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When People Fall From Grace: Reconsidering the Role of Envy in *Schadenfreude*

Wilco W. van Dijk, Jaap W. Ouwerkerk, Sjoerd Goslinga, Myrke Nieweg, and Marcello Gallucci Vrije Universiteit Amsterdam

Previous research yielded conflicting results concerning the role of envy in predicting *Schadenfreude* (pleasure at another's misfortune). Some studies showed that envy predicts *Schadenfreude*, whereas others did not. Results of the present research reconcile these opposing findings, by showing that envy is a predictor of *Schadenfreude* when the target is similar to the observer in terms of gender. These results suggest that envy predicts *Schadenfreude* when people are confronted with the misfortune of a relevant social comparison other.

Keywords: Schadenfreude, pleasure at another's misfortune, envy

When a misfortune befalls another person, our reactions can take several forms. We can sympathize and have feelings of concern and sorrow for the other (Eisenberg, 2000), but we can also experience Schadenfreude, an emotional reaction defined as taking pleasure in another's misfortune (Heider, 1958). This latter emotional reaction has been related to envy by numerous scholars (Elster, 1989; Heider, 1958; Mora, 1987; Plato 427-348 BC/1925; Spinoza, 1677/2002). Although theoretical accounts of the relationship between envy and Schadenfreude date back to ancient Greek philosophers like Socrates and Plato, empirical support for the posited theoretical link had to wait until the late 1990s, when Smith and colleagues experimentally showed that Schadenfreude is evoked when an envied person experiences a misfortune (Brigham, Kelso, Jackson, & Smith, 1997; Smith, Turner, Garonzik, Leach, Urch-Druskat, & Weston, 1996). However, more recent research challenged these findings by failing to document an association between envy and Schadenfreude (Feather & Sherman, 2002; Hareli & Weiner, 2002). In the present article we propose that these conflicting results can be reconciled by pointing at the specific conditions under which envy does and does not predict Schadenfreude.

Rationale for Linking Envy and Schadenfreude

Envy is elicited when a person lacks another's superior quality, achievement, or possession and either desires it or wishes that the other lacked it (Parrot & Smith, 1993). It is usually a very unpleasant emotion, which can include feelings of inferiority, hostility, and injustice (Parrot, 1991; Smith, 1991). A misfortune befalling an envied other can be pleasing because it cuts away the very basis of envy, it renders the advantaged other less enviable. Moreover, it can trans-

Wilco W. van Dijk, Sjoerd Goslinga, Myrke Nieweg, and Marcello Gallucci, Department of Social Psychology, Vrije Universiteit Amsterdam; Jaap W. Ouwerkerk, Department of Communication Science, Vrije Universiteit Amsterdam.

Correspondence concerning this article should be addressed to Wilco W. van Dijk, Department of Social Psychology, Vrije Universiteit Amsterdam, van der Boechorststraat 1, 1081 BT Amsterdam, The Netherlands. E-mail: ww.van.dijk@psy.vu.nl

form an invidious comparison into a more favorable comparison, providing a relative advantage in comparison with the envied person (Ortony, Clore, & Collins, 1988; Smith, 2000; Smith et al., 1996). Smith and colleagues provided empirical support for the posited link between envy and *Schadenfreude* (Brigham et al., 1997; Smith et al., 1996). In these studies, participants who learned of a misfortune befalling an advantaged person reported more pleasure than when the misfortune befell a less advantaged person. Analyses showed that this effect on *Schadenfreude* was mediated by participants' envy toward the target.

However, more recent empirical studies challenged the view that envy predicts *Schadenfreude*. Hareli and Weiner (2002), for example, found a reliable and strong relationship between hostile feelings (i.e., anger and hate) and *Schadenfreude*, but failed to document a relationship between envy and *Schadenfreude*. Furthermore, Feather and Sherman (2002) found that *Schadenfreude* was predicted by resentment, but not by envy. Thus, the current state of empirical affairs leaves us with opposing views concerning the relationship between envy and *Schadenfreude*. Looking in more detail into previous studies may shed some more light on these conflicting results.

A Closer Look at Previous Studies on Envy and Schadenfreude

Close examination of previous studies on envy and *Schaden-freude* reveals that these studies differ in several important aspects. Two important differences between the studies which do support the relationship between envy and *Schadenfreude* (Brigham et al., 1997; Smith et al., 1996) and those which do not (Feather & Sherman, 2002; Hareli & Weiner, 2002) concern the assessment of envy and the targets with which the participants were confronted.¹

¹ The earlier studies differed also in their experimental procedure. Those studies that did show an effect of envy on *Schadenfreude*, used as stimulus material a videotaped interview with a male student after which an epilogue informed the participants that this student had suffered a recent

In the following sections we will elaborate on how these differences between studies may help to explain their conflicting results.

Assessment of Envy

Previous studies on envy and *Schadenfreude* differed remarkably in their assessment of envy. In those studies that supported the relationship between envy and *Schadenfreude* both benign and hostile aspects of envy were assessed. Whereas in those studies that did not support the relationship between envy and *Schadenfreude* only benign aspects of envy were assessed. In these latter studies envy was explicitly measured in less hostile terms, because it was disputed whether hostile aspects are defining features of envy. Both Feather and Sherman (2002) and Hareli and Weiner (2002) argued that hostile feelings (such as dislike and resentment) are not necessary defining characteristics of envy and should be treated as independent predictors of *Schadenfreude*.

The notion that hostile feelings may set the stage for Schadenfreude has been put forward by numerous scholars (e.g., Ben Ze'ev, 2000; Feather, 1994; Heider, 1958; Leach, Spears, Branscombe, & Doosje, 2003; Ortony, Clore, & Collins, 1988; Spinoza, 1677/2002) and has received considerable empirical support (e.g., Brigham et al., 1997; Feather, 1989; Feather & Sherman, 2002; Hareli & Weiner, 2002; Smith et al., 1996; van Dijk, Ouwerkerk, Goslinga, & Nieweg, 2005). In our view envy does include a hostile component. This hostility may be a defensive response to an unflattering social comparison or an angry response to a sense of injustice (i.e., it is believed that the envied person's advantage is unfair). Without discussing the specific features of the experience of envy in detail, the point we want to make here is that in those studies that did find a relationship between envy and Schadenfreude, the assessment of envy included hostile feelings, whereas this was not the case in studies that did not find a relationship between envy and Schadenfreude. One could argue that exactly those hostile feelings, which were incorporated by Smith and colleagues (Brigham et al.; Smith et al.) in their assessment of envy, were responsible for their findings that envy elicits Schadenfreude. In other words, envy does predict Schadenfreude if hostile feelings are incorporated in the assessment of envy, whereas envy does not predict Schadenfreude if hostile feelings are not incorporated.

misfortune. Moreover, a cover story masked the true purpose of these studies. By contrast, those studies that did not show an effect of envy on *Schadenfreude* used a vignette methodology, in which participants read a vignette about a hypothetical student who suffered a misfortune. Although hypothetical vignettes can make interesting and informative contributions, they have several limitations. Especially for examining less desirable emotions like envy and *Schadenfreude* a vignette methodology may suffer from demands characteristics (e.g., reluctance to admit envy and/or *Schadenfreude*), which might have obscured a possible relationship between envy and *Schadenfreude*. In our present study we carefully designed a credible cover story, in which participants were led to believe that the target person was an actual person. Moreover, our main dependent variables were interpersed between questions especially designed to reinforce the claims made in the cover story that the study was concerned with impression formation and use of different media.

Targets of Schadenfreude

Previous studies on envy and Schadenfreude also differed with respect to the targets to which participants reacted. In those studies that supported the relationship between envy and Schadenfreude, participants reacted mostly to targets with the same gender as themselves. Whereas in those studies that did not support the relationship between envy and Schadenfreude, participants reacted mostly to targets with a different gender as themselves. More specifically, in the supporting studies participants were mostly male (Smith et al., 1996: 56%, 64 out of 114) or only male (Brigham et al., 1997: 100%, 151 out of 151), who were confronted with the misfortune of a male target only. By contrast, in the nonsupporting studies participants were mostly female (Feather & Sherman, 2002: 74%, 136 out of 183; Hareli & Weiner, 2002, Study 2: 70%, 35 out of 50; Hareli & Weiner, Study 3: 70%, 86 out of 123), who were confronted with a misfortune of either a female or a male target (Hareli & Weiner, 2002, Study 2), a misfortune of a male target (Hareli & Weiner, 2002, Study 3), or a misfortune of a gender unspecific target (Feather & Sherman, 2002). This leaves the possibility that support for the relationship between envy and Schadenfreude might be dependent upon the degree of similarity between participants and targets.

Part of the pleasure in Schadenfreude stems from the transformation of an invidious comparison into a more favorable comparison, which highlights one's own advantages rather than disadvantages. This transition provides an easy opportunity for selfenhancement and might be especially pleasing when the social comparison is directly relevant to the self and one's personal goals (Smith, 2000). Tesser's Self-Evaluation Maintenance (SEM) model (Tesser, 1991) posits that affective reactions to social comparison information depend on the performance of the comparison other, the relevance of the performance domain to one's selfdefinition, and the closeness of the relationship with the comparison other. For example, when the relevance of the performance is low, the better the other's performance and the closer the relationship, the more one can bask in the reflected glory of the close other's good performance. However, if the other's performance is highly relevant, one's own performance pales by the outstanding performance of a close other and one will suffer by comparison with this close other's better performance (Tesser, Millar, & Moore, 1988). Following this line of reasoning one could argue that a misfortune happening to a close other, who outperformed oneself on a relevant domain, should be more pleasing than a misfortune happening to a less close outperforming other.

Closeness is defined here in a unit-relation sense, referring to the connection that exists between people who are "perceived as belonging together in a specifically close way" (Heider, 1958, p. 201). People are perceived as belonging together if they can be subsumed by some social construct and research has shown that only a minimal degree of similarity between two people (e.g., sharing birthdays) is necessary to create a sense of "belonging together" (Miller, Downs, & Prentice, 1998). Moreover, research has shown that both the likelihood of comparisons being made and their impact on the self depend on the perceived similarity between a person and a comparison other. Social comparisons that involve someone similar are both more likely and have more impact than social comparisons that involve someone less similar (Gastorf & Suls, 1978; Goethals & Darley, 1977; Lockwood & Kunda, 1997;

Major, Testa, & Bylsma, 1991; Miller, Turnbull, & McFarland, 1988; Tesser, 1991; Wood, 1989). One social construct that might serve as an important basis for similarity is gender (other examples might be nationality, religion, social status, family membership, etc.). Indeed, research has suggested that people have a preference for same-gender comparisons (Major, 1994). This suggests that envy might predict *Schadenfreude* when a misfortune happens to someone with the same gender (i.e., a similar comparison other), whereas envy will not predict *Schadenfreude* when a misfortune happens to someone with a different gender (i.e., a dissimilar comparison other).

The Present Research

In the present research we examine whether the conflicting results from previous studies concerning the relationship between envy and Schadenfreude can be attributed to differences in: (a) assessment of envy, that is, the inclusion or not of hostile feelings in the assessment of envy and/or (b) similarity between participants' gender and targets' gender. The first issue is addressed by assessing envy and hostile feelings independently from each other. This enables us to investigate the individual contributions of both affective reactions in eliciting Schadenfreude. If envy does not predict Schadenfreude above and beyond hostile feelings, the conflicting results of previous studies can be attributed to different assessments of envy. The second issue is addressed by including participants and targets of both genders in our study. This enables us to investigate whether similarity between participants' gender and targets' gender has an effect on the relationship between envy and Schadenfreude. If envy does predict Schadenfreude when participants and targets have the same gender, but does not predict Schadenfreude when they have different genders, the conflicting results of previous studies can be attributed to this (lack of) similarity.

Method

Participants and Design

Participants were 249 students (148 women, 101 men) from the Vrije Universiteit Amsterdam. The mean age of the sample was 20.46 years (SD=2.31 years). Participants were randomly assigned to one of eight conditions of a 2 (Achievements Target: high vs. average) \times 2 (Gender Target: male vs. female) \times 2 (Misfortune: criminal investigation vs. poor academic performance) factorial design. In each of the eight conditions 29 to 34 participants took part. They were paid €5 in exchange for their participation.

Experimental Procedures

Participants were invited to the laboratory to participate in a study on the impact of different media on impression formation. Upon arrival, they were led to separate cubicles containing a computer, which was used to present instructions and stimulus information and to collect data. Participants were told that they would read two interviews on their computer screens, which were part of a series of interviews called "Studying in the 21st century" and were allegedly collected in cooperation with the Vrije Universiteit Amsterdam. Subsequently they were informed that these interviews concerned students who were about to finish their studies. In the first interview a student was interviewed and gave information about how he or she was doing at the university. In this interview the student's achievements and

gender were both varied. In the high achievements condition details were fashioned to make the student appear outstanding in terms of academic achievements, research, and likelihood of getting a good job. In the average achievements condition details were fashioned to make the student appear average in these terms. In the male target condition the student was called Mark. In the female target condition the student was called Marleen. After reading the first interview, participants were asked to respond to statements pertaining to their impressions of the student (see below), and several questions especially designed to reinforce the claim made in the instructions that the study was concerned with impression formation and use of different media.

Following these questions, participants read a second interview, which was allegedly with the supervisor of the student. This second interview informed participants that the student had suffered a recent setback. The student's supervisor told either that the student was caught stealing a laptop from the university and that he or she was subject to a criminal investigation or that the student gave a very poor presentation of his or her thesis and had to rewrite major parts of it. In both cases the student suffered a delay in his or her studies. Finally, following the second interview, participants were asked questions pertaining to their reactions to the misfortune that happened to the student.

Envy, Hostile Feelings, and Schadenfreude

After reading the interview with the student, envy and hostile feelings toward the student were assessed. Envy was assessed by averaging scores on the following four statements (Cronbach's $\alpha = .81$): "I would like to be in the position of [...]," "I'm jealous of [...]," "I would like to be in the shoes of [...]," and "I feel less good when I compare my own results with those of [...]." Hostile feelings were assessed by averaging scores on the following three statements ($\alpha = .84$): "I hate [...]," "I have a feeling of contempt for [...]," and "I dislike [...]."

After reading the interview with the student's supervisor, participants' Schadenfreude was assessed by averaging scores on the following five statements ($\alpha = .82$): "What happened gives me satisfaction," "I like what happened to [...]," "I couldn't resist to smile a little," "Actually I had to laugh a little," and "I feel Schadenfreude." All statements were rated on 7-point scales (1 = strongly disagree; 7 = strongly agree) and presented along with several filler statements concerning multiple aspects of target and misfortune.

Results

To investigate whether (a) envy predicts *Schadenfreude* above and beyond hostile feelings and (b) the relationship between envy and *Schadenfreude* is dependent upon the similarity between participants' gender and targets' gender, a hierarchical regression analysis was performed on *Schadenfreude*.⁴ Envy, hostile feelings, participant's gender, and target's gender were entered in the first step and the resulting model explained 17% of the variance in *Schadenfreude*, F(4, 248) = 13.23, p < .001. Both envy ($\beta = .12$, t[244] = 2.08, p < .05) and hostile feelings ($\beta = .36$, t[244] = .26)

² To increase variability in envy, targets' achievements were varied. Moreover, in order to enhance generalizability of the findings two different misfortunes were used.

³ Depending upon conditions and when appropriate the name Mark or Marleen was used in the statements. Both names are very common in the Netherlands

⁴ Using a regression model enables us to test all relevant main effects and interaction effects in one coherent analysis. Conducting analyses of variances (ANOVAs) yield the same results.

6.26, p < .001) were positively related to Schadenfreude, indicating that Schadenfreude was more intense when envy was stronger and that Schadenfreude was more intense when hostile feelings were stronger. Furthermore, a significant relationship was found between participant's gender and Schadenfreude ($\beta = -.12$, t[244] = -2.07, p < .05), indicating that Schadenfreude was more intense for male participants than for female participants. Next, the three two-way interactions between participant's gender, target's gender, and envy were entered ($R^2_{ch} = .02$), F(3, 241) = 2.17, p <.10. Results indicated that only the Gender Participant \times Gender Target interaction had a significant relationship with Schadenfreude ($\beta = .14$, t[241] = 2.36, p < .05); Schadenfreude was more intense when participant's gender and target's gender were similar. Finally, in Step 3 the Gender Participant \times Gender Target \times Envy interaction was entered ($R^2_{ch} = .02$), F(1, 240) = 5.06, p < .05. Results indicated that this three-way interaction was significant $(\beta = .13, t[240] = 2.25, p < .05)$. Following Aiken and West (1991), we determined the regression slopes for the four different combinations of participant's gender and target's gender separately. Results showed that envy predicted Schadenfreude when either a male participant learned about a misfortune of a male target ($\beta = .13$, t[51] = 2.30, p < .05) or when a female participant learned about a misfortune of a female target ($\beta = .12$, t[74] = 2.04, p < .05). By contrast, envy did not predict Schadenfreude when a male participant learned about a misfortune of a female target ($\beta = -.04$, t < 1, ns.) or when a female participant learned about a misfortune of a male target ($\beta = .02, t < 1, ns$; see Figure 1).⁵

Discussion and Conclusions

Present findings showed that envy predicted *Schadenfreude* above and beyond hostile feelings, indicating that the conflicting results of earlier studies cannot be attributed to the inclusion or not of hostile feelings in the assessment of envy. Both envy and hostile feelings have their own individual contribution to the experience of *Schadenfreude*. Our present findings also showed that envy predicted *Schadenfreude* when participants learned about a misfortune of a same gender target, whereas envy did not predict *Schadenfreude* when participants learned about a misfortune of a different gender target. These results indicate that envy predicts *Schadenfreude* when there is a similarity between the target of *Schadenfreude* and the envying person.

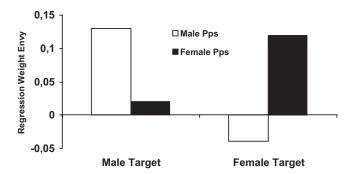


Figure 1. Regression weights (β s) for envy as predictor for *Schaden-freude* toward male and female targets in relation to the gender of the participants.

Results of the present research suggest that earlier findings concerning the role of envy in Schadenfreude are not contradictory, but rather supplementary. These earlier findings have pointed at specific circumstances under which envy is and is not a predictor of Schadenfreude. Studies of Smith et al. (1996) and Brigham et al. (1997) suggested that envy predicts someone's Schadenfreude if a misfortune is befalling a person who is similar and might serve as a relevant social comparison. Studies of Feather and Sherman (2002) and Hareli and Weiner (2002) suggest that envy does not predict someone's Schadenfreude if a misfortune is befalling a person who is less similar and therefore less likely to serve as a relevant social comparison. Taken together, earlier and present findings show that Schadenfreude is a multidetermined emotion, which can be evoked by both hostile feelings and by envy. Both these affective reactions may not be necessary for the elicitation of Schadenfreude, but they might be sufficient to elicit pleasure at another's misfortune.

References

Aiken, L. S., & West, S. G. (1991). Multiple regression: Testing and interpreting interactions. London: Sage Ltd.

Ben-Ze'ev, A. (2000). *The subtlety of emotions*. Cambridge, MA: MIT Press

Brigham, N. L., Kelso, K. A., Jackson, M. A., & Smith, R. H. (1997). The roles of invidious comparisons and deservingness in sympathy and Schadenfreude. Basic and Applied Social Psychology, 19, 363–380.

Eisenberg, N. (2000). Empathy and Sympathy. In M. Lewis & J. Haviland-Jones (Eds.), *Handbook of emotions* (pp. 677–691). New York: Guilford Press.

Elster, J. (1989). The cement of society. New York: Cambridge University Press.

Feather, N. T. (1989). Attitudes towards the high achiever: The fall of the tall poppy. Australian Journal of Psychology, 41, 239–267.

Feather, N. T. (1994). Attitudes towards high achievers and reactions to their fall: Theory and research concerning tall poppies. Advances in Experimental Social Psychology, 26, 1–73.

Feather, N. T., & Sherman, R. (2002). Envy, resentment, Schadenfreude, and sympathy: Reactions to deserved and undeserved achievement and subsequent failure. Personality and Social Psychology Bulletin, 28, 953–961.

Gastorf, J. W., & Suls, J. (1978). Performance evaluation via social comparison: Performance similarity versus related attributed similarity. *Social Psychology*, 41, 297–305.

Goethals, G. R., & Darley, J. (1977). Social comparison theory: An attributional approach. In J. Suls & R. L. Miller (Eds.), Social comparison processes: Theoretical and empirical perspectives (pp. 259–278). Washington, DC: Hemisphere.

Hareli, S., & Weiner, B. (2002). Dislike and envy as antecedents of pleasure at another's misfortune. *Motivation and Emotion*, 26, 257–277.
 Heider, F. (1958). *The psychology of interpersonal relations*. New York: Wiley.

Leach, C. W., Spears, R., Branscombe, N. R., & Doosje, B. (2003).

⁵ Including Misfortune and the interactions with Misfortune in the regression does not change the results. Results do reveal a significant Gender Participant \times Gender Target \times Misfortune interaction ($\beta = -.13$, t[234] = -2.23, p < .05). The Gender Participant \times Gender Target \times Envy interaction shows a similar effect ($\beta = .12$, t[234] = 1.94, p = .054), whereas the Gender Participant \times Gender Target \times Envy \times Misfortune interaction is not significant ($\beta = -.04$, t < 1, ns.).

Malicious pleasure: Schadenfreude at the suffering of another group. *Journal of Personality and Social Psychology*, 84, 932–943.

- Lockwood, P., & Kunda, Z. (1997). Superstars and me: Predicting the impact of role models on the self. *Journal of Personality and Social Psychology*, 73, 93–103.
- Major, B. (1994). From social inequality to personal entitlement: The role of social comparisons, legitimacy appraisals, and group membership. In M. Zanna (Ed.), Advances in Experimental Social Psychology (Vol. 26, 293–355). New York: Academic Press.
- Major, B., Testa, M., & Bylsma, W. H. (1991). Responses to upward and downward comparisons: The impact of esteem-relevance and perceived control. In J. Suls & T. A. Wills (Eds.), *Social comparison: Contempo*rary theory and research (pp. 237–260). Hillsdale, NJ: Erlbaum.
- Miller, D. T., Downs, J. S., & Prentice, D. A. (1998). Minimal conditions for the creation of a unit relationship: The social bond between birthdaymates. *European Journal of Social Psychology*, 28, 475–481.
- Miller, D. T., Turnbull, W., & McFarland, C. (1988). Particularistic and universalistic evaluation in the social comparison proces. *Journal of Personality and Social Psychology*, 55, 908–917.
- Mora, R. (1987). Egalitarian envy. New York: Paragon.
- Ortony, A., Clore, G. L., & Collins, A. (1988). The cognitive structure of emotions. New York: Cambridge University Press.
- Parrott, W. G. (1991). The emotional experience of envy and jealousy. In P. Salovey (Ed.), *The psychology of jealousy and envy* (pp. 3–30). New York: Guilford Press.
- Parrott, W. G., & Smith, R. H. (1993). Distinguishing the experiences of envy and jealousy. *Journal of Personality and Social Psychology*, 64, 906–920.

- Plato. (1925). *Plato* (H. N. Fowler & W. R. M. Lamb, Trans.). New York: Putnam. (Original work published 427–348 B. C.)
- Smith, R. H. (1991). Envy and the sense of injustice. In P. Salovey (Ed.), The psychology of jealousy and envy (pp. 79–99). New York: Guilford Press.
- Smith, R. H. (2000). Assimilative and contrastive emotional reactions to upward and downward social comparison. In J. Suls & L. Wheeler (Eds.), *Handbook of social comparison: Theory and research* (pp. 173– 200). New York: Kluwer Academic/Plenum Press Publishers.
- Smith, R. H., Turner, T. J., Garonzik, R., Leach, C. W., Urch-Druskat, V., & Weston, C. M. (1996). Envy and Schadenfreude. Personality and Social Psychology Bulletin, 22, 158–168.
- Spinoza, B. (2002). Ethica (H. Krop, Trans.). Amsterdam: Prometheus/ Bert Bakker. (Original work published 1677.)
- Tesser, A. (1991). Emotion in social comparison and reflection processes. In J. Suls & T. A. Wills (Eds.), Social comparison: Contemporary theory and research (pp. 115–145). Hillsdale, NJ: Erlbaum.
- Tesser, A., Millar, M., & Moore, J. (1988). Some affective consequences of social comparison and reflection processes: The pain and plasure of being close. *Journal of Social and Personality Psychology*, 54, 49–61.
- van Dijk, W. W., Ouwerkerk, J. W., Goslinga, S., & Nieweg, M. (2005).
 Deservingness and Schadenfreude. *Cognition and Emotion*, 19, 933–939.
- Wood, J. V. (1989). Theory and research concerning social comparison of personal attributes. *Psychological Bulletin*, 106, 213–248.

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