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WHO CARES ABOUT THE ENVIRONMENTAL IMPACT OF CARS?
Those With an Eye Toward the Future

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ABSTRACT: This study examines preference for commuting to work by car or public transportation (PT) within an expanded social dilemma framework (i.e., one that recognizes the importance of both social and temporal concerns). Commuters completed scales assessing commuting preferences, beliefs regarding the environmental impact of cars, social value orientation (SVO), and the consideration of future consequences (CFC). Preference for PT was higher among commuters who believed that commut-

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ing by car harms the environment and among those scoring high in CFC. Most important, a significant two-way interaction revealed that preference for commuting by PT was positively related to beliefs regarding the harmful environmental consequences of commuting by car only among those high in CFC. SVO was unrelated to commuting preferences. In sum, a future orientation may be more important than a prosocial orientation in shaping commuting preferences.

Keywords: *commuting preferences; social dilemmas; proenvironmental behavior; social value orientation; consideration of future consequences*

The use of automobiles contributes to serious environmental problems including global warming, acid rain, resource depletion, noise pollution, and congestion (Lowe, 1990). Despite these problems, the majority of commuters continue to rely on their cars (Newman & Kenworthy, 1989). This naturally raises the question, why? Why, in the face of serious threats to the environment, do commuters continue to rely on their cars?

One approach to this problem has been to frame commuting decisions as a social dilemma (Van Lange, Van Vugt, Meertens, & Ruiter, 1998; Van Vugt, Meertens, & Van Lange, 1995; Van Vugt, Van Lange, & Meertens, 1996). Across these studies, *social dilemmas* have typically been conceptualized as situations in which individual and collective interests are at odds (Messick & Brewer, 1983). This "classic" conceptualization has led researchers to examine whether commuting preferences are shaped by (a) individual differences in social value orientation (i.e., preferences for distributions of outcomes to self and others; Messick & McClintock, 1968) or (b) beliefs regarding the environmental impact of cars. In fact, studies often find that preference for commuting by public transportation is higher among prosocials and those who believe the car harms the environment. Nevertheless, there has been at least one puzzling null finding in this literature; namely, prosocials do not appear to be more sensitive than proselfs to the perceived environmental impact of cars (Van Lange et al., 1998; Van Vugt, Van Lange, & Meertens, 1996). This raises at least two questions. First, why are prosocials not more sensitive than proselfs to the perceived environmental impact of cars? Second, if not prosocials, then who might be especially sensitive to the perceived environmental impact of cars?

This study attempts to shed light on these questions by reconceptualizing the nature of the social dilemma confronting commuters as a situation in which short-term individual interests are at odds with long-term collective interests (Messick & Brewer, 1983). This "expanded" conceptualization underscores our belief that many large-scale environmental social dilemmas contain two (rather than one) conflicts of interest: a *social conflict* (individual vs. collective interests) and a *temporal conflict* (short- vs. long-term

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interests). Within this expanded framework, we complement past research by examining the relationship between commuting preferences, social value orientation, and beliefs regarding the environmental impact of cars. More important, we also incorporate individual differences in the *consideration of future consequences* (CFC) (i.e., the weight attached to immediate vs. delayed consequences of one's actions; Strathman, Gleicher, Boninger, & Edwards, 1994). We hypothesize that individuals high in CFC should prefer commuting by public transportation and should be especially sensitive to the perceived environmental impact of cars.

COMMUTING DECISIONS AS (CLASSIC) SOCIAL DILEMMAS: THE ROLE OF SOCIAL CONCERNS

Recent attempts to understand commuting decisions have framed such decisions as social dilemmas (i.e., situations in which individual and collective interests are at odds). This analysis has led researchers to predict that individuals concerned with maximizing their own well-being (i.e., proselfs) should be more inclined to commute by car (as it is personally convenient), whereas individuals concerned with collective well-being (i.e., prosocials) should be more inclined to commute by public transportation (as it is better for the environment). Framed as such, this hypothesis implies at least two different mechanisms that might explain the link between a prosocial orientation and preference for commuting by public transportation. On one hand, prosocials may be more likely than proselfs to prefer commuting by public transportation because prosocials are more convinced that public transportation is better for the environment (i.e., perceived environmental impact mediates the relationship between social value orientation and commuting preferences). On the other hand, prosocials may be more likely than proselfs to prefer commuting by public transportation because (a) most people believe that public transportation is more environmentally friendly than cars and (b) prosocials are more sensitive to information about the environmental impact of cars (i.e., social value orientation moderates the relationship between perceived environmental impact and commuting preferences).

Several studies provide support for these hypotheses. First, prosocials report a greater preference for public transportation than proselfs (Van Vugt, 1997; Van Vugt et al., 1995; Van Vugt, Van Lange, & Meertens, 1996). Second, preference for public transportation is associated with lower concern with convenience and/or flexibility and higher concern with the environment (Joireman, Van Lange, Kuhlman, Van Vugt, & Shelley, 1997; Van Vugt et al., 1995; Van Vugt, Van Lange, & Meertens, 1996). In a similar vein, preference for public transportation is higher when commuters believe that it is less

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environmentally damaging than the car (Van Lange et al., 1998; Van Vugt, Van Lange, & Meertens, 1996). Third, relative to proselfs, prosocials report less concern with travel flexibility and more concern with environmental impact (Van Vugt, Van Lange, & Meertens, 1996). Fourth, proselfs are more sensitive to the relative efficiency of cars versus public transportation, suggesting that they are more concerned with how commuting alternatives affect their own individual outcomes (Van Lange et al., 1998).

Although the preceding findings lend support to a social dilemma analysis of commuting decisions, several studies have failed to support various elements of the hypothesis presented earlier. First, at least two studies have failed to find a main effect of social value orientation on commuting preferences (Joireman et al., 1997; Van Lange et al., 1998). Second, one study (of the two testing this hypothesis) failed to support the prediction that proselfs should be more concerned with individual travel attributes (convenience, time, flexibility), whereas prosocials should be more concerned with collective travel attributes (environment, public health; Van Vugt et al., 1995). Third, at least two studies have failed to support the prediction that the relationship between perceived environmental impact of cars and preference for public transportation should be stronger among prosocials relative to proselfs (Van Lange et al., 1998; Van Vugt, Van Lange, & Meertens, 1996).[1] In fact, in one case (Van Vugt, Van Lange, & Meertens, 1996), proselfs' commuting preferences were more affected by the environmental impact of cars. These findings raise at least two important questions. First, why are prosocials not more sensitive to the perceived environmental impact of cars? Second, if not prosocials, then who might be especially sensitive to the environmental impact of cars? We believe that both questions may be answered by reexamining the nature of the social dilemma confronting commuters.

COMMUTING DECISIONS AS (EXPANDED) SOCIAL DILEMMAS: THE ROLE OF TEMPORAL CONCERNS

In each of the studies cited earlier, social dilemmas have been framed as situations in which individual and collective interests are at odds (Messick & Brewer, 1983). This classic conceptualization highlights one of two possible conflicts underlying many real-world social dilemmas (i.e., a social conflict). Although a social conflict is, by definition, a necessary feature of all social dilemmas, it may not be entirely sufficient to understand many real-world social dilemmas. Indeed, many real-world social dilemmas likely involve a temporal conflict as well (Dawes, 1980; Messick & Brewer, 1983; Messick & McClelland, 1983; Vlek & Keren, 1992).

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One implication of this expanded conceptualization within the present context is that environmentally friendly commuting preferences may be shaped by *both* social and temporal considerations. Indeed, given that much of the environmental damage caused by cars is delayed, temporal concerns may be an especially important determinant of commuting preferences.

Despite their theoretical relevance to commuting decisions, little research has examined the role of explicitly temporal concerns.[2] Temporal concerns have, however, received increasing attention in the more general proenvironmental literature. For example, several recent studies have demonstrated that individuals scoring high in CFC (Strathman et al., 1994)—an explicitly temporal concern—are more likely to engage in consumer behavior (Lindsay & Strathman, 1997; Strathman et al., 1994) and political behavior (Joireman, Lasane, Bennett, Richards, & Solaimani, 2001) that benefits the environment. These studies also indicate that individuals scoring high in CFC are more convinced of, and affected by, the long-term benefits of such proenvironmental behaviors.

Applied to commuting decisions, these findings suggest that individuals who consider the future consequences of their actions will be more inclined to commute by public transportation because public transportation is better for the environment. As noted earlier, this hypothesis suggests two possible mechanisms that might explain the link (if any) between CFC and commuting preferences. On one hand, relative to those scoring low, individuals scoring high in CFC may be more likely to prefer commuting by public transportation because they are more convinced that public transportation is better for the environment (i.e., perceived environmental impact mediates the relationship between CFC and commuting preferences). On the other hand, individuals scoring high in CFC may be more likely to prefer commuting by public transportation because (a) most people believe that public transportation is more environmentally friendly than cars, and (b) individuals high in CFC are more sensitive to information about the environmental impact of cars (i.e., CFC moderates the relationship between perceived environmental impact and commuting preferences).

SUMMARY OF HYPOTHESES

In sum, we forward several hypotheses. First, preference for public transportation should be higher among prosocials (Hypothesis 1), those scoring high in CFC (Hypothesis 2), and those who believe that commuting by car harms the environment (Hypothesis 3). Second, the perceived environmental impact of cars should mediate the relationship between commuting preferences and both social value orientation (Hypothesis 1a) and CFC

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(Hypothesis 2a). Third, social value orientation and CFC should moderate the relationship between the perceived environmental impact of cars and preference for public transportation, with the relationship being stronger among prosocials (Hypothesis 1b) and those high in CFC (Hypothesis 2b). Finally, it is possible that social value orientation and CFC will interact such that the hypotheses just outlined (1a-2b) may be most strongly upheld for prosocials scoring high in CFC (Hypothesis 4). As a preliminary test of these hypotheses, we surveyed commuters about their real-life commuting preferences for car versus public transportation.

METHOD

PARTICIPANTS AND PROCEDURE

Participants were commuters in a large city in the northwestern United States. As part of a larger study, surveys were distributed at a major connecting point for buses and at several gas stations. Prospective participants were asked if they were commuters and if so, whether they would be willing to complete a survey on commuting decisions. Those who agreed received a survey with return postage, which they could later complete at home or at work in approximately 20 minutes. Participants who indicated an interest received a short summary of the study's results.

Of the 600 surveys handed out, 189 (31.5%) were returned. The sample consisted of 82 men and 104 women (3 participants failed to indicate their sex), with a mean age of 37 years and 9 months. Due to the short, 2-week lag between distribution and final acceptance of the surveys and the lack of incentives for participation, the response rate was lower than we had hoped but was not necessarily uncommon (e.g., Davila, Bradbury, Cohan, & Tochluk, 1997; Joireman et al., 1997).

SURVEY MEASURES

Social value orientation. We assessed social value orientation using a set of 9 three-alternative decomposed games in which participants choose among varying distributions of outcomes to self and an "other" (Van Lange, Otten, De Bruin, & Joireman, 1997). As an example, in one game, participants chose among three options offering points to self and other: Option A = 480 points to self, 80 points to the other (i.e., a competitive choice, as it offers the highest positive relative gain between one's own and the other's

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outcomes); Option B = 540 points to self, 280 points to the other (i.e., an individualistic choice, as it offers the highest gain to self); Option C = 480 points to self, 480 points to the other (i.e., a prosocial choice, as it offers the highest joint gain, highest other gain, and smallest difference in self-other outcomes).

Prior to making any choices, participants were first informed that they had been paired with another person with whom they would not meet or communicate and were provided with an example decomposed game to become familiarized with the procedure. Further instructions emphasized that the final outcomes to the participant (and the other) would be based on the participant's choice in combination with the other's choice, emphasizing the interdependent nature of the choice. Finally, participants were asked to imagine that they valued the points and that their partner valued the points as well.

To be classified, participants had to demonstrate a consistent preference for one of the three orientations in at least six of the nine games. Using this criterion, 152 of the 189 participants (80.4%) were classifiable, including 110 prosocials, 35 individualists, and 7 competitors. Following convention, participants were subsequently classified as either prosocials (cooperators or altruists) or proselfs (individualists and competitors; cf. Kramer, McClintock, & Messick, 1986; Van Lange & Liebrand, 1991). Past research supports both the internal reliability (Liebrand & Van Run, 1985) and temporal stability of the decomposed games measure (Kuhlman, Camac, & Cunha, 1986). Additional research suggests that this measure is free from concerns with social desirability (Platow, 1995), and a number of studies support the "ecological validity" of the social value orientation construct in such areas as helping behavior (McClintock & Allison, 1989), negotiation (De Dreu & Van Lange, 1995), and sacrifice in interpersonal relationships (Van Lange, Agnew, Harinck, & Steemers, 1997).

CFC

We assessed CFC using Strathman et al.'s (1994) 12-item scale ($\alpha = .81$). The CFC Scale contains general statements regarding an individual's tendency to take into account the future consequences of his or her behavior, none of which bear directly on environmental behavior (e.g., "I consider how things might be in the future and try to influence those things with my day to day behavior"). Participants indicated the extent to which such statements were characteristic of themselves on a scale from 1 (*extremely uncharacteristic*) to 5 (*extremely characteristic*). The CFC Scale possesses high internal and test-retest reliability and exhibits good convergent and discriminant validity (Strathman et al., 1994). More recent studies provide additional

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evidence for the validity of the CFC Scale with respect to proenvironmental behavior (e.g., Joireman, Lasane, et al., 2001; Lindsay & Strathman, 1997).

COMMUTING PREFERENCES AND PERCEIVED ENVIRONMENTAL IMPACT OF CARS

After indicating their preference for commuting by car or public transportation (1 = *strong preference for car*, 7 = *strong preference for public transportation*), commuters rated the extent to which they agreed that cars cause greenhouse gases and acid rain (1 = *strongly disagree*, 7 = *strongly agree*) and subsequently rated how harmful the car was relative to both trains and buses (1 = *much less*, 7 = *much more*). These four items were averaged into a single Perceived Environmental Impact Scale ($\alpha = .70$).

RESULTS

DATA SCREENING

To evaluate the assumptions underlying multiple regression, and search for possible outliers, data were first screened according to procedures outlined in Tabachnick and Fidell (2001). Preliminary data screening revealed that scores on both CFC and perceived environmental impact were significantly negatively skewed (respective zs = –3.38, –4.75; $p < .001$, two-tailed) and that each variable had a single univariate outlier on the negative end (zs = –3.41, –3.45; $p < .001$, two-tailed). Squaring each variable resulted in nonsignificant skewness values and eliminated the outliers. Additional inspection of outliers in the multiple regression analysis reported below revealed no additional problems and supported the assumptions of linearity and homoscedasticity.

TESTS OF HYPOTHESES[3]

To appropriately test our most global hypotheses (1-3) as well as our two mediation hypotheses (2a and 3a), it was first necessary to evaluate the simple relationships among the predictors, the (presumed) mediator, and criterion variable (cf. Baron & Kenny, 1986). Thus, prior to reporting the multiple regression analyses, we briefly discuss the simple correlations between the two personality variables, perceived environmental impact of commuting by car, and preference for commuting by public transportation, shown in Table 1.

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TABLE 1
Correlations Between Preference for Public Transportation (PT), Perceived Environmental Impact (PEI) of Car, and Personality Variables for Full and Reduced Samples

	M[a]	SD	*PT*	*PEI*	*CFC*
Preference for PT	4.51	2.52	—	.25***	.19**
	4.41	2.53			
PEI	32.56	10.75	.22***	—	.27***
	33.00	10.48			
Consideration of future consequences (CFC)	15.10	4.09	.20**	.25***	—
	15.43	4.03			
Social value orientation (SVO)	—	—	–.04	.03	.02

NOTE: Correlations in the top of the diagonal are based on the full sample (n = 175, listwise); correlations in the bottom of the diagonal are based on the reduced sample with classifiable social value orientations (n = 145, listwise). Higher values indicate stronger preference for commuting by PT, stronger belief that commuting by car has harmful environmental consequences (PEI), higher CFC, and a more prosocial orientation (SVO; prosocials = 1, proselfs = –1).
a. Top *M* and *SD* from full sample. Bottom *M* and *SD* from reduced sample. Transformed *M*s and *SD*s shown for PEI and CFC (both were squared to reduce negative skewness).
**p < .05. ***p < .01. Both two-tailed.

As can be seen in the correlations on the bottom half of the diagonal, social value orientation was unrelated to both perceived environmental impact of cars (r = .03, *ns*) and preference for public transportation (r = –.04, *ns*). In light of these results, we conducted two sets of analyses. The first set of analyses was based on a reduced sample involving participants who could be classified as either prosocials or proselfs (the standard approach in research on social value orientation). The second set of analyses was based on a full sample involving all participants, including those who could not be classified into one of these social value orientation categories (resulting in a sample more representative of research including individuals whose social value orientation is not classifiable). Correlations for the full sample are shown in the top half of the diagonal in Table 1.

We begin by discussing the simple correlations for the reduced sample. As noted earlier, the results failed to support Hypotheses 1 and 1b in that social value orientation was unrelated to commuting preferences or beliefs regarding the environmental impact of cars (rs = –.04 and .03, *ns*). However, consistent with Hypotheses 2 and 3, preference for commuting by public transportation was higher among commuters scoring high in CFC (r = .20, p < .05) and among commuters who more strongly believed that commuting by car harms the environment (r = .20, p < .05). Also consistent with

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Hypothesis 2a, commuters scoring higher in CFC were more likely to believe that commuting by car harms the environment ($r = .25$, $p < .01$). An identical pattern was evident in the full sample (top of diagonal in Table 1). As a set, these correlations provide some preliminary evidence in support of one of the mediation hypotheses (Hypothesis 2a). Additional evidence concerning this hypothesis is presented in the context of the multiple regression analyses discussed below.

To test the mediation (Hypothesis 2a)[4] and moderation hypotheses (Hypotheses 1b and 2b), we subsequently conducted two 3-step regression analyses, one for the reduced sample (left half of Table 2) and one for the full sample (right half of Table 2). On the first step of the reduced sample analysis we entered CFC and social value orientation without the potential mediator. On the second step of the reduced sample analysis, to test for mediation, we entered the perceived environmental impact of cars. On the third step of the reduced sample analysis, to test for moderation, we entered the two 2-way interactions.[5] In the full sample analysis, we followed a similar progression of steps but we dropped social value orientation and its interaction with perceived environmental impact of cars. Results from both the reduced and full samples, shown in Table 2, were identical.

Two important results should be noted in this table. First, in line with Hypothesis 2a (mediation), Step 2 of this model (for both reduced and full samples) revealed that perceived environmental impact of cars remained a significant predictor in the presence of CFC, whereas CFC was only marginally related to commuting preferences in the presence of perceived environmental impact of cars. This pattern held in both the reduced and full samples. These results provide some evidence that the relationship between CFC and commuting preferences is partially mediated by perceived environmental impact of cars. Second, and in support of Hypothesis 2b, results from the third step of the analysis (for both reduced and full samples) revealed a significant interaction between perceived environmental impact and CFC in both the reduced and full samples. To further examine this interaction using the reduced sample, separate slopes assessing the relationship between commuting preferences and perceived environmental impact were tested for departure from 0 for individuals 1 standard deviation above the mean (high CFC = 19.42) and 1 standard deviation below the mean (low CFC = 11.40) on CFC (cf. Judd & McClelland, 1989). (Within these analyses, CFC remained a continuous variable.) The resulting slopes (from the reduced sample) are shown in Figure 1.

Consistent with Hypothesis 2b, the simple slope analyses revealed that the relationship between perceived environmental impact and preference for commuting by public transportation was highly significant among

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TABLE 2
Regression Models Predicting Preference for Commuting by Public Transportation

	Reduced Sample[a]					*Full Sample*				
Model				*Adjusted*					*Adjusted*	
Variable	B	β	t	R^2	F	B	β	t	R^2	F
Model 1				.03	2.97*				.03	6.43**
SVO	–.11	–.04	–0.48							
CFC	.12	.20	2.40**			.12	.19	2.54**		
Model 2				.05	3.52**				.07	7.19***
SVO	–.12	–.04	–0.54							
CFC	.10	.15	1.82			.08	.13	1.72		
PEI	.04	.18	2.12**			.05	.21	2.78***		
Model 3				.08	3.51***				.08	6.26***
SVO × PEI	–.01	–.14	–0.52							
CFC × PEI	.01	.98	2.51**			.01	.72	2.03**		

NOTE: SVO = social value orientation (prosocials = 1, proselfs = –1); CFC = consideration of future consequences; PEI = perceived (adverse) environmental impact of cars. Reduced sample with classifiable SVOs (n = 145). Full sample includes nonclassifiable SVOs (n = 175). PEI and CFC were both squared to reduce negative skewness.
a. The higher order interactions (SVO × CFC; SVO × CFC × PEI) were not significant (ps > .30).
*p < .10. **p < .05. ***p < .01. All two-tailed.

individuals high in CFC (β = .38, t = 3.26, p < .001) but was not at all significant among individuals low in CFC (β = .02, t = 0.17, *ns*). Identical results were obtained for the full sample: The relationship between perceived environmental impact and preference for commuting by public transportation was significant among individuals high in CFC (β = .35, t = 3.44, p < .001) but not among individuals low in CFC (β = .08, t = 0.82, *ns*). Inconsistent with Hypothesis 4, subsequent analyses failed to reveal support for the predicted two-way interaction between CFC and social value orientation, and the three-way interaction between these personality variables and perceived environmental impact (ps > .30).

DISCUSSION

This study approached commuting decisions as a social dilemma in which short-term individual interests are at odds with long-term collective interests (i.e., highlighting both social and temporal conflicts). Based on this revised framework, we forwarded several hypotheses concerning the relationship

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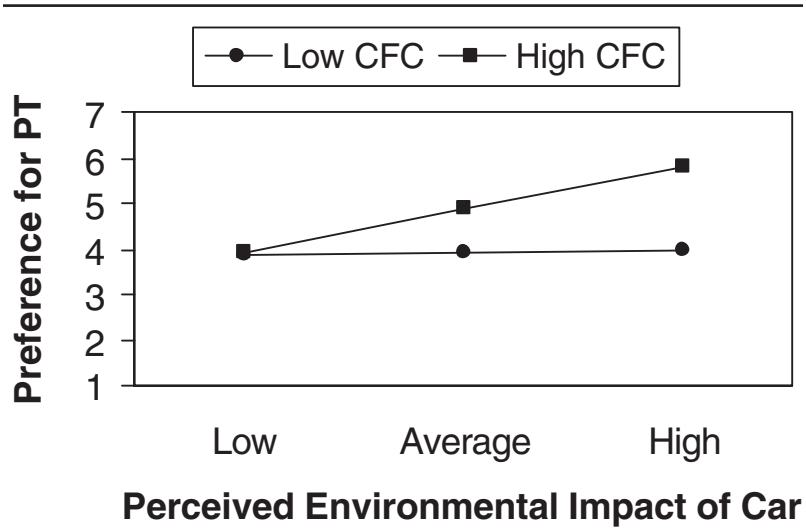

Figure 1: Preference for Commuting by Public Transportation (PT) as a Function of Perceived Environmental Impact of Cars and Consideration of Future Consequences (CFC)

between commuting preferences, social value orientation (Messick & McClintock, 1968), and CFC (Strathman et al., 1994). In line with predictions, preference for commuting by public transportation was higher among individuals scoring high in CFC (Hypothesis 2) and among those who believed that commuting by car harms the environment (Hypothesis 3). More important, the present results supported the predictions that (a) perceived environmental impact of cars would mediate the relationship between CFC and commuting preferences (Hypothesis 2a)—the relationship between CFC and preference for public transportation became weaker when perceived environmental impact was included in the model, and (b) that perceived environmental impact would interact with CFC such that the relationship between perceived environmental impact of cars and preference for commuting by public transportation would be stronger among commuters high in CFC (Hypothesis 2b). In contrast to some previous studies and our own predictions, prosocials did not express stronger preference for public transportation, nor were prosocials more sensitive to the environmental impact of cars, and social value orientation did not interact with CFC.

These findings help extend past research on social dilemmas and individual differences in CFC. At a broader level, the present results underscore the

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potential value in distinguishing between social and temporal concerns that may guide decision making in social dilemmas, especially those social dilemmas in which the suboptimal collective consequences (e.g., resource depletion, pollution) are delayed. Below, we discuss these issues in turn and suggest several avenues for future research.

COMMUTING DECISIONS AS CLASSIC VERSUS EXPANDED SOCIAL DILEMMAS

Several past studies have framed commuting decisions as a situation in which individual interests and collective interests are at odds (i.e., a social dilemma). Based on this classic conceptualization of social dilemmas, these studies have devoted much attention to individual differences in social value orientation, assuming and often demonstrating that prosocials (or in some cases, prosocials with high trust) are more inclined to commute by public transportation (e.g., Van Lange et al., 1998; Van Vugt et al., 1995; Van Vugt, Van Lange, & Meertens, 1996). A number of these studies have also established that preference for commuting by public transportation is higher among people who believe that commuting by car harms the environment (Van Lange et al., 1998; Van Vugt, Van Lange, & Meertens, 1996). One consistent and surprising finding in these studies has been that prosocials were not more sensitive than proselfs to the perceived environmental impact of cars. The present results concur with this null finding and once again raise the question, Who cares about the environmental impact of cars?

In attempting to predict who cares about the environmental impact of cars, we framed commuting decisions as a situation in which short-term individual interests are at odds with long-term collective interests. This expanded conceptualization of social dilemmas explicitly assumed that the social dilemma facing commuters contains two (rather than one) conflicts: a social conflict (individual vs. collective interests) and a temporal conflict (immediate vs. delayed consequences). Because many of the adverse environmental consequences of commuting by car are delayed (e.g., depletion of natural resources, global warming), we assumed that individual differences associated with the temporal dimension (i.e., CFC; Strathman et al., 1994) might be particularly relevant in predicting who cares about the environmental impact of cars. Consistent with this reasoning, individuals scoring 1 standard deviation above the mean on CFC showed a strong positive relationship between perceived environmental impact of cars and preference for public transportation, whereas individuals scoring 1 standard deviation below the mean on CFC showed no relationship between perceived environmental impact and preference for public transportation. These results suggest that a future

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orientation may be more important than a prosocial orientation in motivating concern about the environmental impact of cars.

That said, an important question remains, namely, *why* are individuals who score high on CFC especially concerned with the environmental impact of cars? Several possible mechanisms are suggested by Stern, Dietz, and Kalof's (1993) extended norm activation model of proenvironmental behavior. Stern et al.'s model is an expansion of Schwartz's (1970) earlier norm activation model, which assumes that moral norms influence behavior only when actors believe that certain actions have consequences for another's well-being (i.e., awareness of consequences) and when actors accept responsibility for those actions (i.e., ascription of responsibility). According to Stern et al.'s extended norm activation model, an individual's propensity to act in a proenvironmental manner is based on the extent to which that individual's actions have consequences for things they value (i.e., the self, others, and biosphere; cf. Merchant, 1992; Schultz, 2001). Applied to commuting decisions, Stern et al.'s model suggests at least three different types of environmental consequences that might be of concern to those high in CFC. Specifically, such individuals may be concerned with how pollution caused by cars affects their own well-being (e.g., health, ability to enjoy scenery), the well-being of society in general (e.g., public health, resource depletion), or the well-being of the biosphere (e.g., trees, lakes, fish). Distinguishing between these various consequences could provide additional insight into the relationship between CFC and commuting preferences and may serve as the basis for the development of targeted campaigns to encourage alternatives to commuting by car.

Future research might also benefit by examining whether additional mechanisms differentiate between those low and high in CFC. For example, it is possible that beyond differences in perceived environmental consequences (outcome expectancy), individuals high in CFC have greater self-efficacy with regard to the utilization of alternative transportation modalities (e.g., as a result of better planning strategies) as well as a stronger belief in their ability to exert effort in the pursuit of alternative transportation modalities (cf. Pelletier, Dion, Tuson, & Green-Demers, 1999).

Before concluding this section, we wish to comment more generally on the distinction we have drawn between so-called classic (purely social) and extended (social + temporal) social dilemmas. First, the terms *classic* and *extended* represent our attempt to differentiate between the conceptualizations typically used in studies of large-scale applied social dilemmas rather than common parlance. Second, we are clearly not the first to draw a distinction between such classic and extended social dilemmas. Indeed, the distinction between social dilemmas without and with delayed consequences was a

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centerpiece of Messick and Brewer's (1983) classic article on social dilemmas. Third, and more generally, the classic and extended conceptualizations presented in this article are somewhat broader than what is commonly taken as a formal definition of a social dilemma (cf. Dawes, 1980).[6]

CFC

This study also complements and extends work on CFC (Strathman et al., 1994). First, this study extends past studies that have heretofore focused on how CFC relates to proenvironmental consumer behavior (Lindsay & Strathman, 1997; Strathman et al., 1994) and proenvironmental political behavior (Joireman, Lasane, et al., 2001). Second, the present results provide additional evidence for the construct validity of the CFC Scale in that CFC was more strongly related to commuting preferences as the perceived environmental impact of cars increased, as would be expected on the basis of the CFC construct. The nature of this interaction is consistent with interactions reported in past studies that have shown that individuals high in CFC are more sensitive to the long-term consequences of actions that can impact the environment (Joireman, Lasane, et al., 2001; Joireman, Van Lange, et al., 2001; Strathman et al., 1994). Thus, a growing number of studies provide support for the construct validity of the CFC Scale in the context of a variety of large-scale applied social dilemmas.

STRENGTHS AND LIMITATIONS

Before concluding, we wish to comment on several of the strengths and limitations of this study. First, because correlational data prevent conclusive statements regarding causality, future research is needed to more convincingly demonstrate that CFC plays a causal role in decision making in social dilemmas. Second, given that the mediator (perceived environmental impact) was assessed after the criterion variable (preference for public transportation), the results concerning mediation should be taken as preliminary and in need of further verification. At the same time, it is worth noting that the present results are consistent with Joireman, Lasane, et al.'s (2001) finding that the perceived social consequences of environmental conditions (e.g., public health) mediates the relationship between CFC and involvement in proenvironmental political behavior. Third, the relatively low return rate as well as the low percentage of proselfs in our study may have resulted in a sample that was less representative than the population of interest. For example, if we assume that conscientiousness, which has been shown to relate positively to CFC (Strathman et al., 1994), relates to the inclination to complete

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and return the survey in time, it is possible that our sample overrepresents individuals high in CFC. If true, however, this potential selection bias may have actually led to an underestimation of the relationships reported in the present study (i.e., as a result of lowered variability in CFC). Given the null finding for social value orientation, the relatively low percentage of proselfs in this study may be more problematic. It is possible, for example, that our sample underrepresents the more self-oriented proselfs, who may be less inclined to complete the survey, and therefore underestimates the effect for social value orientation. Future studies might avoid this potential problem by compensating participants, a procedure that results in a higher percentage of proself volunteers (cf. Van Lange, 1999; Van Lange & Visser, 1999). Fourth, given the existence of various structural barriers to public transportation (e.g., availability, realistic travel time) and the fact that commuting decisions are often based on habitual behavior (Verplanken, Aarts, & van Knippenberg, 1997; Verplanken, Aarts, van Knippenberg, & Moonen, 1998; Verplanken, Aarts, van Knippenberg, & van Knippenberg, 1997), it is possible that self-reported commuting preferences examined here may not directly translate into actual commuting choices. Nevertheless, the present findings suggest that all other things being equal, preference for public transportation is likely to be higher among individuals who believe the car adversely affects the environment and care about this impact (i.e., high in CFC).

Despite the preceding caveats, we believe this study has a number of strengths. First, although several past studies have pursued social dilemma analyses of commuting decisions, most have been based on commuting preferences within experimental simulations and hypothetical scenarios (e.g., Van Lange et al., 1998, Study 1; Van Vugt et al., 1995; Van Vugt, Van Lange, & Meertens, 1996), and of the two studies involving real-life preferences (Van Vugt, 1997; Van Vugt, Van Lange, Meertens, & Joireman, 1996), only one dealt directly with commuting by car versus public transportation (Van Vugt, 1997). The present study complements these studies by examining real-life commuting preferences for car versus public transportation. Second, this study is, to our knowledge, the first to demonstrate a link between real-life commuting preferences and CFC. Third, by demonstrating a link between CFC and commuting preferences, this study highlights the potential importance of distinguishing between two theoretically distinct conflicts of interest within many applied social dilemmas, the social conflict (individual vs. collective interests) and the temporal conflict (immediate vs. delayed consequences). Understanding this distinction could hold many important implications for decision making in social dilemmas with delayed consequences. Indeed, a concern with collective well-being (i.e., prosocial

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orientation) may be insufficient to motivate prosocial behavior in the absence of a concern with delayed consequences. Given the potentially important distinction between the social and temporal dimensions and their corresponding individual differences, future research comparing social value orientation and CFC would appear to be in the long-term collective interests of researchers hoping to understanding decision making in social dilemmas.

NOTES

1. Although no published study has supported the prediction that prosocials will show a stronger relationship between perceived environmental impact and public transportation, it is worth noting that at least one study has demonstrated that prosocials *report* being more concerned with the environmental impact of cars (Van Vugt, Van Lange, & Meertens, 1996; see also Van Vugt, Meertens, & Van Lange, 1995, where the trend was marginally significant). In other words, when asked to rate their "concern" with travel attributes related to the environment (environment and/or public health), prosocials tend to self-report more environmental concern. The puzzling finding is that prosocials, in fact, do not actually appear to be more sensitive to the perceived environmental impact of cars (i.e., social value orientation does not appear to moderate the relationship between perceived environmental impact of cars and preference for public transportation in a theoretically meaningful manner).

2. Several studies have, however, implied a link between social concerns (i.e., social value orientation) and temporal concerns (i.e., concern with the long-term environmental consequences of commuting decisions). Although this link may make some theoretical sense (cf. Kelley & Grzelak, 1972; McClintock, 1978), as noted earlier, there appears to be little evidence for the claim that individuals with a prosocial orientation are more concerned with and/or affected by the negative long-term environmental consequences of commuting by car.

3. Formally, assertions of statistical significance rest on the assumption that the sample is representative of the population to which the analysis is generalized. Although we attempted to garner a representative sample, the low return rate in this study underscores the importance of interpreting the results with caution. Notably, claims of statistical significance should be taken as suggestive, rather than definitive, and the present results should be viewed as a springboard for future field research using a more representative sample and future lab work using more controlled conditions.

4. Because social value orientation was unrelated to perceived environmental impact and commuting preferences, the mediation hypothesis (1a) in this case is already rejected.

5. An interaction term based on two correlated predictor variables will by definition be at least partially—and sometimes highly—redundant with those predictor variables. When all three terms are included in a single regression model, this overlap introduces multicollinearity among the three terms. One increasingly common approach to the problem of multicollinearity in moderated multiple regression has been to center the constituent variables about their means before creating the interaction term (e.g., Aiken & West, 1991). As Kromrey and Foster-Johnson (1998) have shown, however, this approach does not change the interpretation or significance test of the interaction term. Moreover, in the case of correlated, continuous predictors with no meaningful 0 point, as we have here, tests of the main effects of the two predictor variables in the

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presence of the interaction term is questionable at best (Kromrey & Foster-Johnson, 1998). Indeed, although an interaction term is only meaningful when its component variables have been partialed out, main effects in the current context do not, by definition, reflect the partialing out of the interaction term (e.g., Cohen, 1978; Cohen & Cohen, 1983). Accordingly, we conducted our moderated multiple regression analysis in a hierarchical fashion (Cohen & Cohen, 1983), entering the various predictor variables (without the interaction) on the first step and then examining the interaction terms on a second step. This prevented the interaction terms from, as Cohen and Cohen (1983, p. 305) say, "stealing" the "rightful variance" of the two predictor variables. In the event of a significant interaction, an examination of the simple slopes (see Figure 1) provided further clarification of the main effects of the relevant variables (Kromrey & Foster-Johnson, 1998).

6. In the most restrictive sense, social dilemmas are defined by two properties: (a) Each individual is always better off choosing a noncooperative (vs. a cooperative) alternative (i.e., the noncooperative alternative dominates the cooperative alternative), and (b) when all decision makers choose the noncooperative alternative, all receive worse outcomes than if all had chosen the cooperative alternative (Dawes, 1980).

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