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**Locus of Control: Daily Variability within a Stressful Context**

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**Locus of Control: Daily Variability within a Stressful Context**

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## **Abstract**

### **Locus of Control: Daily Variability within a Stressful Context**

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Research has established locus of control as a strong trait-level predictor of health and well-being and indicates that individuals with a greater sense of internal control benefit from healthier outcomes across a broad range of domains. To date, however, little research has investigated the potential malleability and state-level functioning of locus of control. Drawing from social learning theories, it was predicted that locus of control would vary on a daily basis and further that this variation would be influenced by daily hassles and anxiety. Additionally, an individual's trait-level of internal locus of control was expected to moderate this association. The current study consists of 58 couples expecting their first child. Couples were asked to independently complete three weeks of daily diaries during their third trimester. Diaries assessed daily feelings of control, anxiety, and number of hassles encountered. Once reliable daily variation of locus of control was established, within-person analyses revealed a negative relationship such that on a day when an individual reported more anxiety or more hassles, that individual also

reported feeling less control than on an average day. Further analyses revealed that an individual's trait-level of internal control influenced this association such that, overall, those individuals with a higher trait-level of internality maintained higher levels of daily control in the face of hassles and anxiety. These findings extend prior research by providing a better understanding of locus of control and suggest important implications for efforts aimed at improving health and well-being.

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## **Introduction**

The construct of locus of control has been studied extensively as it relates generally to health and well-being. Individuals who believe they control their lives experience less stress and conversely, those who believe that their lives are out of their control experience greater levels of stress and the subsequent, adverse effects of stress (Lefcourt, Martin, & Saleh, 1984; Sandler & Lakey, 1982; Shapiro & Shapiro, 1983). Conceived as a stable trait, individuals are generally classified as having either an internal or external locus of control. Individuals with an internal locus of control believe that events result primarily from their own behavior and actions while those with an external locus of control believe that powerful others, fate, or chance primarily determine events (Rotter, 1966). Numerous theories posit an important role in human behavior for control constructs such as locus of control (Rotter, 1966), self-efficacy (Bandura, 1977), helplessness (Abramson, Seligman, & Teasdale, 1978; Seligman, 1975), and perceived control (Thompson, 1981). These terms are often used interchangeably despite having distinct features.

### **LOCUS OF CONTROL**

Locus of control has been shown to influence the degree to which individuals experience stress (Lefcourt, Martin, & Saleh, 1984; Sandler & Lakey, 1982; Shapiro & Shapiro, 1983). For instance, Lefcourt and colleagues found that individuals with an internal locus of control derive greater stress-buffering benefits from social support than do those who operate from a more external orientation. In fact, Sandler and Lakey found



that while externals receive a greater quantity of support than internals, the stress buffering effect of support is evident only for internals. More recent research concerning couples as they transition to parenthood for the first time indicates that for mothers and fathers, sense of control is a significant predictor of mental health: specifically, a greater sense of control throughout the transition to parenthood was predictive of lower levels of anxiety and depressive symptoms (Keeton, Perry-Jenkins, & Sayer, 2008).

In addition to stress-buffering effects, having a sense of control has consistently been found to have adaptive effects. Personal control is associated with emotional well-being (Cunningham, Lockwood, & Cunningham, 1990), positive health outcomes (Andersen, Kiecolt-Glaser, & Glaser, 1994; Keeton, Perry-Jenkins, & Sayer, 2008), and a greater likelihood of making difficult behavior changes (Thompson & Spacapan, 1991). Rooted in social learning theory, internal-external control theory suggests that individuals with a greater sense of internal control tend to operate via beliefs that mediate adaptive coping responses. In other words, the process of successfully managing stressful circumstances, and seeking to master, reduce, or solve personal and interpersonal problems requires deliberate behavioral efforts.

Despite the extensive research on locus of control as a trait-level predictor, little work has addressed the potential malleability of the construct. Recent research, discussed above, concerning personal control and the transition to parenthood suggests that control may, indeed, be composed of both stable and malleable components (Keeton, Perry-Jenkins, & Sayer, 2008). In addition to finding an individual's sense of control a

significant predictor of mental health outcomes for both parents, the researchers, having measured control at five time points across a year's span, found that increases in control predicted decreases in anxiety and depressive symptoms over the transition. In fact, their results indicate the malleable, not the stable, component of control to be more predictive of depression over time.

Given the implications that locus of control has for outcomes such as health and psychological well-being, it seems important to thoroughly understand the construct. If it does, indeed, fluctuate then measuring it at one point in time may lead to inaccurate assessment and if there is potential for change, then understanding the factors that influence an individual's sense of control seems necessary in order to develop interventions aimed at changing behavior.

### **SOCIAL LEARNING THEORY**

This potential for change can be understood through the lens of social learning theory (Rotter, 1966). According to Rotter, beliefs about what affects personal outcomes develop from specific experiences and the associated reinforcement history. Rotter's view was that a more internal locus of control develops in those individuals who have experienced successful control attempts as compared with those who have experienced unsuccessful attempts at control. For example, if an individual is diagnosed with a disease and takes personal action to combat the illness (e.g. through diet and exercise) and is, in turn, successful at ameliorating the disease, they are likely to develop a stronger sense of control. If, however, despite their actions, they struggle with the disease and are

unable to combat it, they are likely to experience a diminished sense of control. Though these contingency experiences guide what kinds of attitudes and behaviors people adopt, the cumulative nature of these experiences would also suggest potential for continual change in attitude and behavior.

### **SELF-EFFICACY**

Self- efficacy, a separate but related construct, lends credence to the notion that personal control fluctuates over short periods of time. Rooted in social cognitive theory (Bandura, 1997), self-efficacy refers to the perception that individuals have the skills or abilities to enact effective responses. So while locus of control refers to the extent to which one believes that their behaviors lead to subsequent outcomes, self-efficacy is the belief that one can perform the behavior necessary to achieve the subsequent outcome. Social cognitive theory, an extension of social learning theory, posits that self-regulatory systems or internal controls over one's behavior, guide behavioral decisions (Bandura). Combined these schools of thought posit that people have a sense of perceived control when they believe that personal action controls outcomes (internal locus of control) and that they personally possess the skills necessary to enact those behaviors (self-efficacy). Regardless of one's general sense of control, the extent to which an individual feels efficacious in a particular situation might determine the level of control one feels within that context. This perspective led to research demonstrating that control constructs are more effectively operationalized in a domain-specific sense. Examples of well-established domain-specific scales include: Safety Locus of Control (Jones & Wuebker,

1993); Work Locus of Control (Spector, 1988); Job Satisfaction Locus of Control (Pettersen, 1985); and Health Locus of Control (Levenson, 1972; Wallston & Wallston, 1981). For instance Wallston and Wallston's Multidimensional Health Locus of Control Scale, a domain-specific measure, measures the extent to which individuals believe that health is determined by one's own actions, by chance, or by powerful others. This domain specific measure illustrates how despite having a generally strong sense of internal control, an individual might attribute their health to things beyond their control (e.g. act of God, medical science). Domain specific measures suggest that a sense of internal control is situation dependent and as situations vary so must locus of control.

## **Locus of Control as a State**

An individual's locus of control should be shaped by the extent to which one is able to produce desired outcomes and avoid negative outcomes through their own actions making locus of control a learning process rather than a static trait. In addition to the parenting study discussed above, there is some evidence that locus of control is highly responsive to experiences. Various educational and psychological interventions aimed at both children and adults designed to strengthen the tie between behavioral choices and outcomes have been found to increase reports of internal locus of control (Hans, 2000; Hattie, Marsh, Neill & Richards, 1997; Krampen, 1987; Ryon, 2008). In their meta-analysis of 18 adventure-based programs, Hattie et al. (1997) noted the highest effect sizes generated seemed to center around the theme of self-control, that is of all variables measured the construct that appeared most malleable was locus of control. By isolating the effect sizes of locus of control, the comprehensive meta-analysis revealed an effect size of 0.30 for the construct pre- to post-intervention. Specifically, a significant increase on the internal dimension of locus of control was found in pre- to post intervention measures. This suggests that adventure based interventions, to the extent that they are effective, are so because they shift individuals perception of their control over their environment. A later meta-analysis replicated Hattie et al.'s findings: Hans (2000) conducted a meta-analysis comprised of 30 adventure-based programs. Results indicated a significant shift in internality regardless of most program characteristics. Overall, seven of the 30 studies reflected statistically significant pre- to post-intervention changes in the

measure of internality, with the remaining 21 studies reflecting nonsignificant yet positive shifts (in the internal direction) in locus of control.

The malleability of locus of control has also been demonstrated in domains outside of adventure program based interventions. A culturally sensitive educational intervention targeting Latinas' sense of control over disease, specifically breast cancer (Ryon, 2008), found that feelings of control increased pre to post intervention: Comparisons of post-intervention Multi-dimensional Health Locus of Control subscales (Wallston & Wallston, 1981) revealed significant between group differences on the Internal and Chance subscales. Subjects exposed to the culturally sensitive intervention realized a significant increase in the expected direction on the Internal subscale suggesting a greater sense of control over one's own health and a significant decrease in the expected direction on the Chance subscale suggesting a decreased likelihood of attributing their state of health to chance. Further evidence of the malleability of locus of control comes from Krampen (1987) who found that different kinds of teacher feedback (social, individual, and factual) affected performance outcome and altered locus of control orientation in schoolchildren. Individual (non-comparative) feedback was the most beneficial for children both in terms of achievement outcomes and in changes of locus of control orientations in the direction of increased internality.

## **Overview of the Current Study**

Originally conceived of as a trait, research to date has thoroughly established the predictive quality of locus of control. Although sometimes modified by context and found malleable through intervention, locus of control is considered generally characteristic of an individual. Past research has primarily examined the correlation of control constructs such as locus of control with health outcomes, psychological well-being, and personality characteristics. These studies have generally been cross-sectional in nature using control variables as predictors. The relatively few that have been longitudinal in nature have been short-term, pre-to post-test comparisons. The goal of the current study is exploratory in nature and is expected to build upon the existing body of research concerning locus of control and the associated variables. While it is important to understand how an individual's locus of control may guide, among other things, behavior, it seems equally imperative to understand how life events ultimately affect one's locus of control.

To investigate locus of control at both the trait and state-levels within the context of a major life stressor, couples approaching first time parenthood completed individual psychological measures to establish, among other things, a baseline trait-level of locus of control. The transition to parenthood is conducive for studying the potential malleability of control as it lends itself to situations that likely require individuals to engage in novel control behaviors. Participants provided information on their daily levels of personal control, hassles, and anxiety through the use of daily diaries administered for a period of three weeks during the third trimester of pregnancy.

Analyses of these data addressed three specific hypotheses. First, does locus of control vary on a daily basis (H1)? Given the findings that suggest locus of control to be somewhat malleable given an individual's life experiences, it was anticipated that an individual's general sense of control would fluctuate on a daily basis. Regardless of an individual's trait orientation within person variation of control (as measured by 3 researcher-generated diary items) was expected to vary on a daily basis.

Second, does an individual's (daily) sense of control co-vary with their reported hassles and anxiety (H2)? It was believed that the negative nature of these factors would provide the experiences conducive for the anticipated shift in expectancy. In other words, the negative outcomes associated with hassles and anxiety were expected to reduce an individual's sense of personal control.

And lastly, does an individual's trait-level locus of control moderate the effects that daily hassles and anxiety have on an individual's daily sense of control (H3)? Drawing from Rotter's (1966) internal-external control theory which suggests that individuals with a greater sense of internal control tend to operate via beliefs that mediate adaptive coping responses for a broad range of behaviors, it was anticipated that for those with a higher level of trait-level Internality daily hassles and anxiety would influence daily sense of control to a lesser degree than for those with lower trait-level Internality.

An important contribution of the proposed research is the method of data collection. To date, locus of control has never been assessed on a daily basis to investigate it potentially co-varying with everyday experiences. Intensive longitudinal



designs such as this allow for the exploration of patterns within individuals while also allowing for the investigation of differences between individuals. The longitudinal, daily diary structure of this study provides a unique opportunity to assess how an individual's sense of control fluctuates on a daily basis given daily activities, stressors, and anxiety within the larger context of a major life stressor (transition to parenthood).

## Method

### PARTICIPANTS

Participants were 58 couples in their third trimester of pregnancy, expecting their first child. Couples were recruited using several methods. Couples from the prenatal waitlist at the Priscilla Pond Flawn Child and Family Laboratory at the University of Texas at Austin were contacted via email. Community-wide recruitment involved advertisements in local newspapers and websites including *Facebook* and *Craig's List*. Additionally, local retailers, wellness centers, and OBGYN offices were asked to display recruitment fliers and postcards. Eligibility requirements included: (a) the pregnant partner had entered her third trimester of pregnancy (27<sup>th</sup> week), (b) this was the first child for both partners, and (c) both partners could read and write in English.

Participants ranged in age from 19 to 40 years old. On average, pregnant partners were 28.6 ( $SD = 4.4$ ) years old and non-pregnant partners were 29.9 ( $SD = 5.0$ ) years old. Seventy-nine percent of the pregnant women identified themselves as White, 26.9% as Hispanic/Latina, 1.5% as African American, and 7.5% as Asian American. Eighty-two percent of their partners identified themselves as White, 17.7% as Hispanic/Latino, 4.5% as African American, and 4.5% as Asian (participants were asked to 'please check all that apply' resulting in cumulative percentages greater than 100 percent). Eighty-six percent of the couples reported being married with a median household income range of \$40,000 to \$59,999 annually. The pregnant women reported a median income range of \$20,000 to \$39,999 annually while their partners reported a median income range of \$40,000 to \$59,000 annually. Assuming no change in

household income, 10% of our sample will be living below the national poverty line when their child is born. Overall, couples reported being together 7.45 years ( $SD = 3.55$ ). On average, pregnant women reported significantly greater relationship satisfaction ( $M = 73.18, SD = 7.54$ ) than their partners ( $M = 70.68, SD = 8.29$ ) ( $t(66) = -2.08, p < .05$ ). And finally, couples were heterosexual with the exception of one same-sex (female) couple.

## **PROCEDURE**

During the third trimester, couples came into the lab to complete individual background measures. The survey assessed basic demographic information as well as couples' current relationship satisfaction, general health, and personality including locus of control. The background measure was administered via the internet using Snap Surveys software. Participants were assigned a unique login ID for access to the surveys. Upon completion of the background measures, couples were trained on the use of the diary devices. The diaries were administered on ipod touches (Apple Corporation) provided by the researchers using the iForm data collection software developed by Zerion Corp. Participants were asked to complete an individual daily diary nightly for a three-week period antepartum. Diaries assessed their support exchanges, emotional well-being, relationship satisfaction, health, daily activities and their perceived control. All participants received their own password-protected device to ensure privacy. These devices automatically tracked the date and times the surveys were completed and stored the data for later download by the experimenter. The devices were

programmed to allow access to each day's diary between the hours of 5:00pm and 1:00am. This feature eliminated the potential for participants to complete multiple diaries at one time. Questions were asked in the same order each day and took approximately 5-10 minutes to complete (participants become faster at completing the survey the more times they take it). Participants were provided postage paid mailers in order to return the devices to the lab at the end of the 3-week period. Couples were paid \$50 once the devices were received by the lab.

Fifty-two percent (34 pregnant, 25 non-pregnant) of participants completed all 21 days of diaries. Ninety-four percent (56 pregnant, 51 non-pregnant) of participants completed at least 14 days of the diaries and 98% (56 pregnant, 55 non-pregnant) of participants completed at least one week (7 days) of the daily diaries. Reasons given for diaries with fewer than seven days of entries included: pre-term birth for one couple and another lost the device. In all, pregnant women completed a total of 1068 days of diaries and their partners completed 992 days of diaries. Though the electronic method of data collection was a strength of this research, researcher error resulted in the loss of diary data from one couple (the device was erased prior to the data being stored). All other data from this couple have been dropped from the analyses. Additionally the background data from one participant was not successfully uploaded due to server error.

## **BACKGROUND MEASURES**

**Locus of Control: Internal subscale.** Levenson's (1981) scale consists of 24 items measured on a 6-point Likert scale ranging from 1 (*strongly disagree*) to 6

(*strongly agree*). The scale consists of separate measures of internality (general perceived control; 8 items), control by others (8 items), and the effects of chance (8 items). Only the Internal subscale is used in the current study. Sample items include: “When I make plans, I am almost certain to make them work” and “I can pretty much determine what will happen in my life”. Responses for the Internal subscale are summed with scores ranging from 8 – 48. Levenson found means ranging from the low 30’s to the low 40’s (SD values approximating 7). The overall mean for the current sample was 36.41,  $SD = 5.25$ .

## **DIARY MEASURES**

**Personal control items.** To assess personal control on a daily basis, the research team developed a 3 item measure based on Levenson’s Internal subscale and Paulus’ Self-Efficacy subscale. The items were rated on a 5-point Likert scale from 0 (*not at all true*) to 4 (*very true*). Internal items included: “I feel that I have control over the things that happen to me” and “Today I was able to deal with my problems”. The self-efficacy item asks: “Today I was able to manage my health well”. An average score was computed for each partner on each day with higher scores indicating greater personal control, ( $M = 2.87$ ,  $SD = .82$ ). Information regarding reliability is relevant to H1 and is discussed in the results section.

**Daily hassles.** To assess the experience of hassles on a daily basis, the diary presented participants with a researcher-generated checklist of hassles developed for the current study. The list consisted of 8 common every-day hassles including: conflicts

with partner, financial issues, and car maintenance. Participants were asked to indicate whether they had experienced any of the hassles that day. A composite hassles score was computed for each partner on each day by summing the number of hassles reported, with higher scores indicating greater hassles. The options of ‘other hassles’ and ‘no hassles’ were included in this list. The overall mean for the sample was 1.15,  $SD = 1.31$ .

**Anxiety.** In order to assess participant’s anxiety on a daily basis, three high-loading items from the anxiety scale of the Profile of Mood States, as reported by McNair and Lorr (1971), were used. For each item, participants were asked to rate how they felt “right now” on a scale from 0 (*not at all*) to 4 (*very much*). These items included: on edge, uneasy, and anxious. An average score was computed for each partner on each day with higher scores indicating greater levels of anxiety. The overall mean for the sample was .64,  $SD = .74$ . This shortened daily measure of anxiety has previously been documented to be a reliable and consistent measure (Cranford, Shrout, Iida, Rafaeli, Yip, & Bolger, 2006) and analysis from this sample also demonstrates its reliability (between-person reliability estimate for pregnant women = .79 and for their partners = .84; within-person reliability estimate for pregnant partners = .74 and for non-pregnant partners = .79).

## Results

### **HYPOTHESIS 1: DETERMINING VARIABILITY OF DAILY LOCUS OF CONTROL**

First an examination of descriptive statistics was used in order to address the first hypothesis: Individuals' sense of control will fluctuate on a daily basis (i.e. locus of control will vary at the within-person level). In order to establish variation in one's daily sense of control, the mean within-person standard deviation was computed for daily locus of control as well as for anxiety, depression, anger, and relationship closeness. These latter four variables were chosen for comparison given that their daily variation is well-established in the literature (Gleason, Iida, Shrout, & Bolger, 2008; Laurenceau & Bolger, 2005; Shrout, et al., 2006) and that they are comprised of a similar number of items. Table 2 details the results of the comparisons for the mean within-person standard deviations. Daily locus of control ranged from .17 to 1.08 compared with a range of 0 to 1.09 for depression and 0 to 1.15 for anxiety suggesting comparable variability in daily locus of control. In fact, while some participants experienced no daily change in several of the variables used for comparison, the same was not true for locus of control.

A series of reliability analyses demonstrated decent reliability in the daily locus of control scale. Between-person reliability (interpreted as the between-person reliability of the average of the measures taken on the same day) was high for both pregnant women ( $\alpha = .94$ ) and their partners ( $\alpha = .85$ ). Within-person reliability (interpreted as the combined state-trait reliability, but based on only the daily scale) was sufficient for both pregnant ( $\alpha = .77$ ) and non-pregnant partners ( $\alpha = .85$ ). Additionally using a generalizability theory framework described in Cranford et al. (2006), the daily locus of

control scale showed adequate reliability of change within-person for both pregnant (alpha = .74) and non-pregnant partners (alpha = .64). These alphas indicate how viable this scale is for detecting differences in systematic changes in locus of control over days. Taken together with the descriptive comparisons, these analyses suggest that the daily locus of control scale is capturing daily change reliably (particularly for pregnant individuals).

## **HYPOTHESIS 2: PREDICTING DAILY LOCUS OF CONTROL**

A multilevel approach, which accounts for the fact that the data are dependent due to nesting of persons across time and within couples, was taken to investigate Hypothesis 2: Individual's (daily) sense of control will co-vary with their reported hassles and anxiety.

The MIXED procedure in SAS (SAS Institute, 2008) was used to model two levels: a within-individual level and a between-individual level. The within-individual level of the analysis allowed each individual's daily locus of control to be modeled as a function of same day anxiety and hassles adjusting for yesterday's locus of control, anxiety, and hassles. I also adjusted for day in study as participants are approaching a stressor (the birth of their child) and weekend as anxiety and hassles are lower on weekend days. The intercept, anxiety, and daily hassles were allowed to be random. For instance allowing the intercept to be random means that a participants' starting value of daily locus of control was allowed to vary individual to individual and couple to couple. The within-individual equation was as follows:



$$L_{ijk} = b_{0ij} + b_{1ij}D_{ijk} + b_{2ij}W_{ijk} + b_{3ij}Y_{ijk} + b_{4ij}A_{ijk} + b_{5ij}H_{ijk} + e_{ijk}$$

$L_{ijk}$  is daily locus of control for individual  $i$ , in couple  $j$ , on day  $k$ ;  $D_{ijk}$  is day in study for individual  $i$ , in couple  $j$ ;  $W_{ijk}$  represents weekend;  $Y_{ijk}$  is yesterday's locus of control for individual  $i$ ;  $A_{ijk}$  is the level of anxiety reported by the individual on day  $k$ ;  $H_{ijk}$  is the number of hassles reported by the individual on day  $k$ ; and  $e_{ijk}$  is a residual component specific to individual  $i$  in couple  $j$  on day  $k$ . The coefficient  $b_{0ij}$  is the regression intercept for individual  $i$  in couple  $j$  and represents daily locus of control on a weekday at the beginning of the study when yesterday's daily locus of control, and today's anxiety and hassles are at their projected average level for each individual (all three were within-person centered).

The covariance matrix of the residuals was structured such that same-day correlations were allowed for residuals within each couple and cross-day correlations with a first-order autoregressive pattern were allowed for residuals within each person accounting for dependency within couples and across time. As recommended by Kenny, Kashy, and Cook (2006) degrees of freedom in the analyses were determined using satterthwaite approximation.

The between-individual level of the analyses were adjusted for pregnancy status; all predictor variables were interacted with effect-coded pregnancy status (-.5 = not pregnant, .5 = pregnant), which allows non-interacted coefficients to be interpreted as an average across pregnancy status. For example, the between-individual equation for the intercept was as follows:

$$b_{0ij} = \gamma_{00} + \gamma_{01}P_{ij} + u_{0ij}$$

Table 3 presents the results from this model. The intercept indicates that the mean of daily locus of control (on a 0 to 4 scale) on the first day of the study which is a weekday is equal to 2.92,  $t(106) = 39.73$ ,  $p < .001$ , for a hypothetical person whose own same-day anxiety and hassles were at their average level and whose previous day's locus of control was at its average level. Daily locus of control was affected by the previous day's locus of control,  $\gamma_{30} = -0.29$ ,  $t(1446) = -14.93$ ,  $p < .001$ , such that individuals who are higher than their average for yesterday's level of control are lower in daily locus of control for the current day. The more hassles an individual reported on a particular day the lower their locus of control for that same day,  $\gamma_{50} = -0.13$ ,  $t(52) = -8.02$ ,  $p < .001$ . Likewise, the more anxiety an individual reported on a particular day the lower their locus of control for that same day,  $\gamma_{40} = -0.25$ ,  $t(45) = -8.49$ ,  $p < .001$ . Pregnancy status did not moderate any level 1 variables with the exception of daily hassles. Not surprisingly, pregnant women experienced more of a decrease in daily locus of control when they experienced hassles as compared with their non-pregnant partners ( $\gamma_{51} = .07$ ,  $t(1173) = 2.70$ ,  $p < .01$ ), however the decrease in locus of control due to hassles was significantly different from zero for both partners.

### **HYPOTHESIS 3: MODERATION BY TRAIT-LEVEL LOCUS OF CONTROL**

Using a multilevel model similar to that used to test hypothesis two, I examined Hypothesis 3: Individual's trait-level locus of control (as measured by Levenson's Internal Subscale) will moderate the extent to which daily hassles and anxiety influence an individual's daily sense of control.

The analysis was identical to the one described for H2, however trait internal locus of control was included as a main effect as well as interacted with anxiety and hassles. Again the within-individual level of the analysis allowed each individual's assessment of their sense of control on a given day to be modeled as a function of that individual's reported hassles and anxiety from that same day while controlling for the previous day's sense of control, hassles, and anxiety. The between-individual level of the analyses again adjusted for pregnancy status; all predictor variables were interacted with effect-coded pregnancy status (-.5 = not pregnant, .5 = pregnant), which allows all coefficients to be interpreted as an average across pregnancy status. In addition, the level two equations for anxiety and hassles included grand mean centered trait locus of control as a potential moderator of their level one effects. The model accounted for the fact that the data are dependent due to the nesting of persons across time and within couple. The within-individual equation was identical to that of hypothesis two, but the between-individual equation for anxiety and hassles changed:

$$b_{4ij} = \gamma_{40} + \gamma_{41}P_{ij} + \gamma_{42}T_{ij} + \gamma_{43}P_{ij}T_{ij} + u_{0ij}$$

$$b_{5ij} = \gamma_{50} + \gamma_{51}P_{ij} + \gamma_{52}T_{ij} + \gamma_{53}P_{ij}T_{ij} + u_{0ij}$$

Table 4 presents the results from this model which mirror those from the previous model. The intercept indicates that the mean of daily locus of control (on a 0 to 4 scale) on the first day of the study which is a weekday is equal to 2.91,  $t(98) = 39.98$ ,  $p < .001$ , for a hypothetical person whose own same-day anxiety and hassles were at their average level, whose trait-level locus of control was at the average level for the sample, and whose previous day's locus of control was at its average level. Daily locus of control was

affected by the previous day's locus of control,  $\gamma_{30} = -0.29$ ,  $t(1440) = -14.34$ ,  $p < .001$ , such that individuals who are higher than their average for yesterday's level of control are lower in daily locus of control for the current day. The more hassles an individual reported on a particular day the lower their locus of control for that same day,  $\gamma_{50} = -0.13$ ,  $t(46) = -8.96$ ,  $p < .001$ . Likewise, the more anxiety an individual reported on a particular day the lower their locus of control for that same day,  $\gamma_{40} = -0.26$ ,  $t(45) = -8.44$ ,  $p < .001$ . Daily locus of control was affected by one's trait-level locus of control,  $\gamma_{60} = 0.03$ ,  $t(257) = 4.39$ ,  $p < .001$ , such that for an individual with a higher than average trait-level internal locus of control, their daily mean locus of control was higher than average. Pregnancy moderated the effects of both anxiety and hassles on daily locus of control. Again, pregnant women experienced more of a decrease in daily locus of control when they experienced hassles as compared with their non-pregnant partners ( $\gamma_{51} = -0.13$ ,  $t(46) = -8.96$ ,  $p < .001$ ). Similarly, pregnant women experienced more of a decrease in daily locus of control when they reported more anxiety as compared with their non-pregnant partners ( $\gamma_{41} = -0.25$ ,  $t(45) = -8.44$ ,  $p < .001$ ).

The interactions between anxiety and trait-level locus of control,  $\gamma_{42} = .00$ ,  $t(189) = .01$ ,  $p = .99$  and between daily hassles and trait-level locus of control were essentially equal to zero,  $\gamma_{52} = .00$ ,  $t(192) = .07$ ,  $p = .95$ . There was, however, a significant three-way interaction between pregnancy, trait-level locus of control, and daily hassles ( $\gamma_{53} = 0.016$ ,  $t(272) = 3.14$ ,  $p < .01$  indicating that pregnant and non-pregnant partners differ in how hassles affect their daily anxiety when they are high or low in trait-level locus of control. However neither of the coefficients for the interactions between hassles and

trait-level locus of control are significantly different from zero. Therefore the three-way interaction is not interpretable.

## Discussion

When we consider the influence that an individual's locus of control has on one's health and well-being, it seems that understanding how and to what extent one's locus of control shifts is of great importance. Researchers have primarily been concerned with the predictive value of control constructs when defining them as enduring traits. Social learning theory suggests this may be a fallacy. The current study and recent research concerning personal control and the transition to parenthood suggests that control is, indeed, composed of both stable and malleable components (Keeton, Perry-Jenkins, & Sayer, 2008). This finding is important because, as the authors contend, most researchers base measures of control on one-time assessments used to predict subsequent outcomes. Given these findings, it seems careful interpretation of such measures is necessary to determine whether the assessment is a reflection of an individual's enduring trait or the result of some temporary environmental circumstance. Importantly, this potential malleability holds promise for development of interventions aimed at shifting trait-level locus of control. The current paper proposed that locus of control is a complex characteristic in that it should not only behave at the trait level, as is well-established in the literature, but given the challenges and stressors of everyday life, it should exhibit variation at the state-level. In order to establish and better understand the extent to which locus of control operates as a state level characteristic, it was necessary to establish daily variability. In order to establish this variation, the mean within-person standard deviation was computed for daily locus of control as well as for anxiety, depression, anger, and relationship closeness. The comparison of these means revealed that locus of control

exhibited comparable variation to those constructs in which daily variation is well-established in the literature suggesting daily variability in locus of control.

The current study also examined the association between an individual's daily locus of control and one's daily reports of anxiety as well as of hassles experienced daily. Multilevel models were used to determine this co-variation. Daily control was modeled as a function of anxiety and hassles while controlling for the previous day's locus of control. The between-individual level of analysis adjusted for pregnancy effects. Analyses revealed significant associations between daily locus of control and same day anxiety and hassles. As expected, the more anxiety an individual reported on a particular day, the less in control they felt on that same day. The same was true for reported hassles. The more hassles an individual reported on a particular day the lower their sense of control for that same day. This last effect was moderated by pregnancy status. Analysis revealed that pregnant women experienced more of a decrease in their sense of control given daily hassles as compared with their non-pregnant partners. This finding was not surprising given the pregnant partner's already burdened state. This reactive effect due to pregnancy possibly reflects both the physical burden of carrying a child as well as the saliency of the impending birth.

Finally, the current study examined the extent to which an individual's trait-level of internal locus of control moderated the effects of daily anxiety and hassles on one's daily sense of control. A similar multilevel model to that of the previous question was used. The between-individual level of this model included trait-level locus of control as a potential moderator of the main effects of anxiety and hassles on daily sense of control.

These findings generally mirrored those from the previous analysis. Not surprisingly, trait-level locus of control does play a role in daily sense of control in that those with a more internal trait-level locus of control have a higher daily mean locus of control.

Given the extent to which locus of control has been studied and the predictive value that has been well-established, the current study has broad implications for understanding locus of control as a state-level variable. The findings showing daily variability support the idea that measuring control at one time point provides an incomplete assessment of an individual's locus of control. Therefore, careful interpretation of research-to-date concerning locus of control is necessary. Numerous theories, particularly those developed to understand health behaviors and the subsequent outcomes, are structured such that locus of control is considered at the trait-level. Ignoring the state-level component of control could prove problematic. Since there is well-established predictive value in one's trait-level of control it seems likely that there is predictive value in either state-level locus of control or in the extent to which one experiences variability.

Though directionality has not been established, findings suggesting co-variation between one's daily sense of control and their reported hassles and anxiety for that same day suggest that either these variables influence daily feelings of control or that daily feelings of control influence the way we experience daily hassles and stressors. When considering locus of control through the lens of social learning theory, it seems reasonable that one's general sense of control develops based on contingency experiences. However, looking through this same lens, it is unclear as to why the



literature has established locus of control as an enduring trait. Taken together, the daily variability and co-variation with daily hassles and stressors found in these data suggest, at the very least, malleability of the construct. Additionally, the potential for reciprocal influence of experiences and locus of control suggests an ongoing developmental process in which interventions could prove to have important influence on overall well-being.

### **STRENGTHS AND LIMITATIONS OF CURRENT STUDY**

The longitudinal, daily diary structure of this study was the first to investigate how an individual's sense of control fluctuates on a daily basis, providing a more accurate account of how locus of control operates given daily anxiety and hassles within the larger context of a major life stressor (transition to parenthood). In addition to the unique contribution this work makes to the field, there are several strengths in methodology and design that support the findings. The electronic method of data collection enabled participants to engage in the diary process at more convenient times and in more convenient locations than traditional paper methods. This technology provided more accurate data collection for several reasons. First, the ease of completing evening diaries likely resulted in greater compliance. Second, the diary became available each evening for a period of six hours and electronically stamped each entry with time and date. Finally, once the device was returned to the research lab, data were uploaded to the server electronically limiting potential human error.

Importantly, this diary method provided considerable data points for within-person analyses. Because the sample consisted of couples, the multilevel models

controlled for dependency of persons both within-couples and across time. The within-person analyses were used to examine the association between daily control, hassles, and anxiety. The multilevel models approach provided estimations of these associations while controlling for potential influence from other variables. For instance, I could estimate the association between daily changes in locus of control and reported hassles and anxiety while controlling for yesterday's sense of control and weekend effects on mood. Though anxiety measured subjective feelings, daily hassles were assessed using a checklist of common, everyday hassles and stressors which provided an estimate of each person's exposure to these events independent of their subjective ratings of the negativity of these events. This format helps limit the possibility of this general, subjective negativity influencing the results. Finally, controlling for yesterday's report of the outcome variable (daily control) means that residualized change is being assessed. This allowed for examination of daily patterns of these associations independent of the individual's experiences from the previous day.

Although there are several strengths of the current study, there are several factors that limit the interpretation of the current results. First, the data reported are correlational, and thus I am unable to make strong causal inferences. Although a strength of this work is the checklist by which hassles are measured (eliminating negative subjectivity associated with these events), these data cannot rule out the possibility that an individual's sense of control may frame whether or not everyday events are interpreted as bothersome. Next, this homogeneous sample of couples expecting their first child limits the extent to which I can generalize the findings. It may be that for women in their third

trimester of pregnancy, the burden of carrying a baby and the stress associated with an impending birth influence control and the associated variables differentially than for non-pregnant women. However, given the absence of a comparison group of non-pregnant women, these data do not allow for determination of whether pregnancy actually matters. Finally, given my population of interest and the recruitment method employed, our sample size is modest and is at risk of a self-selection bias.

### **DIRECTIONS FOR FUTURE RESEARCH**

Given these findings, it seems important to more thoroughly investigate locus of control at the state level and not just as a stable trait. Future research should investigate the potential mechanisms that both influence and are influenced by one's daily sense of control. Because major life events usually involve important others, investigating the role of this intrapersonal characteristic within important interpersonal processes, such as support interactions and conflict resolution, will provide better insight as to how one's locus of control operates within these contexts. The current research is part of a larger study investigating the support process within couples as they transition to parenthood. In addition to measuring support transactions on a daily basis, we measure health behaviors and negative health symptoms as well as relationship closeness. Preliminary analyses suggest that the experience of health symptoms is influenced by one's daily locus of control. Additionally, these analyses suggest that this sense of control may influence how we feel about our close relationships.

Establishing the extent to which one's more trait-level locus of control is malleable, based on major life events, is an important next-step. A second wave of data will assess individual's trait-level locus of control using the same measure found in the initial background survey. A pre- to post- measure of locus of control given a major life stressor in addition to the previously mentioned variables will better inform us as to the potential mechanisms involved in change.

## **Conclusion**

The concept of control has been one of the most enduring ideas in behavioral research and theory. Personal control is a well-established and important predictor of health and well-being and as such, researchers have been concerned with the effects one's orientation of control has on these outcomes and various life events. Although conceptualized, measured, and discussed as a stable trait, social learning theory suggests that locus of control may fluctuate given an individual's experiences. Indeed, the current study extends previous work by establishing daily variation in our measure of control. This potential for change in personal control holds implications for the health and well-being of individuals facing major life transitions and the associated stressors. Understanding the potential for inaccurate assessment of an individual's trait-level locus of control provided a one-time measurement in the presence of everyday anxiety and hassles is important in the development of interventions. Importantly, programs aimed at promoting health and well-being, built within the traditional theoretical frameworks of health behaviors that address locus of control at the trait-level may prove more effective once a better understanding of the state-level influences has been established. Because having a sense of control tends to increase an individual's coping skills (ie., less avoidance, more problem-focused, and greater support seeking) (Arslan, Dilmac, & Hamarta, 2009), it stands to reason that cognitive interventions aimed at restructuring perceptions of control would be an appropriate, cost-effective method for minimizing the negative effects of such transitions.

## Appendix

Table 1

*Means and Standard Deviations*

|                                  | <u>Pregnant</u> | <u>Non-pregnant</u> |
|----------------------------------|-----------------|---------------------|
| Trait-level Internal Orientation |                 |                     |
| <i>M</i>                         | 36.68           | 36.70               |
| <i>SD</i>                        | 4.84            | 5.22                |
| Relationship Satisfaction        |                 |                     |
| <i>M</i>                         | 73.18*          | 70.68*              |
| <i>SD</i>                        | 7.54            | 8.29                |
| Average Daily Personal Control   |                 |                     |
| <i>M</i>                         | 2.82            | 2.98                |
| <i>SD</i>                        | .79             | .78                 |
| Average Daily Hassles            |                 |                     |
| <i>M</i>                         | .93             | 1.19                |
| <i>SD</i>                        | 1.10            | 1.39                |
| Average Daily Anxiety            |                 |                     |
| <i>M</i>                         | .67             | .66                 |
| <i>SD</i>                        | .76             | .74                 |

*Note:* Trait-level Internal scores could range from 8 to 48. Relationship Satisfaction scores could range from 0 to 81. Average Daily Personal Control scores could range from 0 to 4. Average Daily Hassles could range from 0-8. Average Daily Anxiety scores could range from 0 to 4.

\*  $p < .05$ .

Table 2

*Comparison of mean within-person standard deviations: how much individuals tended to vary across the course of the study. For instance a within-person SD of zero indicates that an individual reported the same level of that variable on every day of the diary period.*

|                        | <i># of<br/>Items in<br/>Scale</i> | <i>Mean<br/>Variability</i> | <i>SD</i> | <i>Minimum<br/>Variability</i> | <i>Maximum<br/>Variability</i> |
|------------------------|------------------------------------|-----------------------------|-----------|--------------------------------|--------------------------------|
| Anxiety                | 3                                  | 0.545                       | 0.267     | 0                              | 1.152                          |
| Depression             | 3                                  | 0.415                       | 0.289     | 0                              | 1.087                          |
| Anger                  | 3                                  | 0.472                       | 0.297     | 0                              | 1.175                          |
| Relationship Closeness | 4                                  | 0.609                       | 0.240     | 0.127                          | 1.296                          |
| Locus of Control       | 3                                  | 0.500                       | 0.189     | 0.174                          | 1.038                          |

Table 3

*Effects of Daily Hassles and Anxiety on Daily Locus of Control: Multilevel Models Results (N=58)*

|  | <i>Daily Locus of Control</i> |           |          |          |
|--|-------------------------------|-----------|----------|----------|
|  | <i>Effect</i>                 | <i>SE</i> | <i>t</i> | <i>p</i> |
| Intercept                                | 2.918**                       | 0.073     | 39.37    | .001     |
| Day                                      | -0.005                        | 0.004     | - 1.34   | .183     |
| Weekend                                  | 0.066*                        | 0.026     | 2.50     | .013     |
| Yesterday's Locus of Control             | -0.298**                      | 0.020     | - 14.93  | .001     |
| Hassles                                  | -0.127**                      | 0.016     | - 8.02   | .001     |
| Anxiety                                  | -0.253**                      | 0.030     | - 8.49   | .001     |
| Pregnancy                                | 0.040                         | 0.106     | 0.38     | .707     |
| Day x Pregnancy                          | 0.013                         | 0.009     | 1.45     | .147     |
| Weekend x Pregnancy                      | 0.038                         | 0.057     | 0.68     | .499     |
| Yesterday's Locus of Control x Pregnancy | -0.001                        | 0.040     | - 0.03   | .979     |
| Hassles x Pregnancy                      | 0.066*                        | 0.025     | 2.70     | .007     |
| Anxiety x Pregnancy                      | 0.071                         | 0.044     | 1.62     | .105     |

*Note: df varied based on Satterwaithe prediction. df ranged from 43 to 1603.*

*\* p < .05, \*\*p < .001.*



Table 4

*Effects of Daily Hassles and Anxiety on Daily Locus of Control as Moderated by Trait-Level Internal Locus of Control: Multilevel Models Results (N=58)*

|   | <i>Daily Locus of Control</i> |           |          |          |
|---|-------------------------------|-----------|----------|----------|
|   | <i>Effect</i>                 | <i>SE</i> | <i>t</i> | <i>p</i> |
| Intercept                                   | 2.913**                       | 0.073     | 39.98    | .001     |
| Day   | -0.005                        | 0.004     | - 1.39   | .165     |
| Weekend                                     | 0.065*                        | 0.026     | 2.49     | .013     |
| Yesterday's Locus of Control                | -0.287**                      | 0.020     | - 14.34  | .001     |
| Hassles                                     | -0.134**                      | 0.015     | - 8.96   | .001     |
| Anxiety                                     | -0.259**                      | 0.031     | - 8.44   | .001     |
| Trait Internal Locus of Control             | 0.033**                       | 0.007     | 4.39     | .001     |
| Anxiety x Trait Internal Locus of Control   | 0.000                         | 0.005     | 0.01     | .995     |
| Hassles x Trait Internal Locus of Control   | 0.000                         | 0.003     | 0.07     | .947     |
| Pregnancy                                   | 0.035                         | 0.102     | 0.35     | .730     |
| Day x Pregnancy                             | 0.011                         | 0.008     | 1.38     | .168     |
| Weekend x Pregnancy                         | 0.024                         | 0.057     | 0.42     | .676     |
| Yesterday's Locus of Control x Pregnancy    | 0.002                         | 0.041     | 0.05     | .957     |
| Hassles x Pregnancy                         | 0.080*                        | 0.025     | 3.22     | .001     |
| Anxiety x Pregnancy                         | 0.092*                        | 0.045     | 2.05     | .041     |
| Trait Internal Locus of Control x Pregnancy | -0.034*                       | 0.014     | - 2.41   | .017     |
| Anxiety x Trait x Pregnancy                 | 0.011                         | 0.010     | 1.15     | .251     |
| Hassles x Trait x Pregnancy                 | 0.016*                        | 0.005     | 3.14     | .002     |

*Note: df varied based on Satterwaithe prediction. df ranged from 43 to 1603.*

*\*  $p < .05$ , \*\* $p < .001$ .*

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