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Insure against Negative Shocks?  
Psychological Evidence from Panel Data

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MELBOURNE INSTITUTE®  
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# **Can Having Internal Locus of Control Insure against Negative Shocks? Psychological Evidence from Panel Data\***

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## **Abstract**

We investigate whether the intensity of emotional pain following a negative shock is different across the distribution of a person's locus of control – the extent to which individuals believe that their actions can influence future outcomes. Using panel data from Australia, we show that individuals with strong internal locus of control are psychologically insured against becoming a victim of property crime and death of a close friend, but not against the majority of other life events. The buffering effects vary across gender. Our findings thus add to the existing literature on the benefits of internal locus of control.

**JEL classification:** D03, I19, J64

**Keywords:** Locus of control, resilience, well-being, happiness, HILDA

## 1. Introduction

A rapidly growing literature in economics is highlighting the importance of non-cognitive skills in determining economic choices and behaviors. The overall consensus among these studies is clear: Measures of non-cognitive skills such as the Big Five personality traits (conscientiousness, extraversion, openness to experience, emotional stability, and agreeableness), creativity, and self-esteem are important predictors of many successful educational and labor market outcomes, including highest completed education level, productivity in the labor market, retention rates, and wages (see, e.g., Barrick and Mount, 1991; Salgado, 1997; Bowles et al., 2001; Heckman et al., 2006; Heineck, 2011).

In this paper, we focus our attention on one specific non-cognitive skill: locus of control. Locus of control represents a person's generalized attitude, belief, or expectancy regarding the nature of the causal relationship between his/her behavior and its consequences (Rotter, 1966; Lefcourt, 1976). The distinction is typically made between "internal" locus of control – that is, the belief that much of what happens in life stems from one's own actions – and "external" locus of control – that is, the belief that events in one's life are outcomes of external factors (e.g., fate, luck, other people) and are therefore beyond one's control.

Empirical evidence that documents the benefits of internal locus of control is now becoming well established in the labor market literature (for a review, see Cobb-Clark, 2015). Studies in this area have shown that people who have internal locus of control tend to invest more in human capital accumulation than people with an external locus of control, because the former's expected return to human capital investment is higher (Coleman and DeLeire, 2003).<sup>1</sup> People with internal locus of control also tend to live a healthier lifestyle through healthier diets and exercise (Cobb-Clark et al., 2014), save more money for "rainy days" (Cobb-Clark et al., 2013), invest more time to stimulate cognitively their children (Lekfuangfu et al., 2014), and hold riskier assets (Salamanca et al., 2013). Another interesting and important property of internal locus of control is grit or perseverance in the face of adversity. For example, evidence is emerging that people who have internal locus of control tend to continue employment following a health shock (Schurer, 2014) and

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<sup>1</sup> One exception is a study by Cebi (2007), who does not find internal locus of control to be a significant predictor of educational attainment after cognitive ability is controlled for; however, she finds internal locus of control to be an important predictor of future wages.

search for a job more intensively when unemployed (Caliendo et al., 2015; McGee, 2015).

The current study contributes to the literature on locus of control by investigating whether an individual's belief about the ability to control future outcomes has important implications for the individual's psychological resilience against negative shocks. According to the world-leading scholar on resilience George Bonanno (2004), psychological resilience can be defined as the ability of individuals

in otherwise normal circumstances who are exposed to an isolated and potentially highly disruptive event such as the death of a close relation or a violent or a life-threatening situation to maintain relatively stable, healthy levels of psychological and physical functioning ... as well as the capacity for generative experiences and positive emotions. (pp. 20–21)

The potentials for humans' psychological resilience are important not only to psychologists but also to economists and judges. Knowledge of the extent to which people are psychologically insured against various adverse life events can, for example, improve the way that compensatory damages (or the level of compensation for a bad life event due to negligence) are calculated in the courts of law (Oswald and Powdthavee, 2008). It can also help improve the accuracy of many existing cost–benefit models that take into account people's subjective experiences (see, e.g., Kahneman and Sugden, 2005; Dolan and Kahneman, 2008).

However, although Bonanno and colleagues have been able to show that an average person is remarkably resilient across various adverse life events, including bereavement (Bonanno et al., 2002), sexual assault (Bonanno, 2013), and surviving a terror attack (Bonanno et al., 2005), more remains to be understood about the heterogeneity and the determinants of the heterogeneity that forms the average (Bonanno, 2005).

We hypothesize that people who hold a generalized belief that they are in control of their own future suffer less psychologically from a negative life shock than people who believe that they are unable to influence events affecting them. In other words, we believe that internal locus of control acts as a psychological buffer against many negative events that take place in our lives, including the death of a loved one and job loss. Using a unique longitudinal dataset from Australia, we are

able to show that many life events are detrimental to our life satisfaction and mental health. However, for some life events – for example, becoming seriously injured/ill or becoming a victim of physical violence – the negative effects associated with these life events are significantly smaller for individuals with a strong internal locus of control.

## **2. Background literature**

### *2.1. Psychological resilience and hedonic capital*

Over the last two decades, George Bonanno and his colleagues at the Loss, Trauma, and Emotion Lab have almost single-handedly dominated the field of research of people's propensity for psychological resilience (for a recent review of progress, see Southwick et al., 2014). One of their long-standing research agendas is to empirically establish factors – which may be genetic, epigenetic, developmental, demographic, cultural, economic, or social – that determine psychological resilience and explain why some groups of people may be more resilient than others.

The econometric evidence of individual differences among emotional responses to negative life events is well established. For example, using a latent growth mixture model as an empirical strategy to identify heterogeneity in long-term stress responses, Mancini et al. (2011) report that approximately 59% of the people in their German sample scarcely experienced any emotional loss to the death of a loved one (i.e., their life satisfaction remained relatively high pre- and post-loss), whereas approximately 21% experienced a significant drop in their life satisfaction and then a gradual improvement toward the pre-loss level. In Mancini et al.'s study, 71% of the sample did not report any significant changes in their life satisfaction at the year of divorce, and only 19% experienced a moderate decrease in their subjective well-being. Zhu et al. (2014), using the Health and Retirement Study survey, report that 72% of people experienced zero or minimal depression symptoms prior to, and following, chronic pain onset.<sup>2</sup>

What explains why some groups of individuals are more resilient than others? There is little economic theory in this area. One notable exception is Graham and Oswald (2010), who sketched out a theory in which psychological resilience is conceptualized as a byproduct of how much stock of hedonic capital the individual

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<sup>2</sup> For more evidence, see Galatzer-Levy and Bonanno (2013), Lotterman et al. (2014), and Orcutt et al. (2014).

has accumulated over the years. According to Graham and Oswald, the definition of hedonic capital may include

social relationships with partners, friends and colleagues; health ... self-esteem; status; and meaningful work. For some people, religious faith may also play a part. These things are stocks in that they rely on past inputs and are carried across time periods. (p. 373)

This implies that our ability to cope with stress and adversity is determined by the current level of our hedonic capital, which has since been shown to be empirically consistent across types of shocks and types of psychological resources, including the respondent's level of religiosity (Clark and Lelkes, 2005), personality traits (Boyce and Wood, 2011), and childhood experiences (Powdthavee, 2014).

## *2.2. Locus of control, beliefs, and coping strategy*

Conversely, psychologists explain evidence of heterogeneity in psychological resilience as an outcome of individual differences in the efficacy of regulatory strategies (Bonanno and Burton, 2013). Basically, this is the idea that preferences for various coping strategies tend to vary significantly among people and situations. Because some coping strategies have been shown to be more effective for some situations than others (Folkman and Moskowitz, 2004), individuals' decision on whether or not to invest in the more suitable strategies is therefore paramount to the rate of success in people's coping process. For example, in preparation for an examination, students are advised to engage in problem-focused coping prior to the exam, and to practice "distancing" themselves while waiting for their results (Folkman and Lazarus, 1985). By contrast, when dealing with bereavement, it may be more effective for the bereaved initially to adopt some palliative coping strategy to deal with the loss and then later to engage in a more instrumental coping strategy to deal with future plans (Stroebe and Schut, 2001).

One potential explanation for individual differences in people's choices of coping strategies is that there are individual differences in people's perceived locus of control, that is, the extent to which people believe that their actions can lead to the desired outcomes. A small literature in psychology shows that individuals with an internal locus of control tend to react to a problem in a more constructive manner than those with an external locus of control, such as actively looking for solutions rather than relying solely on emotional support (e.g., Butterfield, 1964; Pearlin and

Schooler, 1978; Gianakos, 2002; Ng et al., 2006). In situations amenable to change, persons with an internal locus of control have also been found to use more direct coping efforts and fewer attempts of suppression, whereas externally oriented persons show the reverse pattern (Parkes, 1984). In addition, there is evidence that people's expectations of self-control over their environment play a mediating role in their adaptation process and that individuals with internal locus of control are better adjusted than individuals with external locus of control (Benson and Deeter, 1992).

Given the evidence that individuals who have internal locus of control tend to be more proactive at finding solutions for their problems, it is likely that they will also search more intensively for the most effective coping strategies for a specific situation than individuals who are more external in their perceived locus of control. As a result, there is evidence that people with an internal locus of control tend to suffer less from severe psychiatric disorders (Lefcourt, 1976), particularly from chronic depression (Abramson et al., 1978) and post-traumatic stress disorder (Solomon et al., 1988), and that reported well-being is generally higher among people with a strong internal locus of control (Huebner, 1991; Menec and Chipperfield, 1997; Judge et al., 1998). However, given that previous studies in psychology tend to be based on small cross-sections of either students or employees working in specific firms, the extent of any heterogeneity in psychological resilience by locus-of-control type continues to be imperfectly understood. Our study aims to fill this research void by using a nationally representative dataset to estimate systematically the longitudinal relationship between locus of control and psychological resilience for various measures of subjective well-being and for various types of negative life events.

### **3. Data**

The data originates from 12 waves of the longitudinal Household Income and Labour Dynamics in Australia (HILDA) Survey and have been extracted using PanelWhiz (Hahn and Haisken-DeNew, 2013). A total of 7682 households participated in Wave 1, providing an initial sample of 19 914 persons (Wooden et al., 2002).<sup>3</sup> The members of these participating households form the basis of the panel pursued in subsequent annual survey waves. Interviews are conducted with all adults (defined as persons 15 years of age or older) who are members of the original sample and any other adults

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<sup>3</sup> For details on the top-up sample and the HILDA Survey in general, see Watson and Wooden (2013).

who, in later waves, are residing with an original sample member. Annual re-interview rates (the proportion of respondents from one wave who are successfully interviewed in the next wave) are reasonably high, rising from 87% in Wave 2 to over 96% by Wave 9 (see Watson and Wooden, 2012).

Our dependent variables originate from responses in every wave to (i) one question about overall life satisfaction and (ii) a series of questions about mental health (SF-36). The life satisfaction question reads: “All things considered, how satisfied are you with your life? Pick a number between 0 and 10 to indicate how satisfied you are.” A visual aid is used in the administration of these questions and involves a pictorial representation of the scale with the extreme points labeled “totally dissatisfied” and “totally satisfied.” The mental health questions ask individuals to report how they have been feeling during the past four weeks, including feelings of nervousness, feeling “down in the dumps that nothing could cheer you up,” feeling calm and peaceful, feeling down, and feeling happy. Responses to these questions are then used to form the mental health variable, with a scale that ranges from 0 “worst possible mental health” to 100 “best possible mental health.”

Other variables used in the analysis are asked in a consistent manner every year, with the exception of the locus-of-control variables (asked only in 2003, 2004, 2007, and 2011) and the Big Five personality traits (asked only in 2005, 2009, and 2013).<sup>4</sup>

To define locus of control, we follow Cobb-Clark and Schurer (2013) and use responses to seven questions, each of which is answered by a score ranging from 1 (strongly disagree) to 7 (strongly agree). The questions are: (1) I have little control over the things that happen to me; (2) There is really no way I can solve some of the problems I have; (3) There is little I can do to change many of the important things in my life; (4) I often feel helpless in dealing with the problems of life; (5) Sometimes I feel that I’m being pushed around in life; (6) What happens to me in the future mostly depends on me; and (7) I can do just about anything I really set my mind to do. We

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<sup>4</sup> To have the personality traits available for all years, we (linearly) extrapolate to cover the remaining periods using all available Big Five observations. In other words, respondents in 2003 and 2004 will have the values of the Big Five personality traits measured in 2005, and those in 2007 (2011) will have Big Five values between that reported in 2005 (2009) and 2009 (2013). If an individual has reported only two Big Five scores, for example for 2005 and 2009, then any period prior to 2005 (post-2009) will take on the Big Five score of 2005 (2009), with years between 2005 and 2009 taking on the interpolated Big Five scores of 2005 and 2009. Similarly, if an individual has only a single Big Five observation, then that level is assumed to apply for all years.

compute the locus-of-control score by adding the responses to questions 1 through 5, subtracting the scores from questions 6 and 7, and adding a constant of 16. Using this metric, the locus-of-control variable ranges between 7 (internal) and 49 (external). A similar index has been used in Andrisani (1977), Pearlin and Schooler (1978), Semykina and Linz (2007), and Caliendo et al. (2015). For ease of interpretation, we reverse these scores so that a higher value represents relatively more internal locus of control.

The negative life event variables are taken from responses to the self-completed life event questions, which are available from Wave 2 (2002) onward. In particular, we focus on the following negative life events that the individual may have experienced in the last 12 months:

- (i) Death of a close friend
- (ii) Death of close family members, including spouse and child
- (iii) Major worsening in finances
- (iv) Fired from job or made redundant
- (v) Serious injury/illness to family members
- (vi) Serious personal injury/illness
- (vii) Close family member detained in jail
- (viii) Victim of a property crime
- (ix) Separated from spouse
- (x) Victim of physical violence.

#### 4. Empirical strategy

Let us assume that there exists a well-being function of the form

$$r = h(f(n, n \cdot l, x, t) + e) \quad (1)$$

where  $r$  denotes some self-reported number or level of well-being collected in the survey. The  $f(\dots)$  function is the individual's true well-being and is observable only to the person asked;  $h(\cdot)$  is a non-differentiable function that relates actual to reported well-being;  $n$  is a vector of negative life events that either took place in the respondent's life or in that of his/her close friends or relatives;  $l$  is the respondent's locus of control;  $x$  represents a set of individual characteristics;  $t$  is time trend; and  $e$  is an error term that subsumes the respondent's inability to communicate accurately his/her well-being level. Here, one of the key assumptions is that negative life events significantly reduce the respondent's well-being, at least in the short run. However,

these negative effects are moderated by how much the respondents believe that they can influence their environment and influence the events affecting them. The empirical counterpart of (1) can be written out as

$$W_{it} = \alpha + \beta_0 l_{it} + \sum_{s=1}^{10} n_{sit} \beta_s + \sum_{s=1}^{10} (n_{sit} \times l_{it}) \gamma_s + x'_{it} \lambda + T_t + u_i + e_{it} \quad (2)$$

where  $W_{it}$  represents either life satisfaction or mental health of individual  $i$  at time  $t$ ;  $T_t$  is dummies for survey year (i.e., 2003, 2004, 2007, and 2011); and  $u_i$  is the unobserved individual fixed effects. The subscript  $s$  denotes a particular type of (negative) shock.

One issue with (2) is that locus of control,  $l_{it}$ , is potentially endogenous in the life satisfaction regression equation. According to Cobb-Cark and Schurer (2013), locus of control has been found to be most stable among working-age individuals and is mostly unrelated to changes in life events. However, Cobb-Cark and Schurer were unable to conclude that locus of control is completely time-invariant across the life cycle. Our own analysis also indicates that most within-person changes in locus of control occurred in Wave 11, which is a sample that was not used in Cobb-Clark and Schurer.<sup>5</sup> In addition, it is also possible that any observed relationship between changes in life satisfaction and changes in locus of control are due to both measures sharing common measurement errors over time rather than being causally related to each other.

In an attempt to solve part of this endogeneity problem, we first estimate the following locus-of-control regression equation on the unbalanced subsample of all working-age individuals (21 to 59 years old) who responded to the locus-of-control questions in at least two of waves 3, 4, 7, and 11 (“Sample 1”) while retaining almost the same set of explanatory variables used for (2)<sup>6</sup>

$$l_{it} = \delta + \sum_{s=1}^{10} n_{sit} \theta_s + x'_{it} \pi + T_t + \omega_i + \varepsilon_{it}. \quad (3)$$

From estimating (3), we are able to obtain the “individual fixed effects,”  $\omega_i$ , or the time-invariant locus of control that is orthogonal to changes in negative life events and the respondent’s socio-economic status. This individual specific constant, or fixed

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<sup>5</sup> We find that locus of control is significantly determined by changes in life events and socio-economic status when Wave 11 is included in the analysis. This is also the case for working-age individuals (25–59 years old); see Table 2A in the Appendix. We use the purged fixed effects ( $\omega_i$ ) obtained from (3) after running it on the full adult sample.

<sup>6</sup> The only main difference between the right-hand sides of (2) and (3) is the absence of locus of control and its interaction terms with negative life events.

effect, is then standardized and used in the estimation of (2) instead of the raw locus of control,  $l_{it}$ . A plot of the distribution of this standardized fixed effect  $\omega_i$  against its pooled raw data counterpart  $l_{it}$  can be seen in Fig. 1. Equation (2) thus becomes

$$W_{it} = \alpha + \beta_0 \omega_i + \sum_{s=1}^{10} n_{sit} \beta_s + \sum_{s=1}^{10} (n_{sit} \times \omega_i) \gamma_s + x'_{it} \lambda + T_t + u_i + e_{it} \quad (4)$$

where  $\omega_i$  is unexplained, person-specific locus of control obtained from estimating (3). We estimate (4) using a within estimator on the full sample of all working-age individuals across all waves 2–13 (“Sample 2”).<sup>7</sup> In doing this, we note that the  $\omega_i$  will drop out, but the interactions with the negative shocks will remain. Note also that  $COV(\omega_i, n_{sit}) = 0$  by design.

To aid the interpretation of the coefficients in our fully interacted model, we standardize both the outcome variable and the locus of control variable to have a mean of 0 and a standard deviation of 1. This implies that we can interpret the coefficient on a negative life event  $s$ ,  $\beta_s$ , as the well-being effect of this life event on respondents who have an average locus of control – that is, whose standardized locus of control is equal to 0 – and  $\beta_s + \gamma_s$  as the well-being effect of this life event on respondents whose standardized locus of control is one standard deviation above the mean.

All of our estimation is carried out using either a random-effects or a fixed-effects linear model with cluster-robust standard errors (clustered at the individual level) (Cameron and Miller, 2013). However, similar conclusions can be reached when a Conditional Logit estimator is used to estimate a model with a dichotomized well-being measure as the outcome variable (Ferrer-i-Carbonell and Frijters, 2004).

## 5. Results

Table 2 presents our first estimates from the random-effects and fixed-effects micro-econometric models of life satisfaction, with unexplained, person-specific locus of control shown on the right-hand side (i.e., the estimated  $\omega_i$  from (3)). The dependent variable is self-reported satisfaction with life as a whole (measured cardinally on the 0–10 scale). Exogenous variables consist of age, age squared, and a dummy for

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<sup>7</sup> Allowing for an extensive set of control variables, we have 29 242 observations (12 047 unique individuals) in Sample 1. In Sample 2 we are able to maintain 87 005 observations with the same number of individuals. Summary statistics of all variables used in the analysis can be found in Table 1A in the Appendix.

respondent's gender that appears in the random-effects regressions. Individual characteristics include log of real disposable personal income and dummies for current labor market status, marital status, highest completed education level, and homeownership status, self-assessed health, and total number of resident and non-resident children. We also include the Big Five personality traits (extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience), as well as their interactions with the negative life events, to allow for the possibility that the well-being effects of the negative life events on life satisfaction vary among people by different personality types rather than by different locus-of-control types.<sup>8</sup>

Column 1 of Table 2 presents a simple random-effects regression in which the only right-hand side variables are standardized locus of control, dummy variables representing the negative life events, and a set of exogenous control variables. Standardized locus of control, in which a positive deviation from the mean indicates a relatively more internalized person, and a negative deviation from the mean indicates a relatively more externalized person, enters the life satisfaction regression equation in a positive and statistically well-defined manner. This implies that individuals who are relatively more internalized in their perceived locus of control tend to report higher levels of life satisfaction than individuals who are relatively more externalized, consistent with previous findings in this area (Huebner, 1991; Menec and Chipperfield, 1997; Judge et al., 1998). The estimated partial correlation appears to be moderately sizeable for a variable in a life satisfaction regression model; a 1 standard deviation increase in locus of control is associated with an approximately 0.3 standard deviation increase in life satisfaction.

Regarding the negative life events that took place within the last twelve months, we can see that eight out of ten events (with the exceptions of death of close family members and close family member detained in jail) are negatively and statistically significantly related to life satisfaction. The ranking of the partial correlations between life satisfaction and negative life events is in the following order: major worsening in finance ( $-0.422$ ), separated from spouse ( $-0.272$ ), victim of physical violence ( $-0.241$ ), serious personal injury/illness ( $-0.179$ ), victim of a property crime ( $-0.084$ ), fired from job or made redundant ( $-0.049$ ), death of a

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<sup>8</sup> Although personality traits have generally been shown to be relatively stable over time (Cobb-Clark and Schurer, 2012), other studies have shown them to be powerful predictors of within-person changes in life satisfaction (Boyce et al., 2013).

close friend ( $-0.026$ ), close family member detained in jail ( $-0.018$ ), serious injury/illness to family members ( $-0.014$ ), and death of close family members ( $-0.001$ ).

Column 2 of Table 2 introduces the interaction terms between standardized locus of control and each of the ten negative life events as regressors in the random-effects regression equation. Of the ten interaction coefficients, only two (serious personal injury/illness and victim of a property crime) are positive and statistically significant at the conventional levels. This implies that the effects of these two life events on life satisfaction are significantly less negative for individuals who are relatively more internal in their perceived locus of control than the mean. Qualitatively similar results are obtained in Column 3 of Table 2 when we control for individual characteristics as well as the Big Five personality traits and their individual interaction terms with each of the negative life events.

Finally, in Column 4 of Table 2 we correct for any unobserved heterogeneity bias at the individual level, that is, the presence of  $u_i$ , by introducing individual fixed effects into the linear estimation of (2). Because locus of control is person-specific and time-invariant by design, it naturally drops out from the estimation.

We can see that the positive and statistically significant interaction effect between locus of control and “serious personal injury/illness” is statistically insignificantly different from zero after individual fixed effects have been accounted for in the regression model. Conversely, the interaction term for “victim of a property crime” continues to be positively and statistically significantly related to changes in life satisfaction. Column 4 estimates thus produce the following results for, for example, a person who had been a victim of a property crime in the last 12 months. Looking at the estimated coefficient on the main effect of being a victim of a property crime, we can see that its effect on life satisfaction for a person with an average locus of control is  $-0.062$  [ $S.E. = 0.013$ ]. However, for a person who is one standard deviation more internal in the perceived-locus-of-control scale than the average, the effect is approximately one half of the effect experienced by a person with an average locus of control at  $-0.062 + 0.037 = -0.025$  [ $S.E. = 0.018$ ].

In Table 3 we re-estimate the specifications of Table 2 with standardized mental health (SF-36) as the outcome variable. In the full specification model with individual fixed effects, we can see that nine out of ten life events (the exception

being close family members detained in jail) have negative and statistically important main effects on the respondent's mental health. However, it appears that the psychic costs for three life events (death of close friends, serious personal injury/illness, and close family member detained in jail) are statistically significantly moderated by internal locus of control. For example, the average well-being effect of losing a close friend is almost completely offset for a person who is one standard deviation more internal in the perceived-locus-of-control scale, that is,  $-0.033 + 0.025 = -0.007$  [*S. E.* = 0.013]. The estimated effects of various life events on both measures of subjective well-being for (i) a person with an average locus of control and (ii) a person whose locus of control is one standard deviation higher than the average are better illustrated in Fig. 2A and Fig. 2B in the Appendix.

Therefore, to summarize the results of Table 2 and Table 3, there is little evidence to suggest that internal locus of control acts as a psychological buffer against every type of negative life event.<sup>9</sup>

In Table 4 we test whether the results are qualitatively and quantitatively similar across genders. Looking across the columns, we can see that the main well-being effects from the majority of the ten life events are negative and statistically significant for both males and females.

With respect to life satisfaction, internal locus of control acts as psychological insurance against only one life event for men and against three life events for women. For men, the life event is being fired from a job or made redundant. For women, it appears that internal locus of control actually buffers the negative effects arising from becoming seriously injured or ill, having a close family member detained in jail, and becoming a victim of a property crime. Interestingly, for men, internal locus of control amplifies the negative well-being effect from having a close family member detained in jail. This would be consistent with males who have internal locus of control blaming themselves or feeling guilt or shame for not having prevented the incarceration of a close relative, whereas males who have external locus of control would consider the incarceration of the family member to be inevitable and so would not feel personal blame, shame, or guilt.

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<sup>9</sup> One natural objection is that people with external locus of control may drop out more frequently from the panel than people with internal locus of control. Nevertheless, we are able to show that qualitatively similar results can be obtained using a smaller, balanced panel sample across all waves (waves 2–12) (see Table 3A in the Appendix).

In terms of mental health, relatively more internalized women, but not men, are buffered psychologically from death of a close friend and major worsening in finances. This implies that, although the main effects of the life events are generally qualitatively similar across male and female subgroups, there is some noticeable heterogeneity by gender with respect to the extent in which internal locus of control moderates these negative effects.

A natural question of interest is whether adaptation to some negative life events is slow and incomplete for people who are more externalized than people who are more internalized in their perceived locus of control. We do this by expanding (2) to include leads and lags for each of the ten life events – two-year leads and two-year lags – and their interactions with the respondent’s locus of control. For practical purposes, we replace standardized locus of control with two dummy variables, which represent (i) people who are placed at the bottom 25% of the external–internal locus-of-control scale, that is, the strongly externalized, and (ii) people who are placed at the top 25% of the external–internal locus-of-control scale, that is, the strongly internalized. Doing this allows us to compare the well-being dynamics – measured before, during, and after the onset of each life event – between people with a strong external locus of control and people with a strong internal locus of control. We then estimate this new equation using the fixed-effects estimator on a sample in which at least five years of life satisfaction and mental health are consecutively observed (because of the need to go backward two periods and forward two periods). Our empirical strategy here is similar to that adopted by Clark et al. (2008), Frijters et al. (2011), and Powdthavee (2012). Given that the table produced a large number of coefficients, we choose to present only the graphical representations of the implied dynamic effects of each life event on life satisfaction and mental health for people at the different ends of locus-of-control distribution in Fig. 3 and Fig. 4, respectively.

Some interesting patterns emerge when we compare the well-being dynamics before and after each of the ten life events. For example, we can see a statistically significant drop beyond zero in life satisfaction at the year of reporting a major worsening in finances (and in mental health one year prior to reporting) for individuals with a strong external locus of control (i.e., the bottom 25% of external–internal locus-of-control scale), but not for those with a strong internal locus of control (i.e., the top 25% of external–internal locus-of-control scale). People with a strong external locus of control also experienced a significant dip into the negative in

both life satisfaction and mental health at the year of becoming seriously injured/ill and at the year of becoming a victim of physical violence, whereas the drops in well-being experienced by people with a strong internal locus of control are either not as negative or statistically insignificantly different from zero. Perhaps with one exception in the long-lasting effect of major worsening in finances on mental health, we did not find strong evidence to suggest that people with a strong external locus of control lack the ability to adapt to adverse life events over time.

However, we did find from conducting this exercise that, although we cannot reject in many cases the null hypothesis that the negative effects of adverse life events are the same across locus-of-control types, we can nevertheless reject the null hypothesis that the negative effect is statistically insignificantly different from zero more often for individuals with strong external locus of control than for individuals with strong internal locus of control.

## **6. Conclusions**

In this paper we set out to test the importance of internal locus of control (or self-efficacy) on people's subjective well-being in the face of adversity. Using unique longitudinal data for Australia, we initially show that individuals with internal locus of control are generally more satisfied with life and have better mental health than those with external locus of control. We are also able to present evidence that an onset of most of the selected negative life events is observed together with a significant dip in both measures of subjective well-being, particularly within 12 months of having experienced a major worsening in finances, becoming seriously injured/ill, separating from spouse, or becoming a victim of physical violence.

However, some evidence indicates that people who are more internal in their perceived locus of control tend to either suffer less from or be entirely indifferent to some negative life events than people who are more external in their perceived locus of control. The internal locus of control's capacity to buffer against shocks varies by gender, and its marginal benefit is more apparent for people with a strong internal locus of control. Our findings thus contribute to the rapidly expanding literature with new evidence of the benefits of internal locus of control and the importance of non-cognitive skills on people's lives in general.

One potential mechanism that may explain why internal locus of control acts as psychological insurance against some rather than all of the negative events in our

lives is sample selection. People with a strong internal locus of control may endogenously select themselves into some types of events that would normally be considered negative by normative standards. It is conceivable that people with a strong internal locus of control may spend more of their incomes on various risky investments than people with a strong external locus of control (see, e.g., Salamanca et al., 2013), which may lead to the former reporting the experience of “major worsening in finances” in the year of investment. However, the treatment effect on these individuals’ well-being is unlikely to be the same as for individuals who may not have selected themselves into experiencing major worsening in finances. Regarding other life events that are considerably more exogenous (e.g., becoming seriously injured or ill, or becoming a victim of physical violence), internal locus of control may work as a psychological buffer purely through attitude adjustment and/or better coping mechanisms, given the evidence in the psychology literature that people with a strong internal locus of control are more likely than people with a strong external locus of control to react to a problem by actively looking for solutions rather than relying solely on emotional support (e.g., Butterfield, 1964; Gianakos, 2002; Ng et al., 2006).

Although our results indicate some direct benefits to having a strong internal locus of control in the face of adversity (albeit perhaps significantly less than indicated in psychology studies), we still cannot rule out other potential explanations for our findings. For example, one alternative explanation is that people with a strong internal locus of control tend to invest early and more intensively in accumulations of human capital, health capital, and social capital than people within a strong external locus of control (see, e.g., Coleman and DeLeire, 2003; Cobb-Clark et al., 2014), and this may act as an indirect psychological insurance against future shocks. This would be more consistent with the idea of “hedonic capital,” or the theory that people with a large stock of psychological resources tend to be more resilient in general (Graham and Oswald, 2010; see also Powdthavee, 2014). In other words, it is possible that the moderation effects observed in our study are caused by long-run lagged impacts of early accumulations of these hedonic capitals rather than short-run contemporaneous impacts of internal locus of control, which has so far been our preferred interpretation of the estimated interaction effects.

Like most papers in social sciences, our study is not without significant limitations. A natural objection to our results will always be that internal locus of

control is not randomized across the sample. Although our fixed-effects estimation may have taken care of the unobserved person-specific characteristics that correlate simultaneously with internal locus of control and with being more psychologically resilient to some life events, we still do not know enough about what may have caused someone to be relatively more internal in their perceived locus of control in the first place. This is a difficult question to address, given that we are not able to influence people's locus of control through a randomized control trial (or to find an appropriate variable to instrument for locus of control) prior to them experiencing each of the ten studied life events. As a result, our estimates need to be treated with caution, and future research should return to studying the origins and the determinants of internal locus of control in a systematic way.

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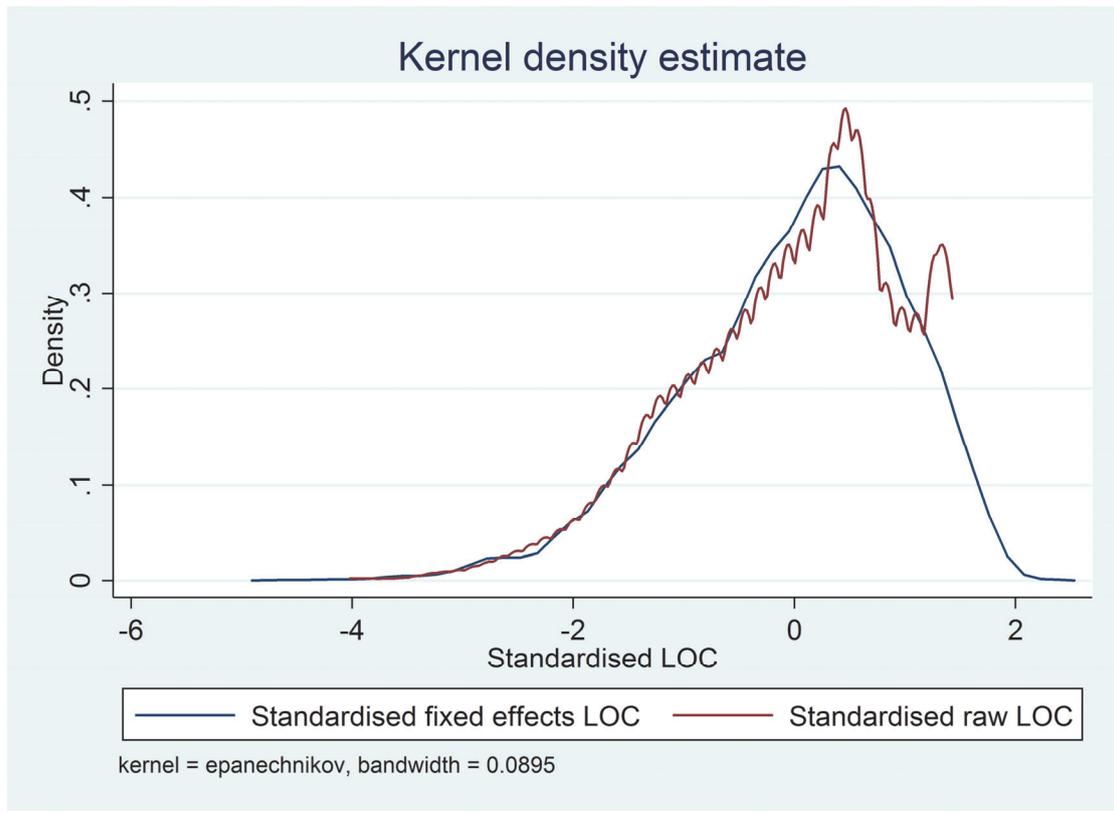
**Table 1: Descriptive statistics**

	<b>M</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Life satisfaction (raw score)	7.77	1.44	0	10
Mental health (raw score)	73.89	16.91	0	100
Locus of control (raw score) - Waves 3, 4, 7, & 11	38.06	7.66	7	49
<b>Negative life events</b>				
Death of a close friend	0.09	0.28	0	1
Death of close family members	0.10	0.30	0	1
Major worsening in finances	0.04	0.18	0	1
Fired or made redundant	0.04	0.19	0	1
Serious injury/illness to family members	0.16	0.37	0	1
Serious personal injury/illness	0.07	0.26	0	1
Close family member detained in jail	0.01	0.12	0	1
Victim of a property crime	0.05	0.21	0	1
Separated from spouse	0.04	0.20	0	1
Victim of physical violence	0.02	0.12	0	1
<b>Exogenous personal characteristics</b>				
Male	0.47	0.50	0	1
Age	40.31	10.61	21	59
Ln(real personal income)	10.44	0.85	0.07	13.52
<b>Current employment status</b>				
Employed Full-time	0.58	0.49	0	1
Employed: Part-time	0.22	0.41	0	1
Unemployed: Looking for full-time work	0.02	0.15	0	1
Unemployed: looking for part-time work	0.01	0.09	0	1
Not in the labour force, marginally attached	0.05	0.22	0	1
Not in the labour force, not marginally attached	0.12	0.32	0	1
Employed, but usual work hours are unstable	0.00	0.02	0	1
<b>Current marital status</b>				
Married	0.56	0.49	0	1
De facto	0.16	0.37	0	1
Separated	0.03	0.18	0	1
Divorced	0.06	0.24	0	1
Widowed	0.01	0.09	0	1
Never married and not de facto	0.17	0.38	0	1
<b>Current long-term health status</b>				
Long-term health impairment: Yes = 1	0.00	0.02	0	1
<b>Highest education level completed</b>				
Postgraduate degree	0.05	0.21	0	1
Graduate diploma/certificate	0.17	0.38	0	1
Bachelor honours	0.07	0.25	0	1
Advanced diploma, diploma	0.17	0.37	0	1
Cert III or IV	0.10	0.30	0	1
Year 12	0.23	0.42	0	1
Year 11 and below	0.15	0.35	0	1
<b>Current number of children</b>				
Non-resident children aged 0-4	0.01	0.12	0	4
Non-resident children aged 2-5	0.30	0.78	0	10

Non-resident children aged 6-14	0.05	0.31	0	6
Non-resident children aged 15-24	0.20	0.55	0	6
Resident children aged 0-4	0.25	0.57	0	4
Resident children aged 2-5	0.03	0.18	0	5
Resident children aged 6-14	0.49	0.86	0	7
Resident children aged 15-24	0.29	0.66	0	7
<b>Current homeownership status</b>				
Own home/paying mortgage	0.69	0.46	0	1
Rent or pay board	0.29	0.45	0	1
Involved in a rent-buy scheme	0.00	0.03	0	1
Live here rent free/free tenure	0.02	0.15	0	1
<b>Raw Big Five personality variables (extrapolated)</b>				
Agreeableness	5.40	0.88	1	7
Conscientiousness	5.10	0.99	1	7
Emotional stability	5.12	1.03	1	7
Extraversion	4.43	1.07	1	7
Openness to experience	4.27	1.03	1	7

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**Figure 1: A Kernel plot of the standardized locus of control distributions (fixed versus raw)**



**Table 2: Random effects and fixed effects life satisfaction regression equations  
with locus of control and negative life events as independent variables**

VARIABLES	RE (1)	RE (2)	RE (3)	FE (4)
<b>External-Internal scale</b>				
Standardized locus of control	0.293*** (0.007)	0.288*** (0.007)	0.233*** (0.007)	
<b>Negative life events</b>				
Death of a close friend	-0.026*** (0.010)	-0.026*** (0.010)	-0.024** (0.010)	-0.031*** (0.010)
Death of close family members	0.001 (0.008)	0.001 (0.008)	0.001 (0.008)	-0.000 (0.008)
Major worsening in finances	-0.422*** (0.022)	-0.409*** (0.023)	-0.352*** (0.022)	-0.317*** (0.023)
Fired or made redundant	-0.049*** (0.017)	-0.049*** (0.016)	-0.036** (0.016)	-0.016 (0.017)
Serious injury/illness to family members	-0.014* (0.007)	-0.013* (0.007)	-0.018** (0.007)	-0.014* (0.007)
Serious personal injury/illness	-0.179*** (0.012)	-0.173*** (0.012)	-0.147*** (0.012)	-0.135*** (0.012)
Close family member detained in jail	-0.018 (0.027)	-0.020 (0.027)	-0.013 (0.026)	-0.005 (0.027)
Victim of a property crime	-0.084*** (0.013)	-0.082*** (0.013)	-0.077*** (0.013)	-0.062*** (0.013)
Separated from spouse	-0.272*** (0.019)	-0.274*** (0.019)	-0.169*** (0.020)	-0.176*** (0.021)
Victim of physical violence	-0.241*** (0.032)	-0.233*** (0.031)	-0.222*** (0.033)	-0.201*** (0.034)
<b>Interaction terms</b>				
Death of a close friend × Standardized LOC		-0.004 (0.011)	0.008 (0.011)	0.007 (0.012)
Death of close family members × Standardized LOC		-0.010 (0.010)	-0.010 (0.010)	-0.008 (0.010)
Major worsening in finances × Standardized LOC		0.030 (0.020)	0.031 (0.020)	0.018 (0.021)
Fired or made redundant × Standardized LOC		0.016 (0.019)	0.014 (0.019)	0.011 (0.020)
Serious injury/illness to family members × Standardized LOC		0.007 (0.008)	0.010 (0.008)	0.006 (0.009)
Serious personal injury/illness × Standardized LOC		0.027** (0.013)	0.031** (0.013)	0.022 (0.014)
Close family member detained in jail × Standardized LOC		-0.029 (0.030)	-0.025 (0.030)	-0.011 (0.031)
Victim of a property crime × Standardized LOC		0.045*** (0.015)	0.046*** (0.016)	0.037** (0.016)
Separated from spouse × Standardized LOC		-0.026 (0.018)	-0.031 (0.019)	-0.032 (0.020)
Victim of physical violence × Standardized LOC		0.017 (0.030)	0.011 (0.031)	0.019 (0.031)
<b>Exogenous variables</b>				
Male	-0.085*** (0.012)	-0.085*** (0.012)	-0.011 (0.013)	
Age	-0.026*** (0.003)	-0.026*** (0.003)	-0.028*** (0.004)	-0.015** (0.006)
Age-squared/100	0.035*** (0.004)	0.035*** (0.004)	0.032*** (0.005)	0.016** (0.007)

Constant	0.513*** (0.066)	0.513*** (0.066)	0.666*** (0.096)	0.437*** (0.144)
Year dummies	Yes	Yes	Yes	Yes
Individual characteristics	No	No	Yes	Yes
Personality traits and their interactions with life events	No	No	Yes	Yes
Individual fixed effects	No	No	No	Yes
Observations	88,143	88,143	87,005	87,005
Within R-squared	0.024	0.024	0.040	0.042
Number of unique person	12,047	12,047	12,047	12,047

**Note:** \* $<10\%$ ; \*\* $<5\%$ ; \*\*\* $<1\%$ . RE = random effects model. FE = fixed effects model. Robust standard errors – clustered at the individual level – are reported. Life satisfaction is standardized so that it has zero mean and a standard deviation of one. Individual characteristics include log of real disposable personal income, dummies for current labor market status, marital status, highest completed education level, and homeownership status, self-assessed health, and total number of resident and non-resident children.

**Table 3: Random effects and fixed effects mental health regression equations  
with locus of control and negative life events as independent variables**

VARIABLES	RE (1)	RE (2)	RE (3)	FE (4)
<b>External-Internal scale</b>				
Standardized locus of control	0.392*** (0.007)	0.384*** (0.007)	0.291*** (0.006)	
<b>Negative life events</b>				
Death of a close friend	-0.043*** (0.009)	-0.041*** (0.009)	-0.039*** (0.009)	-0.033*** (0.009)
Death of close family members	-0.075*** (0.008)	-0.075*** (0.008)	-0.072*** (0.008)	-0.069*** (0.008)
Major worsening in finances	-0.380*** (0.019)	-0.369*** (0.019)	-0.318*** (0.019)	-0.287*** (0.020)
Fired or made redundant	-0.047*** (0.015)	-0.047*** (0.015)	-0.030** (0.015)	-0.025* (0.015)
Serious injury/illness to family members	-0.063*** (0.007)	-0.062*** (0.007)	-0.062*** (0.007)	-0.057*** (0.007)
Serious personal injury/illness	-0.221*** (0.012)	-0.216*** (0.012)	-0.182*** (0.011)	-0.165*** (0.012)
Close family member detained in jail	-0.053** (0.026)	-0.048* (0.026)	-0.038 (0.025)	-0.012 (0.026)
Victim of a property crime	-0.044*** (0.012)	-0.043*** (0.012)	-0.039*** (0.012)	-0.028** (0.012)
Separated from spouse	-0.265*** (0.017)	-0.265*** (0.016)	-0.219*** (0.017)	-0.214*** (0.017)
Victim of physical violence	-0.263*** (0.028)	-0.258*** (0.028)	-0.243*** (0.029)	-0.210*** (0.030)
<b>Interaction terms</b>				
Death of a close friend × Standardized LOC		0.019** (0.010)	0.029*** (0.010)	0.025** (0.011)
Death of close family members × Standardized LOC		0.002 (0.009)	0.000 (0.009)	0.002 (0.010)
Major worsening in finances × Standardized LOC		0.025 (0.016)	0.034** (0.017)	0.023 (0.017)
Fired or made redundant × Standardized LOC		-0.003 (0.015)	0.001 (0.015)	0.004 (0.016)
Serious injury/illness to family members × Standardized LOC		0.010 (0.007)	0.015** (0.008)	0.012 (0.008)
Serious personal injury/illness × Standardized LOC		0.022* (0.012)	0.025** (0.012)	0.022* (0.012)
Close family member detained in jail × Standardized LOC		0.037 (0.023)	0.048* (0.025)	0.051* (0.028)
Victim of a property crime × Standardized LOC		0.011 (0.012)	0.006 (0.013)	0.007 (0.013)
Separated from spouse × Standardized LOC		-0.002 (0.016)	0.007 (0.017)	0.002 (0.017)
Victim of physical violence × Standardized LOC		0.009 (0.026)	-0.009 (0.028)	-0.010 (0.029)
<b>Exogenous variables</b>				
Male	0.094*** (0.012)	0.094*** (0.012)	0.124*** (0.012)	
Age	-0.002 (0.003)	-0.001 (0.003)	-0.007* (0.004)	0.002 (0.005)
Age-squared/100	0.011*** (0.004)	0.011*** (0.004)	0.016*** (0.005)	-0.000 (0.006)
Constant	-0.125**	-0.126**	0.116	0.135

	(0.061)	(0.061)	(0.085)	(0.131)
Year dummies	Yes	Yes	Yes	Yes
Individual characteristics	No	No	Yes	Yes
Personality traits and their interactions with life events	No	No	Yes	Yes
Individual fixed effects	No	No	No	Yes
Observations	87,876	87,876	86,741	86,741
Within R-squared	0.026	0.027	0.049	0.051
Number of unique person	12,046	12,046	12,046	12,046

**Note:** \* $<10\%$ ; \*\* $<5\%$ ; \*\*\* $<1\%$ . RE = random effects model. FE = fixed effects model. Robust standard errors – clustered at the individual level – are reported. Mental health (SF-36) is standardized so that it has zero mean and a standard deviation of one. Individual characteristics include log of real disposable personal income, dummies for current labor market status, marital status, highest completed education level, and homeownership status, self-assessed health, and total number of resident children.

**Figures 2A & 2B: The estimated effects of different life events on life satisfaction and mental health for working-age respondents, regression-corrected**

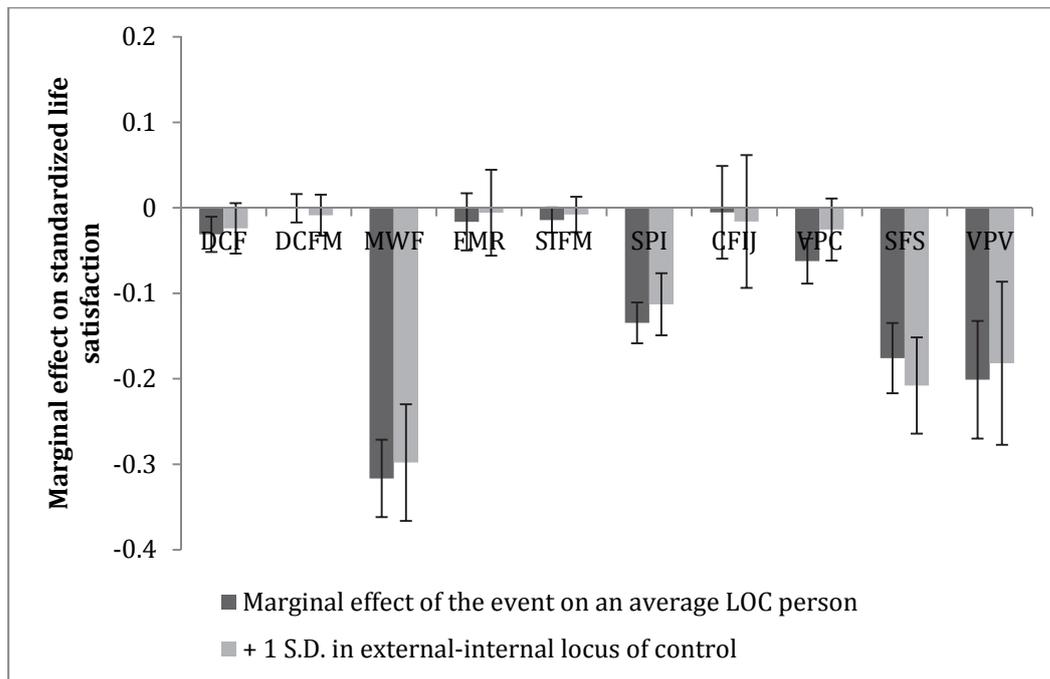


Fig.2A: Life satisfaction

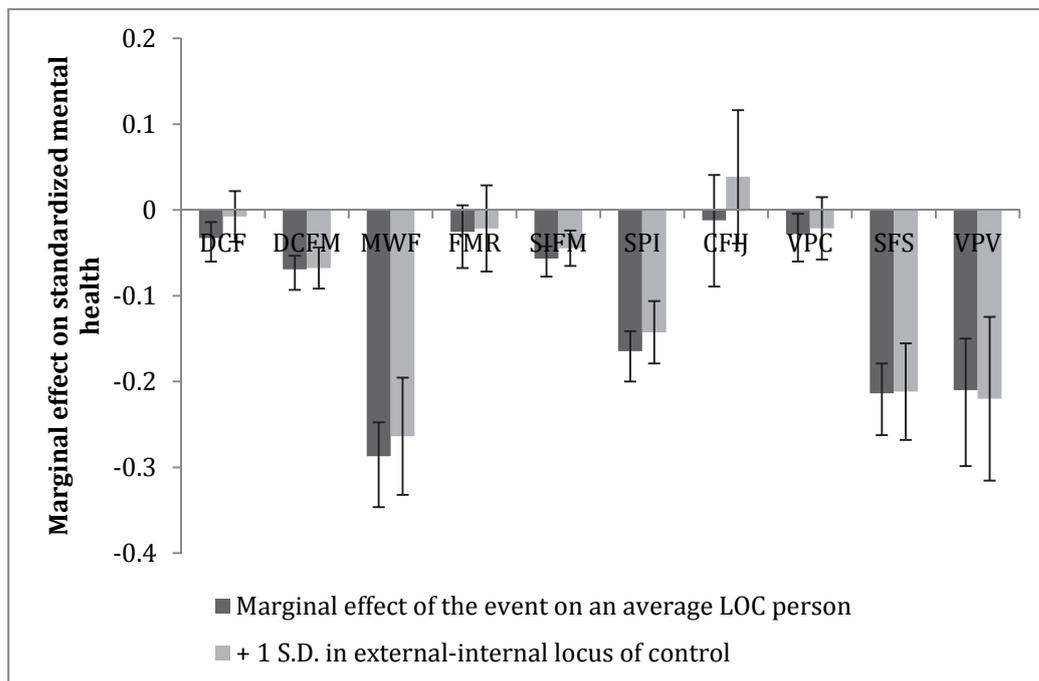


Fig.2B: Mental health

**Note:** 4-standard-error bands (95% C.I.) are reported: 2 above 2 below.

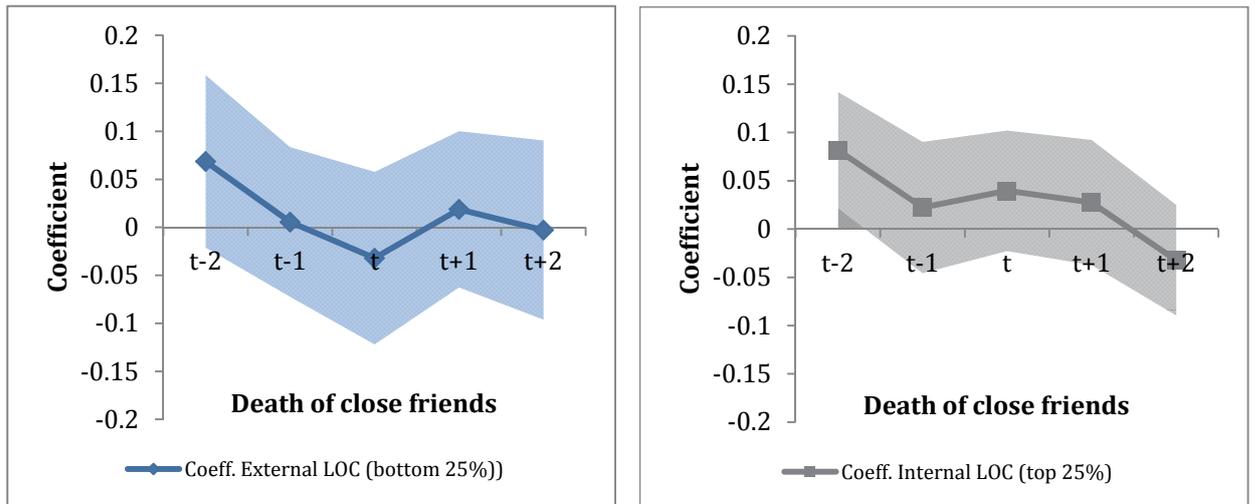
DCF = death of close friends, DCFM = death of close family members, including spouse and children, MWF = major worsening in finances, FMR = fired or made redundant, SFM = serious injury/illness to family members, SPI = serious personal injury/illness, CFIJ = close family member detained in jail, VPC = victim of a property crime, SFS = separated from spouse, VPV = victim of physical violence.

**Table 4: Fixed effects life satisfaction and mental health regression equations by gender**

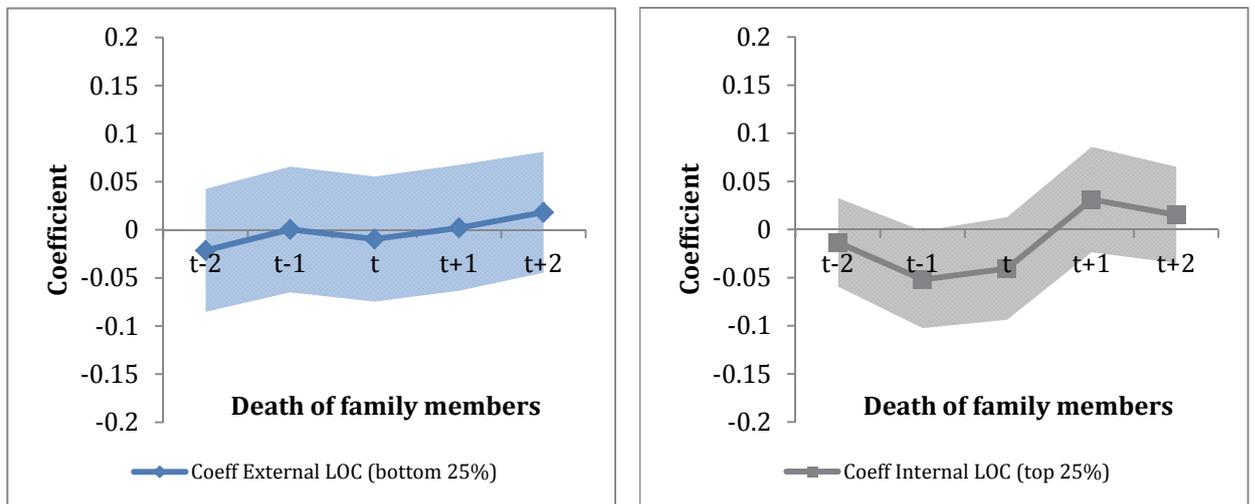
VARIABLES	Life satisfaction		Mental health	
	Females	Males	Females	Males
<b>Negative life events</b>				
Death of a close friend	-0.026 (0.017)	-0.032** (0.014)	-0.045*** (0.015)	-0.036*** (0.013)
Death of close family members	-0.010 (0.012)	-0.004 (0.012)	-0.087*** (0.012)	-0.058*** (0.012)
Major worsening in finances	-0.318*** (0.033)	-0.325*** (0.034)	-0.253*** (0.028)	-0.309*** (0.031)
Fired or made redundant	0.022 (0.027)	-0.033 (0.023)	-0.060** (0.026)	-0.010 (0.022)
Serious injury/illness to family members	-0.028*** (0.011)	-0.006 (0.011)	-0.069*** (0.011)	-0.045*** (0.011)
Serious personal injury/illness	-0.135*** (0.019)	-0.129*** (0.017)	-0.159*** (0.018)	-0.171*** (0.018)
Close family member detained in jail	-0.015 (0.034)	0.006 (0.051)	-0.020 (0.034)	-0.046 (0.047)
Victim of a property crime	-0.054*** (0.020)	-0.056*** (0.020)	-0.035* (0.019)	-0.011 (0.017)
Separated from spouse	-0.144*** (0.032)	-0.196*** (0.027)	-0.181*** (0.026)	-0.235*** (0.025)
Victim of physical violence	-0.185*** (0.051)	-0.182*** (0.048)	-0.242*** (0.044)	-0.159*** (0.047)
<b>Interaction terms</b>				
Death of a close friend × Standardized LOC	0.011 (0.016)	0.001 (0.017)	0.004 (0.014)	0.049*** (0.016)
Death of close family members × Standardized LOC	-0.014 (0.013)	-0.001 (0.015)	-0.012 (0.013)	0.017 (0.014)
Major worsening in finances × Standardized LOC	0.026 (0.028)	0.010 (0.031)	0.003 (0.024)	0.051** (0.025)
Fired or made redundant × Standardized LOC	0.059** (0.028)	-0.028 (0.027)	0.014 (0.022)	-0.010 (0.022)
Serious injury/illness to family members × Standardized LOC	0.011 (0.011)	-0.001 (0.014)	0.010 (0.011)	0.013 (0.012)
Serious personal injury/illness × Standardized LOC	0.006 (0.019)	0.041** (0.020)	0.018 (0.016)	0.026 (0.020)
Close family member detained in jail × Standardized LOC	-0.081** (0.039)	0.109** (0.045)	0.041 (0.034)	0.062 (0.045)
Victim of a property crime × Standardized LOC	0.018 (0.021)	0.055** (0.023)	0.008 (0.020)	0.003 (0.018)
Separated from spouse × Standardized LOC	-0.046 (0.029)	-0.013 (0.026)	0.000 (0.024)	-0.001 (0.024)
Victim of physical violence × Standardized LOC	0.016 (0.042)	0.017 (0.045)	-0.018 (0.037)	-0.010 (0.044)
<b>Exogenous variables</b>				
Age	-0.005 (0.009)	-0.025*** (0.008)	0.015** (0.008)	-0.015** (0.008)
Age-squared/100	0.005 (0.010)	0.027*** (0.010)	-0.012 (0.009)	0.015* (0.009)
Constant	0.369* (0.200)	0.403* (0.208)	-0.194 (0.181)	0.405** (0.191)
Year dummies	Yes	Yes	Yes	Yes
Individual characteristics	Yes	Yes	Yes	Yes
Personality traits and their interactions with life events	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes
Observations	46,460	40,545	46,333	40,408
Within R-squared	0.044	0.049	0.051	0.058
Number of unique person	6,367	5,680	6,367	5,679

**Note:** \* $<10\%$ ; \*\* $<5\%$ ; \*\*\* $<1\%$ . Robust standard errors – clustered at the individual level – are reported. Life satisfaction and mental health (SF-36) is standardized so that it has zero mean and a standard deviation of one. Individual characteristics include log of real disposable personal income, dummies for current labor market status, marital status, highest completed education level, and homeownership status, self-assessed health, and total number of resident children.

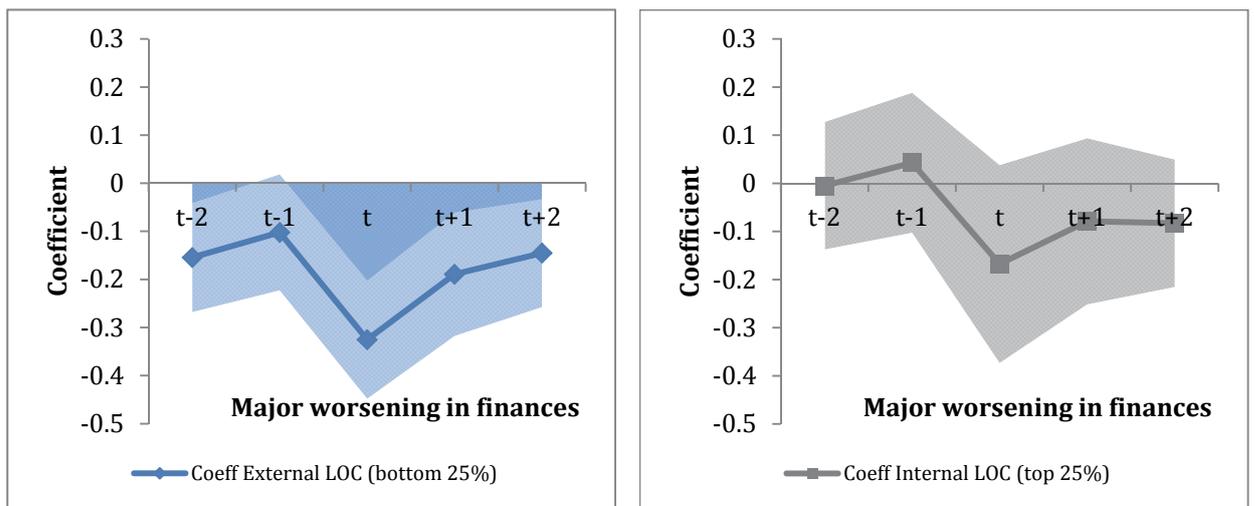
**Fig 3A-3J: Leads and lags in life satisfaction to negative life events by locus of control type**



*Fig 3A: Death of close friends*



*Fig 3B: Death of close family members, including spouse/child*



*Fig 3C: Major worsening in finances*

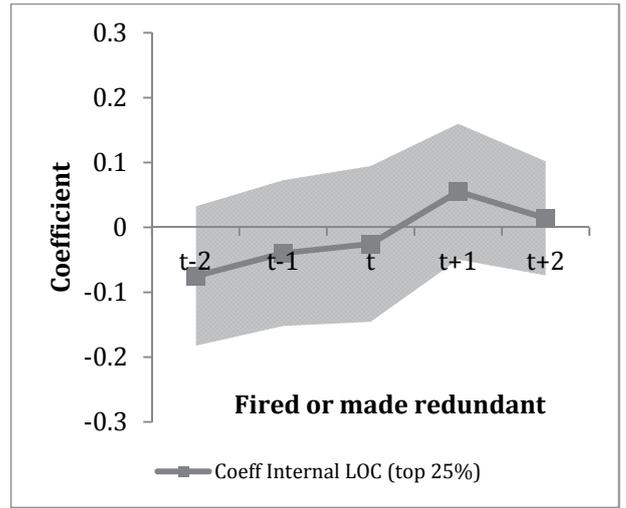
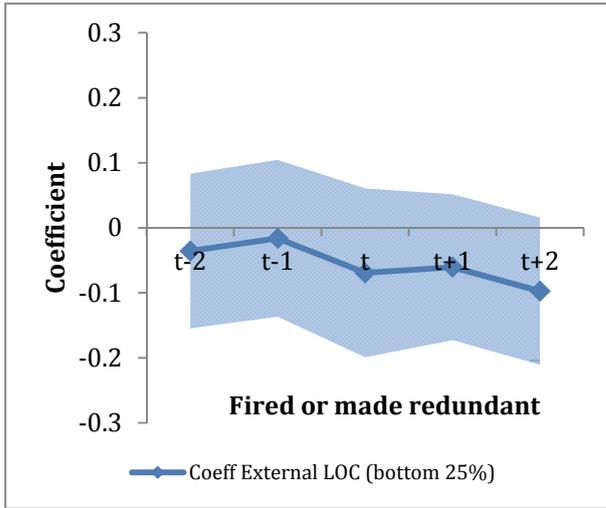


Fig 3D: Fired or made redundant

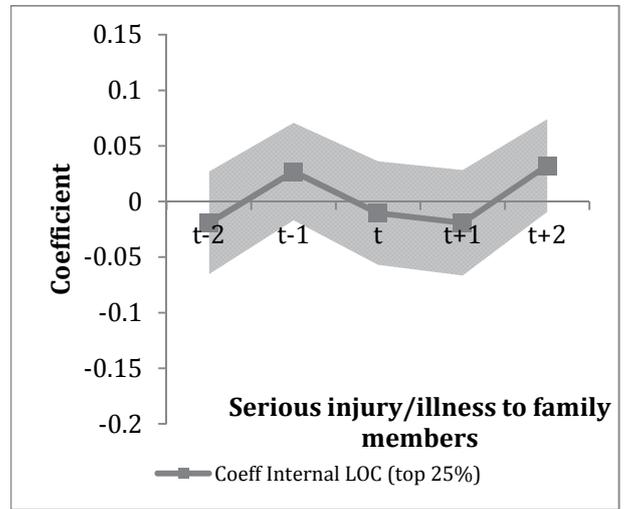
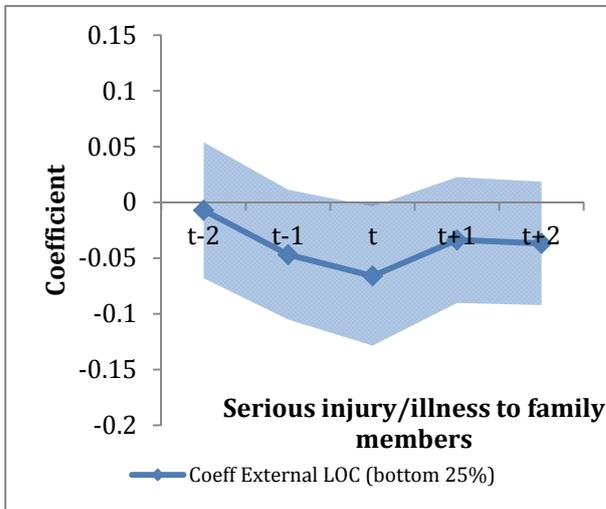


Fig 3E: Serious injury/illness to family

members

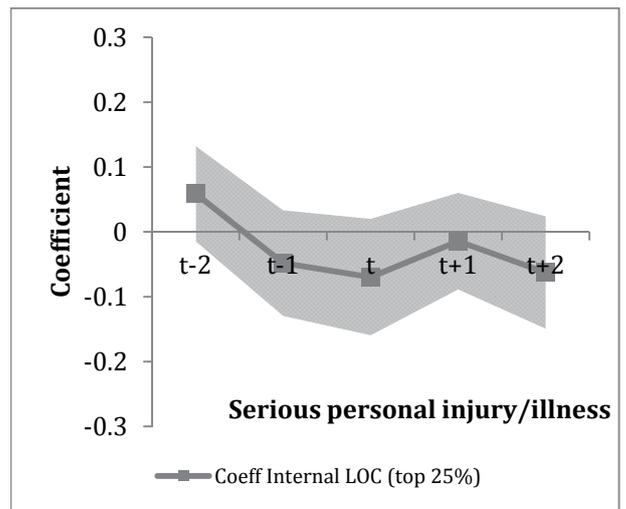
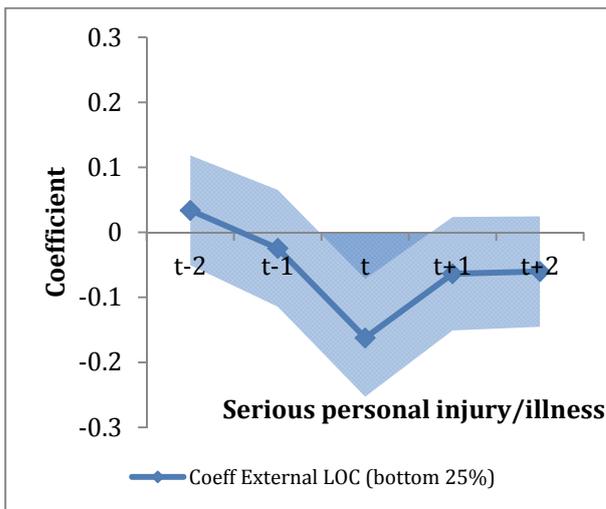


Fig 3F: Serious personal injury/illness

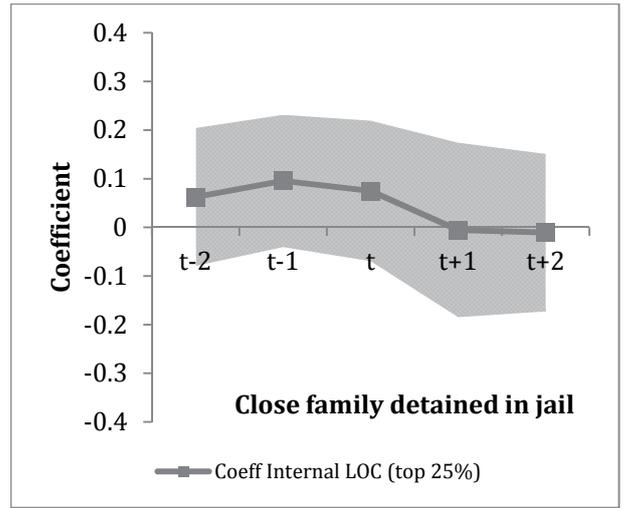
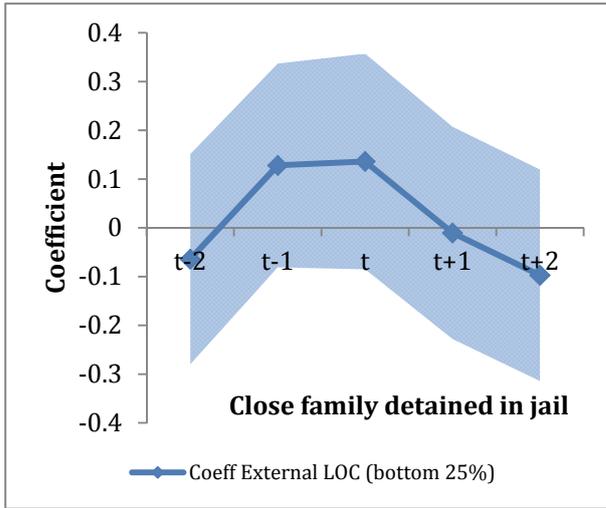


Fig 3G: Close family detained in jail

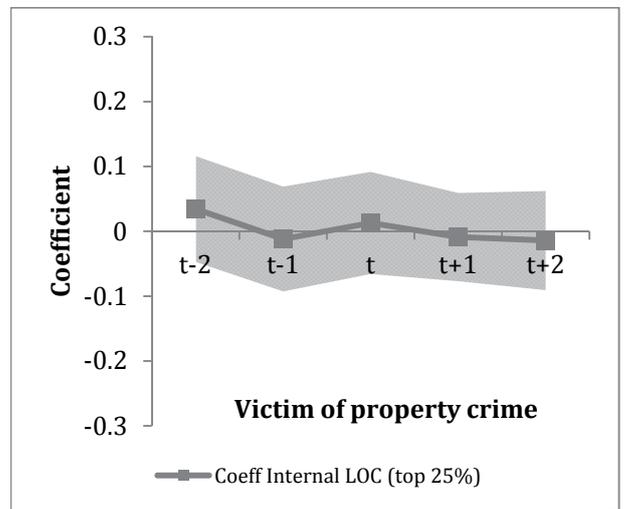
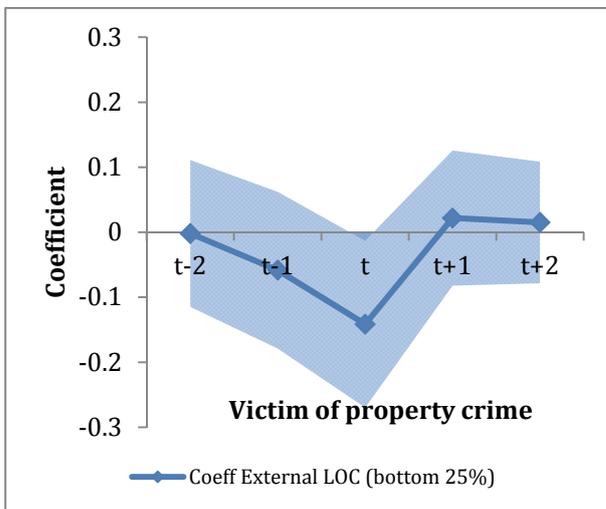


Fig 3H: Victim of property crime

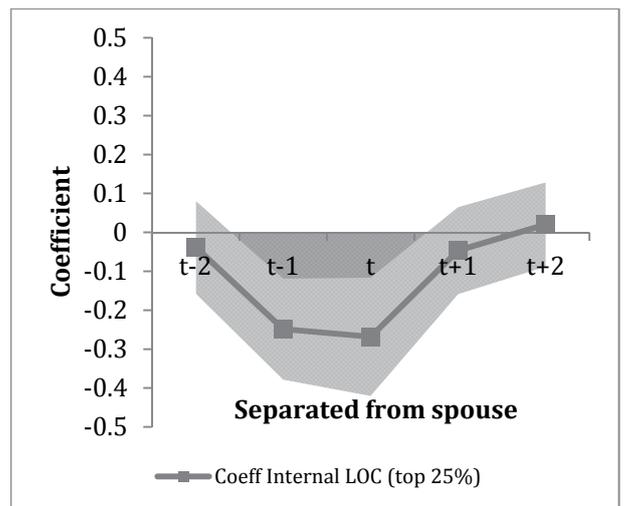
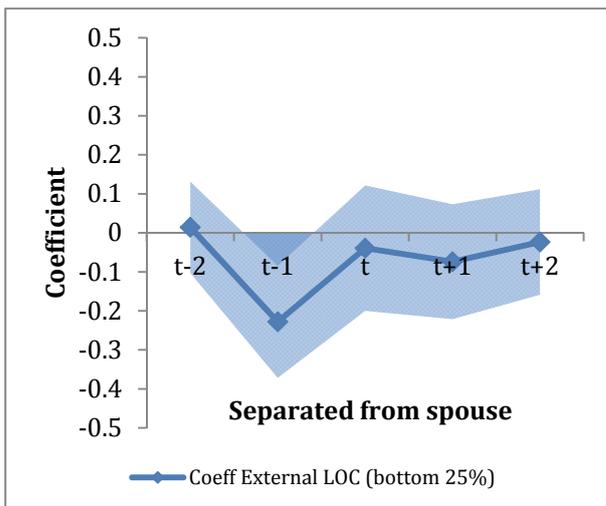


Fig 3I: Separated from spouse

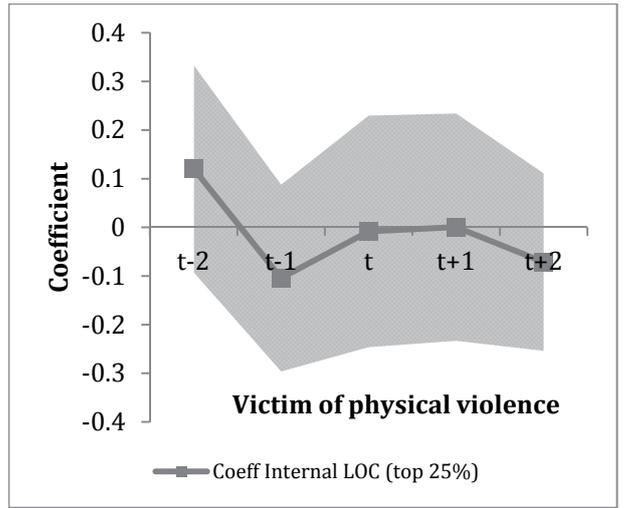
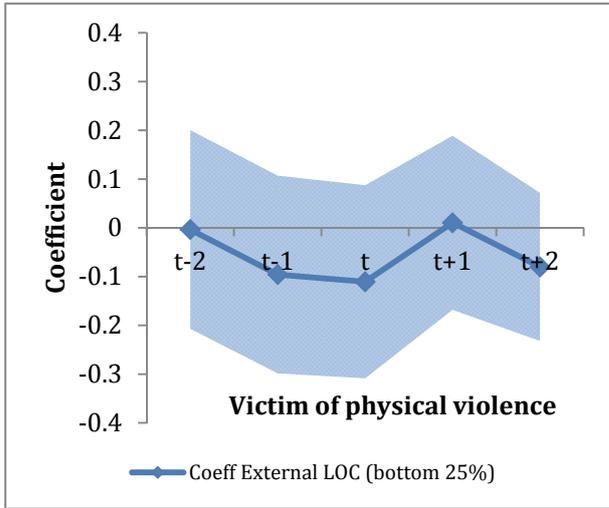
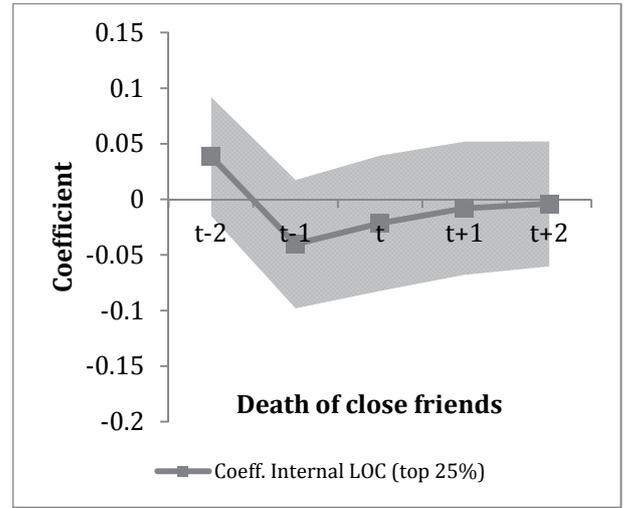
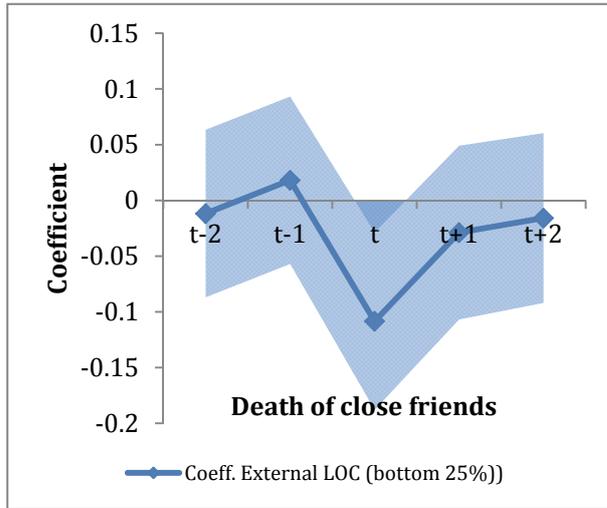


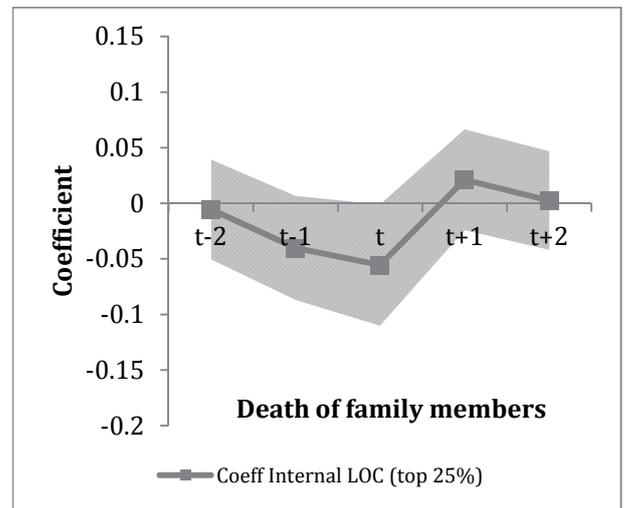
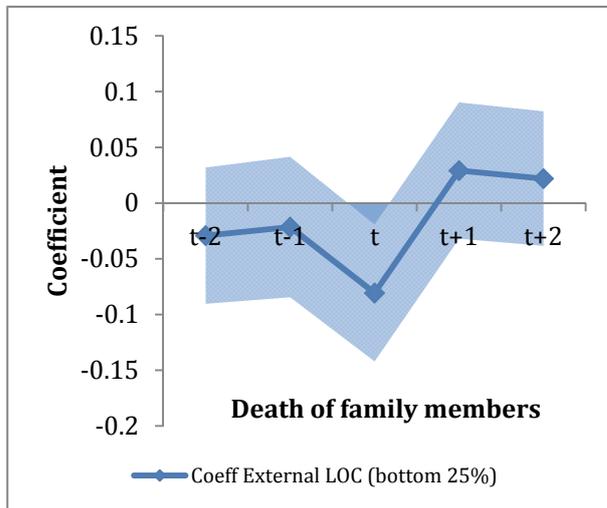
Fig 3J: Victim of physical violence

Note: 95% confidence intervals are reported. External locus of control (bottom 25% of the External-Internal locus of control scale) and internal locus of control (top 25% of the External-Internal locus of control) are presented here. Each time (t) represents 0-12 months. The event in question took place at time t=0. Each value represents the lead and lag coefficients of the negative life event in question.

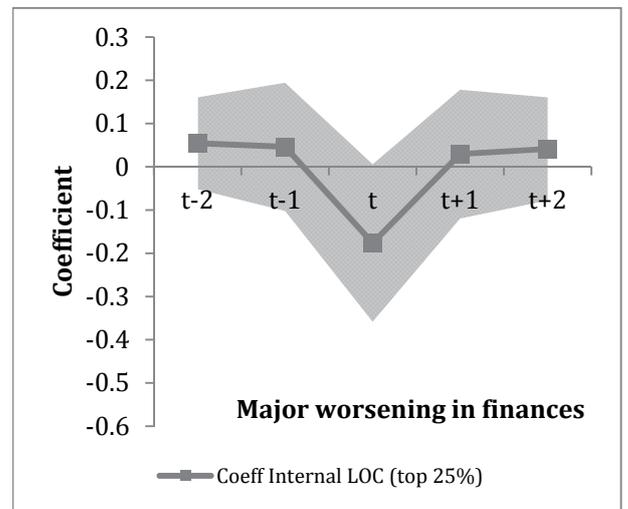
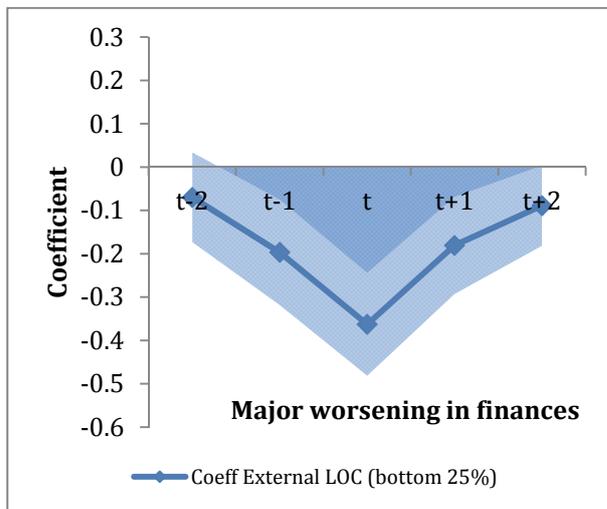
**Fig 4A-4J: Leads and lags in mental health to negative life events by locus of control type**



*Fig 4A: Death of close friends*



*Fig 4B: Death of close family members, including spouse/child*



*Fig 4C: Major worsening in finances*

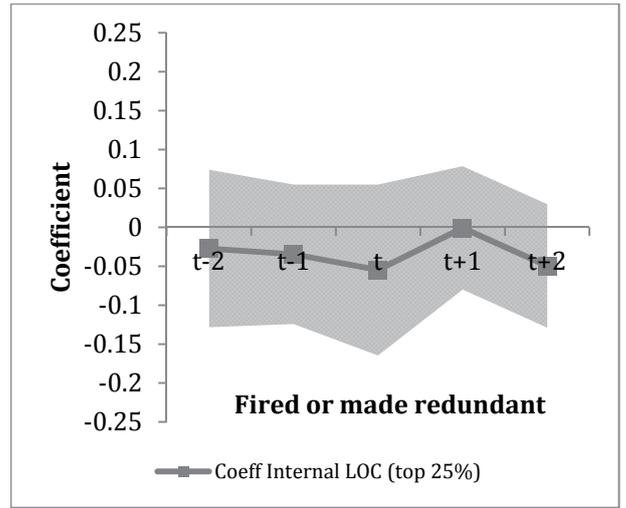
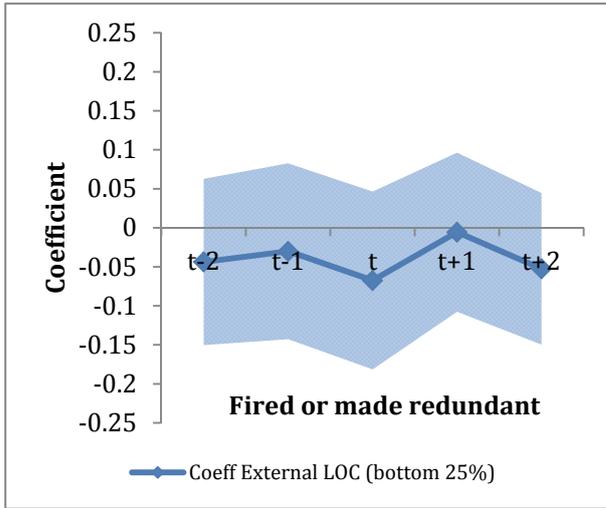


Fig 4D: Fired or made redundant

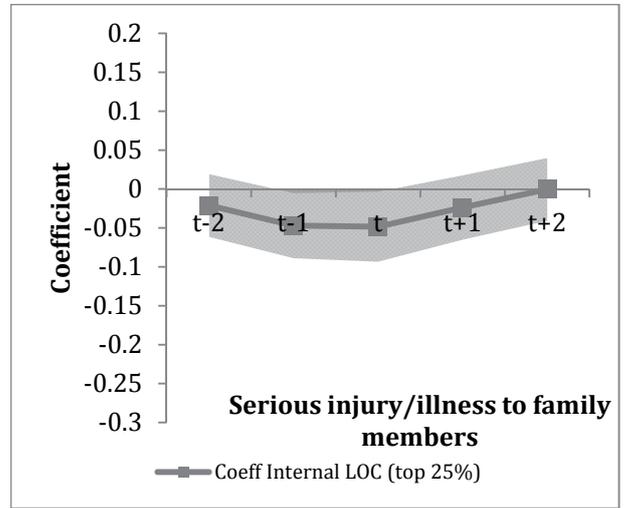
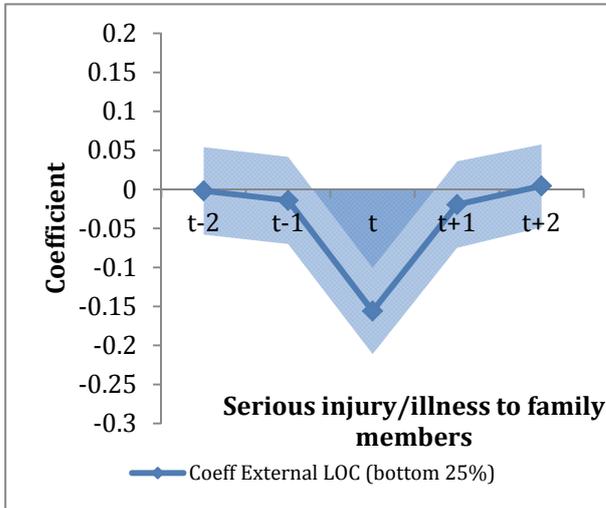


Fig 4E: Serious injury/illness to family members

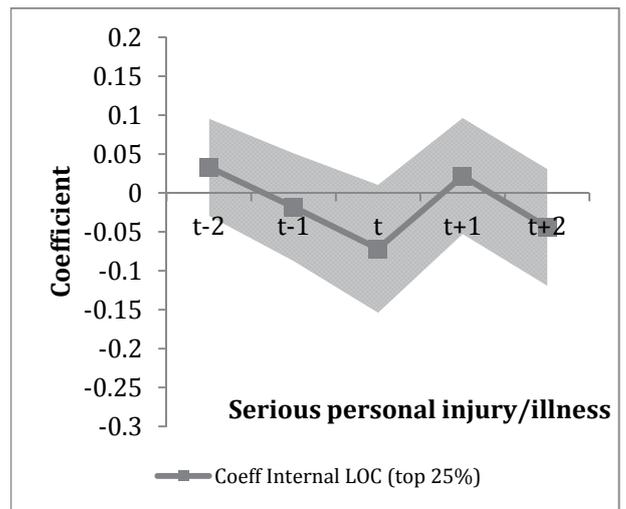
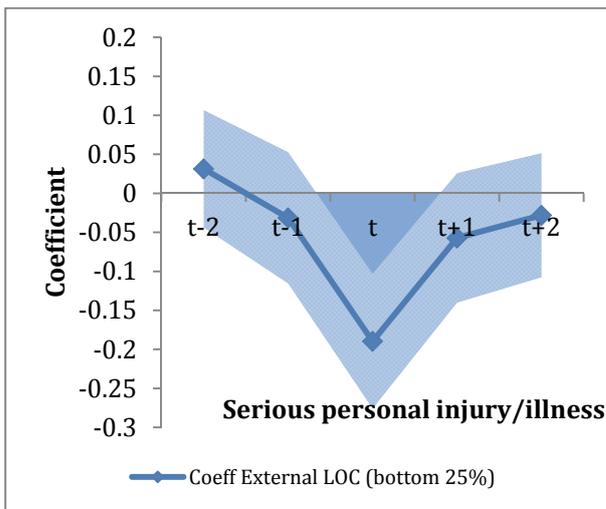


Fig 4F: Serious personal injury/illness

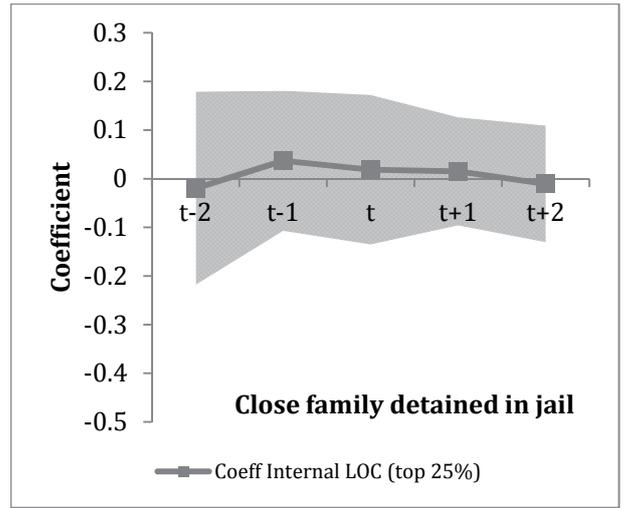
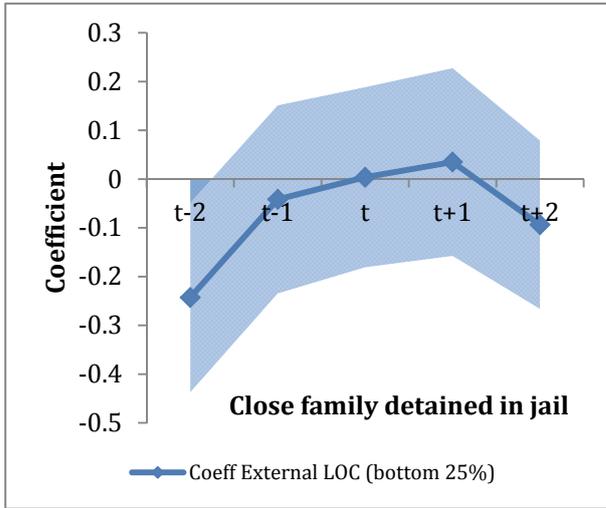


Fig 4G: Close family detained in jail

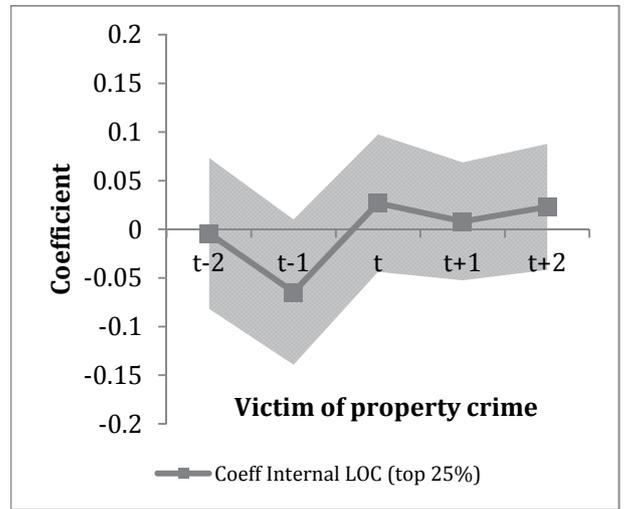
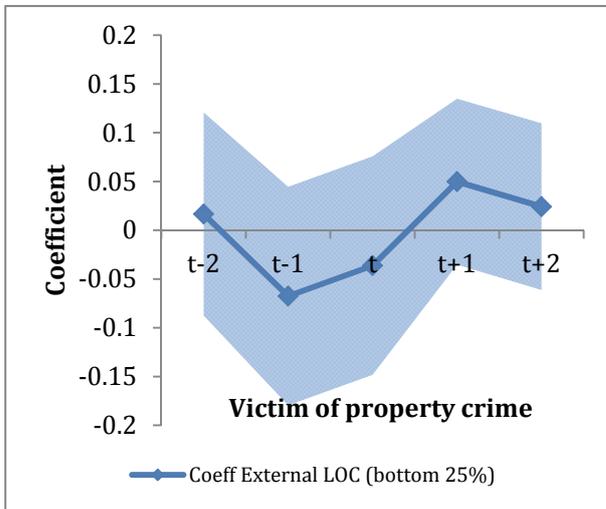


Fig 4H: Victim of property crime

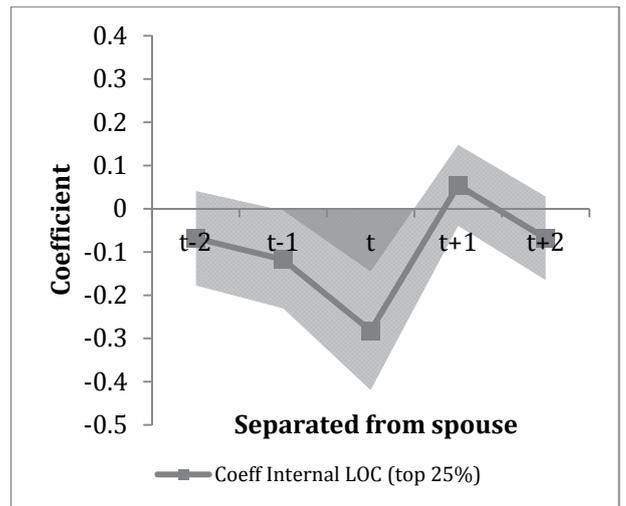
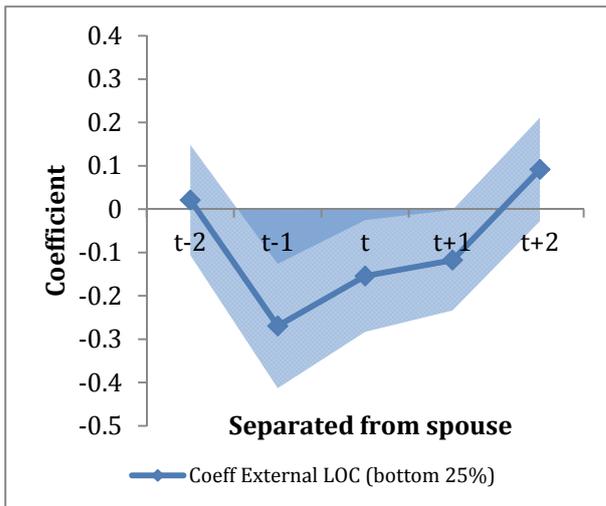


Fig 4I: Separated from spouse

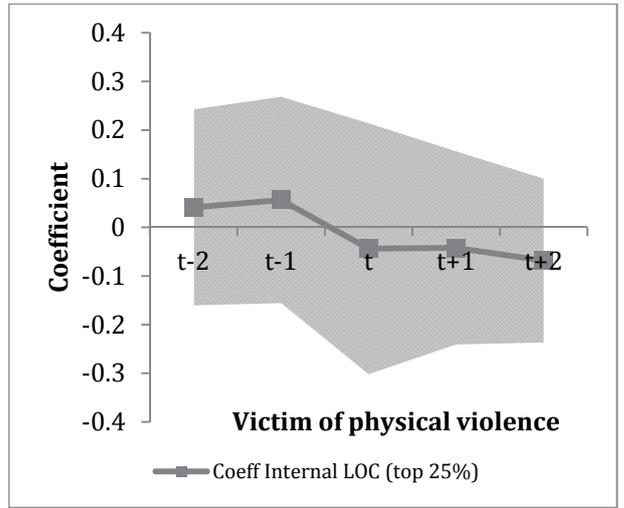
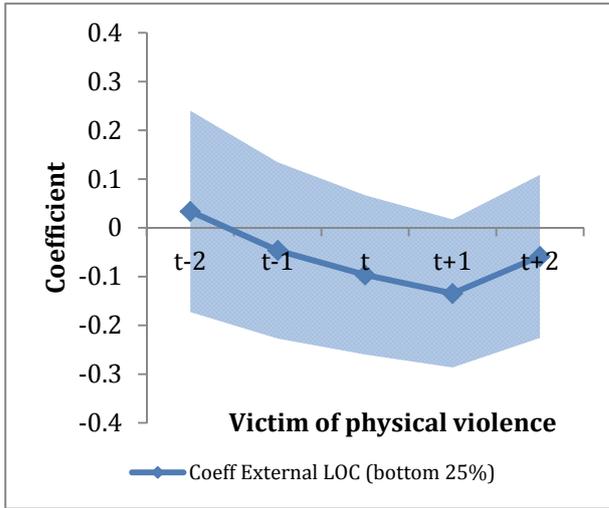


Fig 4J: Victim of physical violence

Note: 95% confidence intervals are reported. External locus of control (bottom 25% of the External-Internal locus of control) and internal locus of control (top 25% of the External-Internal locus of control) are presented here. Each time (t) represents 0-12 months. The event in question took place at time t=0. Each value represents the lead and lag coefficients of the negative life event in question.

## Appendix

Table 1A: Determinants of locus of control (Waves 3, 4, 9 & 11)

VARIABLES	Working age (21<=age<=59)
<b>Negative life events</b>	
Death of a close friend	0.007 (0.021)
Death of close family members	-0.015 (0.017)
Major worsening in finances	-0.365*** (0.038)
Fired or made redundant	-0.028 (0.033)
Serious injury/illness to family members	-0.038*** (0.015)
Serious personal injury/illness	-0.060*** (0.022)
Close family member detained in jail	-0.053 (0.055)
Victim of a property crime	-0.063*** (0.023)
Separated from spouse	-0.086** (0.034)
Victim of physical violence	-0.180*** (0.060)
Age	-0.005 (0.010)
Age-squared	0.005 (0.011)
Ln(real personal income)	0.040*** (0.011)
<b>Current employment status</b>	
Employed: Part-time	0.028 (0.018)
Unemployed: Looking for full-time work	-0.015 (0.053)
Unemployed: looking for part-time work	0.019 (0.071)
Not in the labour force, marginally attached	0.003 (0.033)
Not in the labour force, not marginally attached	0.019 (0.029)
Employed, but usual work hours are unstable	-0.043 (0.413)
<b>Current marital status</b>	
De facto	-0.043* (0.026)
Separated	-0.139*** (0.048)
Divorced	-0.071 (0.049)
Widowed	-0.122 (0.125)
Never married and not de facto	-0.027 (0.036)
<b>Current long-term health status</b>	
Long-term health impairment: Yes = 1	-0.108*** (0.018)
<b>Highest education level completed</b>	
Graduate diploma/certificate	0.054 (0.065)
Bachelor honours	-0.017 (0.059)
Advanced diploma, diploma	0.053

	(0.088)
Cert III or IV	-0.001
	(0.085)
Year 12	-0.098
	(0.079)
Year 11 and below	-0.029
	(0.095)
<b>Current number of children</b>	
Non-resident children aged 0-4	-0.026
	(0.069)
Non-resident children aged 2-5	0.003
	(0.029)
Non-resident children aged 6-14	-0.040
	(0.031)
Non-resident children aged 15-24	0.010
	(0.024)
Resident children aged 0-4	-0.023
	(0.015)
Resident children aged 2-5	-0.049
	(0.049)
Resident children aged 6-14	-0.042**
	(0.017)
Resident children aged 15-24	-0.033
	(0.022)
<b>Current homeownership status</b>	
Rent or pay board	0.009
	(0.020)
Involved in a rent-buy scheme	-0.115
	(0.148)
Live here rent free/free tenure	0.028
	(0.043)
<b>Standardized Big Five personality variables (extrapolated)</b>	
Standardized agreeableness	0.026
	(0.019)
Standardized conscientiousness	0.051**
	(0.020)
Standardized emotional stability	0.102***
	(0.019)
Standardized extraversion	0.064***
	(0.023)
Standardized openness to experience	0.010
	(0.021)
Constant	-0.188
	(0.233)
<hr/>	
Year dummies	Yes
Personality traits and their interactions with life events	Yes
Individual fixed effects	Yes
Observations	29,242
Within R-squared	12,047
Number of unique individuals	0.030

**Note:** \*<10%; \*\*<5%; \*\*\*<1%. Robust standard errors – clustered at the individual level – are reported. Locus of control is standardized to have zero mean and a standard deviation of one. The continuum scale runs from extremely external to extremely internal. This sample is denoted as ‘Sample 1’ in Section 4. The excluded reference groups are: employed full-time, married, postgraduate degree, and own home/paying mortgage.

**Table 2A: Fixed effects estimates on the control variables**

<b>VARIABLES</b>	<b>Life satisfaction</b>	<b>Mental health</b>
Ln(real personal income)	0.006 (0.005)	0.003 (0.005)
<b>Current employment status</b>		
Employed: Part-time	0.027*** (0.010)	-0.004 (0.010)
Unemployed: Looking for full-time work	-0.139*** (0.027)	-0.083*** (0.023)
Unemployed: looking for part-time work	0.050 (0.038)	-0.062* (0.035)
Not in the labour force, marginally attached	-0.051** (0.021)	-0.071*** (0.018)
Not in the labour force, not marginally attached	0.001 (0.017)	-0.084*** (0.016)
Employed, but usual work hours are unstable	-0.177 (0.173)	-0.114 (0.131)
<b>Current marital status</b>		
De facto	0.054*** (0.015)	0.015 (0.015)
Separated	-0.280*** (0.030)	-0.132*** (0.026)
Divorced	-0.180*** (0.031)	-0.030 (0.026)
Widowed	-0.257*** (0.081)	-0.215*** (0.082)
Never married and not de facto	-0.099*** (0.022)	-0.022 (0.021)
<b>Current long-term health status</b>		
Long-term health impairment: Yes = 1	-0.109*** (0.010)	-0.134*** (0.010)
<b>Highest education level completed</b>		
Graduate diploma/certificate	-0.006 (0.036)	-0.060 (0.038)
Bachelor honours	-0.081** (0.034)	-0.065* (0.035)
Advanced diploma, diploma	-0.012 (0.049)	-0.121** (0.050)
Cert III or IV	-0.005 (0.046)	-0.087* (0.046)
Year 12	-0.066 (0.042)	-0.073* (0.043)
Year 11 and below	0.059 (0.057)	-0.105* (0.054)
<b>Current number of children</b>		
Non-resident children aged 0-4	-0.109** (0.043)	-0.050 (0.032)
Non-resident children aged 2-5	-0.003 (0.015)	0.006 (0.014)
Non-resident children aged 6-14	-0.089*** (0.021)	-0.010 (0.017)
Non-resident children aged 15-24	-0.011 (0.013)	-0.011 (0.013)
Resident children aged 0-4	-0.020** (0.009)	0.007 (0.008)
Resident children aged 2-5	-0.068*** (0.023)	-0.036* (0.021)
Resident children aged 6-14	-0.041*** (0.009)	-0.029*** (0.009)
Resident children aged 15-24	-0.048*** (0.012)	-0.039*** (0.012)
<b>Current homeownership status</b>		
Rent or pay board	-0.029**	0.009

	(0.012)	(0.010)
Involved in a rent-buy scheme	-0.018	0.113
	(0.123)	(0.074)
Live here rent free/free tenure	0.001	0.004
	(0.025)	(0.022)
<b>Standardized Big Five personality variables (extrapolated)</b>		
Standardized agreeableness	0.036***	0.038***
	(0.010)	(0.009)
Standardized conscientiousness	0.033***	0.052***
	(0.010)	(0.010)
Standardized emotional stability	0.086***	0.165***
	(0.010)	(0.010)
Standardized extraversion	0.064***	0.113***
	(0.012)	(0.011)
Standardized openness to experience	0.020*	0.025**
	(0.011)	(0.010)
Constant	0.437***	0.135
	(0.144)	(0.131)
<hr/>		
Year dummies	Yes	Yes
Personality traits and their interactions with life events	Yes	Yes
Individual fixed effects	Yes	Yes
Observations	87,005	86,741
Within R-squared	0.042	0.051
Number of unique individuals	12,047	12,046
<hr/>		

**Note:** \* $<10\%$ ; \*\* $<5\%$ ; \*\*\* $<1\%$ . Robust standard errors – clustered at the individual level – are reported. Life satisfaction and mental health (SF-36) is standardized so that it has zero mean and a standard deviation of one. The estimates are based on the specifications reported in Columns 4 of Tables 2 and 3, respectively. This sample is denoted as ‘Sample 2’ in Section 4. The excluded reference groups are: employed full-time, married, postgraduate degree, and own home/paying mortgage.

**Table 3A: Balanced sample estimates**

VARIABLES	Life satisfaction (FE)	Mental health (FE)
<b>Negative life events</b>		
Death of a close friend	-0.011 (0.014)	-0.041*** (0.013)
Death of close family members	-0.009 (0.012)	-0.072*** (0.012)
Major worsening in finances	-0.309*** (0.032)	-0.292*** (0.029)
Fired or made redundant	-0.001 (0.023)	-0.026 (0.022)
Serious injury/illness to family members	-0.014 (0.011)	-0.065*** (0.010)
Serious personal injury/illness	-0.140*** (0.017)	-0.171*** (0.017)
Close family member detained in jail	0.012 (0.043)	-0.017 (0.037)
Victim of a property crime	-0.062*** (0.019)	-0.036** (0.017)
Separated from spouse	-0.230*** (0.031)	-0.228*** (0.027)
Victim of physical violence	-0.218*** (0.053)	-0.235*** (0.049)
<b>Interaction terms</b>		
Death of a close friend × Standardized LOC	-0.011 (0.017)	0.006 (0.016)
Death of close family members × Standardized LOC	-0.005 (0.016)	0.014 (0.015)
Major worsening in finances × Standardized LOC	0.058* (0.033)	0.051* (0.027)
Fired or made redundant × Standardized LOC	0.051* (0.029)	0.030 (0.024)
Serious injury/illness to family members × Standardized LOC	-0.010 (0.013)	0.025** (0.013)
Serious personal injury/illness × Standardized LOC	0.037* (0.021)	0.028 (0.019)
Close family member detained in jail × Standardized LOC	-0.016 (0.058)	0.036 (0.045)
Victim of a property crime × Standardized LOC	0.009 (0.025)	-0.027 (0.022)
Separated from spouse × Standardized LOC	-0.001 (0.031)	0.029 (0.025)
Victim of physical violence × Standardized LOC	0.043 (0.050)	-0.010 (0.045)
<b>Exogenous variables</b>		
Age	-0.011 (0.010)	0.006 (0.009)
Age-squared/100	0.014 (0.012)	-0.005 (0.010)
Constant	0.318 (0.236)	0.077 (0.209)
Year dummies	Yes	Yes
Individual characteristics	Yes	Yes
Personality traits and their interactions with life events	Yes	Yes
Individual fixed effects	Yes	Yes

Observations	40,096	39,965
Within R-squared	0.052	0.062
Number of unique person	3,610	3,610

**Note:** \*<10%; \*\*<5%; \*\*\*<1%. Robust standard errors – clustered at the individual level – are reported. Life satisfaction and mental health (SF-36) is standardized so that it has zero mean and a standard deviation of one. Same set of control variables as in Column 4, Tables 2 a