Evaluating an Online Intervention to Increase Present Control over Stress

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Samuel Mathew Hintz

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Patricia Frazier

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Abstract

The temporal model of perceived control is concerned with the perception of control over stressful life events and differentiates between past, present, and future control (Frazier, Berman, & Steward, 2001). To date, present control has been found to be associated with a range of positive outcomes including lower levels of depression, anxiety, and stress and higher levels of life satisfaction and physical health (e.g., Frazier, 2003; Frazier et al., 2011). The goal of the three studies presented here was to assess the feasibility and effectiveness of an online intervention designed to increase present control in samples of undergraduate students coping with stress. In an initial pilot test (Study 1, N = 31), our online intervention increased present control in both within group (pre/post within intervention group, $d = .56$) and between group (intervention group vs. stress-information only group, $d = .51$) analyses. In Study 2 ($N = 34$), a refined intervention produced larger within-group increases in present control ($d = .79$). Finally, Study 3 ($N = 292$) compared the present control intervention, the present control intervention plus feedback, and stress-information only groups and found that the two present control intervention groups had lower levels of stress, depression, and anxiety relative to the stress-information only group at posttest and 3-week follow-up (mean between group $d$ at follow-up = -.35, mean within group $d$ for intervention groups at follow-up = -.46). Further, mediation analyses revealed that these effects were mediated by changes in present control. Implications for research and practice are discussed.

Key words: perceived control, stress, online intervention
Table of Contents

LIST OF TABLES ..............................................................................................................v

LIST OF FIGURES .........................................................................................................vi

OVERVIEW OF THE DISSERTATION AND LITERATURE REVIEW ......................1

DEVELOPING A PRESENT CONTROL INTERVENTION .............................................7

STUDY 1: PROOF OF CONCEPT FOR A PRESENT CONTROL INTERVENTION ...9
  Method ..........................................................................................................................10
  Results and Discussion ............................................................................................11

STUDY 2: IMPROVING THE PRESENT CONTROL INTERVENTION .....................13
  Method ..........................................................................................................................13
  Results and Discussion ............................................................................................16

STUDY 1: LARGER TRIAL OF THE PRESENT CONTROL INTERVENTION ...........17
  Method ..........................................................................................................................20
  Results ..........................................................................................................................22
  Discussion ....................................................................................................................28

REFERENCES ...............................................................................................................34

APPENDIX A: Additional Stress Information ...........................................................47

APPENDIX B: Internet Based Interventions for Related Conditions .....................54

APPENDIX C: Interventions to Address College Stress ..............................................57

APPENDIX D: Self-Efficacy and Psycho-Education Interventions .........................61

APPENDIX E: Description of the Study 1 Intervention ..............................................64

APPENDIX F: Personalized Feedback Messages .......................................................66
List of Tables

Table 1. Study 3: Preintervention Correlations and Descriptive Statistics…………………41

Table 2. Study 3: Between-group Differences in Present Control at Postintervention (T2) and Follow-Up (T3)………………………………………………………………………42

Table 3. Study 3: Between-group Differences in Mental Health at Post-Intervention (T2) and Follow-Up (T3) ………………………………………………………………………43

Table 4. Within Group and Between Group Effect Sizes (Cohen’s d)…………………44

Table 5. T3 Present Control as a Mediator of Intervention Effects on Mental Health Outcomes at 3-week Follow-Up………………………………………………………45
List of Figures

Figure 1. Study 3 Participant Recruitment and Attrition………………………………………46
OVERVIEW OF THE DISSERTATION AND LITERATURE REVIEW

Introduction

Perceived control is generally defined as beliefs about one’s ability to influence events, and is a key construct in psychological research (Bandura, 2001). Perceived controllability is also a key aspect of theories of stress and coping (see e.g., Skinner, 1996), and has been posited as a central contributor to the development of Post-Traumatic Stress Disorder (PTSD; e.g., Ehlers & Clark, 2000; Foa, Zinbarg, & Rothbum, 1992). In much of this literature, perceived control has been conceptualized as a binary construct. That is, individuals are theorized to perceive events as either controllable or uncontrollable, with uncontrollable events hypothesized to lead to more distress (Foa et al., 1992). However, the temporal model of perceived control highlights that perceptions of control can focus on control over the past, present, or future (Frazier, Berman, & Steward, 2001). Each type of control can be summed up as a question: Could I have influenced the occurrence of this stressful event (past control)? Can I influence my present experiences related to this event (present control)? Can I prevent this stressful event from happening again (future control)? Significant differences exist among these control constructs in their relations to stress-related outcomes, with present control being the only form of control consistently associated with positive mental health (e.g., Frazier et al., 2011). The purpose of this research was to develop an intervention designed to increase present control and reduce the effects of stress in college students. We first briefly review research on temporal control beliefs, the prevalence and outcomes of college student stress, and then describe the development and assessment of an online
present control intervention for college student stress.

**Review of Research on Past, Present, and Future Control**

**Past control.** An initial review of the literature related to the temporal model of control found that higher levels of past control were associated with poorer adjustment following stressful and traumatic events (Frazier et al., 2001), despite existing theories that controllable events are less distressing (e.g., Foa et al., 1992). More recent work has confirmed this conclusion. For example, in a study of sexual assault survivors, both personal and vicarious past control were associated with more distress (Frazier, 2003). Past control also predicted problem avoidance and social withdrawal coping strategies, both of which were related to greater distress (Frazier, Mortensen, & Steward, 2005). Finally, using a measure specifically developed to test the temporal model of control, past control was significantly related to higher levels of PTSD, depression, anxiety, and stress symptoms (Frazier et al., 2011; Frazier et al., 2012), and lower life satisfaction and physical health (Frazier et al., 2012).

**Future control.** Research on the relation between perceived future control and adjustment to stressful life events is less consistent: In some studies, future control was unassociated with distress whereas in others it was associated with better adjustment and in still others it was associated with poorer adjustment (Frazier, 2003; Frazier et al., 2001). More recently, however, future control has been found to be associated with greater distress when an event was objectively uncontrollable (e.g., sudden bereavement) and associated with positive outcomes when an event was objectively controllable (i.e., outcome of an exam) (Frazier et al., 2011). Thus, the relation between future control and
distress may depend on the objective controllability of the event.

**Present control.** Present control differs from past and future control in both its definition and associated outcomes. Whereas past and future control concern control over the occurrence of a specific event, present control concerns present aspects of a stressful event, such as how one currently thinks or feels about the event. Present control, so conceived, was related to many positive outcomes in the Frazier et al. (2001) review and in more recent research. For example, in a study examining perceived control after sexual assault, present control (i.e., control over the recovery process) was associated with less distress at each of four follow-up time points (Frazier, 2003) and use of more effective coping strategies (Frazier et al., 2005). Using a recently developed temporal control measure, present control was associated with lower levels of general distress, event-specific distress, and binge drinking (Frazier et al., 2011) as well as higher levels of life satisfaction and better physical health (Frazier et al., 2012), with medium to large effect sizes. These relations were significant controlling for a host of variables including general control beliefs, coping strategies, social support, and neuroticism (Frazier et al., 2011; Frazier et al., 2012). Finally, a recent study of incoming international students at a Midwestern university found that perceived present control over academic stress was the best predictor of positive adjustment trajectories (Hirai, 2013).

Taken together, these findings highlight the ways in which the effects of perceived control vary based on their temporal focus, and that the only aspect of perceived control that is consistently and robustly related to better outcomes is perceived present control. To date, this relation has been established cross-sectionally,
longitudinally, and prospectively (Frazier et al., 2011; Frazier et al., 2012), but not experimentally. The next step in our translational program of research thus was to assess whether present control could be increased through an intervention and whether such an intervention would in turn lead to lower levels of distress. We thus developed an intervention designed specifically to raise levels of present control and examined the effects of this intervention on adjustment outcomes.

We began by developing an online intervention for college students coping with stress. This seemed the ideal place to begin for several reasons. First, there are few stress-focused interventions specifically designed for the general undergraduate population; rather, most target specific subgroups such as medical students (Robotham & Julian, 2006). Second, although a present control intervention may eventually prove to be an effective tool in dealing with more serious stressors and traumas, because the intervention was untested, it made sense to initially test it with a sub-clinical sample. Finally, because much of the research on present control has involved college students, evidence for the validity of the construct was strongest with this population. Thus, our goal was to translate our knowledge related to perceived control to reducing the effects of stress in college students (Tashiro & Mortensen, 2006). Below we review the literature on college student stress, and then describe our rationale for developing an online intervention.

**Prevalence and Outcomes of Stress in College Students**

Given the breadth of new experiences and challenges faced by individuals during their undergraduate education, it is not surprising that this period of life is characterized by substantial stress. Indeed, 45% of undergraduates attending one of 17 Midwestern
secondary schools reported experiencing at least two major stressors in the past 12 months and 26% reported that they were consistently unable to manage their stress (Lust, Ehlinger, & Golden, 2010). Another study found that over 80% students felt overwhelmed by all they had to do (American College Health Association, 2012). Interpersonal and academic stressors are particularly common among undergraduate students (e.g., Hashim, 2003; Lust et al., 2010).

The general effects of stress impact every system in our bodies (Schooler, Dougall & Baum, 2000). For example, numerous studies have examined the connection between experiences of stress and negative health behaviors and outcomes. Among undergraduates, those who reported higher stress levels were less likely to exercise regularly, less likely to consume fruits and vegetables, and more likely to consume junk food and soft drinks (Hudd et al., 2000; Lust et al., 2010; Wichianson, Bughi, Unger, Spruijt-Metz, & Nguyen-Rodriguez, 2009). Perhaps more relevant for this intervention, stress is also associated with significant mental health outcomes, including higher levels of depression and anxiety symptoms (Dyrbye, Thomas, & Shanafelt, 2006). A study of university students found that stress was a stronger predictor of poor mental health than either deficits in internal resources or social support (Bovier, Chamot & Perneger, 2004).

Given the prevalence of stress and its relation to negative mental health outcomes, it may not be surprising that nearly 1 out of 3 undergraduates report clinical levels of distress (Bewick, Gill, Mulhern, Barkham, & Hill, 2008). The severity of mental health problems among college students is placing significant demands on mental health clinics, resulting in long wait lists for services (Kitzrow, 2003). However, many students on
campus do not seek help, due in part to lack of time and stigma related to counseling (Eisenberg, Golberstein, & Gollust, 2007). See Appendix A for more information on the prevalence and outcomes of stress in college students.

**Internet-based Interventions**

Internet-based interventions are one solution to this lack of access. A recent survey found that only 10% of sampled individuals were unwilling to try an online intervention (Klein & Cook, 2010). Such interventions may be particularly suitable for college students given their widespread adoption of technology and access to the Internet (Smith, Rainie, & Zickuhr, 2011). Importantly, although students’ likelihood of seeking help goes down with increasing distress, intention to use online interventions goes up (Ryan, Shochet, & Stallman, 2010).

Online interventions are a promising alternative to face-to-face services for many reasons. Online interventions have been found to be effective for a variety of conditions including depression and anxiety (Amstadter, Broman-Fulks, Zinzow, Ruggiero, & Cercone, 2009; Barak, Hen, Boniel-Nissim, & Shapira, 2008) and to be as effective as in-person interventions (van Straten, Cuijpers, & Smits, 2008). Finally, online interventions do not require individuals to travel to a physical location to receive care, are less expensive to deliver, and maintain privacy for those sensitive to perceived stigma (Amstadter et al., 2009). See Appendix B for more detail on internet-based interventions for related conditions.

Although online interventions have generally been found to be effective, there are few online interventions specifically focused on coping with college stress. The most
popular is MyStudentBody: Stress (Chiauzzi, Brevard, Thurn, Decembrele, & Lord, 2008), which is a web-based program offering tailored motivational feedback based on student responses in five domains: physical stress, life events, daily hassles, coping style, and depression. Students are also offered access to a variety of additional resources (e.g., relaxation exercises, information about the effects of stress) based on their responses. However, comparisons between students assigned to MyStudentBody: Stress, a stress-information only alternative, or a no treatment group found no between-group differences in the primary outcomes (i.e., perceived stress, health promoting behaviors). Thus, although our study’s goals are primarily to translate theory, it meets an additional, more practical need by creating a potentially valuable tool for college mental health services. Appendix C for more information on interventions to address college stress.

**Developing a Present Control Intervention**

To create our online intervention to increase present control, we drew on Bandura’s (1996) work on sources of self-efficacy. These include (1) mastery experiences (successful achievement of goals in a given domain), (2) vicarious experiences (observation of similar others having mastery experiences), and (3) social persuasion (verbal information that facilitates mastery experiences). With regard to vicarious experiences, *coping* models, in which the model struggles and then finally succeeds, are more helpful than *mastery* models, in which the model immediately demonstrates correct performance.

Our intervention sought to provide participants with mastery experiences by encouraging them to practice present control through online exercises. We provided
vicarious experiences by exposing students to narrated presentations of other students’ experiences regarding present control and stress. With regard to social persuasion, we exposed participants to expert descriptions of present control beliefs and their benefits via videos of our research expert, a tenured professor at a research university.

We also reviewed the literature for guidance on best practices for stress management intervention development. For instance, stress management interventions in occupational settings have been most effective when they focus on one central cognitive-behavioral element instead of several topics (Richardson & Rothstein, 2008). Furthermore, research with student interventions has indicated that small behavioral changes that require little time to implement are rated by students as most satisfying (Brennan, McGrady, Lynch, & Whearthy, 2010) and that empirically supported medical/psychological information is more effective in producing change than test feedback or advice (Donker, Griffiths, Cuijpers, & Christensen, 2009). As such, we designed our program to communicate the singular concept of present control, to be very brief, and to stress the empirical support for the information provided. For additional information on self-efficacy and psycho-education interventions, see Appendix D.

**Overview of Current Studies**

Initially, two pilot studies were conducted to test the feasibility of developing a present control intervention and to gather information to improve the intervention. Specifically, these pilot studies were intended to gauge the effect size of change (if any) in present control and obtain information from participants to optimize future versions of the intervention. The first pilot study compared our initial present control intervention to
basic stress information in terms of increasing present control. The second pilot built upon the first to refine and focus the intervention (with no comparison group). Outcomes included present control and positive and negative affect. The third study was a randomized controlled trial that tested the final version of the intervention against a stress-information only group and a group that received the standard present control intervention along with feedback on their online exercises. Outcomes were assessed with regard to changes in stress, depression, and anxiety. This third study was powered to detect effect sizes equal to those in the pilot studies.

**Study 1: Proof of Concept for a Present Control Intervention**

The initial intervention was conceived as an online course containing written text (with optional narration), pictures, videos, and online exercises. To assess the basic efficacy of this intervention, the present control intervention condition (containing information on stress and present control) was compared to a stress-information only condition. Both versions were developed using Moodle™, an online learning management tool that can manage video, audio, and text delivery. The intervention was structured such that participants would first navigate through a series of web pages providing basic stress information before branching into either the present control or stress-information only versions. The present control intervention version presented the concept of present control along with interactive tasks for participants to practice applying the concept in their lives. This version concluded by asking participants to label aspects of one of their current stressors as either “controllable” or “uncontrollable” and to brainstorm ways that they could take action on the controllable aspects. The stress-
information version provided further information about stress misconceptions and concluded by asking participants to write a paragraph summarizing what they had learned. In both versions, information was conveyed via text, videos of our expert explaining the topics, and videos of a university student discussing the topic’s relevance to her life. Both conditions were self-paced, but generally took about 15 minutes to complete. The goals of this first study were to assess whether present control scores could be increased via an online psychoeducational intervention, and to gather feedback to improve the intervention. See Appendix E for more detail on the intervention used in Study 1.

Method

Participants and Procedures

Participants (N = 31) were recruited from psychology courses at a large Midwestern university. Because interpersonal stressors are common in undergraduate students, and to provide a focus to the intervention, inclusion criteria required that participants currently be experiencing an interpersonal stressor. After providing consent in an online survey, participants completed a measure of present control (described below). They were then randomly assigned to either the present control intervention condition (n = 15) or the stress information only condition (n = 16) and sent the appropriate intervention link one week later. Participants were assigned to condition using an online random number generator.

Immediately after completing the intervention, participants completed a measure of perceived control and provided feedback on the interventions. Completion rates varied
across condition, with 13 (87%) from the present control intervention condition completing the intervention and posttest compared to 9 (56%) from the stress-information condition. Of those that completed (the sample for the analyses), 51% were age 18-21, 39% were 22-29, and 10% were 30 or older. Additionally, past samples from the same population have been predominately White (usually around 70%) and female (usually around 70%); however, these data were not collected from this sample. Participants were given extra credit for participating.

**Measures**

**Perceived control.** The Perceived Control over Stressful Events Scale (PCOSES; Frazier et al., 2011) is a 22-item measure designed to assess perceptions of past, present, and future control over specific stressors. Individuals rated each item (e.g., “My reaction to the event is not under my control”, reverse scored present control item) on a 4 point scale (1 = strongly disagree to 4 = strongly agree). Scores on these scales have demonstrated adequate internal consistency, test-retest reliability, and convergent and discriminant validity with undergraduate samples (Frazier et al., 2011; Frazier et al., 2012). The PCOSES was administered both before and after the intervention although only the 7-item present control scales were used in these analyses. Cronbach’s alphas for present control were .75 at both pretest and posttest.

**Intervention feedback.** After completing the intervention and the PCOSES, participants were asked to rate individual elements of the intervention (i.e., expert videos, videos from student, lesson content, lesson images, lesson narration, final activity) on a scale from 1 (unhelpful/confusing) to 5 (very helpful). They were also asked to provide
qualitative feedback about particular areas they found confusing/unhelpful or other changes they would recommend.

**Results and Discussion**

To assess whether present control increased as a result of the intervention, an analysis of covariance (ANCOVA) was performed with condition as the independent variable, T1 present control scores as a covariate, and T2 present control scores as the outcome measure. Although the between-group difference was not significant because of the small sample size, $F(1,19) = 1.80$, $p = .20$, partial eta squared = .09, the between-group effect size was medium ($d = .51$). Within group pre/post analysis in the present control condition also revealed a medium effect ($d = .56$) for increases in present control. The within group effect size within the stress-information only group was $d = .05$ for present control.

Responses to questions asking for feedback about the intervention varied somewhat by condition. For the present control intervention group, the elements rated most helpful were the expert videos ($M = 4.23$, $SD = 0.73$), lesson content ($M = 3.85$, $SD = 0.69$), and final exercise ($M = 3.77$, $SD = 1.01$). The other areas received somewhat lower ratings: student testimonial ($M = 3.46$, $SD = 1.20$), lesson narration ($M = 3.23$, $SD = 1.24$), and lesson images ($M = 2.92$, $SD = 1.32$). For the stress-information only group the highest rated elements were lesson content ($M = 3.67$, $SD = 1.23$) and expert videos ($M = 3.56$, $SD = 0.73$). The other elements were rated as follows: student testimonial ($M = 3.22$, $SD = 0.83$), lesson narration ($M = 2.89$, $SD = 1.45$), final exercise ($M = 3.11$, $SD = 1.54$), and lesson images ($M = 2.22$, $SD = 1.20$). The conditions
differed most notably with respect to the helpfulness of the expert videos ($M = 4.23$ vs. 3.56). Qualitatively, participants commented that the images did not seem to be connected to the material and that the student testimonial was difficult to follow, but they had generally positive perceptions of the interventions and of the online format.

In sum, the results of this initial pilot study suggested that present control could be increased via a brief online intervention at least in the short term (based on the within and between-group effect sizes). This supported moving forward with further development of the intervention. Feedback about specific intervention components was used in the development of the next iteration.

**Study 2: Improving the Present Control Intervention**

Having demonstrated basic efficacy, an additional pilot study was conducted to develop and assess a second iteration of the present control intervention. This iteration was necessary to confirm that alterations to the program were beneficial and also to broaden the range of variables under consideration. Whereas the first pilot focused on changes in present control when comparing a present control intervention with a stress-information only condition, this second pilot study focused on assessing whether the revised present control intervention (1) produced larger within-group increases in present control and (2) was associated with increases in positive affect and decreases in negative affect. Given the shift in purpose, no comparison group was included.

**Method**

**Participants and Procedure**

Participants were students in psychology courses at the same large Midwestern
university ($N = 34$) who took part in this study for extra credit. A majority of the participants were female (65%) and between the ages of 18-21 years old (59%). Data on ethnic background were not collected in this study. After giving consent, participants were sent an online link to complete the pre-intervention survey and first module. Participants completed one module every other day for the first three modules and then were given one week to practice applying present control before completing the last module. During this week, participants completed online stress logs every other day for a total of 3 logs. Immediately after participants had completed the final module, they completed the post-intervention survey. Nineteen participants (56%) completed all four intervention modules, the three stress logs, and the T2 survey.

**Changes to the Intervention**

Based on the quantitative and qualitative feedback gathered during the first pilot, a series of changes were made to the intervention. First, components that the participants found less useful (e.g., lesson images) were eliminated. Second, to emphasize the components that participants found most useful (i.e., expert videos, exercises, lesson content), a new structure was introduced. In this second version, the intervention consisted of four online modules, each following the same format. Each module began with a video of our expert providing education about a specific topic. Next participants watched a video of a group discussion in which our expert facilitated the learning of a group of undergraduates. Finally, participants completed a closing activity intended to encourage integration of new material into their lives. Each module could be completed in 10-12 minutes. Thus, the entire intervention could be completed in approximately 1
Modules covered a logical progression of topics:

1. **Module One: Studying Your Stress.** In this module our expert described common college stressors and negative stress outcomes, using specific examples from a recent undergraduate survey. Next, our expert facilitated a group of students as they discussed their current stressors. This group was comprised of two graduate students and two undergraduate research assistants who discussed actual personal stressors in their lives. After observing this facilitated conversation, participants listed some of their current stressors and wrote about how this stress was affecting them.

2. **Module Two: Considering Your Control.** In this module our expert defined past, present, and future control and described the positive outcomes associated with present control. Our group then discussed ways in which they had focused on past control and how they might transition to considering their stressors from a present control perspective. Finally, participants completed an activity in which they labeled aspects of their personal stressors as either “controllable” or “uncontrollable.”

3. **Module Three: Clarifying Your Control.** In this module our expert reviewed what had been covered so far and described how to avoid pitfalls in implementing present control. Our group then verbalized some of the difficulties they had encountered as they adopted a present control focus. Finally, participants wrote about a misconception they had about present control and how they understood it better now. They also completed an activity containing self-efficacy focused motivational interviewing questions. Participants were then given 1 week to practice implementing a present control perspective via three online stress logs, where they reflected on the
current stress in their lives and practiced applying present control in these situations.

4. Module Four: Preparing for the Future. In this module our expert discussed techniques to help participants continue the skills they had begun to learn. The expert checked in with two of the group members in individual videotaped interviews to find out how their practice week had gone and to review how to keep going with their new skills. Finally, participants answered motivational interviewing questions about overcoming potential obstacles to their adoption of present control, and were encouraged to develop two behavioral changes that would help them to remain focused on present control.

Measures

**Present control.** The Perceived Control Over Stressful Events Scale (PCOSES; Frazier, et al., 2011), described in Study 1 was completed before module 1 (pretest) and after module 4 (posttest). Cronbach’s alphas in this sample for present control were .74 at pretest and .79 at posttest.

**Affect.** The Positive and Negative Affect Schedule (PANAS, Watson, Clark, & Tellegen, 1988) was used to measure positive and negative affect. Individuals rated themselves on single mood terms (e.g., ashamed, inspired) by indicating how much they were experiencing the target mood at the present moment (1 = very slightly to 5 = extremely). The positive and negative affect scales have 10 items each. Scores on this measure has been found to have sufficient validity (convergent and divergent), stability over time, internal consistency, and orthogonal factor structure in samples of undergraduate students (Watson et al., 1988). This measure was administered both before
and after completion of the intervention. Alpha coefficients in this sample at T1 and T2 ranged from .83 to .94.

**Intervention feedback.** The feedback form used in Study 1 was also used here.

**Study 2: Results and Discussion**

To examine whether the present control intervention produced the expected changes in present control and affect, paired t-tests were conducted comparing pretest and posttest scores on present control and positive and negative affect. Results of paired t-tests assessing change in present control, $t(17) = -3.30, p < .01$, and negative affect, $t(18) = 2.13, p < .05$, were significant. Decreases in positive affect were marginally significant, $t(18) = -1.95, p = .07$. Within group effect sizes were large for present control ($d = .79$) and medium to small for positive and negative affect ($d_s = .42$ and -.33, respectively).

Ratings of the various aspects of this iteration of the intervention were all above the scale midpoint: practice forms ($M = 3.72, SD = .96$), module activities ($M = 3.50, SD = 1.15$), expert videos ($M = 3.42, SD = 1.07$), and group video ($M = 3.26, SD = 1.10$). Qualitatively, participants commented again on the usefulness of the expert videos and the overall benefits of the program. However, participants commented negatively on the group videos (e.g., they were stilted, hard to follow, boring to watch).

In sum, these findings provided additional evidence that the intervention was effective in increasing immediate levels of present control, and that this second longer version of the intervention resulted in bigger improvements in present control than the first iteration (within group effect size = .79 vs. .56). In addition, the samples reported
increases in positive affect and decreases in negative affect. Feedback about specific intervention components was used to further improve the intervention.

**Study 3: Larger Trial of the Present Control Intervention**

Having established the feasibility of an online present control intervention as well as the likely effect size and most promising components, the next step was to conduct a properly powered randomized controlled trial, broaden the range of outcome measures assessed, and gather initial evidence regarding present control as a causal factor in reducing distress. In Study 3, participants were randomly assigned to one of three conditions: a present control intervention (PCI) group (similar to the 2nd pilot but with some changes described in the Method section below), a stress-information only group (that completed only module 1), or a PCI plus feedback condition. Participants in the PCI plus feedback condition were given personalized feedback via email after each module exercise and stress log. This feedback was intended to encourage students to continue participating and to serve as a means of clarifying potential sticking points about present control. A meta-analysis of alcohol dependence interventions using personalized feedback found an average effect size of .22 favoring groups receiving feedback compared to those who did not (Riper et al., 2009). Personalized feedback has been rated as more interesting and helpful than general feedback and is associated with higher levels of behavior change (De Vries, Kremers, Smeets, Brug, & Eijmael, 2008). As such, we developed a set of feedback responses that could be personalized for participants at each stage of the intervention (available from first author). See Appendix F for these messages.
This study followed the same procedure as Study 2, with two important differences. First, because it seemed likely that individuals already high in present control would not benefit from the intervention, potential participants were screened on the PCOSES and only those with mean present control scores of 3 or lower (out of 4) were included in the study. Second, a follow-up time point (T3) was added 3 weeks after the conclusion of the intervention. Depression, anxiety, stress, and perceived stress were assessed at pre-intervention, post-intervention, and 3-week follow-up. We focused on these outcome measures because research has demonstrated their relevance as impediments to student functioning (Lust et al., 2010), and past research on present control has found significant relations with these measures (Frazier et al., 2011; Frazier et al., 2012). Other measures, hypotheses, and results and presented in Appendix G.

Our hypotheses were as follows. First, it was expected that both the PCI group and the PCI plus feedback group would increase in present control significantly more from pretest to posttest and follow-up than the stress-information only group. Next, we hypothesized that the two present control intervention groups would decrease more in the primary outcomes of perceived stress, and depression, anxiety, and stress symptoms than the stress-information only group. We also predicted that the PCI plus feedback group would have a greater increase in present control and a greater decline in mental health symptoms at follow-up than the PCI group, although we predicted that differences between the two PCI groups would be small (d = ~.20). Finally, beyond simply demonstrating that our intervention produced positive changes in our outcome variables (e.g., stress), we predicted that changes in present control were the specific mediator
responsible for these improvements (i.e., that changes in present control would completely mediate the relationship between group membership and changes in outcome measures). We assessed hypotheses 1 and 2 using analyses of covariance and assessed mediation using multiple regression.

**Method**

**Participants and Procedures**

An a priori power analysis using G*Power 3.17 (Faul, Erdfelder, Buchner, & Lang, 2009) indicated that at least 158 participants ($N = 53$ per condition) would be necessary to detect a medium effect in an ANCOVA with three groups and one covariate at a significance level of .05, power of .80. Basing power on the ability to detect a medium effect seemed reasonable given the effect sizes in the two pilot studies ($d's = .33$ to .79). Participants were students in psychology courses at the same large Midwestern university who were given extra credit for their participation. An initial participant pool was prescreened for inclusion in the study via an online survey ($N = 404$). Of these, 292 (72%) had mean present control scores of 3 or less and were sent an email invitation to participate in the intervention study: 97 were randomly assigned to the PCI group, 98 to the PCI plus feedback group, and 97 to the stress-information only group. The final sample was those who consented to participate and began the intervention ($N = 223$; 76%). In this final sample, most participants were female (70%) and between 18-21 years old (77%). The racial/ethnic make-up of the sample was 71% European American/White, 16% Asian/Asian American, 1% African American/Black, 2% Hispanic, 3% multiracial, and 3% other. There were no significant between-group differences with regard to sex,
age, year in school, and ethnicity.

Information about participant attrition is reported in Figure 1. Eighty-seven percent of those who began the intervention ($n = 195$) completed a follow-up survey 3 weeks after the conclusion of the intervention (Time 3, T3). Completion rates did not differ by condition.

Participants were guided through the study by a series of links emailed to them according to the intervention schedule. In general, participants would receive a link every other day directing them to the next step in the intervention. Participant progress was tracked and individuals were sent reminder emails until they either completed the needed section or discontinued participation. Participants were considered to have discontinued participation if they had not completed the current module by the time the next module was sent out (typically within 2-3 days).

**Changes to Intervention**

Structurally, the third iteration of the intervention was identical to the second (i.e., four modules, three stress logs). However, based on feedback from the second pilot study the group videos were replaced with narrated presentations (created using Prezi) that highlighted the experiences of past intervention participants as they related to the topic of the module. A series of motivational interviewing questions (e.g., How confident are you that you can improve at handling stress? see Appendix H for full list) also were added to the module exercises and stress logs. These questions were intended to reduce attrition and build motivation for continuing in the intervention.

**Measures**
All measures (except intervention feedback) were completed online immediately prior to the intervention (T1), immediately after the intervention (T2), and 3 weeks following intervention completion (T3).

Present control. Present control was assessed using the PCOSES (Frazier et al., 2011) described in Study 1. Alphas in this sample for scores on the present control scale ranged from .83 at T1 to .86 at T3.

Depression, anxiety, and stress. The Depression Anxiety Stress Scales (DASS-21; Lovibond & Lovibond, 1995) is a 21-item measure containing 3 scales assessing depression, anxiety, and stress (e.g. “I found it hard to wind down”). Each item was rated on a scale from 0 (does not apply) to 3 (very much) that measures how much that item applied to the individual in the past 2 weeks. In past research with college student samples, the alpha coefficients for scores on the DASS subscales ranged from .81 to .87 (Frazier et al., 2009). The validity of DASS-21 scores has been established by substantial correlations of each subscale with similar constructs (Crawford & Henry, 2003). Alphas in this sample ranged from .84 to .90 across subscales and time points.

Perceived stress. The Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983) is a 10-item instrument that measures the perception of stress (e.g. “How often have you felt nervous or ‘stressed?’”). Participants rated items on a scale from 0 (Never) to 4 (Very Often) with regard to experiences over the past 2 weeks. Reliability and validity of scores with similar populations has been adequate (e.g., alphas from .84 to .85; Cohen et al., 1983). Alphas in this sample ranged from .86 to .88.

Intervention feedback. In addition to the questions described in Study 1,
participants were asked how frequently they had used present control from postintervention to the 3-week follow-up and how much they remembered about each element of the intervention (1 = *I don’t remember this part at all* to 5 = *I can remember a lot of this part*).

**Results**

**Preliminary Analyses**

At T1, T2, and T3 all variables were examined for outliers. Although several scores were more than three standard deviations away from the mean (14 total, but no more than 2 on any given variable), they did not appear to be outliers on visual examination. As such, no correction procedures (e.g., winsorizing) were conducted. The correlation matrix and descriptive statistics for all pretest measures are presented in Table 1. Correlations among the four primary outcome measures ranged from .55 to .75.

Because we had missing data due to attrition over time we assessed the pattern of missingness present in the data. Data missing completely at random (MCAR) or missing at random will not bias results, whereas data not missing at random may. To assess this, several procedures were conducted. First, Little’s omnibus MCAR test was nonsignificant (*p* = .45), providing initial evidence that data were missing completely at random. Second, variables with missing data at either T2 or T3 were recoded into new variables in which 0 represented missing data and 1 represented observed data. These recoded variables were then correlated with all observed variables at T1 and T2 to examine whether missing data on any variable at T2 or T3 was related to observed data at T1 or T2. No significant correlations were found. That is, the pattern of missing data for
any variable was not significantly related to scores on another variable. In addition, parameters were estimated using multiple imputation to determine if such a procedure would produce estimates that differed from those computed from the observed data to such a degree that interpretation was affected. However, only negligible differences were found. Given these findings, no procedures to estimate missing values were used in the analyses.

**Intervention Effects on Present Control**

To examine whether the Present Control Intervention (PCI) or the PCI plus feedback interventions were more effective in increasing in present control relative to the stress-information only comparison group, analyses of covariance (ANCOVAs) were conducted with present control scores at T2 and at T3, controlling for T1 scores. Means, standard deviations, and ANCOVA results are presented in Table 2.

The omnibus F test for the ANCOVA assessing between group differences on present control at postintervention (using present control scores at T1 as a covariate) was significant (see Table 2). Bonferroni adjusted pairwise comparisons indicated significant differences between the stress-information only group and both the PCI and PCI plus feedback groups, with the intervention groups reporting greater present control. There were no differences between the PCI and PCI plus feedback groups. The between-groups effect sizes for T2 present control scores were medium to large for the comparisons of the present control conditions to the stress-information only condition: $d = .67$ (PCI vs. stress information only) and $d = .54$ (PCI plus feedback vs. stress information only). The difference between the two present control intervention groups was small ($d = .13$). All
between and within-group effect sizes are in Table 4.

At the 3-week follow-up, the omnibus F test for the ANCOVA assessing between group differences in present control (using present control scores at T1 as a covariate) also was significant (see Table 2). As at postintervention, Bonferroni adjusted pairwise comparisons indicated significant differences between the present control intervention groups and the stress-information only group but not between the PCI and the PCI plus feedback groups. Medium to large effect sizes were found between groups (PCI /stress information only: $d = .66$, PCI plus feedback/stress information only: $d = .59$) for present control at T3. The effect size for the difference between the two PCI groups at T3 was small ($d = .07$).

**Intervention Effects on Mental Health Outcomes**

A MANCOVA was conducted to assess group differences postintervention in the four mental health outcome variables (three DASS subscales, perceived stress) with T1 scores on these measures included as covariates (see Table 3). The omnibus F test for the MANCOVA assessing between group differences in the four mental health measures was significant, Wilks’ $\lambda = .92$, $F (8,388) = 2.07$, $p < .05$, partial $\eta^2 = .04$. The univariate tests indicated significant between-group differences for perceived stress, anxiety, and depression but not stress symptoms. Bonferroni post-hoc comparisons revealed that the PCI group reported significantly less perceived stress, anxiety and depression than the stress-information only group, and that the PCI plus feedback group reported significantly less depression and perceived stress than the stress-information only group. At postintervention, between-groups effect sizes comparing the PCI and stress-
information only groups ranged from $d = .19$ (stress) to .39 (depression), with an average effect size of $d = .32$. Between-groups effect sizes comparing the PCI plus feedback and stress-information only groups ranged from $d = .18$ (anxiety) to .37 (depression), with an average effect size of $d = .29$ (see Table 4). There were no significant differences between the PCI and PCI plus feedback groups ($d's = .02$ to .15).

A MANCOVA also was conducted to measure group differences in the four mental health outcome variables at the 3 week follow-up, with T1 scores included as covariates (see Table 3). The omnibus F test was significant, Wilks’ $\lambda = .91, F(8,368) = 2.197, p < .05$, partial $\eta^2 = .05$. The univariate tests indicated significant between-group differences for all scales. Bonferroni post-hoc comparisons revealed that those in the PCI group reported significantly lower stress symptoms and perceived stress than the stress-information only group. Those in the PCI plus feedback group reported less depression, anxiety, and stress symptoms than the stress-information only group. Effect sizes were generally small to medium at T3: PCI/stress-information only: $d's = .14$ to .43 (average $d = .31$), PCI plus feedback/stress-information only: $d's = .24$ to .52 (average $d = .39$).

Thus, effect sizes were somewhat bigger at follow-up than postintervention. There were no significant differences between the PCI and PCI plus feedback groups. Effect sizes comparing the PCI and PCI plus feedback groups were very small ($d's = |.04$ to .16$|$) but generally favored the PCI plus feedback group.

Qualitatively, in the stress logs participants were able to articulate how they had applied present control in their own lives. The following are two examples.

“Last time I said that my 3 exams were stressing me but that I needed to do
whatever it took to keep the goal of studying as a positive thing. Last night, to make the studying process more enjoyable, I went to a coffee shop. This was exactly the kind of thing I hoped to do.”

“Last time I talked about controlling how much homework I have to do this weekend by doing it a little bit every night instead of waiting till the last minute. This has helped a lot. I feel more relaxed when I think about all the time I could spend on it, rather than just on the weekends when I'd rather do other things.”

Students were also asked to describe what might change in their lives if they were able to maintain the changes that they had begun during the intervention:

“If I were able to maintain these changes I would be able to finally deal with stress in a positive way. By realizing not all things are in my control, I can now take a step back and deal with stress better.”

“I think overall I would be happier and healthier and I would be able to maintain healthier relationships.”

**Participant Ratings of Intervention**

Participants were asked to rate the helpfulness and the amount of material remembered for the practice logs, module activities, expert videos, and past participant example videos. Ratings of helpfulness in this sample were moderate for each of the areas rated (M’s = 3.64 to 3.87 out of 5). Ratings of amount of material remembered were similarly moderate (M’s = 3.39 to 4.03 out of 5) for all areas rated. Mean ratings of use of present control since the end of the intervention ranged from 2.54 to 2.58 out of 5 for the two intervention groups.
Do Increases in Present Control Mediate Intervention Effects?

Having established significant between-group differences in the outcome variables at postintervention and follow-up, we next tested whether changes in present control explained these differences (i.e., mediated the intervention effects). We focused on follow-up differences because the effect sizes for the intervention were bigger at follow-up and because this is the more important time point. T3 present control was tested as a mediator of between-group differences in each T3 outcome variable. T1 scores on present control and the outcome measures were included in each model as covariates. Because the intervention groups fared similarly in previous analyses, they were combined into one treatment group and compared to the stress-information only group.

To assess mediation, each T3 outcome measure was regressed on the T1 scores on the outcome variable and present control, the intervention condition variable, and T3 present control scores (see Table 5). Because mediated effects frequently do not have a normal distribution, asymmetric confidence intervals were used to test for significance. An effect is significant if its asymmetric confidence interval does not contain zero. These analyses were conducted using an SPSS macro for multiple mediation (Preacher & Hayes, 2008). This macro allows for the entry of covariates into the mediation model and uses 1000 bootstrap resamples to determine appropriate confidence intervals for each mediator. In these models, the effects of intervention condition were no longer significant and asymmetrical confidence intervals for the mediated effect of intervention condition through present control did not contain zero. Thus, T3 present control scores mediated the relationship between intervention condition and T3 stress, depression, anxiety, and
perceived stress.

**Discussion**

The purpose of these studies was to develop an intervention to increase present control among undergraduate students, to assess its efficacy for decreasing stress-related outcomes, and to examine whether increases in perceived control mediated treatment effects. We also assessed whether incorporating feedback into the intervention increased its effectiveness. Key findings, limitations, and future directions are discussed below.

**Intervention Effectiveness**

In general, the three studies summarized here confirmed our primary hypothesis that our intervention would result in greater increases in present control relative to an intervention that only contained information about stress. Although past research has consistently found an association between present control and better mental health (e.g., Frazier et al., 2011), little was known about the malleability of the construct. These results show that present control can be increased using a brief online intervention, with medium to large effects.

The intervention groups also experienced significantly greater reductions in perceived stress and symptoms of anxiety, depression, and stress than the stress-information only comparison group. In general, these between-group differences were larger at the 3 week follow-up than immediately postintervention. The average effect size across both present control intervention conditions at the 3-week follow-up for mental health outcomes was $d = .35$, consistent with other online psychological interventions that used self-report outcome measures ($d = .43$, Barak et al., 2008). This effect size was
in the range of effect sizes for two other studies that tested much longer stress-focused interventions (Zetterqvist, Maanmies, Strom & Andersson, 2003, \(d = .70\), 2 month duration; Hasson, Anderberg, Theorell & Arnetz, 2005: \(d = .29\), 6 month duration).

Recall that the intervention, including all modules and activities, took only about one hour to complete over a 7-day period. Our intervention also appeared to be more effective than other interventions directly targeting college student stress (Chiauzzi et al., 2008). Thus, these initial results are promising and constitute a strong foundation from which to develop future iterations of this program.

We also predicted based on prior research that the group that received feedback on their responses to the modules and stress logs would have slightly larger gains in present control, and slightly larger decreases in stress-related mental health outcomes compared with the intervention group that did not receive feedback. At postintervention and follow-up, the differences between the intervention groups were small (average \(|d| = .08\)) and not significant for either present control or the mental health variables. The largest difference suggested that the PCI plus feedback condition was more effective than the PCI condition in reducing depression at follow-up (\(d = .16\)). This effect size approaches that found in other studies that compare interventions with and without feedback (average \(ds = .25 - .40\); De Vries et al., 2008; Kluger & DeNisi, 1996). However, the generally small between-group effect sizes, and in particular the small effect sizes favoring the PCI group for present control (\(ds = .07\) to .13), the most theoretically important variable, indicates that feedback did not provide the anticipated boost in effectiveness. This may be because the feedback was fairly superficial due to
resource constraints. Participants also received this feedback more than a day later than when they submitted their responses, which may have limited its effectiveness.

Regression analyses also indicated that, as predicted, changes in present control mediated the effects of the intervention on mental health outcomes. This represents the first time that present control has been examined as a mediator of changes in mental health, strengthening claims about the causal role of present control in reducing distress. Our analyses incorporated many of the recommendations for establishing mediation of intervention effects outlined by Kazdin (2007). In particular, our intervention was specifically designed to target a theory-based mediator (present control), thus following the recommendation to experimentally manipulate the proposed mediator. However, claims regarding mediation could be strengthened by assessing the mediator and outcomes at more time points (e.g., during the intervention). Assessing multiple mediators would be helpful in establishing the specificity of the mediator effect.

Finally, despite no face-to-face contact, our completion rate (87% of those who started the intervention) was greater than that found in other online intervention studies. For example, a recent meta-analysis of internet-based interventions for depression found a 43% completion rate across 40 studies (Richards & Richardson, 2012). Whether this completion rate generalizes to other settings in which participants are not receiving compensation remains to be seen.

**Limitations and Future Research**

These studies had several limitations. First, the samples consisted primarily of White and female participants which limits the generalizability of the findings. We are
now assessing the efficacy of our intervention in more diverse sample of community college students. Second, because all students participated for extra credit, there may be greater attrition if no compensation was offered. Third, outcomes were assessed only via self-report measures. More objective measures are needed in future studies, such as measures of academic performance. Finally, the follow-up assessment for Study 3 was conducted only 3 weeks after the intervention. More frequent time points and longer follow-ups could shed further light on the course and duration of participant improvement.

Given the general support provided by these studies for the present control intervention, there are several avenues for future research. First, some changes to the feedback provided in the PCI plus feedback condition may strengthen its effect. It would be useful to consider the possible return on investment for time spent having a counselor briefly call participants after each module. Such feedback would naturally be more personalized, direct, and immediate, characteristics that could result in greater improvement. Second, the analyses conducted in this paper focused on average treatment effects which assume that all members of each group are responding in the same way. Future research should use techniques such as group based trajectory modeling to examine this assumption. If differing patterns of response were discovered within a particular treatment group, it would be useful to identify predictors of response patterns to help identify those individuals who would benefit most from this intervention. More importantly, such analyses could be used to identify types of individuals likely to not improve and direct them to higher levels of mental health care or different types of
interventions. Finally, this research supports the effectiveness of a brief online intervention for students representing a presumably average cross-section of undergraduates. It remains to be seen whether this tool would perform as well (in terms of outcomes and completion rates) when used by a more distressed subsample (e.g., a help-seeking sample).
References


medical students. *Academic Medicine, 81*, 354-373.


Kitzrow, M. A. (2003). The mental health needs of today's college students: Challenges


### Table 1

*Study 3: Preintervention Correlations and Descriptive Statistics*

<table>
<thead>
<tr>
<th>Measure</th>
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<th>3</th>
<th>4</th>
<th>M</th>
<th>SD</th>
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<td>2. DASS Stress</td>
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<td>-</td>
<td>-</td>
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<td>.63</td>
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<td>3. DASS Depression</td>
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<td>.61***</td>
<td>-</td>
<td>-</td>
<td>.79</td>
<td>.63</td>
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<td>.64***</td>
<td>.62***</td>
<td>-</td>
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<td>.62</td>
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<td>5. Perceived Stress</td>
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<td>.75***</td>
<td>.67***</td>
<td>.55***</td>
<td>2.01</td>
<td>.65</td>
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*Note. N = 223. ***p<.001*
Table 2

**Study 3: Between-group Differences in Present Control at Postintervention (T2) and Follow-Up (T3)**

<table>
<thead>
<tr>
<th></th>
<th>PCI</th>
<th>PCI + F</th>
<th>SIO</th>
<th>F</th>
<th>df</th>
<th>p</th>
<th>partial η²</th>
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<td>n = 68</td>
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<td>M(SD)</td>
<td>M(SD)</td>
<td>M(SD)</td>
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<td><strong>M(SD)</strong></td>
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<td>3.15(.45)ₐ</td>
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<td>.14</td>
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<tr>
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<th>F</th>
<th>df</th>
<th>p</th>
<th>partial η²</th>
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<td><strong>Follow-Up (T3)</strong></td>
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<tr>
<td><strong>M(SD)</strong></td>
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<td>3.27(.46)ₐ</td>
<td>2.88(.46)</td>
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<td>.14</td>
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*Note.* PCI = Present Control Intervention, PCI + F = Present Control Intervention plus Feedback, SIO = Stress-Information Only, ₐ = significantly different from the SIO group at p<.05. Analyses control for T1 present control. M = mean. SD = standard deviation.
Table 3

Study 3: Between-group Group Differences in Mental Health at Postintervention (T2) and Follow-Up (T3)

<table>
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<tr>
<th></th>
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<th>SIO</th>
<th></th>
<th></th>
<th></th>
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<td>n = 72</td>
<td>n = 70</td>
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<td>df</td>
<td>p</td>
<td>η²</td>
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<tr>
<td></td>
<td>M(SD)</td>
<td>M(SD)</td>
<td>M(SD)</td>
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<tr>
<td>Anxiety</td>
<td>.42(.46)</td>
<td>.46(.49)</td>
<td>.62(.66)</td>
<td>4.11</td>
<td>2</td>
<td>.02</td>
<td>.04</td>
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<td>.65(.53)</td>
<td>.85(.76)</td>
<td>5.60</td>
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<td>.001</td>
<td>.05</td>
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<td>1.03(.64)</td>
<td>1.14(.66)</td>
<td>1.39</td>
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<td>Perceived Stress</td>
<td>1.76(.65)</td>
<td>1.80(.59)</td>
<td>1.97(.60)</td>
<td>4.43</td>
<td>2</td>
<td>.01</td>
<td>.04</td>
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|                      | n = 57  | n = 70   | n = 67  | F     | df    | p       | η²   |
|                      | M(SD)   | M(SD)    | M(SD)   |       |       |         |       |
| Anxiety              | .43(.50) | .32(.43) | .57(.60) | 3.94  | 2     | .02     | .04   |
| Depression           | .53(.57) | .50(.51) | .76(.69) | 4.93  | 2     | .01     | .05   |
| Stress               | .91(.60) | .87(.55) | 1.19(.70) | 6.99  | 2     | .001    | .07   |
| Perceived Stress     | 1.63(.68) | 1.68(.52) | 1.89(.73) | 3.77  | 2     | .03     | .04   |

Note. PCI = Present Control Intervention, PCI + F = Present Control Intervention plus Feedback, SIO = Stress-Information Only, a = significantly different from the SIO group at p<.05. Analyses control for T1 scores on all measures. M = mean. SD = standard deviation.
### Table 4

**Study 3: Within Group and Between Group Effect Sizes (Cohen’s d)**

<table>
<thead>
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<th>Variable</th>
<th>Grp</th>
<th>Within Group d (90% CI)</th>
<th>T2 Between Group d</th>
<th>T3 Between Group d</th>
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<td>1 vs. 2</td>
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<td></td>
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<td>3</td>
<td>.02 (-.25, .29)</td>
<td>.18 (-.10, .45)</td>
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<td><strong>Anxiety</strong></td>
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<td>-.39 (-.61, -.15)</td>
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<td>-.47 (-.70, -.23)</td>
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<td></td>
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<td>.12 (-.17, .44)</td>
<td>-.07 (-.35, .23)</td>
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<td><strong>Stress</strong></td>
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<td>-.51 (-.81, -.22)</td>
<td>.05</td>
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<td>-.36 (-.64, -.10)</td>
<td>-.60 (-.87, -.32)</td>
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<td>-.08 (-.37, .21)</td>
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<td><strong>Perceived Stress</strong></td>
<td>1</td>
<td>-.37 (-.69, -.08)</td>
<td>-.56 (-.88, -.26)</td>
<td>.02</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>-.35 (-.63, -.07)</td>
<td>-.52 (-.77, -.26)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>.01 (-.26, .27)</td>
<td>-.13 (-.46, .17)</td>
<td></td>
</tr>
</tbody>
</table>

*Note. CI = confidence interval. T1 = Time 1. T2 = Time 2. T3 = Time 3. Group 1 = Present Control Intervention, Group 2 = Present Control Intervention plus Feedback, Group 3 = Stress Information Only. Positive d’s indicate increases in scores over time and negative d’s indicate decreases. Within group d’s were calculated by subtracting the mean of each group at T2 from the mean of that group at T1 and dividing by the SD of that group at T1 as recommended by Morris and DeShon (2002). The between-group d is then the difference between these two within-group effect sizes. The 90% CI’s were calculated by taking the 50th (bottom 5%) and 950th (top 5%) d value out of 1,000 bootstrapped samples.*
## Table 5

*Study 3: T3 Present Control as a Mediator of Intervention Effects on Mental Health Outcomes at 3-week Follow-Up*

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Predictors</th>
<th>$B (SE)$</th>
<th>Bootstrapped Mediated Effect (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>T3 Anxiety</strong></td>
<td>Step. 1</td>
<td>Time 1 Anxiety</td>
<td>.49 (.05)***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time 1 present control</td>
<td>.07 (.06)</td>
</tr>
<tr>
<td></td>
<td>Step 2</td>
<td>Intervention group</td>
<td>-.02 (.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T3 present control</td>
<td>-.34 (.06)***</td>
</tr>
<tr>
<td><strong>T3 Depression</strong></td>
<td>Step. 1</td>
<td>Time 1 Depression</td>
<td>.57 (.06)***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time 1 present control</td>
<td>.08 (.07)</td>
</tr>
<tr>
<td></td>
<td>Step 2</td>
<td>Intervention group</td>
<td>-.07 (.07)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T3 present control</td>
<td>-.37 (.07)***</td>
</tr>
<tr>
<td><strong>T3 Stress</strong></td>
<td>Step. 1</td>
<td>Time 1 Stress</td>
<td>.53 (.06)***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time 1 present control</td>
<td>.06 (.08)</td>
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<tr>
<td></td>
<td>Step 2</td>
<td>Intervention group</td>
<td>-.12 (.08)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T3 present control</td>
<td>-.44 (.08)***</td>
</tr>
<tr>
<td><strong>T3 Perceived Stress (PSS)</strong></td>
<td>Step. 1</td>
<td>Time 1 PSS</td>
<td>.42 (.06)***</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Time 1 present control</td>
<td>.12 (.09)</td>
</tr>
<tr>
<td></td>
<td>Step 2</td>
<td>Intervention group</td>
<td>.00 (.08)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>T3 present control</td>
<td>-.64 (.08)***</td>
</tr>
</tbody>
</table>

*Note.* Intervention group coding: 0 = Stress-Information Only ($n = 76$) and 1 = combined PCI and PCI + feedback groups ($n = 147$). SE = standard error. CI = confidence interval. ***$p<.001$
Figure 1. Study 3 Participant Recruitment and Attrition
Appendix A

Additional Stress Information

Prevalence of Stress in College

College is a stressful time for undergraduates. For instance, 23% of students reported that they had experienced at least three major stressors during the last 12 months (Lust, Ehlinger, & Golden, 2010). The stressors included academic (failing a class, academic probation), relational (getting married, death of someone close, roommate conflict), financial (excessive debt, lack of health insurance) and health (being diagnosed with a serious physical illness) events. As the coming pages will reiterate, these rates are common for undergraduate students. Indeed, a review of previous versions of the same survey produced similar figures. The previous three years found that between 43-44% of students had experienced 1 or 2 major stressors and between 20 – 30% had experienced 3 or more (Lust, Ehlinger, & Golden, 2009; 2008; 2007). Further data suggest that such experiences do not occur exclusively in college. A national survey of college freshman (N= 201,818) that found that 29% of students enter college having already been overwhelmed in high school (Pryor et al., 2010).

However, the breadth of stressful experiences can produce some inconsistencies in the literature. For instance, an international sample of 584 students found that a mere 22% of respondents indicated a moderate level of stress, with only 7% noting severe or extremely severe levels of stress (Gan, Mohd Nasir, Zalilah, & Hazizi, 2011). Although these levels seem much lower than those noted above, it is possible that some of this variance is due to differing criteria regarding what constitutes “stress.” For instance, a
survey by the American College Health Association (ACHA) found that 27% of undergraduates reported that “stress” affected their academic performance (2008). However, the same survey noted that students additionally reported that concern for a troubled friend (11%), discrimination (1%), relationship difficulties (11%), and roommate difficulties (5%) were factors that had academic impact (ACHA, 2008). Confusingly, these experiences would likely also constitute “stress” to many readers and certainly do so in much of the literature already mentioned above. Other inconsistencies in the literature are more drastic. For example, one survey indicated that only 26% of students reported that they were consistently unable to manage their stress (Lust et al., 2010) whereas another noted that an astounding 87% of respondents felt overwhelmed by all they had to do (American College Health Association, 2008). Given the broad nature of stress as a topic of research, it is not surprising that such inconsistencies exist. That said, the preponderance of the literature point to major stress as a nearly universal experience and severe stress as extremely common.

**Negative Outcomes of Stress**

Though stress impacts nearly every system in our bodies, particular physical and mental health outcomes bear mentioning (Schooler, Dougall & Baum, 2004).

*Physical Health Outcomes*

To date, numerous studies have examined the connection between experiences of stress and negative health outcomes. Stress impacts health through three specific pathways (Schooler et al., 2004). First, stress can affect biological mechanisms in the body. One example of this is repeated tissue damage due to continuous release of stress
hormones. Second, stress acts on the physiological systems of the body, causing people to engage in negative health habits (smoking, drug use, overeating, etc). Finally, stress can impact current health behaviors, causing individuals to reduce or eliminate behaviors that promote health (e.g., regular check up, exercise, medication adherence).

A review of important physical outcomes related to stress found that particular conditions (heart disease, stroke, back pain, stomach ulcer, cancer, and diabetes) were exacerbated by the presence of increased stress (Quick, Quick, Nelson, & Hurrell, 2004). They further noted specific behavioral changes that correlated highly with increased stress including cigarette smoking, alcohol and drug abuse, accident proneness, violent behavior, and eating disorders. These same negative health behaviors have been noted in college samples. Undergraduates who reported high stress had poorer eating and exercise habits (Hudd et al., 2000; Wichianson, Bughi, Unger, Spruijt-Metz, & Nguyen-Rodriguez, 2009).

Additionally, increases in experiences of major stress were associated with higher rates of risky behavior across all categories of behavior measured, including tobacco use within past 30 days, drinking five or more drinks in the last 2 weeks, marijuana use in the past 30 days, credit card debt over $3000, or any gambling in the past 12 months (Lust et al., 2010; Nelson, Lust, Story, & Ehlinger, 2008). Thus, students who experience high levels of stress are more likely to encounter direct physical effects of stress on the body, as well as engage in deleterious health behavior such as alcohol or tobacco use. Finally, these students are likely to avoid behaviors that promote health, including proper diet and exercise.
Mental Health Outcomes

Perhaps more relevant for this intervention, stress is also associated with significant mental health outcomes. At the broadest level, high levels of stress are negatively correlated with general life satisfaction (Weinstien & Laverghetta, 2009). This general dissatisfaction also manifests itself in specific ways. For instance, a survey of 145 college students found that students with high levels of stress were significantly less satisfied with their GPA, weight, and fitness level (Hudd et al., 2000). Furthermore, there is limited evidence that the undergraduate stress burden is not a uniquely North American issue. For example, a 2011 survey of Malaysian students found that stress was significantly related to depression, anxiety, and disordered eating behaviors (Gan et al., 2011).

Stress has been consistently linked to depression (Coyne & Downey, 1991; Dyrbye, Thomas, & Shanafelt, 2006; Gan et al, 2011) and anxiety (Andrews & Wilding, 2004; Coyne & Downey, 1991; Dyrbye et al., 2006). However there is some debate about the effects of stress at lower levels. Some studies have found increased academic performance as a result of moderate increases in stress (Keeley, Zayac, & Correia, 2008; Sarid, Anson, Yaari, & Margalith, 2004). While other have found immediate, gradual, and persistent negative effects of stress on mental health (Bovier et al. 2002). In this context, stress moderates an individual’s ability to leverage his or her own internal resources towards maintaining good mental health (Bovier et al., 2002). Finally, although psychopathology is frequently conceptualized as arising from increased stress, some research has demonstrated that the opposite is also true. Using depression as an example,
one study highlighted how depressed individuals also generate severe stress in a variety of ways, including picking partners who likewise suffer from psychopathology and impaired ability to solve interpersonal problems (Pettit & Joiner, 2006).

Stress, then, is associated with a host of negative physical and mental health outcomes. Stress affects the body’s systems both directly and indirectly by contributing to negative health behaviors, inhibiting positive health behaviors, and exacerbating a variety of physical illnesses. Stress also contributes to lowered quality of life, dissatisfaction with life, and increased rates of depression and anxiety. Finally, evidence suggests that stress both contributes to and is contributed to by these outcomes.

Common stressors in college populations

Although stress is a deceptively common experience, some stressful events are more common than others. One survey of 13,700 undergraduates attending one of several Midwestern universities found that stressor events involving a roommate/housemate conflict were the most common (23%), followed by the death of someone close to you (19%) and termination of a personal relationship (not including marriage, 18%) (Lust et al., 2010). Likewise data from two undergraduate institutions demonstrated similar results, noting that 32-35% had experienced interpersonal loss and 17-25% had experienced bereavement (Frazier et al., 2011). Another student study also noted high rates of interpersonal stress, finding that 30-31% of identified stressors were academic and 28% were interpersonal (Hashim, 2003). Finally, in a study examining important changes around the college transition, interpersonal events (loss of contact/time with
family and friends) were rated as the most salient negative changes (Bitsika, Sharpley, & Rubenstein, 2010).

Currently, there is mixed evidence regarding whether or not these stressful experiences vary according to gender. One study examining the college student experiences of 74 freshman at a southwestern university found no differences between men and women’s experience of family and college related stressors (Dyson & Renk, 2006). Another study likewise found no difference between men and women with respect to academic or interpersonal stress response rates (Hashim, 2003). However, another study found that some stressful experiences were significantly more common for men (being beaten by a stranger, being robbed with a weapon, or having one’s life threatened) whereas others were more common for women (unwanted sexual contact/attention, or stalking; Frazier et al., 2009) Another study also found differential rates, noting that women experienced higher overall stress than men, particularly around familial relationships, finances, and daily hassles (Brougham, Zail, Mendoza, & Miller, 2009).

Though much research has found that interpersonal stress is most common among college students, this perspective is not unanimous. A survey of 100 undergraduates from a mid-sized university cited intrapersonal sources of stress as most common, including shifts in sleeping habits, eating habits, new responsibilities, etc. Overall, 38% of stated stressors were intrapersonal, while only 19% were interpersonal (Ross, Niebling, & Heckert, 1999). However, when prompted to write about what was currently causing them stress, most students respond with interpersonal material. One study found
that 70% of a small undergraduate sample wrote about relationship problems and 45%
included some mention of family discord/conflict (Lumley & Provenzano, 2003).

Therefore, not only is stress a common experience in college, but specific
experiences of stress are more common than others. Examination of the literature
suggests that relationship stress predominates, although limited evidence indicates that
personal concerns are equally distressing.
Appendix B

Internet Based Interventions for Related Conditions

Beyond explicit stress, other interventions have focused on conditions highly correlated with increased stress:

*Substance Abuse.* One study (n=265) focused on the effectiveness of a high-risk drinking prevention web site for college students (Chiauzzi, Green, Lord, Thum, & Goldstein, 2005). The web site asks students to fill out online questionnaires with reference to four areas: (1) beliefs regarding alcohol; (2) lifestyle issues (3) the risks they take when they drink; and (4) the consequences they suffer as a result of drinking. Based on their responses, the students were offered immediate, personalized feedback designed to increase their motivation to change their drinking behaviors. Relevant portions of the website are also highlighted based on the students’ responses. The website was found to be particularly effective for women and binge drinkers. There exist many more online studies that focus on alcohol behaviors. But since they, like this study, often employ feedback, they are described in that section below. Currently, evidence for the use of IBIs for cigarette smoking is mixed for adult samples from the general population and insufficient to support widespread adoption for college samples (Hutton et al., 2011).

*Panic Disorder.* Amstadter, Broman-Fulks, Zinzow, Ruggiero, and Cercone (2009) reviewed 9 IBI’s out for Panic Disorder and noted that, although they tended to perform well against control/no-treatment conditions, it was less clear that IBIs were superior to face-to-face counseling. Some comparability was established for CBT and relaxation, with both noting medium to large within groups effect sizes (.42 vs. .71) when
delivered via internet (Carlbring, Ekselius, & Andersson, 2003). Finally, a meta-analysis of 23 different interventions designed to treat panic and anxiety found an average within groups effect size of .8 (Barak, Hen, Boniel-Nissim, & Shapira, 2008).

Depression. Amstadter et al. (2009) found that 8 out of 10 Internet based depression interventions they reviewed reported positive results (using symptom measures as the primary outcome measure). The two studies that found negative results were similar in that they either did not require frequent access to the intervention or were applied only as a preventative measure. The authors also tentatively concluded that interventions with a higher intensity/exposure level were more likely to be effective. A meta-analysis of computer based CBT interventions for depression found an average effect size of .4 when compared to controls (Cuijpers, 2007). This between group comparison is helpful when coupled with findings by Barak et al. (2008) that found an average within group effects size of .32 when comparing 16 different studies addressing depression.

Also focusing on depression, a 2011 study examined the effectiveness of an online intervention to affect attributions of self worth (Peters, Constans, & Mathews, 2011). Researchers created two computer based cognitive bias modification (CBM) programs designed to either promote statements of self-worth around positive events or statements of self-deficiency around negative events (n=54). The authors found support for their hypothesis that attributional style can be changed through computer based CBM procedures, noting that individuals in the positive condition were more likely to attribute poor performance to task difficulty whereas individuals in the negative condition
increased (non significantly) in their tendency to attribute poor performance to internal causes.

Additionally, in a review of brief interventions for depression, 6 out of 8 studies found significant decreases on depression scales (McNoughton, 2007). Among these were 5 Internet or computer based interventions. This review found that interventions with the highest completion rates were those that were more structured, shorter, and involved frequent contact from the study personnel. The importance of contact is further emphasized by the following: one website evaluated in the review was not found to significantly reduce depressive symptoms when administered alone. However, with the addition of either a post card or telephone reminder, significant reductions were achieved.

*Comorbid Depression and Anxiety.* Finally, two studies examined IBIs aimed at comorbid depression and anxiety. Results indicated that the Internet interventions (based on a CBT foundation) were more effective than treatment as usual on symptomatology as well as social and occupational functioning (Proudfoot et al, 2003; Proudfoot et al, 2004).
Given this pressing need, what is the state of stress management for college populations? Furthermore, what features are characteristic of successful interventions? A selective review of stress management interventions in general (in non-student settings) can begin to outline our answer. A meta-analysis of 36 studies, evaluating more than 55 stress management interventions (N = 2,847), found that the majority used a small-group format to deliver the intervention (Richardson & Rothstein, 2008). The majority of the groups incorporated some aspects of relaxation and meditation (69%) or cognitive behavioral skills (CBT) training (56%). Overall the authors found a medium effect size (d = .53) for stress management interventions over their comparable controls. It is worth noting that CBT interventions individually had a larger effect size of 1.16. Finally, briefer studies returned a higher effect size that those that were longer >4 weeks (.80 vs. .34-.40), also, one-component studies had a larger effect size than those with multiple components (.64 vs. .2-.60).

Likewise, a separate meta-analysis of 35 randomized controlled trials (N=3,077) assessing stress management interventions for HIV-positive adults found that the majority of interventions took place in small groups (64%) and tended to focus on coping skills (59%), intrapersonal skills (50%), and relaxation (48%; Scott-Sheldon et al., 2008). Participants in the studies they reviewed were largely male (82%) with an average age of 37 years. In terms of the effects of these interventions, reductions in depression and anxiety (the most common outcome measures used) had small to medium size effects.
when compared to controls (d=.28 for both). The authors also noted significant decreases for psychological distress (d=.19) and fatigue (d=.38). It is worth wondering how many of these interventions would fare against other forms of treatment. In this particular study, the vast majority used assessment only control conditions (74%).

This brief review emphasizes some general trends in stress management interventions. They are most frequently delivered via small groups and most commonly focus on cognitive skills or relaxation. They are reasonably effective at reducing stress and its correlates (depression and anxiety) and there is tentative evidence favoring shorter interventions that focus on one primary component. Given this background, what stress management interventions have been used in college populations?

Although there is a growing recognition of the importance of college stress, implementation of stress interventions has been somewhat piecemeal. In their review of the stress literature pertaining to college students, Robotham and Julian (2006) noted that the research to this point has largely focused on particular groups of students rather than undergraduates as a whole. They noted that areas with a strong vocational element such as law students, medical students, social work students, hospitality students, and nursing students seemed to have received the most attention. Along these lines, Brennan, McGrady, Lynch, and Whearty (2010) developed an 8-week stress intervention focused on teaching specific skills (relaxation, identifying cognitive distortions, nutrition) to first year medical students. Participants (N=144) completed satisfaction questionnaires, but no other outcomes were measured. Participants indicated that they were most satisfied
with modules that presented small behavior changes that did not require much time to implement (deep breathing, mindfulness, diet changes).

Along these lines, one study (N=113) used interventions that required that students only practiced three times per week for one month (Wolitzky-Taylor & Telch, 2010). Participants were assigned to one of four groups: 1. Worry Exposure (individuals confront worry via imagery until distress subsides); 2. Expressive Writing (individuals write about their worst fear coming true); 3. Relaxation (individuals exposed to relaxing audio/visual stimuli); or a 4. waitlist control group. Individuals in active conditions were required to engage in their treatment three times weekly and track their participation in personal logs. At post-treatment, all students assigned to active conditions had significantly decreased academic worry, although the difference between the expressive writing group and the control group was not significant. Significant decreases in perceived stress were also noted for all active conditions.

Other interventions have pursued expressive writing (EW) as a stress management strategy as well. Although EW has been connected to a variety of physical and mental health outcomes (Pennebaker & Chung, 2007), evidence in college populations remains mixed. In one EW study, 74 undergraduate reporting physical symptoms were assigned to either a stressful experiences writing group or a time management group (Lumley & Provenzano, 2003). Not only did membership in the writing condition predict decreased distress, it also predicted higher GPAs the following semester. That said, these results are inconsistent with other EW studies with college samples. For example, a review of three
RCTs found that expressive writing produced no effect on the main outcome measure (GPA; Radcliffe et al., 2011).

Finally, a study of a resilience intervention to promote stress-related growth found that individuals in the intervention group improved significantly more than those in a control group (Dolbier, Jaggars, & Steinhardt, 2010). Participants in the intervention group engaged in 2 hour group sessions once weekly for 4 weeks. This intervention, drawing on cognitive behavioral therapy and rational emotive therapy, engaged participants in a process designed to increase their ability take responsibility for their actions.

In summary, the majority of stress interventions tend to use small groups and most involve aspects of relaxation and CBT. They have generally been shown to be effective. However, their application, particularly within the college setting, has been limited primarily to particular student groups.
Appendix D

Self-Efficacy and Psycho-Education Interventions

Self-Efficacy Interventions

Given the multiple avenues by which one can approach this topic, Self-Efficacy has been a common intervention focus. Fitzgerald and Schutte (2010) tested an intervention designed to increase leadership self-efficacy (SE) in managers (N=118). Managers in the SE group were found to have significantly more leadership self-efficacy compared to a control group. The SE group engaged in an expressive writing task that involved writing about their deepest thoughts and feelings around transformational leadership for 20 minutes a day, three days a week. The control group was asked to write about non-work activities that had taken place during the day over the same time frame.

In contrast, a study of a stage based intervention to change exercise intentions in older adults found that changes in stage of change (Prochaska & Norcross, 2001) were not related to actual levels of desired behavior (in this case exercise) or changes in self-efficacy (Greaney et al., 2008). Likewise, a 2002 intervention (n=89) found that both a day long workshop or a set of 6 individual sessions were effective in significantly increasing parenting self-efficacy when compared to a control group (Sofronoff & Farbotko, 2002). Another study compared patient’s self-efficacy when regularly contacted by a nurse following surgery when compared to controls. Nurses used a 20 min protocol including assessment, management options and evaluations based on Bandura’s theory of self-efficacy and incorporated the components of verbal persuasion, performance accomplishment and emotional arousal (Wong et al., 2005). Those
contacted by a nurse were found to have significantly higher levels of SE by the study’s conclusion.

Self-efficacy is also often included in studies as the primary mechanism by which to affect behavior in a particular domain. For instance, Hyde et al. (2008) reviewed 10 self-efficacy interventions designed to decrease addiction behaviors. Of those reviewed, 7 of the 10 found a significant effect for self-efficacy. Aspects of self-efficacy that were emphasized were verbal persuasion and experiential activities. Interestingly, they noted no significant differences in the method of delivery, the intensity of the intervention, or the specific addiction behavior being considered between studies that found a significant effect and those that did not.

**Psychoeducation**

Another common form of intervention is psychoeducation. Effective psychoeducation about stress should fulfill two criteria: 1. Individuals should arrive at a better understanding of what stress is and how stress affects them, and 2. They should be exposed to better methods of dealing with experiences of stress (Livingston, 1988). However, specifically stress related psychoeducation interventions for students are limited. Only one of four studies in a recent meta-analysis (Donker, Griffiths, Cuijpers, & Christensen, 2009) of stress psychoeducation was directed at college students (combined n = 694; college students n=177). These studies incorporated a range of formats, including Internet based, personalized mailings, telephone calls, or in-person sessions. Psychological distress was the primary outcome measure and effect sizes ranged from .04 - .61 (Cohen’s d) with a small pooled effect size of .20 between groups.
Effect sizes for college students in general were small (d = .07). The authors noted that effective interventions tended to be those that incorporated empirically supported information (medical, psychological, depression, or anxiety information drawn from the literature) rather than test feedback or advice. However, no differences were noted regarding modes of delivery, suggesting that internet based interventions are as effective as other delivery method for psychoeducation interventions. Significant effects have also been found with college samples for classroom delivered psycho-education interventions to reduce stigma (Sharp, Hargrove, Johnson, & Deal, 2006).
Appendix E

Description of the Study 1 Intervention

Both conditions made use of Moodle™, a learning management tool used to manage video, audio, and text delivery. Participants navigated through a series of web pages containing text with optional narration, video of research experts explaining present control or related topics, video of students recounting their own experience with present control, interactive tasks for practicing present control, and a final activity in which participants would implement present control to their lives. In each condition, participants engaged in a self-paced psycho-education online course. Each course took about 15 minutes to complete and was made up of 3 distinct parts:

First, participants were given some general information about stress. Participants read information about the stress process and watched three videos: one in which a fellow student “Michelle” described her current stress, one in which a stress expert described some of the negative outcomes associated with stress, and one in which the same student described how stress had negatively impacted her. This portion was the same for each condition.

In the second portion of the course, the conditions diverged. The active intervention was introduced to present control by a video of an expert describing the definitions and outcomes of past, present, and future control. Next participants were given an example situation of relational conflict (roommate conflict) and completed a sorting exercise to demonstrate their basic knowledge of what types of situational factors
were actually controllable. They then watched a video of the “Michelle” explaining how she had applied present control to help her deal with current stress.

In the neutral condition, students watched a video of an expert describing the positive benefits of properly managing stress. Students were presented with several myths about stress along with further helpful hints for maintaining healthy levels of stress. They watched a video of “Michelle” discussing how she had adapted to her stress by engaging in social outings, exercising and maintaining a proper diet.

Finally, both conditions completed an activity. In the active intervention, participants were asked to reflect on their interpersonal stressor and answer several questions about what aspects of the situation they could and couldn’t control, along with possible ideas of how they might influence aspects under their control. In the neutral condition, students were asked to write a brief paragraph summarizing what they had learned about stress.
Appendix F.

Personalized Feedback Messages.

Module 1 Message:

Hi there!

This is Sam Hintz, a researcher with the REP Stress Study. I’ll be sending you periodic emails as we move forward in the study. There’s no need to reply to these emails. Their role is just to give you some feedback and encouragement as you complete the program.

For instance, I see that you are dealing with a pretty difficult situation involving very brief description of stressor. It sounds really stressful. I’m sure that it has been taking its toll on you. Fortunately, people with situations very similar to yours have found that this program helped quite a bit.

I’m glad you are keeping on. You’ll hear more from me after each module--

Sam

Module 2 Message:

Hi again,

It looks like you’re off to a good start with present control. You’re right, you can’t control identified uncontrollable factor. You’re better off focusing on identified controllable factor. It can be hard to keep these straight when you’re in the situation, but just identifying them is a great start.

Keep up the good work,

Sam

Module 3 Message:

Hi again,

We all have things from our history that motivate us. I’m glad you were able to identify identified motivational experience. You’ll do well to keep that in mind as you approach the practice logs this week.

The more you put into this process, the more you’ll get out--

Sam
Practice Log 1 Message:

Hi,

Great! You’ve finished the first of the logs. You’re getting more and more practice with present control. You can’t control identified uncontrollable factor, you can control identified controllable factor. The real trick is to put into action the plan that you wrote about. I’m looking forward to seeing if you were able to identified planning step.

Keep at it,

Sam

Practice Log 2 Message:

Hey,

Two logs down, one to go. I appreciate your commitment to understanding present control and I’m impressed with your ability to stick to this program. It seems like you’ve been able to look at described stressful situation from a slightly different perspective. You know, other people have been in the same position as you, and they’ve seen a big improvement from this new perspective.

You’re doing good work,

Sam

Practice Log 3 Message:

Nice job on the final practice log! You’ve done a lot of work over the past week or so. I’ve been pleased at the progress you’ve made on coming up with productive actions you can take. It seems like identified action makes a lot of sense and you’re seeing some success. As you go into the last module, consider how helpful it would be to keep this going!

You’ve worked hard, you’ve earned your success--

Sam
Appendix G

Additional Hypotheses, Analyses, and Results

Additional Variables

At T3, preferred hours of sleep, actual hours of sleep, missed days of work/class, late assignments, and number of relationship conflicts were also measured to check for further group differences at follow-up. No significant differences between groups were observed for any of these variables.

Self-Efficacy

In the studies above, present control is conceptualized broadly. Participants are theorized not only to have a certain sense of control related to the discrete stressors they identify, but also to experience present control as global perspective that could be applied to any particular stressor. Given this conception, one would expect that increases in present control (related to specific stressors) would be accompanied by increases in general self-efficacy (global perspective). As such, a measure of self-efficacy was included at all time points.

*Measure:* The Generalized Self-Efficacy scale (Schwarzer & Jerusalem, 1995) is a 10-item survey that measures current levels of self-efficacy. Participants rate 10 self-efficacy statements from 1 (Not at all true) to 4 (Exactly true). Alphas in this sample were all acceptable, ranging from .84 to .90.

*Group Differences at Follow-Up.* Self-efficacy at T1, T2, and T3 was examined for outliers. No adjustment procedures were conducted. An ANCOVA was conducted to measure group differences in self-efficacy. Means, standard deviations, ANCOVA
results, and significance tests for the three groups at T2 and T3 are show below. The omnibus F test for the ANCOVA assessing between group differences in self efficacy at T2 was significant, \( F(2) = 3.53, p < .05, \text{ partial eta}^2 = .034 \). The omnibus F test for the ANCOVA assessing between group difference in self efficacy at T3 was significant, \( F(2) = 5.68, p < .05, \text{ partial eta}^2 = .056 \). Bonferroni post-hoc comparisons revealed that those in the standard plus feedback group reported significantly more self-efficacy than the stress-information only group.

**Means, Standard Deviations, and ANCOVA Results for General Self Efficacy**

<table>
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<tr>
<th></th>
<th>Standard</th>
<th>S + F</th>
<th>Control</th>
<th>F</th>
<th>df</th>
<th>P</th>
<th>Partial eta(^2)</th>
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<tr>
<td>T1 GSE</td>
<td>2.92 (.39)</td>
<td>2.89 (.39)</td>
<td>2.99 (.43)</td>
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<td>2</td>
<td>.14</td>
<td>.017</td>
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<tr>
<td>T2 GSE</td>
<td>3.06 (.47)(^a)</td>
<td>3.00 (.45)</td>
<td>3.53</td>
<td>2</td>
<td>.031</td>
<td>.034</td>
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<td>T3 GSE</td>
<td>3.14 (.41)(^a)</td>
<td>3.00 (.53)</td>
<td>5.68</td>
<td>2</td>
<td>.004**</td>
<td>.056</td>
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\(^{**}p<.01; \; a = \text{significantly differs from control group}\)
Substance Use and GPA

It was hypothesized that increases in present control would also result in decreases in substance use. Given that not enough participants endorsed smoking to be included in the analysis, and the lack of significant differences between groups with regard to alcohol use, this was not supported by this study. It is possible that context effects played a role. The intervention was launched (T1) immediately after Spring break and common alcohol use during the previous two weeks may have obscured between group differences.

It was hypothesized that increases in present control would also result in higher GPA for the current semester for students in the treatment groups compared to the previous semester. Given the lack of significant differences between groups with regard to GPA, this was not supported by this study. Means, standard deviations, ANCOVA results, and significance tests for the three groups at T3 are show below. The omnibus F test for the ANCOVA assessing between group differences in GPA at T3 was not significant, $F(2) = .52, p > .05$, partial $\eta^2 = .005$

Means, Standard Deviations, and ANCOVA Results for GPA

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<td><strong>T3</strong></td>
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<td>GPA</td>
<td>3.36 (.48)</td>
<td>3.34 (.60)</td>
<td>3.27 (.78)</td>
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<td>.517</td>
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\[ F(2) = .52, p > .05, partial \eta^2 = .005 \]
Appendix H

Motivational Interviewing Questions

Module 1:
None

Module 2:

1. How important is it to you to get better at handling stress? (1: Not very important – 5: Very important)
2. How confident are you that you can improve at handling stress? (1: Not very important – 5: Very important)
3. What encourages you that you can improve at handling stress, if you want to? (free response)
4. If improving your ability to handle stress seems like a good idea, what personal strengths can you draw on to accomplish this task? (free response)

Module 3:

1. Ultimately, changing the way you handle stress is your decision. How willing are you to work over the next days to try and implement present control? (1: Not very willing – 5: Very willing)
2. What things from your history can you use to help you succeed at present control? (free response)
3. How confident are you that you will be able to complete the stress logs? (1: Not confident at all – 5: Very confident)
4. How confident are you that you will be able to implement present control? (1: Not confident at all – 5: Very confident)

**Practice Log 1:**

1. How important to you is it to complete this stress management program? (1: Not very important – 5: Very important)

2. How confident are you that you’ll be able to complete each of the logs on time? (1: Not very confident – 5: Very confident)

**Practice Log 2:**

1. Incorporating present control involves changing our thinking, which can be a hard task. How difficult do you think it will be for you to change your thinking? (1: Not very difficult – 5: Very difficult)

2. How confident are you that you will be able to make the change? (1: Not very confident – 5: Very confident)

**Practice Log 3:**

1. Now that you’ve been practicing present control for a few days, think about the future. What would be different in your life if you were able to maintain these changes? (free response)

**Module 4:**

None