. Time spent on old puzzles	−.03	.05	−.18	—	
5. Total time spent on puzzles	.15	.25*	.88**	.32**	—

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

three. Ryan et al. (1991) argued that ego-involving conditions (e.g., competition) where people get negative feedback are the most likely to lead to ego-involved persistence during the free-choice period. Accordingly, in conditions where there was implicit negative feedback from losing the competition (Conditions 3–5), total free-choice behavior and enjoyment were not correlated, $r(46) = .16$, $p < .40$, whereas, in conditions with no competition or no implicit negative feedback (Conditions 1 and 2), the magnitude of correlation between total free-choice behavior and enjoyment was more than twice as large and nearly significant, $r(30) = .34$, $p < .06$. This is the first study in which the within-person and the group-level approaches were both considered, and these preliminary results suggest that both approaches are reasonable ways to distinguish the two types of persistence.

In the next preliminary analysis, we examined perceived competence as a manipulation check using protected t tests. Competitors in Condition 2 who won the reward felt more competent than losers in Condition 3 who got no feedback and no reward, $t(75) = 4.09$, $p < .001$. Losers in Condition 4 who received positive performance feedback felt significantly more competent than loser in Condition 3 who received neither feedback nor rewards, $t(75) = -2.95$, $p < .01$. Finally, losers in Condition 5 who got performance-contingent rewards did not differ in their level of perceived competence from losers in Condition 4 who got positive performance feedback, $t(75) = -0.32$, $p < .75$. As such, the manipulations did work in that losing diminished feelings of competence whereas positive feedback and performance-contingent rewards enhanced feelings of competence.

Primary Analyses

A MANOVA was conducted across the five conditions with all five behavioral and self-report variables included. The overall F-value for the Pillai's procedure was significant, $F(16, 300) = 2.49$, $p < .001$. Subsequently a one-way ANOVA was performed for each of the variables, and then the hypothesized contrasts were tested. The cell-means appear in Table III.

The five experimental conditions differed significantly on the intrinsic motivation behavioral measure of working on new puzzles, $F(4, 75) = 4.48$, $p < .01$, and on perceived competence, $F(4, 75) = 4.89$, $p < .001$. The conditions were marginally different on self-reported enjoyment, $F(4, 75) = 2.01$, $p < .10$, on ego-involved persistence (i.e., playing with old puzzles), $F(4, 75) = 2.37$, $p < .06$, and on total free-choice behavior (i.e., the sum of working on old and new puzzles), $F(4, 75) = 2.02$, $p < .10$.

Contrast Analyses

Next, we performed contrasts using protected t tests to examine the hypotheses about intrinsic motivation and ego-involved (i.e., internally-controlled)

Table III. Means and Standard Deviations for Perceived Competence, Enjoyment, and Number of Seconds Spent on the New or/and Old Puzzles

	No-competition, no-feedback, no-reward (Condition 1)		Winning c-c reward (Condition 2)		Losing c-c reward (Condition 3)		Losing c-c reward, receiving positive feedback (Condition 4)		Losing c-c reward, receiving p-c reward (Condition 5)	
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
Perceived competence[a]	4.88	0.99	5.27	1.01	3.66	1.34	4.82	1.11	4.94	1.06
Enjoyment[a]	5.31	0.98	5.34	0.78	4.62	1.14	5.42	0.85	5.15	0.74
Time spent on new puzzles	205.1	144.1	217.4	132.9	95.0	132.1	199.6	153.9	66.4	95.1
Time spent on old puzzles	18.3	45.8	6.6	13.8	27.5	42.2	33.8	75.1	78.3	124.7
Total time spent on puzzles	223.4	151.77	224.0	133.7	122.5	148.1	233.4	154.2	143.5	140.2

Note. c-c reward = competitively contingent reward; p-c reward = performance-contingent reward. $n = 16$ per cell.
[a]Response rates varied between 1 (*Completely Disagree*) and 7 (*Completely Agree*).

persistence. First, as predicted for Contrast 1, participants who lost the competition and got neither positive feedback nor rewards (Condition 3) spent less time with the new puzzles during the free-choice period, $t(75) = 2.60$, $p < .01$, and reported less enjoyment, $t(75) = 2.28$, $p < .03$, than did those who won the competition and got the contingent reward (Condition 2). Further, as predicted for Contrast 2, losers of the competition were less intrinsically motivated on both the free-choice measure, $t(75) = 2.34$, $p < .02$, and the self-report measure, $t(75) = 2.14$, $p < .04$, than were participants in the no-competition/no-feedback/no-reward control group (Condition 1).

Now consider the three groups who lost the competitively contingent reward. As predicted for Contrast 3, those who received specific positive feedback for performing above the 70th percentile (Condition 4) were significantly more intrinsically motivated than losers who got no positive feedback (Condition 3), as reflected in both the free-choice measure, $t(75) = -2.22$, $p < .05$, and the self-report measure, $t(75) = -2.50$, $p < .01$. Further, as expected for Contrast 4, providing performance-contingent rewards to losers for performing above the 70th percentile (Condition 5) resulted in significantly less free-choice behavior on new puzzles than providing the comparable positive feedback without rewards, $t(75) = 2.95$, $p < .01$, but there was not a difference between the two groups in reported enjoyment, $t(75) = 0.94$, $p < .35$. Parenthetically, although these contrasts were not specified in the hypotheses, losers who received performance-contingent rewards did not differ in their level of free-choice behavior from losers who got neither feedback nor rewards, $t(75) = 0.64$, $p < .54$, but the performance-contingent rewards group was marginally higher on enjoyment, $t(75) = -1.69$, $p < .09$.

Concerning ego-involved persistence, our one prediction for Contrast 5 was that the three groups of losers would be higher in ego-involved persistence (i.e., time spent on the old puzzles) than would winners and control group (i.e., non-ego-involved) participants, and the contrast supported this hypothesis, $t(75) = -2.10$, $p < .05$. This finding supplemented the preliminary, group-level analysis that showed that total free-choice behavior in the lose conditions tended to reflect more ego-involved persistence whereas in the win and control conditions it tended to reflect more intrinsic motivation.

Mediational Analyses

We assessed perceived competence primarily as a manipulation check; however, because it varied by condition as reported above and because it has mediated the effects on intrinsic motivation of winning versus losing a competition in previous studies (Vallerand & Reid, 1984), we examined whether it would mediate the intrinsic motivation contrast effects in this study. As a preliminary analysis, we tested whether actual performance varied by condition in order to ensure that any mediation by perceived competence of the contrast effects would not be a

function of actual puzzle performance. We performed a one-way ANOVA on the five conditions for the average time taken by participants to solve the four puzzles and found that the result was not significant, $F(4, 75) = 0.77$, $p < .55$.

To examine the degree to which perceived competence mediated the condition effects on intrinsic motivation, we used the regression procedure suggested by Judd and Kenney (1981), first for intrinsic motivation assessed as new-puzzle behavior and then for intrinsic motivation assessed as enjoyment. Mediation can be concluded if a significant effect of the independent variable on the dependent variable decreases in magnitude and becomes nonsignificant when the mediator (perceived competence) is added to the equation, assuming the mediator remains a significant predictor of the outcome.

Consider new puzzle behavior. All four hypothesized effects (namely, win versus lose; control group versus lose; lose versus lose plus positive feedback; and lose plus positive feedback versus lose plus performance-contingent reward) which were tested with Contrasts 1–4 for new puzzle behavior were significant, as outlined above. For each, then, the first requirement of the Judd and Kenny procedure was satisfied—the independent variable was significantly related to the dependent variable. However, as can be seen in the correlation matrix of Table II, perceived competence was not significantly correlated with new-puzzle behavior, so the requirement specified by Judd and Kenny that the mediator be related to the dependent variable was not met. Accordingly, we concluded that perceived competence did not mediate any of the contrast effects on the free-choice measure of intrinsic motivation.

Now consider the dependent variable of self-reported enjoyment. As predicted, only three of the four contrast effects were significant in the ANOVAs—namely, win versus lose; control group versus lose; and lose versus lose plus positive feedback. Thus, the first requirement for mediation was met for these three relations. Thus, we examined possible mediation by perceived competence for each of these relations.

We began by examining the effect of winning versus losing (with no additional feedback or reward). The contrast effect did predict perceived competence, $\beta = .57$, $F(1, 30) = 14.67$, $p < .001$, and perceived competence predicted enjoyment when the effect of condition was controlled, $\beta = .54$, $F(2, 29) = 8.33$, $p < .01$, so these requirements for mediation were met—namely, the independent variable predicted the mediator and the mediator predicted the dependent variable when the independent variable was controlled for. Finally, the significant effect of the competitive-outcome contrast became nonsignificant as a predictor of enjoyment when perceived competence was added to the equation, $\beta = .06$, $F(2, 29) = 0.08$, $p < .77$. As such, the analyses suggest that the effect on enjoyment of winning versus losing a competitively contingent reward was mediated by perceived competence.

Then, we turned to whether the undermining of enjoyment by losing relative to the control group was mediated by perceived competence. In this analysis, the

contrast for the manipulated independent variable predicted perceived competence, $\beta = .47$, $F(1, 30) = 8.52$, $p < .01$, and the relation of perceived competence to enjoyment when controlling for the effect of the contrast was also significant, $\beta = .40$, $F(2, 29) = 5.24$, $p < .05$, so these requirements for mediation were met. Finally, the contrast effect of losing relative to the control group became nonsignificant as a predictor of enjoyment when perceived competence was added to the equation, $\beta = .24$, $F(2, 29) = 1.83$, $p < .19$. Thus, the analyses suggest that the effect on enjoyment of losing a competitively contingent reward relative to a no-competition/no-feedback/no-reward control group was also mediated by perceived competence.

Last, we tested for mediation of the effect on self-reported enjoyment of losing versus losing but receiving positive feedback. The independent variable did predict perceived competence, $\beta = .44$, $F(1, 30) = 7.07$, $p < .05$, and the relation of perceived competence to enjoyment when controlling for the effect of the contrast was also significant, $\beta = .43$, $F(2, 29) = 6.06$, $p < .05$, so these requirements for mediation were met. Finally, the contrast effect of losing relative to losing but getting positive feedback became nonsignificant as a predictor of enjoyment when perceived competence was added to the equation, $\beta = .19$, $F(2, 29) = 1.20$, $p < .28$. As such, the analyses suggest that the effect of losing a competitively contingent reward relative to losing the reward but getting positive feedback was mediated by perceived competence.

DISCUSSION

In the typology of reward contingencies (Deci et al., 1999; Ryan et al., 1983), the competitive contingency, which means receiving a reward for beating an opponent, has been the least studied. The fact that it requires winning makes the contingency quite controlling, and the one published study of people actually competing for rewards showed the contingency to be highly undermining of intrinsic motivation using both the free-choice behavioral measure and the self-report measure (Pritchard et al., 1977). However, it is an interesting contingency because participants who win the reward receive salient competence information. Presumably, for winners, the feedback implicit in the competitive outcome should be very affirming of competence, whereas for losers, it could be quite discouraging, resulting in significantly different levels of intrinsic motivation as was the case with winning versus losing a competition without contingent rewards (Reeve & Deci, 1996; Vallerand & Reid, 1984). Thus far, no experiment had examined the effects of winning versus losing competitively contingent rewards, so the first important finding of the present study was that winners of competitively contingent rewards were significantly more intrinsically motivated than loser, assessed with both free-choice behavior and self-reports of enjoyment. As well, winners felt more competent than losers.

The relations of the intrinsic motivation of a control group to that of the winners and of the losers of a reward depend on what type of control group is used, an issue that is very important in terms of one's conclusions about the effects of competition and competitively contingent rewards. In the first study of competition and intrinsic motivation, winners of a competition were less intrinsically motivated that the control group that did not compete but got positive feedback comparable to that which was implicit in winning the competition (Deci et al., 1981). In a later study, Reeve and Deci (1996) used a control group that did not compete and did not get performance feedback. In that study, winners in a nonpressuring interpersonal ambience were more intrinsically motivated than participants in the no-competition/no-feedback control group, whereas winners in a pressuring interpersonal ambience did not differ in intrinsic motivation from the no-competition/no-feedback control group. Losers, on the other hand, showed substantially less intrinsic motivation than the no-competition/no-feedback control group. Unlike these two previous studies, the present study examined not just competition but winning versus losing a competitively contingent reward. In the present study, which involved competing for a reward in a relatively pressuring interpersonal ambience, we expected and found no difference between the intrinsic motivation of winners and participants in the no-competition/no-feedback/no-reward control group, but losers were significantly less intrinsically motivated than these control-group participants. Together, this set of findings suggests that getting positive feedback in the presence of another doing the same activity is more facilitative of intrinsic motivation than winning a competition against that other. Further, losing a competition or a competitively contingent reward leads to less intrinsic motivation than winning a comparable competition or competitively contingent reward and also to less intrinsic motivation than a control group that does not compete and either does or does not get positive feedback.

Perhaps the most important aspects of the current experiment was the focus on losers. Most previous studies of competition have included only winners, with the exception of a few studies that compared winners versus losers of a competition, and no study of competitively contingent rewards has examined the effects of losing the reward. In the present study, expecting that losing a competitively contingent reward would be quite detrimental to intrinsic motivation (which in fact it was), we examined whether there was any way to ameliorate that negative effect. Because losers of a competitively contingent reward both got implicit negative feedback and lost the reward, we provided one group of losers with positive feedback for meeting a specified standard and another group with performance-contingent rewards for meeting the same specified standard (even though both groups lost the competition). Losers who got neither positive feedback nor performance-contingent rewards served as a comparison group for examining these questions.

Results of the present study revealed that positive performance feedback can indeed go a long way toward counteracting the negative effects of losing. Participants who lost the competition but got positive performance feedback were

significantly more intrinsically motivated than losers who did not get the positive feedback, and the losers with positive feedback did not differ significantly in intrinsic motivation from either the no-competition/no-feedback/no-reward control group or the winners. This set of findings appeared for both the behavioral and self-report measures. It seems therefore that positive feedback about performance is extremely important for maintaining intrinsic motivation in competitive settings. Indeed, as noted, Deci et al. (1981) found that receiving positive implicit feedback in the presence of another doing the same task led to significantly greater intrinsic motivation than winning the competition. In other words, it is positive information rather than winning that is most nourishing of intrinsic motivation (McAuley & Tammen, 1989).

The effects of performance-contingent rewards for losers were more complex and help to sort out some of the confusion in the literature about performance-contingent rewards. The most comprehensive and valid meta-analysis of reward effects showed that performance-contingent rewards undermined the free-choice behavioral measure of intrinsic motivation but did not undermine enjoyment of the activity (Deci et al., 1999). Accordingly, we expected different results on the behavioral versus self-report measure for losers who got performance-contingent rewards. However, in making predictions about performance-contingent-reward effects it is necessary to consider what type of control group is being used. There are three possibilities:(a) a group that gets no rewards and no feedback; (b) a group that gets no rewards but gets unexpected positive feedback comparable to that implicit in the rewards for the experimental group; and (c) a group of participants who get no rewards but are told that their performance will be evaluated and subsequently are given positive feedback comparable to that implicit in the rewards for the experimental group. The Deci et al. meta-analysis showed that performance-contingent rewards undermined free-choice behavior relative to the first two of these control groups. The third group was not included in the meta-analysis because relatively few studies have been done using a control group where participants were told their performance would be evaluated and then were given positive feedback. Counter to our predictions that performance-contingent rewards would be undermining relative to this evaluation-and-positive-feedback control group, Harackiewicz and Sansone (2000) argued that relative to this control group, performance-contingent rewards would enhance intrinsic motivation.

The current study used exactly that control group. The group of losers who got the positive feedback were told before they began that if they solved three out of the four puzzles correctly they would have performed well, better than 70% of previous participants, and subsequently they were told that they had done well by meeting the standard. Results of the study showed that with the free-choice behavioral measure, performance-contingent rewards undermined intrinsic motivation relative to the group of participants who were told they would be evaluated and then got positive feedback, whereas with the enjoyment measure

performance-contingent rewards left intrinsic motivation unchanged relative to the group that got positive feedback for meeting the standard. Thus, the results were in line with the Deci et al. meta-analysis and suggest that performance-contingent rewards tend to undermine intrinsically motivated behavior but leave enjoyment unchanged relative to all three types of control groups outlined above. As such, these results, which supported our hypothesis, failed to support the Harackiewicz and Sansone prediction that performance-contingent rewards would lead to greater intrinsic motivation than this evaluation-and-positive-feedback control group.

There are two points worth making with regard to these results. First, the majority of studies of performance-contingent rewards and of competition done by the Harackiewicz and Sansone group have used only the self-report measure that has tended not to show significant undermining of enjoyment by performance-contingent rewards. It appears that the self-report measure is responsive to any indicator of competence even when the perceived competence does not positively affect the motivation of behavior. Indeed, in the present study, performance-contingent rewards did not undermine enjoyment relative to positive feedback (although it did undermine free-choice behavior). Further, the performance-contingent rewards group had marginally higher enjoyment than the group of losers who got neither feedback nor rewards (although the free-choice behavior of those two groups did not differ). The other point worth noting about these findings is that all participants in both the positive feedback and the performance-contingent rewards groups had lost the competition for rewards, and it is unclear how that might have affected the relative intrinsic motivation of these two groups. Additional research comparing performance-contingent rewards to an evaluation-and-positive feedback control group using participants who had not previously lost a competitively contingent reward would be important before definitive conclusions can be drawn. However, such work has to include both a behavioral and self-report measure of intrinsic motivation if it is to be useful, and it must be done in a way that ego-involved persistence can be differentiated from intrinsic motivation, as was done in the current study.

In this regard, the current study showed that people who competed and did poorly (i.e., lost) persisted longer on old puzzles during the free-choice period than did those who either did not compete or won. Further, for the participants who lost, their total persistence did not relate to enjoyment, further suggesting that their persistence was ego involved. This result is in line with the findings of Ryan et al. (1991) who found such persistence with people who were induced to be ego involved without explicit competition and then performed relatively badly.

One important conclusion that is emerging from the studies of competition and competitively contingent rewards is that positive performance feedback is crucial for maintaining intrinsic motivation in competitive settings. It is more facilitative than winning a competition (Deci et al., 1981), and it can counteract the negative effects of losing a competition or a competitively contingent reward.

In a sense, this suggests that the important thing about a competitive outcome is how people feel about it—how they personally experience it. In fact, a study by McAuley and Tammen (1989) showed that winning versus losing a competition on a familiar activity did not have a significant effect on intrinsic motivation but that people's self-evaluations of how well they did on the task was significantly related to intrinsic motivation. As such, this, along with the finding that winning when feeling pressured to do so has a substantially negative effect on intrinsic motivation indicates that a strong focus on winning, whether by parents, coaches, or athletes, can be quite problematic for people's intrinsic motivation.

It is important to note that the current studies and most of those reviewed in this paper were conducted in psychology laboratories. Clearly, although this allows for the degree of careful control necessary to disentangle what elements in the competitive situation have what effects on intrinsic motivation, it does create a problem for ecological validity. For example, the target activities used in lab experiments are typically novel, whereas in the real world people often compete at activities they have been training at for years and they may have a deep personal commitment to doing well at the activity. In other words, the activities of life at which people complete may be an important part of their identities, and there is little evidence of how the results of laboratory experiments would generalize to such real-world situation.

In conclusion, it seems that trying to win competitions and competitively contingent rewards is becoming more and more prevalent in modern culture, yet it appears that a focus on winning may indeed be counter-productive at least with respect to intrinsic motivation for the target activities. If, instead of emphasizing winning above all else, participants in activities and observers of the activities focused more on good performance than on winning, the results for the participants' motivation is likely to be far more positive.

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