The Relation of Bias in Life Event Predictions and Depressive Symptoms: Considering the Role of Beliefs of Control

Thesis

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Abstract

Previous research has shown bias in predicting future life events is related to depressive symptoms, with high levels of depressive symptoms being associated with pessimism in predictions. Depressive symptoms have also been associated with an external locus of control (i.e., the belief that one's actions play little role in determining future outcomes). This study tested two separate approaches to (at least temporarily) inducing reduced endorsement of beliefs in an external locus of control—a writing task and a rating task—to examine whether these manipulations led to decreased bias in predictions compared to a control group. Additionally, this study examined whether locus of control or event controllability serve as moderators of the relation between bias in life event predictions and depressive symptoms. The manipulations used in this study failed to reduce participants' endorsement of beliefs in an external locus of control. Unexpectedly, there was a trend for those who completed the writing task to exhibit a more optimistic bias in future event prediction than those in the rating task. Also, this study found little evidence in support of the hypothesis that locus of control serves as a moderator between depressive symptoms and bias in future event prediction and no evidence that controllability serves as a moderator between depressive symptoms and bias in future event prediction.

This thesis is dedicated to my family, who now know more about locus of control and bias in event prediction than they have ever wanted.

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Introduction

People frequently have expectations regarding the likelihood that future life events will occur to them. For example, people may predict they will do exceptionally well on an exam, receive a pay increase at work, or become ill during the winter. The accuracy of these predictions is something that can vary from person to person or situation to situation. Some individuals tend to make biased predictions that are optimistic; that is, they think that positive events are more likely to occur to them and negative events are less likely to occur to them. Others tend to make biased predictions that are pessimistic; that is, they under-predict the likelihood that positive events will occur to them and over-predict the likelihood that negative events will happen to them.

The tendency for individuals to make pessimistic predictions about future life events has been linked to mood disorders, particularly Major Depressive Disorder. Aaron Beck's "cognitive triad" posits that depressed individuals have negative, unrealistic views about the future, in addition to negative distortions of the way they view themselves and the world around them (1967, 1976). On the other hand, individuals who do not exhibit depressive symptoms tend be optimistic in their expectations about future events (Taylor and Brown, 1989). However, research suggests that nondepressed individuals can exhibit a more pessimistic (or less optimistic) bias in future event predictions as well, particularly for events that are considered uncontrollable (Weinstein, 1980).

The general tendency to believe events are not controllable by oneself, but instead due to outside factors such as luck or chance, is called an external locus of control. A substantial amount of research regarding the relationship between depressive symptoms and an external locus of control exists. A meta-analysis of 97 studies found a moderate relationship of $r = .31$

between depressive symptoms and an external locus of control (Bernassi & Sweeny, 1989). I am not aware of research that investigates the interrelationships among depressive symptoms, future event prediction and locus of control orientation, or depressive symptoms, future event prediction and the perceived controllability of individual events.

This study examines whether one can manipulate the accessibility of beliefs related to control, whether doing so will ameliorate pessimistic bias in future event prediction, and investigates whether locus of control or perceived controllability of events serves as a moderator between depressive symptoms and bias in future event predictions. The remainder of the introduction will consist of an outline of previously conducted research that collectively constitute a basis for the questions put forth and addressed by the current study. The previous research concerns the relationship between depressive symptoms and bias in future event prediction, locus of control and optimism in future event prediction, the relationship between locus of control and depressive symptoms, and perceived controllability and optimism in future event prediction. Additionally, background information on the construct of locus of control will be presented.

Depressive Symptoms and Bias in Future Event Prediction

Individuals exhibiting elevated depressive symptoms on the Beck Depression Inventory-II (BDI-II; Beck, Steer, & Brown, 1996) have, as previously mentioned, been shown to exhibit pessimistic bias in future event prediction. Strunk, Lopez, and DeRubeis (2006) investigated the relationship between depressive symptoms and bias in future event prediction. The study included 153 participants who varied in self-reported depressive symptoms who were asked to estimate the probability of 40 life events (20 positive and 20 negative, representing a variety of base rates, and all judged relevant to the general population) occurring over the course of the

following 30 days. After the 30 days, participants indicated which events from the list of 40 events occurred during that time. They found that individuals with elevated depressive symptoms showed a pessimistic bias in making predictions about the outcomes of future life events by over-predicting that undesirable events would happen to them and under-predicting that desirable events would happen to them. Additionally, they found individuals with low levels of depressive symptoms exhibited a non-significant optimistic bias, and those participants exhibiting mild depressive symptoms did not exhibit pessimistic or optimistic bias. Among the entire sample, the relationship between depressive symptoms and bias was significant and of a medium effect size (r = -.35). These findings have since been replicated by Strunk & Adler (2009), who also found that individuals exhibiting depressive symptoms show a pessimistic bias.

Locus of Control

A more dispositional construct that indicates the amount of control individuals believe they possess is locus of control. As previously mentioned, one's locus of control has been shown to be related to both pessimistic and optimistic bias in future event prediction. Locus of control was developed predominately by Julian Rotter and his graduate students at The Ohio State University in the 1960s as part of Rotter's social learning theory (Rotter, 1966). Locus of control is a measure of the amount of control people believe they have over the events in their lives. Rotter conceptualized locus of control as a continuum with an external orientation indicating individuals believe they have very little or no control over the outcomes in their life, and an internal locus of control indicating individuals believe they exercise a good deal of control or agency over the events in their lives. Locus of control is also conceptualized as a series of distinct factors. For instance, Levenson (1973) believed that there may be important diversity between individuals who score on the external end of Rotter's locus of control scale, particularly

between those individuals who believe the world is chaotic and ruled by chance and individuals who believe the outcomes of events are controllable, but controlled by powerful others and not themselves. To this end, Levenson created a multidimensional locus of control scale that consists of three subscales: the internal locus of control subscale, which functions to measure locus of control in the way it is conceived by Rotter; a chance subscale, which measures to what degree individuals believe events in their life are controlled by chance; and the powerful others subscale, which measures to what degree an individual believes other powerful individuals exercise control on the outcomes of events in their life. A factor analysis conducted by Levenson found that the powerful others and chance subscales were consistent and distinct factors. Levenson also found that the powerful others and chance subscales were moderately correlated (r = .54) and were negligibly related to the internal subscale (r = .04 and r = .03, respectively), providing some additional support against the idea that locus of control is unidimensional.

Locus of Control and Unrealistic Optimism in Future Event Prediction

Locus of control orientation has been found to be associated with unrealistic optimism in future event prediction. Hoorens & Buunk (1993) investigated the relationship between locus of control and unrealistic optimism, which is the belief that negative events (particularly health-related events, such as contracting AIDS) are more likely to happen to others than to oneself. Locus of control was measured by a Dutch translation of Rotter's Locus of Control Scale. Eighty-four participants were asked to estimate the risk, for themselves and others, of acquiring a number of health related diseases or negative situations such as cancer, heart attack, or AIDS. They found participants exhibiting a strong internal locus of control orientation, or those who believe they have more control over events in their lives, show substantially more optimistic

predictions (alternatively called ‘unrealistic optimism’) than individuals having an external locus of control $r = .33$

Locus of Control and Depression

There are two prominent paradigms regarding the relationship between locus of control and depression. The learned-helplessness model of depression (Seligman, 1975) posits that depressed individuals perceive events to be beyond their control. A second model postulates a self-blame model where depressed individuals assume responsibility for negative events (Beck 1967; Abramson & Sackeim, 1977; Rizley, 1978). The apparent logical incongruence and incompatibility of these two theses presents a ‘depressive paradox’ (Abramson & Sackeim, 1977). Benassi & Sweeney’s 1989 meta-analysis of the literature pertaining to the relationship between depression and locus of control found a significant ($r = .31$) effect size between an external locus of control orientation and depressive symptoms. This lends support to the popular learned helplessness model of depression (Seligman 1975) which posits that depression is related to perceived lack of control over the outcome of a given situation. In addition, a reliable negative correlation between individuals with an internal locus of control and indicators of a variety of forms of psychopathology, including depression, has been found in various studies (Benassi, Sweeney, & Dufour, 1988; Mirowsky & Ross, 1990; Naditch, Gargan, & Michael, 1975; Presson & Benassi, 1996).

Controllability and Optimism in Future Event Prediction

The degree to which individuals believe they can control a given event has been shown to be related to exhibiting optimism when predicting future events. Harris (1996,) in a review of the literature examining the relationship between perceived controllability and optimistic prediction of future events, found a strong association between high perceived controllability and

optimistic predictions. Specifically, it was found that individuals have a tendency to overpredict positive outcomes when they believe they have control over the outcome. A frequently-cited study that illustrates this finding is Weinstein (1980) which investigated the tendency for individuals to be unrealistically optimistic when predicting the probability of future life events. The author predicted participants would exhibit unrealistic optimism by over-predicting good outcomes and under-predicting bad outcomes for themselves relative to others. In addition Weinstein expected to find that the perceived controllability of events would effect predictions in the following way: "the greater the perceived controllability of a negative event, the greater the tendency for people to believe that their own chances are less than average; the greater the perceived controllability of a positive event, the greater the tendency for people to believe that their own chances are greater than average" (p. 808). The portion of the study relevant to the current research consisted of 258 college students estimating their chances of experiencing 42 events compared to the chances of fellow students at that college (e.g., an event was "20 percent less" likely to happen to the student compared to fellow students). The hypothesis was confirmed as there was a relationship between controllability of an event and its estimated likelihood of occurring to the participant relative to fellow students (r = .52). Individuals tend to believe there is a less than average chance that they will experience a negative event if they perceive it to be controllable. Additionally, individuals tend to believe there to be a greater than average chance that a positive event will happen to them if they believe themselves to have a lot of control over the event. Therefore, as one's perceived control regarding an event decreases, there is a greater tendency to view negative events as more likely to occur and to view positive events as less likely to occur.

Focus of the current study

The primary aim of the current study was to discern whether a) one can manipulate the accessibility of beliefs related to control from more external to less external and b) the extent to which a manipulation of control, if successful, would attenuate pessimistic bias. The second aim of this study was to examine the relationships between depressive symptoms, locus of control, and bias in future event prediction. The third aim of this study was to examine the relationships between perceived controllability of life events, depressive symptoms and bias in future event prediction. To these ends, this study was designed with two experimental components and a correlational component. To investigate the primary aim of the study, a subset of the participants exhibiting a high external locus of control orientation were randomly assigned to one of three conditions: a rating manipulation, a writing manipulation, or a control condition. The correlational aspects of the study (the second and third aims) utilized the previously-mentioned control condition, as well as an additional non-manipulation condition consisting of individuals with an internal locus of control orientation.

Hypotheses

There were two hypotheses associated with the experimental component of the study. The first hypothesis was that the two manipulations would be successful in, at least temporarily, increasing the accessibility of beliefs related to personal control (i.e., a less external locus of control orientation). The second hypothesis was that the individuals with a high external locus of control who were given one of the two experimental manipulations would exhibit less pessimistic bias in event predictions than the individuals with a high external locus of control who were in the control group.

The final two hypotheses were related to the correlational component of the study. The third hypothesis was that locus of control would serve as a moderator between depressive symptoms and bias in event predictions. Specifically, it was predicted that individuals with both an external locus of control and a pessimistic bias would experience elevated depressive symptoms than individuals with optimistic or no bias and lower levels of external locus of control. The fourth hypothesis was that individuals with elevated depressive symptoms would experience a greater pessimistic bias for events that were rated as less controllable than for events that were rated as more controllable.

Methods

Participants

All participants were undergraduate students at The Ohio State University enrolled in an introductory psychology class during the fall of 2009 or the winter of 2010. A total of 1,459 students were prescreened using the BDI (Beck et al., 1996) and the Multidimensional Locus of Control Scale (MLCS; Levenson, 1975). Initially, efforts were made to identify students with high or low levels of external locus of control and elevated levels of depressive symptoms. High or low levels of external locus of control were determined by creating an external composite score on the MLCS. Each subscale was standardized with a mean of 0 and standard deviation of 1. Then, the internal subscale was reverse-scored, so the direction of the scale corresponded to the other two subscales. Finally, these scores were averaged. High or low levels of external locus of control were determined by the scores that were in the top or bottom third of those prescreened during the first quarter of data collection. The cutoff scores identified in the first quarter were used during the second quarter of prescreening as well. A BDI cutoff score of 10 or above was initially chosen to identify individuals with elevated depressive symptoms, but this

requirement was dropped due to difficulties obtaining a sufficient sample size, particularly participants low in external locus of control with high BDI scores. Thus, a range of depressive scores were ultimately obtained. A total of 485 students who exhibited a high external locus of control and 479 who exhibited a low external locus of control were identified. These individuals were invited via email to participate in the study.

Of the total 964 invitations sent to students, 240 students (25%) signed up to participate in the study. Of the 240 people, a total of 216 participants (90%) completed the entire study—108 in the experimental conditions and 108 in the control conditions. Three participants entered the study (by consenting to participate) but did not complete any of the surveys. Twenty-one participants dropped out of the study between Time 1 and Time 2. The participants who dropped out of the study did not differ from study completers on depressive symptoms or any of the MLCS subscales (*p*s > .17). The analyses of this study only include the data acquired from participants that completed all time points because bias in future event prediction could not be determined without the event occurrence data obtained at Time 2. The majority of the sample was female (61.3%, n = 147) and Caucasian (74.6%, n = 179). The racial/ethnic background of the rest of the sample was: 2.5% African-American (n = 6), 13.3% Asian-American (n = 32), 3.3% Hispanic/Latino (n = 8), and 6.3% other (n = 15). The mean age was 19.1 (*SD* = 2.31).

Measures

Beck Depression Inventory (BDI). The BDI (Beck et al., 1996) is a reliable and well-validated measure of depression symptoms (Beck, Steer, & Garbin, 1988). It is a 21-question self-report scale with items ranging in value from 0 to 3, with possible scores of 0 (minimal depression) to 63 (high depression). This measure is used in prescreening to identify individuals

with high and low depressive symptoms, and as the sole measure of depressive symptoms throughout the study.

Life Events -- Prediction and Assessment Questionnaire (LE-PAQ). The LE-PAQ (Strunk, Lopez, & DeRubeis, 2006) was utilized to assess bias in future life event predictions. It involves a list of 40 life events which have been judged to be: (a) relevant to the general population; (b) representative of a range of base rates; (c) balanced in the proportion of events that are desirable and undesirable; and (d) representing a range of controllability. At Time 1, participants predict the probability of each event occurring to them over the next 30 days. At Time 2, participants report whether each of the events occurred or not. A bias score was computed for each participant with respect to prediction of future life events. To assess an individual's bias in predicting future life events, the scoring procedures from Stunk et al. were used (2006).

A "Bias" score was calculated for each item on the LEPAQ. For desirable items, the score was the participant's probability judgment minus either 1 if the event occurred during the 30 days or 0 if the event did not occur. For undesirable items, the score was formulated as the occurrence or non-occurrence of the event (coded 1 or 0, respectively) minus the probability judgment for the event. After the individual bias scores were calculated, the bias of each of the 40 events was averaged together to create the Bias score. This algorithm results in higher positive scores corresponding with greater optimism, and lower negative scores corresponding with greater pessimism. The Bias scores can range from -1 to 1. A score of 0 indicates that optimistic and pessimistic biases are equal, and as scores fall further from zero they show greater pessimism or optimism. Positive scores reflect optimism whereas negative scores reflect pessimism. Previous research (Strunk et al., 2006; Strunk & Adler, 2009) has shown that

depressive symptoms negatively correlate with bias in predicting these life events, such that those with greater symptoms display more pessimism.

Life Event Controllability Questionnaire (LE-CQ). This measure was created specifically for this study to assess the perceived controllability of each life event listed on the LEPAQ. Participants indicate how much control they believe they have over each event on a scale of 0 to 4, with 0 being the least amount of control ("I have no control over this outcome"), and 4 being the greatest ("I have complete control over this outcome".)

Multidimensional Locus of Control Scales (MLCS). The MLCS (Levenson, 1973, 1974, 1975) is a well-validated (Goodman & Water, 1987) measure of locus of control; it differs from other measures of locus of control in that it measures locus of control on three separate scales: internal, chance and powerful others. As previously mentioned, an external composite score was used in order to measure external locus of control on a single scale rather than measuring the three separate subscales. The composite score was used for prescreening only.

The MCLS includes three subscales: an internal subscale, a chance subscale, and a powerful others subscale. Levenson (1973) created the chance and powerful others subscales to measure individuals' tendency to attribute control in their lives to chance will behave and individuals' belief that the world is essentially ordered, but that powerful people control it. A factor analysis conducted in Levenson's study found control afforded to powerful others and control afforded to chance to be consistent factors, respectively.

Short Locus of Control Scale (SLCS): This scale, created for this study, is a very basic measure of locus of control used to test randomization and allocation of participants to the different conditions. The scale consisted of one item: "Please rate the extent to which you believe the outcome of events are due to yourself or the outside world." Participants responded

on a 1 (yourself) to 9 (outside world) scale. This scale was created so that there would be a unique, pre-manipulation measure of locus of control; by using this measure, locus of control could be assessed pre and post-manipulation without using the same measure repeatedly in the span of a few minutes.

Overall Procedures

Participants with a high external locus of control were randomly assigned to one of three conditions: the rating condition, the writing condition, and a no-manipulation condition. Participants with a low external locus of control were also assigned to a no-manipulation condition. All participants completed 2 online sessions, with a month between each session. At Time 1, all participants completed the following measures: the SLCS, the LEPAQ (predictions), MLCS, LE-CQ, and the BDI. For the rating and writing conditions, the manipulation of beliefs related to control occurred after the SLCS and before the rest of the questionnaires at Time 1. Participants in no-manipulation conditions completed the same study measures as those in the ratings and writing conditions. At Time 2, all participants completed the LEPAQ (outcomes) (See Figure 1).

Manipulations of Beliefs Related to Control

Rating Manipulation: This manipulation was used to increase the accessibility of beliefs related to personal control. In particular, this manipulation intended to bring to mind various things an individual could do to either bring about positive outcomes or prevent negative outcomes. This, it was reasoned, would lead participants to consider various ways they have control over situations. The scale consisted of 14 items. For each item, the participant was presented with one of seven positive (e.g., "graduating from college with a good GPA") or seven negative events (e.g., "having a significant other end a relationship") and asked to rank-order the

likelihood that they would be able to control the outcome of the event by engaging in each of five actions (e.g., taking the appropriate level courses in order to graduate from college with a good GPA, or maintaining a healthy weight for 3 years).

Writing Manipulation: This manipulation was used to increase the accessibility of beliefs related to personal control and lead the participant to think of things that they have done to bring about an outcome related to having control over a situation. It consists of an essay, guided by the following prompt: "Think of a time when you really took charge in your life and your efforts led to a desired outcome. Write about what the outcome was, and how your efforts were instrumental in getting the desired result."

Results

The mean BDI score of the sample was 10.01 (*SD* = 9.06). A total of 59% of participants scored in the low range of the BDI (0-9), 22% scored in the middle range (10-18), and 19% scored in the moderate to severe range (19-63). The mean BDI scores for each condition and mean MLCS subscale scores are reported in Table 1.

Tests of Randomization and Successful Allocation to High or Low External LOC Conditions

A series of t-tests were used to assess the successfulness of the randomization of a subset of participants to the three high external locus of control conditions and to assess the successful allocation of participants to the high external locus of control conditions or to the low external locus of control condition.

First, there were no significant differences between the high external locus of control conditions (rating, writing and control condition) on the SLCS (all *p*s > .33). Thus, the randomization of high external locus of control participants to these three conditions appeared successful. Second, participants in the low external control condition were significantly different

from participants in the high external locus of control conditions on the SLCS, $t(231) = -2.10$, $p = .037$, $d = .28$. The small difference here can probably be attributed to the brevity of the measure and limited choices within the single item, in addition to the SLCS being a different scale than what was originally used to separate individuals into groups (i.e., the MLCS). However, given the significant results, the allocation of participants to the high external LOC conditions and the low external locus of control condition appeared to be successful (see Table 1).

Primary Analyses Associated with the Experimental Component (Rating, Writing and High External Control Conditions)

Hypothesis 1: Did either of the two manipulations result in a greater accessibility of personal control for those with a high external locus of control?

To examine this hypothesis, I used a general linear model with condition as a predictor of MLCS internal subscale scores at Time 1. There were no significant differences found among the three high external conditions, $F(2, 172) = .81$, $p = .44$. Results were largely the same when MLCS internal subscale prescreening scores were entered as a covariate, $F(2, 171) = 1.32$, $p = .27$. The other two MLCS subscales were examined as well, to see if the manipulations significantly affected locus of control related to powerful others or chance. Neither the MLCS chance subscale nor the MLCS powerful other subscale was significantly different between the three conditions with or without controlling for their respective prescreening scores (ps > .46). Therefore, there is no evidence that the two manipulations resulted in a greater accessibility in beliefs related to personal control for those with a high external locus of control (see Figure 2).

Hypothesis 2: Do the manipulations result in less pessimistic bias for future event prediction?

The mean Bias scores for each condition were as follows: -.00 (*SD* = .084) for the rating condition, .029 (*SD* = .091) for the writing condition, and .0046 (*SD* = .10) for the high external control condition. To examine whether the manipulation conditions differed from the high external control condition or from each other, independent-samples t-tests were utilized. Both the rating and writing experimental conditions did not exhibit a significantly different Bias score than the high external control condition, $t(102) = -.25$, $p = .80$ and $t(110) = 1.32$, $p = .19$, respectively. Interestingly, there was a trend for those in the writing condition to exhibit a more optimistic bias in future event prediction than those in the rating condition, $t(110) = -1.70$, $p = .09$. Given the results, there is little evidence that the manipulations resulted in less pessimistic bias for future event prediction (see Figure 3).

Primary Analyses Associated with the Correlational Component (High External Control and Low External Control Conditions only)

Hypothesis 3: Does locus of control serve as a moderator of the relation between depressive symptoms and bias in life event predictions?

To examine this hypothesis, a regression analysis was conducted on participants in the two control conditions with bias scores as the dependent variable and locus of control, BDI, and their interaction as the independent variables. Each MLCS subscale was assessed separately. The analyses showed that there was a significant interaction between the MLCS internal subscale and BDI in predicting bias in life events, $t(104) = 2.44$, $p = .02$, $\beta = .25$. However, the observed interaction between the MLCS internal subscale and BDI was not quite as predicted, especially with respect to the pattern of results seen with those who have low depressive symptoms (see Figure 4). Although participants exhibiting a high BDI score showed the predicted pattern with locus of control, such that among these participants, those with a low internal locus of control

were more pessimistic than those with a high internal locus of control, the results from participants with a low BDI score showed the opposite pattern. Participants exhibiting a low BDI score and low internal locus of control showed an optimistic bias, whereas participants exhibiting a low BDI score and high internal locus of control showed a very slight pessimistic bias. This interaction seems to be driven mostly by the individuals with low BDI and low internal locus of control. Finally, there were no significant moderation effects seen with the MLCS powerful others subscale ($t(104) = .32$, $p = .75$, $\beta = .03$) or the MLCS chance subscale ($t(104) = -.09$, $p = .92$, $\beta = -.00$). Thus, there was little evidence to suggest that locus of control serves as a moderator between bias in life event prediction and depressive symptoms.

Hypothesis 4: Does the controllability of events serve as a moderator of the relation between bias in life event predictions and depressive symptoms?

To examine this hypothesis, the average controllability scores for each of the 40 events using the LE-CQ were obtained. The 40 events were split into high controllable and low controllable groups by taking the 10 most controllable positive and 10 most controllable negative events and grouped them into a high controllable group. The 10 least controllable positive and 10 least controllable negative events were grouped into the low controllable group. The average LE-CQ score for the high controllability group of events was $M = 4.37$ ($SD = .55$) and the average LE-CQ score for the low controllability group of events was $M = 2.66$ ($SD = .47$). A model was then examined using SAS Proc Mixed with Bias scores as the dependent variable. Three variables were then entered as independent variables: Time 1 BDI score, controllability (a high or low binary variable), and the interaction between BDI and controllability. The interaction between depressive symptoms and controllability did not significantly predict level of Bias, $F(1, 213) = 1.16$, $p = .28$. However, when the relationships between depressive symptoms

and bias for the most highly controllable and least controllable events were examined in separate regression models, there was a slight difference in results. Participants' bias for the highly controllable events did not predict concurrent depressive symptoms [$t(213) = -1.16$, $p = .25$, $\beta = -.08$], but participants' bias for the least controllable events did significantly predict concurrent depressive symptoms [$t(213) = -2.59$, $p = .01$, $\beta = -.17$], such that a greater pessimistic bias predicted higher depressive symptoms. However, given the nonsignificant overall test of the interaction and the small differences in effect sizes between the highly controllable and the least controllable events, there is no evidence that the controllability of events serves as a moderator of the relation between bias in life event predictions and depressive symptoms.

Discussion

The manipulations used in this study were not found to be effective in inducing a less external locus of control orientation, and there was no evidence was found that the manipulations resulted in less pessimistic bias for future event prediction. This study also did not find strong supporting evidence for locus of control serving as a moderator between bias in life event predictions and depressive symptoms and found no evidence for controllability of events serving as a moderator between bias in life event predictions and depressive symptoms.

Though the two manipulations did not increase the accessibility of beliefs related to internal control and did not ameliorate bias in future event prediction, the writing manipulation appears to have somewhat increased optimistic bias, which was predicted in that pessimistic bias was curbed. However, it is unclear what led to this finding, given that locus of control was not significantly different between the two conditions.

The evidence found supporting locus of control as a moderator between depressive symptoms and bias in future in event prediction via the MLCS internal subscale is also puzzling.

The results are partly consistent with previous research indicating that individuals with low depressive symptoms tend to have an optimistic bias in predicting future life events (Weinstein, 1980; Taylor & Brown, 1988). Interestingly, we did find that an optimistic bias in individuals with low depressive symptoms was not normative in our sample, as others have found. As seen in Figure 3, participants exhibiting a low BDI score and high internal locus of control did not exhibit an optimistic bias. Rather, participants, on average, exhibited near zero bias that was in the pessimistic direction. However, these findings are contrary to findings from Hoorens and Buunk (1993), who found that individuals with higher internal locus of control were more optimistic than those with lower levels of internal locus of control. There is a question as to what kind of person would show low depressive symptoms, a low internal locus of control, and an optimistic bias. One possibility, admittedly speculative and made in the absence of data, is that a subset of these participants may have a theological orientation in which they believe in a benevolent omnipotent deity, which might affect the relationship between locus of control and bias. Benson and Spilka (1973) found locus of control to be significantly related to a religious individuals' belief in a vindictive God or belief a God perceived as being all-knowing and all-powerful. There is a potential problem with this hypothesis though: intuitively, it seems that if this hypothesis were true, that the MLCS powerful others subscale would have been found as a moderator of the relationship between bias and depressive symptoms. However, this would not be the case if participants viewed 'powerful others' as worldly figures of authority, such as government officials or law enforcement. Given that western deities are often thought of as transcendent, this sentiment may not be captured in the powerful others subscale but in the more general internal subscale. In addition, such a distinction between a deity and 'Powerful Others' has been found by Jackson and Coursey (1988) as participants in their study did make

distinctions between the amount of control they afforded to 'powerful others' and the power they afforded to God, as evidenced by a relatively low correlation between a measure of the control one afforded to God and Rotter's Internal-External Locus of Control Scale (r = -.26).

Limitations

There are a number of factors that limited what this particular study was able to effectively test and to what degree the results of this study can be generalized to the population at large. To the former concern, the primary question is to what degree the findings of this study can be taken as evidence against the hypothesis that individuals with a high external locus of control would exhibit less pessimistic bias in the manipulation conditions than the control condition. It is possible that the negative results stem, in part, from methodological limitations. As the manipulation failed to temporarily induce a lower external locus of control orientation in participants exhibiting a higher locus of control orientation, it cannot be deduced that a successful manipulation would not have the desired effect of alleviating pessimistic bias. A stronger manipulation may be necessary given the findings of the current study and the conceptualization of locus of control as a stable individual characteristic.

The latter concern of generalizeability relates to how the external validity of the study may be hampered first by the nature of the particular undergraduate sample used and second, having conducted the surveys and implemented the manipulations online. To the first concern, it is possible that depressive symptoms may manifest differently and locus of control orientation may yield different outcomes in a sample with greater variability in age and level of education or in a clinical sample. To the second concern, that the study was conducted online, may also present some limitations. As participants cannot be monitored as they could if they completed the measure in the lab, so the degree to which the participants were taking the study seriously

and understood the instructions for all the questionnaires and manipulations is unknown and could have affected the strength of the manipulation. This limitation may have been particularly true for the hypotheses that the two manipulations conditions would be efficacious in changing locus of control and that the manipulations would result in less pessimistic bias for future event predictions.

Conclusions

In summary, the manipulations used in this study failed to increase the accessibility of beliefs related to personal control, and this study failed to yield evidence in support of the hypothesis that locus of control serves as a moderator between depressive symptoms and bias in future event prediction. However, the failure of the manipulations, along with the limitations of the sample, limit the ability of the study to provide a definitive test of the hypotheses. The current study yields a number of topics that warrant further investigation. First, there is the question of whether beliefs related to control can be manipulated. Given the lack of success of this study in finding any temporary changes in locus of control, further research into the subject will probably require substantially more sophisticated manipulations. If it is the case that locus of control turns out to be essentially and rigidly dispositional, the manipulations may be far more sophisticated and take more time than ones used in this study. For instance, a goal of cognitive therapy and is to help establish a more realistic, accurate and less biased worldview (Beck et al., 1979). It is reasonable to suppose the successful completion of this goal may bring about substantial change in a given individual's locus of control. Additionally, it is suggested that future studies investigating relationships related to those explored in this study include questions related to religion and specific aspects of theological orientation in a demographics section as this may serve as a basis for verifying the aforementioned idea that the relationship between

locus of control orientation and bias in future event prediction may be moderated by religious beliefs.

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Table 1

Descriptive Statistics for All Conditions for Multi-Dimensional Locus of Control Scores (At Pre-screening) and Depressive Symptoms (At Time 1)

Variable		Rating (N = 59)	Writing (N = 59)	High External Control (N =59)	Low External Control (N = 60)
BDI-I	*M*	11.50	10.92	11.02	7.22
	SD	9.70	8.80	7.22	7.11
MLCS	*M*	29.73	30.92	31.15	37.93
Internal	*SD*	6.39	6.76	7.01	5.98
MLCS	*M*	24.75	25.00	24.73	14.24
Chance	*SD*	6.70	8.16	7.48	5.50
MLCS	*M*	26.62	24.93	26.03	16.03
Powerful Other	*SD*	7.19	7.71	7.13	6.15

Note. BDI-I = Beck Depression Inventory, MLCS = Multidimensional Locus of Control Scales.

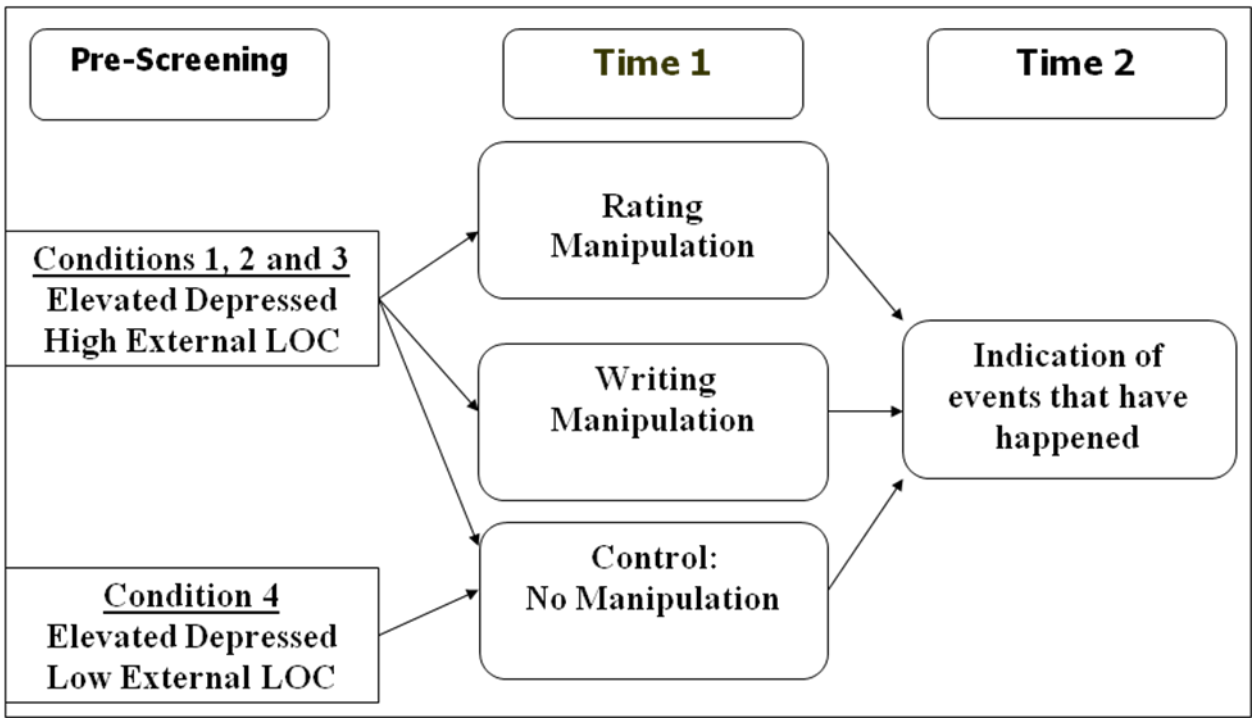

Figure 1. Study Design flow chart.

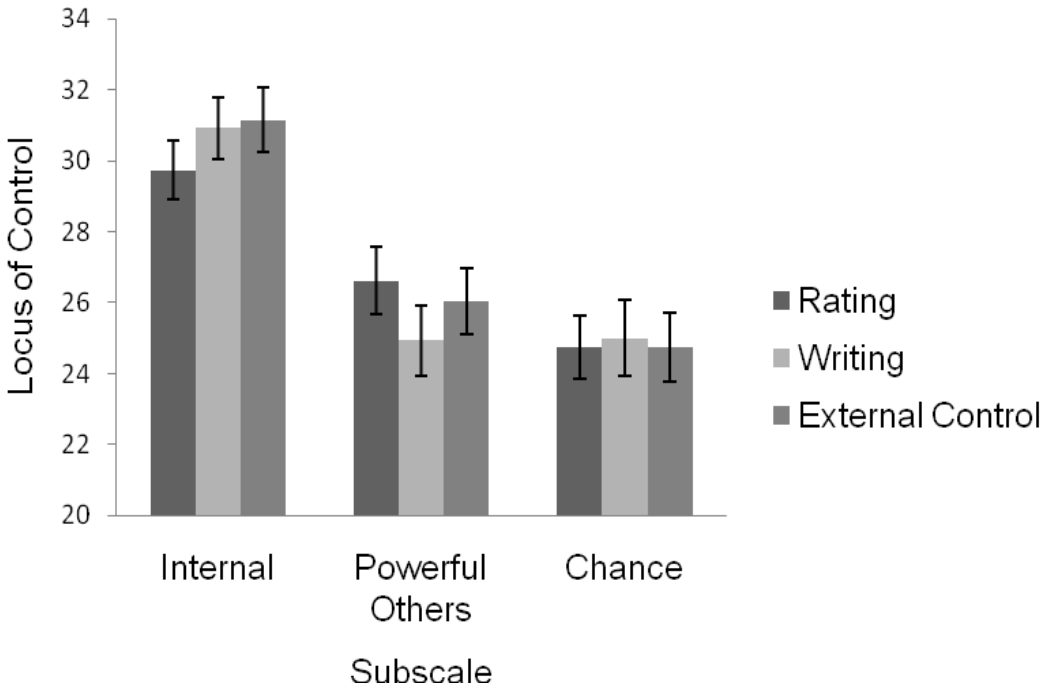

Figure 2. Multidimensional Locus of Control Scales Subscales by Condition. Error bars lines indicate plus or minus one standard error.

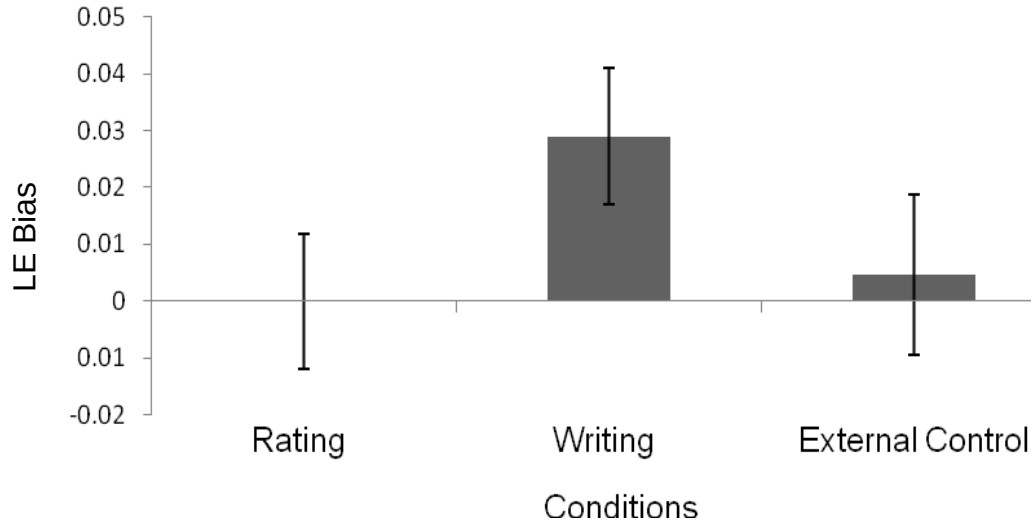

Figure 3. Life event prediction bias as measured by the Life Events -- Prediction and Assessment Questionnaire by condition. Error bars lines indicate plus or minus one standard error.

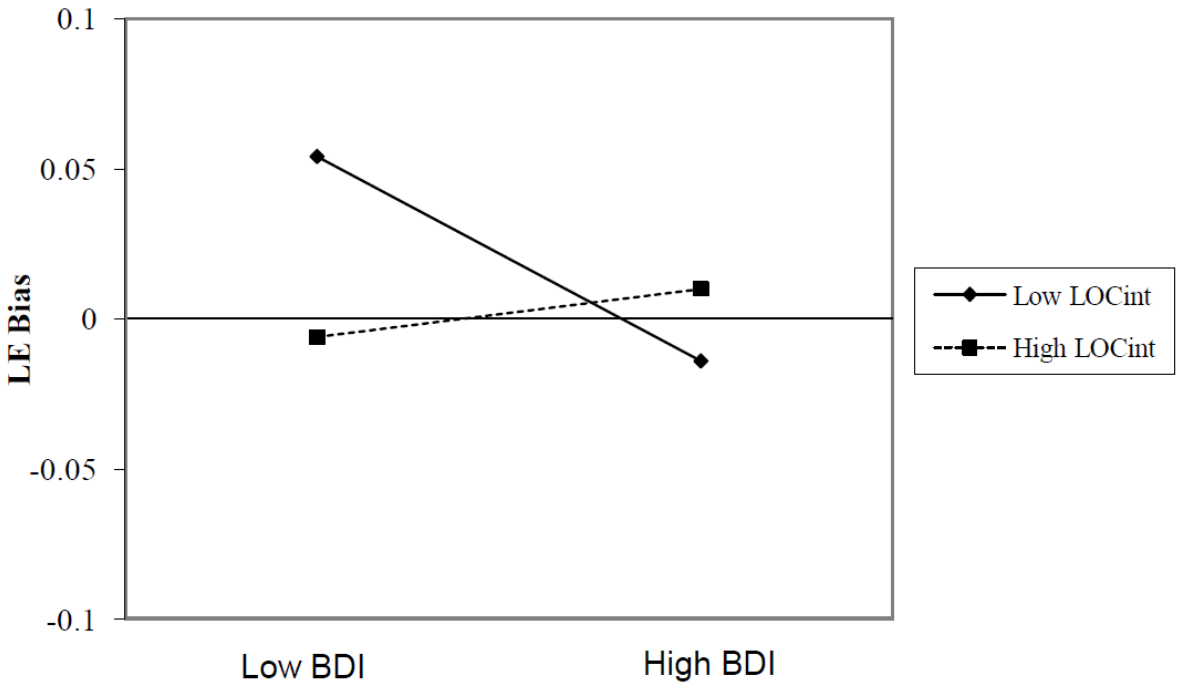

Figure 4: BDI scores, Multidimensional Locus of Control Scales--Internal Subscale, and Life event prediction bias. LOCint = Internal Subscale. Low and high BDI and LOCint were defined as one standard deviation above and below each respective mean.