

Commitment to the environment and student support for “green” campus initiatives

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Abstract Past research has demonstrated that commitment to the environment strongly predicts global pro-environmental intentions. This research is the first to examine whether the commitment to the environment model predicts college students' endorsement of institutional-level changes that may be proposed by university or college administration. Participants were 96 college men and 142 college women who completed questionnaires designed to assess commitment to the environment constructs, willingness to sacrifice for the environment, and support for a series of campus conservation initiatives. A path analysis revealed that the commitment model predicted college students' endorsement of hypothetical “green” campus initiatives. Specifically, commitment to the environment mediated the paths from satisfaction and investments to hypothetical green campus initiatives. Results suggest that endorsement of green campus initiatives may be better received on campuses by students who recognize their interdependence with the environment, characterized by high commitment to the natural environment.

Keywords Campus behavior · Environmental intentions · Students · Commitment · Willingness to sacrifice

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Commitment to the environment and university student behavioral intentions

On college campuses across the United States and around the world, university administrators are taking steps towards sustainable campuses, promoting recycling or reuse of everything from paper and plastic bottles to student furniture. Bins have been strategically placed in residence halls and along sidewalks to collect recyclable materials, and end-of-semester events have been held to pass on used furniture to future students—all in an effort to make sustainable behaviors easier for students. However, the success of the time, effort, and resources invested in sustainability programs depends upon students' willingness to exert the effort needed to take advantage of these programs. If students elect to not walk the extra 10 feet to a recycling bin, or fail to attend furniture swaps, administrators' efforts inevitably will fall short of their intended impact. Thus, it is not enough for administrators to develop programs that should have positive environmental impact; student behavior ultimately will be the driving force that determines program success.

Since 2006, over 650 college and university presidents in the United States have signed the American College and University Presidents' Climate Commitment.¹ However, this commitment only outlines goals, leaving the actual steps up to individual universities. A wide variety of theoretical approaches and methods have been utilized in the evaluation and reporting of these efforts (Clark et al. 2011). Recent articles concerning sustainability in higher education have used basic descriptive research to examine students' perceptions of sustainability efforts (Emanuel and Adams 2011), utilized the theory of planned behavior to examine dining service administrators' intentions to move towards sustainable procedures (Chen Grogore Arendt and Shelley 2011), and reported the results of education programs aimed

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at developing sustainability programs (Shriberg and Harris *in press*). However, perhaps the most widely used paradigm is measuring environmental attitudes (e.g., Lee 2008; Lopez Torres Boyd Silvy and Lopez 2007; Thapa 1999). Although widely used, as Thapa (1999) points out, the link between environmental attitudes and environmental behavior is relatively weak; this finding that is consistent across much of the research on attitudes within social psychology. Thus, exploring alternative theoretical models that are predictive of students' intentions to act in an environmentally friendly manner on college campuses would be useful.

Commitment

Davis, Le, and Coy (2011) presented a model of commitment to the environment that is effective in predicting environmental attitudes and behavioral intentions. This model is rooted in interdependence theory, which provides a framework for examining the processes by which relationship partners mutually affect one another's well-being (e.g., Thibaut and Kelley 1978; Rusbult 1980). Interdependence theory specifies that commitment is the subjective experience of dependence—the degree to which individuals' needs are met, and can only be met, by the partner, whether the partner is a spouse, an organization, or the natural environment (Le and Agnew 2003). Thus, commitment is the feelings (i.e., affect) and thoughts (i.e., cognitions) that shape the behavior required to persist in and maintain all types of relationships (Arriaga and Agnew 2001; Rusbult Olsen Davis and Hannon 2001). Furthermore, commitment predicts pro-relationship outcomes such as relationship maintenance (Le Korn Crockett and Loving 2011) and sacrificial behavior (Etcheverry and Le 2005).

Within the domain of the natural environment, Davis, Green, and Reed (2009) provided initial evidence for the importance of commitment in the person–environment relationship by manipulating individuals' dependence on the natural world. They found that participants primed to feel greater environmental dependence agreed to volunteer for a river clean-up project more often than participants primed to feel less dependence. Moreover, Davis and colleagues (2011) demonstrated that commitment to the environment predicts individuals' willingness to sacrifice for the environment, or the degree to which they are willing to focus on what is best for the environment instead of what is best or easiest for themselves (Van Lange Agnew Harinck and Steemers 1997). In addition, commitment to the environment predicted pro-environmental behavior above and beyond related measures such as ecological worldview (Dunlap Van Liere Mertig and Jones 2000) and environmental identity (Clayton 2003).

Antecedents of commitment

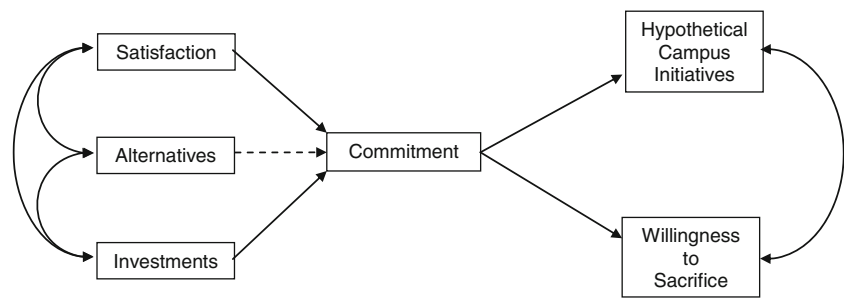
Extending previous work on environmental commitment, research (Davis et al. 2011) has examined predictors of commitment to the environment based on Rusbult's (1980, 1983) model of commitment, derived from interdependence theory (Thibaut and Kelley 1978). In short, interdependence theory posited two predictors of commitment, satisfaction with the relationship (the subjective experience of comparing rewards and costs of the relationship) and alternatives to the relationship (the subjective appraisal of whether rewards may be higher, and costs lower, with another partner). Rusbult (1980) later added investments in the relationship (the time, effort, and resources put into a relationship) and greatly increased the overall predictive ability of the model.

Davis and colleagues (2011) applied this model to the environment, with satisfaction with the environment (the degree to which the environment adequately fulfills individuals' needs); investments in the environment (the amount of time, effort, and other resources individuals put into the environment); and alternatives to the environment (the availability of other options that could fulfill needs that the environment currently fulfills, paralleling their close relationship counterparts). They found that individuals who were more satisfied with and had invested more in the environment were also more highly committed to the environment. Commitment, in turn, was associated with engagement in pro-environmental indicators, such as willingness to sacrifice. However, alternatives to the environment did not predict commitment or pro-environmental intentions. Davis and colleagues posited that this may be due to the fact that there may be no alternative to the natural environment that would provide the same benefits (e.g., restorative effects; Ryan et al. 2010). The lack of an effect for alternatives to the environment is consistent with research applying the investment model to other non-interpersonal domains. A meta-analysis by Le and Agnew (2003) found that, with the exception of jobs, alternatives had no relation with commitment in non-interpersonal domains (e.g., sport, clubs).

The current research

The purpose of this research was to examine whether the commitment model (see Fig. 1) would be useful for administrators to consider when developing specific pro-environmental goals and programs for their college or university. The commitment model has been validated across a variety of phenomena (Le and Agnew 2003) including the natural environment (Davis et al. 2011). To examine campus sustainability, we developed a set of hypothetical campus initiatives to measure students' endorsement of basic changes that college and university administrators could

Fig. 1 Fully mediated model of commitment to the environment



institute to promote sustainability. Furthermore, to replicate past research using the model of commitment to the environment, we included Davis et al.'s (2011) willingness to sacrifice for the environment scale. Due to past meta-analytical (Le and Agnew 2003) and empirical (Davis et al. 2011) findings, we did not anticipate an effect for alternatives to the environment, but we retained it to maintain consistency with our theoretical model and to explore its effect with our new outcome measure (i.e., Rusbult's (1980, 1983).

Based upon past research, we predicted that commitment to the environment would mediate the effects of satisfaction with the environment and investments in the environment on willingness to sacrifice for the environment (Hypothesis 1). In parallel fashion, we predicted that commitment to the environment would mediate the effects of satisfaction with the environment and investments in the environment on our novel measure of campus-specific pro-environmental intentions (Hypothesis 2).

Method

Participants

Participants were 145 students (91 women) from Haverford College, who participated for a payment of \$5, and 93 students (51 women) from Virginia Commonwealth University, who participated in partial fulfillment of a requirement for their introductory psychology course.² Participants were 20 years old on average ($SD=1.42$, ages ranged from 17 to 23 years); 34 % were freshman, 26 % were sophomores, 18 % were juniors, 18 % were seniors (4 % listed other). Fifty-nine percent of participants self-identified as Caucasian, 15 % African American, 15 % Asian American, 5 % Latino, 2 % Native American, and 5 % other).

² Only satisfaction with the environment significantly differed between the samples. However, basic ANCOVAs indicate that there was no significant interaction between the sample and satisfaction with the environment for willingness to sacrifice, $p=0.48$, or hypothetical campus initiatives, $p=0.33$.

Commitment to the environment

We used the Davis et al. (2009) 11-item measure of commitment to the environment to assess long-term orientation and psychological attachment to the natural world (e.g., "When I make plans for myself, I take into account how my decisions may affect the environment"; $\alpha=0.91$) on a nine-point scale (1=do not agree at all; 9=agree completely). We averaged responses to create a composite index.

Antecedents of commitment to the environment

The antecedents to commitment to the environment measures (Davis et al. 2011) are adapted versions of scales developed by Rusbult and colleagues (Rusbult Martz and Agnew 1998). Four items each measured satisfaction with the environment (e.g., "Spending time in the natural environment is rewarding;" $\alpha=0.89$) and investments in the environment (e.g., "I have put a lot of time, energy, and effort into the well-being of the natural environment;" $\alpha=0.93$), and five items measured alternatives to the environment (e.g., "My needs for activity, relaxation, and adventure could easily be fulfilled somewhere other than the natural environment;" $\alpha=0.84$) on a nine-point scale (1=do not agree at all; 9=agree completely).³ We averaged responses to create a composite index for each antecedent.

Willingness to sacrifice for the environment

The willingness to sacrifice scale (Davis et al. 2011) assessed whether students were willing to sacrifice their own needs for the sake of the environment (e.g., "I am willing to give things up that I like doing if they harm the natural environment;" $\alpha=0.88$) on a nine-point scale (1=do not agree at all; 9=agree completely). We averaged responses to create a composite index.

Hypothetical campus initiatives

We developed a set of nine pro-environmental hypothetical campus initiatives to assess whether students would support

³ These scales are short versions of the scales that were later published by Davis et al. (2011).

institutionally mandated changes in behavior that benefit the environment but that would require them to sacrifice time, money, or convenience (e.g., “The housing office is considering putting timers on the showers in the dorms and apartments to encourage students to take shorter showers”; $\alpha=0.74$; see Appendix) on a nine-point scale (1=do not at all support; 9=completely support). We averaged responses to create a composite index.

Results

We performed a path analysis using mPlus software (Muthén and Muthén 2009) to examine effects of commitment model measures (satisfaction, investments, and alternatives) on hypothetical campus initiatives and willingness to sacrifice (see Table 1 for descriptive statistics and intercorrelations). We used the maximum likelihood method of parameter estimation and the scale means for each individual as inputs. In addition, we allowed satisfaction, investments, and alternatives to correlate, and we allowed the error terms for hypothetical campus initiatives and willingness to sacrifice to correlate.

To test our hypotheses, we first tested the fully mediated model based on the basic model of commitment (Rusbult 1980; see Fig. 1), which provided a decent fit to the data, $\chi^2(6)=14.61$, $p<0.05$; comparative fit index (CFI)=0.98, and root mean square error of approximation (RMSEA)=0.08. Next, we tested a partially mediated model for willingness to sacrifice, based on the model specified in Davis et al. (2011), with direct paths from satisfaction with the environment and investments in the environment to willingness to sacrifice. By entering each path individually, we determined that only a direct path between investments in the environment and willingness to sacrifice for the

environment significantly improved model fit, $\Delta\chi^2(1)=8.24$, $p<0.01$, and this model provided an excellent fit to the data, $\chi^2(5)=6.37$, $p<0.27$; CFI=1.00; and RMSEA=0.03 (see Fig. 2). We then examined additional direct effects and the direct path that provided the greatest improvement to model fit was between alternatives to the environment and hypothetical campus initiatives; however, this improvement to the model was not significant, $\Delta\chi^2(1)=1.87$, $p<0.17$, and thus, the previous model was retained.⁴

Consistent with predictions, individuals with greater satisfaction with the environment and investments in the environment reported greater commitment to the environment. Alternatives to the environment were not associated with commitment to the environment; however, we chose to retain the measure in the model because our theoretical framework (i.e., Rusbult's commitment model) includes all three constructs. Partially consistent with Hypothesis 1 and past research (Davis et al. 2011), students' commitment to the environment partially mediated the effects of their investments in the environment on their willingness to sacrifice for the environment and fully mediated the satisfaction with the environment and willingness to sacrifice link. The indirect effects were also significant, $\beta=0.27$, $p<0.001$, 95 % CIs [0.21, 0.33], for satisfaction, and $\beta=0.27$, $p<0.001$, 95 % CIs [0.20, 0.34], for investments.⁵ Consistent with Hypothesis 2, individuals' commitment to the environment fully mediated the effects of investments in the environment and satisfaction with the environment on hypothetical campus initiatives. Furthermore, these indirect paths were significant, $\beta=0.20$, $p<0.001$, 95 % CIs [0.14, 0.26], for satisfaction, and $\beta=0.20$, $p<0.001$, 95 % CIs [0.14, 0.25], for investments.

Discussion

In previous work, Davis and colleagues (Davis et al. 2009, 2011) developed a model of commitment to the environment that successfully predicted general pro-environmental intentions by applying Rusbult's (1980) model of commitment to the human–environment relationship. They found that commitment to the environment mediated the relationships of satisfaction with the environment and investments in the environment with pro-environmental intentions (Davis et al. 2011). The current model replicated and further extended this past work with the inclusion of a campus-specific measure of pro-environmental intentions, support of hypothetical “green” campus initiatives.

Table 1 Descriptive statistics and intercorrelations among measures

	SAT	INV	ALT	COM	WTS	HCI
<i>M</i>	7.09	4.59	6.40	5.71	6.33	5.65
<i>SD</i>	1.48	1.84	1.46	1.41	1.42	1.47
SAT	—	0.34*	−0.21*	0.66*	0.37*	0.29*
INV		—	−0.29*	0.67*	0.54*	0.29*
ALT			—	−0.24*	−0.23*	−0.19**
COM				—	0.66*	0.40*
WTS					—	0.48*
HCI						—

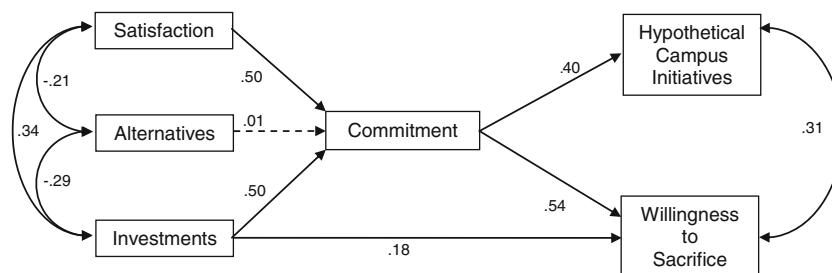
Variable names are *SAT* satisfaction with the environment, *INV* investments in the environment, *ALT* alternatives to the environment, *COM* commitment to the environment, *WTS* willingness to sacrifice for the environment, *HCI* hypothetical campus initiatives

* $p<0.001$; ** $p<0.01$, $N=238$

⁴ No significant differences were found when models were analyzed separately for each university and compared.

⁵ Confidence intervals reported were calculated using a bootstrapping analysis with 2,500 iterations.

Fig. 2 Path model predicting hypothetical campus initiatives and willingness to sacrifice for the environment, $\chi^2(5)=6.37$, $p<0.27$; CFI=1.00; and RMSEA=0.03. *Curved lines* represent correlations. *Solid lines* represent significant standardized path coefficients



In replication of a great deal of past research on commitment and more recent research on environmental commitment, individuals who were more satisfied with and invested in the natural environment also were more committed. In addition, individuals' level of commitment to the environment predicted their willingness to sacrifice for the environment as well as their support of hypothetical campus initiatives. Importantly for our theoretical model, individuals' level of commitment to the environment mediated the effects of satisfaction with the environment and investments in the environment on willingness to sacrifice for the environment and support of hypothetical campus initiatives. Thus, individuals' satisfaction with and investments in the environment affect their behavioral intentions for conservation behaviors via their level of commitment to the environment. Interestingly, alternatives to the environment did not exert any significant effects in our model; these findings are in line with past research on commitment to the environment (Davis et al. 2011). Davis and colleagues (2011) proposed that this may be due to the non-exclusive relationship people have with the environment (i.e., one may be attached to both a natural environment and a non-natural environment, such as the home) whereas, in romantic relationships, exclusivity is expected. This finding also is consistent with meta-analytical findings in other non-interpersonal domains (Le and Agnew 2003). With the exception of jobs, alternatives have consistently failed to predict commitment. This relationship is likely found in research on jobs because there are clear alternatives (i.e., one could take another job); but this is not the case with specific clubs (e.g., no alternative psychology club), playing a specific sport, or, in this case, the natural environment. However, it would be interesting to examine more specific aspects of these domains (e.g., commitment to specific parks) to determine if alternatives predict commitment in such contexts.

Past research had utilized a variety of methods and theories when studying aspects of campus sustainability (e.g., descriptive statistics, Emanuel and Adams 2011; the theory of planned behavior, Chen Grogioire Arendt and Shelley 2011; attitudes, Thapa 1999). A strength of the current work is the use of a well-established theoretical model that researchers and administrators can use to understand students' relationship with the environment. Furthermore, Davis et al. (2009) found that manipulating dependence on

the environment resulted in greater pro-environmental behavior. It would be interesting to determine if manipulating satisfaction with and investments in the environment would yield similar results. It may be possible to cause shifts in pro-environmental behaviors by manipulating degree of satisfaction and investment (in addition to commitment, as has been done in previous work). Based on our finding of partial mediation, increasing investments may be an effective strategy for increasing willingness to sacrifice. However, based on our finding of full mediation by commitment, increasing commitment (via increases in satisfaction or investments) would be the most effective strategy for increasing support of campus initiatives. Future research may seek to test the effectiveness of such hypotheses. Perhaps holding events in campus green-spaces, as opposed to more traditional "built" environments (e.g., auditoriums), would increase students' satisfaction with or investments in the environment and result in greater endorsement of subsequent pro-environmental proposals by the administration.

Several potential limitations to the research should be mentioned. First, these results are correlational. Though research utilizing the commitment model across domains has provided strong evidence for the directionality of the paths (e.g., Rusbult 1980), this has yet to be directly tested using environmental data. Future research, such as that described above, may seek to test causal models. Second, our measure of hypothetical campus initiatives was developed without input from administrators, and the same items were adapted for two universities (see Appendix); future researchers may choose to develop university-specific items. Finally, the commitment and antecedent scales used in this study were measures developed for the general natural environment. Though this highlights the generalizability of these measures and could be interpreted as a strength of the current research, future research may seek to adapt these scales to the particular college or university.

Conservation psychology and campus sustainability are quickly expanding fields. In recent years, psychologists have begun developing a variety of measures and theoretical frameworks for predicting pro-environmental intentions and behavior, while administrators have sought ways to increase efficiency, reduce waste, and promote a healthier environment for students and visitors to their campuses. It is clear

that both areas may benefit from collaborating and understanding the others' perspective and needs. Sustainability administrators may benefit from better understanding their students' views on environmental issues related to campus life, and the commitment to the environment model provides a relatively simple, yet powerful, framework to address this concern.

Appendix

Hypothetical campus initiatives

To what extent does each statement describe your current attitudes? Please use the following scale to record your answers.

1 2 3 4 5 6 7 8 9
Do Not Completely
At All Support Support

1. The (college/university) is considering shortening the week-day hours at the (gym), such that they open at 9 in the morning (rather than 7) and close at 9 at night (rather than 10), to save energy required to heat and power the building.
2. The (college/university) plans on buying bio-fuel for the campus (i.e., for heating etc.), which costs 10 % more, and this cost will be passed on as a tuition increase of \$50 a year per student.
3. The (college/university) proposes changing all light bulbs in classrooms and offices to high efficiency bulbs. However, paying for all of these bulbs will add an additional \$20 to your tuition.
4. The (dining centers) are considering getting rid of trays, because a significant amount of water is wasted in washing them.
5. The (housing office) is considering putting timers on the showers in the dorms and apartments to encourage students to take shorter showers.
6. The (housing office) is planning on installing electric meters in each dorm room and apartment and charging students for their actual electric consumption in their residences.
7. The administration is considering implementing a "pay-per-print" policy in computer labs such that students would have to pay 5-cents per page for printing, to encourage responsible paper use.
8. The administration proposes turning down heaters in the classrooms by 3 degrees during the winter to save energy.
9. The administration wants to install a new plumbing system in the (dorms/resident halls) that will help conserve water; however, this will involve construction work in and around the (dorms/resident halls) for two weeks during the academic year.

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