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Events associated with stability and change in adult locus of control orientation over a six-year period

Stephen Nowicki, Genette Ellis, Yasmin Iles-Caven, Steven Gregory, Jean Golding

1. Introduction

The purpose of this project was to examine the stability and change of locus of control (LOC) orientation in adult men and women over a 6-year period, and to identify events associated with LOC stability or change. LOC refers to individuals’ generalized expectancy regarding the connection between their behavior and reinforcements received in a problem-solving context (Rotter, 1966).

Individuals who fail to see a connection between what they do and what happens to them and view what happens as the result of luck, fate, chance, or powerful others are externally controlled. Conversely, those who tend to perceive a connection between their efforts and what happens to them are internally controlled.

Rotter’s article stimulated a remarkable amount of research. A search of PsychInfo resulted in 17,812 articles with a keyword “locus of control” as of summer 2015 and with 6600 of these appearing after 1996 (1425 dated 2010–2015). LOC has sustained itself as a concept for nearly a half century (Nowicki & Duke, 1974), and its potential problems that could result from using similar appearing cognates, like efficacy (e.g., Influr & Mayer, 2015; Lachman & Weaver, 1998) or attribution (Peterson & Seligman, 1983; Seligman, 1975) interchangeably with LOC concept and measure is being used (e.g., Reich & Influr, 2016). Rotter’s defined LOC within his social learning theory (1954, 1966) emphasizing that it is an expectancy that has the capacity to affect behavior differently from situation to situation and has its greatest impact in circumstances that are novel, ambiguous or transitional.

LOC has been related to an ever-growing number of important and significant aspects of human life including personality characteristics (e.g., Judge & Bono, 2001; Nowicki & Duke, 1974), social adjustment difficulties (e.g., Cheng, Cheung, Chio, & Chan, 2013), academic achievement (e.g., Flouri, 2006), health outcomes (e.g., Conell-Price & Jamison, 2015), and business success (e.g., Kormanik & Rocco, 2009). However, surprisingly little research has been completed concerning the origins of control orientations or their trajectories over time. Using data gathered from the Avon Longitudinal Study of Parents and Children (ALSPAC), Golding, Iles-Caven, Gregory, and Nowicki...
his colleagues contacted former participants and had 197 triads volunteer to participate in a second assessment.

In this paper we are primarily interested in what Schneewind found regarding parent LOC. At both testing times, mother and father LOC scores were positively correlated, but low (time one, $r = 0.19$; time two, $r = 0.21$). Pre-post LOC correlations for mothers and fathers across the 16 years were what Schneewind called “moderate” and ranged between 0.35 and 0.44.

1.1. The present study

Little is known about how LOC expectancies develop and change in adulthood. We lack information about what the LOC association is within spousal or parental dyads, the trajectory of adult LOC over time or what life events are associated with LOC changes over time. Our goal here is to provide such LOC information.

The ALSPAC data set is unique in that it contains LOC scores from both mothers and fathers before the child was born and six years later. Thus we can assess the stability of parents’ LOC during a critical period of their lives. The absence of previous research made prediction difficult. Relationship theories offer competing predictions. Complementary theorists (e.g., Kiesler, 1982) suggest a negative association between mother and father LOC scores, with one individual being external and the other internal. Similarity perspectives (e.g., Byrne, 1969) suggests that the LOC scores would be similar; internals liking internals and externals liking externals. Based on Schneewind’s findings, we predict parents’ own pre-post LOC scores would be moderately related to one another over time, but relatively unrelated to one another at pre- and post-times.

Although Schneewind obtained valuable data regarding adult LOC stability and change, he failed to provide any information about what might be associated with changes. The ALSPAC data set includes data concerning the stressors encountered by adults during the six years between the first and second LOC administration. Rotter (1966) and Lefcourt (1976) theorize that internality thrives when individuals are in warm, supportive, relatively stress free environments in which they can learn to perceive the connection between their behavior and outcomes. We predict that greater stress will be related to greater externality.

2. Material and methods

2.1. The ALSPAC study

This pre-birth cohort was designed to determine the environmental and genetic factors that were associated with health and development of children and their parents (Golding and ALSPAC Study Team, 2004; Boyd et al., 2013). As part of the study design, and in order to determine the parents’ backgrounds prior to the birth of the child, there was a concerted effort to obtain details of their personalities, moods and attitudes, including a measure of their LOC, before the birth of the child.

ALSPAC recruited 14,541 pregnant women resident in Avon, UK with expected dates of delivery 1st April 1991 to 31st December 1992. Enrolment strategies included encouragement through the local media, general practitioners, midwives, health services and obstetric hospitals; women then contacted the study center for further information; they were then sent a series of questionnaires to be completed at home. 14,541 is the initial number of pregnancies for which the mother enrolled in the ALSPAC study. Of these there were 14,062 livebirths, of which 13,988 survived to at least 12 months. For full details of all the data collected see the study website: www.bristol.ac.uk/alspac/researchers/data-access/data-dictionary/.

Uniquely among the major UK cohort studies at the time it was decided to include the fathers of the children. To this end questionnaires were sent to the mother to pass to her partner if she was happy for him to take part. This strategy was approved by the ALSPAC...
2.2. Measures of LOC

The LOC measure used in the present study is a shortened form of the adult version of the Nowicki-Strickland Internal-External locus of control scale (ANSIE) which comprises 40 items in a yes/no format to assess perceived control (Nowicki & Duke, 1974). This was chosen over other scales more specifically related to perceived control over health, as it was considered that this more generalized scale would relate to other factors in addition to health outcomes. Construct validity for the scale has been found in the results of over 1000 studies (Nowicki, 2016). The version used here comprises 12 of the original 40 items, which were chosen after factor analysis of the ANSIE in a pilot of 135 mothers in the USA. An Anglicized version of these 12 items was included in the questionnaires sent to the two parents in pregnancy (Golding, Iles-Caven, et al., 2017) and again six years after the child's birth to determine the LOC questions at the two time points 6 years apart. For the women the numbers fell from 10,565 to 8378 (79% of the original), and for the partners the change was from 7365 to 3891 (53%). From Supplementary Table 1 it can be seen that the proportion of parents with LOC scores 6 years after the study child's birth had proportionately fewer families who (a) resided in public housing, (b) were young mothers, (c) were of manual social class or (d) who smoked. These factors need to be born in mind when generalizing the results.

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Classification into external and internal parents in pregnancy, using the definition for externality of greater than the median LOC score (> 4 for women, > 3 for men), identified 40.3% of mothers and 38.8% of their partners as externally-oriented in pregnancy. Because of increasing internality in the women over time, their median LOC score increased to 3, whereas their partners stayed at 3.

2.3. Identification of events

From 8 months post-birth, each parent was sent a questionnaire concerned with life events in the preceding period, at approximately yearly intervals. The life events inventory comprised 42 items, which were derived for the ALSPAC study using previous inventories as a basis for selection of items. Three main sources were used in this way: Brown and Harris (1978), Barnett, Hanna, and Parker (1983) and Stanley (1988).

In order to develop a summary of variables to determine whether each specific event had occurred over the preschool period of the study child, we created a variable for each event that used all available questions (i.e. those sent to the parents at 8, 21, 33 and 47 months). We did not sum the number of times an event occurred as there was often overlap between ages. Rather than look at the number of the events occurring, we have deliberately looked at each separately using the hypothesis that some types of event will result in increasing internality, and some externality, a pattern that we found when considering the relationship between the events in childhood and the LOC of the adult

2.4. Other variables considered

Other variables investigated here were chosen because they were associated with parental LOC as well as with differential response rates. They were included to determine whether they were associated with any change in LOC orientation across the 6 years. They include: (1) housing tenure – which is an accepted socio-economic indicator in the UK – divided into owner-occupied (includes having a mortgage), rented public housing, and other rented property; (2) age of the mother at the child's conception; (3) social class (based on occupation of the mother's partner classified into manual and non-manual (Standard Occupational Classification, 1990); (4) presence of mother's partner in the home (identified by questionnaire at 8 months); (5) maternal education level (based on the actual qualifications attained and divided into three levels of attainment); (6) the mother's parity (number of previous pregnancies resulting in either a live or stillbirth); (7) the smoking habit of each parent at 8 months of age (categorized in two ways – any regular smoking and regular smoking of ≥10 cigarettes/day).

2.5. Statistical techniques

The statistical strategy was to determine the pattern of factors that were associated with the change in LOC orientation in each parent, with a focus on events that occurred after the initial measure. The study was hypothesis free. Based on the findings from a study of the childhoods of these individuals we anticipated that some of the events might result in a change toward internality, and some toward externality. Results were descriptive, and compared individuals who changed from those who did not, using logistic regression. No account was taken of the number of tests undertaken, to avoid type I errors.

3. Results

3.1. Correlation of parents' LOC scores with one another and across time

As demonstrated in Table 1, both mother and father LOC scores were positively and moderately correlated between the two-time points (mothers = 0.57; fathers = 0.56); cross-sectional correlations between parents at each of the two time points were positively correlated, but low (in pregnancy r = 0.33; 6 years later r = 0.29).

3.2. Additional findings concerning parents' LOC

The 'change score' was calculated as the difference between the LOC score in pregnancy and that obtained 6 years later. Mothers' and fathers' LOC change scores ranged from −9 to +8, with mode and median at 0 with a mean difference of −0.30 [SD 1.89; n = 8302] points for mothers and +0.037 [SD 1.98; n = 3968] points for fathers. Thus, mothers on average were getting more internal while their partners were

Table 1

|                      | Mother in pregnancy | Father in pregnancy | Mother 6 years later | Father 6 years later |
|----------------------|---------------------|---------------------|----------------------|----------------------|
| Mother in pregnancy  | 1.000               |                     |                      |                      |
| Father in pregnancy  | 0.331               | 1.000               |                      |                      |
| Mother 6 years later | 0.570               | 0.244               | 1.000                |                      |
| Father 6 years later | 0.290               | 0.558               | 0.292                | 1.000                |
tending to become more external. The correlation coefficient between the parents change scores was positive but low (0.11).

3.3. Lifestyle and social conditions associated with changes in LOC over time

In Tables 2a and 2b we consider certain lifestyles and social conditions at 8 months post-delivery: for lifestyle we consider the changes in LOC associated with the smoking habits of each parent; social conditions were demonstrated by the tenure of the home in which the family were living and whether the mothers’ partner was part of the household.

Smoking of the parents bore very strong associations with the likelihood of the parents changing their orientation (Table 2a). Of the women who stayed externally oriented 30.7% were smoking when the offspring was 8 months old, whereas 24.7% of those who became internal had this history (P = .002); for women who stayed internal, only 11.9% smoked, but 20.0% of those who became internal did so (P < .0001). Similar patterns were shown for women who were heavy smokers as well as when the partner smoked (Table 2a). Changes in the partners’ orientation were equally associated with the smoking habits of the woman as well as of the partner himself (Table 2b).

Mothers who lived in public housing were considerably more likely to stay external, and those in owner-occupied accommodation less likely to do so. Conversely mothers who were internally oriented in pregnancy were more likely to become external if in public housing (Table 2a). A similar pattern was shown for the mothers’ partners (Table 2b).

Most of the women who answered the relevant questionnaires had live-in partners (Table 2a), but those mothers who were externally oriented were more likely to become internal if the partner was present. Conversely the women who were internal but became external were less likely to have a live-in partner. Partners were less likely to be given (or complete) a questionnaire if they were not living with the mother 6 years post-birth; even so, among those who answered the questionnaire, there was some evidence that those who became internal were more likely to be living with the mother, and those who did not were more likely to become external (Table 2b).

3.4. Stressful life events associated with changes in LOC over time

Table 3a presents variations in the potentially stressful events occurring to parents and ways in which they were associated with maternal changes in the LOC orientation. The first two columns compare proportions of women who had a history of the stressor between those who stayed external and those who became internally-oriented. Of the 42 stressors occurring, just four showed a significant association: the women were more likely to become internal if (a) they went back to work and/or (b) they had problems at work; they were more likely to stay external if they had (i) separated from a partner, or (ii) argued with family or friends.

The last two columns compare the occurrence of the events among those who stayed internal and those who were internal but became external. In this case, 25 of the 42 stressors were significant at the 5% level or higher, with 16 of the 25 at the .005 level and 9 of the 25 at the < .001 levels or better. We find 4 of the 16 significant events associated with staying internal: (i) having a partner who was very ill, (ii) having a partner who had problems at work, (iii) mother returning to work, and (iv) having problems at work. In contrast, three times as many stressful events, 12 in all, were associated with becoming external:

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**Table 2a**

Variation in social and lifestyle circumstances at 8 months associated with change in maternal LOC orientation from pregnancy to 6 years later.

| Social and lifestyle circumstances at 8 m | Mother stayed external | Mother became internal | P   | Mother became external | Mother stayed internal | P       |
|-----------------------------------------|------------------------|------------------------|-----|------------------------|------------------------|---------|
|                                        | %                      | %                      |     | %                      | %                      |         |
| Parental smoking                        |                        |                        |     |                        |                        |         |
| Mother smoked                           | 30.7                   | 24.7                   | .002| 20.0                   | 11.9                   | <.0001  |
| Mother smoked 10+ cigarettes per day    | 21.7                   | 15.8                   | <.001| 12.4                   | 6.0                    | <.0001  |
| Partner smoked                          | 33.8                   | 28.9                   | .018| 25.0                   | 18.2                   | <.0001  |
| Partner smoked 10+ cigarettes per day   | 27.4                   | 22.4                   | .009| 19.0                   | 12.6                   | <.0001  |
| Housing tenure                          |                        |                        |     |                        |                        |         |
| Owner-occupied                          | 72.1                   | 80.5                   |     | 84.9                   | 89.6                   |         |
| Council                                 | 18.0                   | 9.6                    |     | 8.3                    | 3.4                    |         |
| Other rented                            | 9.9                    | 9.9                    | .002| 6.9                    | 7.0                    | .005    |
| Had live-in partner                     | 91.3                   | 93.6                   | .047| 95.6                   | 97.4                   | <.001   |

(Percentages concern the proportion of women in the LOC category who had the history.)

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**Table 2b**

Variation in social and lifestyle circumstances at 8 months associated with change in partners’ LOC orientation from pregnancy to 6 years later.

| Social and lifestyle circumstances at 8 m | Partner stayed external | Partner became internal | P    | Partner became external | Partner stayed internal | P    |
|-----------------------------------------|-------------------------|-------------------------|------|-------------------------|-------------------------|------|
|                                        | %                       | %                       |      | %                       | %                       |      |
| Parental smoking                        |                        |                        |      |                        |                        |      |
| Mother smoked                           | 27.4                    | 16.9                   | <.0001| 18.9                   | 9.4                    | <.0001 |
| Mother smoked 10+ cigarettes per day    | 18.6                    | 9.0                    | <.0001| 11.0                   | 4.9                    | <.0001 |
| Partner smoked                          | 33.2                    | 22.4                   | <.0001| 22.3                   | 12.6                   | <.0001 |
| Partner smoked 10+ cigarettes per day   | 26.6                    | 16.7                   | <.0001| 16.2                   | 8.0                    | <.0001 |
| Housing tenure                          |                        |                        |      |                        |                        |      |
| Owner-occupied                          | 77.4                    | 86.3                   |      | 89.7                   | 93.4                   |      |
| Council                                 | 15.8                    | 6.6                    |      | 4.1                    | 1.2                    |      |
| Other rented                            | 6.8                     | 7.0                    | .007 | 6.2                    | 5.5                    | <.001  |
| Had live-in partner                     | 97.6                    | 98.3                   | .362 | 98.9                   | 99.7                   | .044  |

(Percentages concern the proportion of men in the LOC category who had the history.)
As was found for mothers, parents had more stressful events associated with externality than internality (Table 3b). Only one event was significantly associated with changing from an external to an internal orientation: starting a new job. Four were associated with him being significantly less likely to become internal; (a) losing his job, (b) arguing with his partner, (c) arguing with family and friends, and (d) having major financial problems, (e) getting married, (f) being emotionally abused by her partner, (g) having major financial problems, (h) getting married, (i) being physically abused by her partner, (j) being emotionally abused by her partner, (k) having a partner who emotionally abused her children, and (l) attempting suicide.

| Stressors between 8 and 21 m | Mother stayed external | Mother became internal | P | Mother became external | Mother stayed internal | P |
|-----------------------------|-----------------------|-----------------------|---|-----------------------|-----------------------|---|
| %                           | %                     | %                     |   | %                     | %                     |   |
| Death of friend or relative | 56.1                  | 55.4                  | .748 | 59.6                  | 57.0                  | .080 |
| Child was ill               | 65.6                  | 65.2                  | .852 | 68.7                  | 69.1                  | .762 |
| Partner was ill             | 38.7                  | 41.0                  | .243 | 42.6                  | 48.1                  | < .001 |
| Friend or relative was ill  | 52.2                  | 55.4                  | .117 | 56.6                  | 58.7                  | .153 |
| Mother was hospitalized     | 38.9                  | 39.5                  | .757 | 39.4                  | 41.4                  | .181 |
| Mother divorced             | 4.9                   | 4.1                   | .306 | 4.8                   | 1.9                   | < .0001 |
| Partner rejected the child  | 4.6                   | 3.3                   | .121 | 3.5                   | 1.6                   | < .0001 |
| Mother was ill              | 23.2                  | 22.0                  | .458 | 21.1                  | 18.1                  | .011 |
| Partner lost job            | 21.1                  | 19.3                  | .293 | 19.5                  | 16.6                  | .010 |
| Partner had problems at work| 43.0                  | 46.8                  | .063 | 48.1                  | 52.7                  | .002 |
| Mother had problems at work | 19.4                  | 24.4                  | .002 | 25.3                  | 30.6                  | < .0001 |
| Mother lost her job         | 9.1                   | 9.8                   | .550 | 9.2                   | 10.4                  | .190 |
| Partner went away           | 25.9                  | 25.1                  | .674 | 27.0                  | 27.3                  | .833 |
| Partner in trouble with the law | 5.2                  | 6.3                   | .240 | 4.3                   | 2.6                   | .001 |
| Mother in trouble with the law | 2.1                  | 1.3                   | .160 | 1.7                   | 0.9                   | .015 |
| Mother convicted of an offence | 1.1                  | 0.8                   | .482 | 1.3                   | 0.7                   | .026 |
| Separated from partner      | 17.5                  | 12.8                  | .002 | 13.1                  | 6.5                   | < .0001 |
| Mother's income was reduced | 63.2                  | 63.4                  | .926 | 64.0                  | 64.1                  | .977 |
| Mother and partner argued   | 83.0                  | 83.0                  | .980 | 82.1                  | 79.5                  | .024 |
| Mother argued with family and friends | 42.0 | 37.1 | .016 | 39.1 | 31.7 | < .0001 |
| Moved home                  | 40.6                  | 39.6                  | .615 | 38.1                  | 38.8                  | .618 |
| Physically abused by partner| 7.8                   | 7.8                   | .987 | 6.8                   | 3.8                   | < .0001 |
| Became homeless             | 3.3                   | 3.8                   | .545 | 2.6                   | 1.1                   | < .0001 |
| Major financial problems    | 34.3                  | 31.4                  | .128 | 29.8                  | 25.1                  | < .001 |
| Got married                 | 7.2                   | 5.8                   | .172 | 5.2                   | 3.4                   | .002 |
| Started new job             | 38.9                  | 39.2                  | .858 | 39.5                  | 40.7                  | .397 |
| Went back to work           | 45.4                  | 51.2                  | .004 | 53.4                  | 60.2                  | < .0001 |
| Took an exam                | 13.2                  | 15.8                  | .061 | 15.4                  | 16.8                  | .179 |
| Emotionally abused by partner| 22.0                  | 22.7                  | .670 | 21.1                  | 14.0                  | < .0001 |
| Partner emotionally abused children | 5.7 | 5.0 | .450 | 4.7 | 2.8 | < .001 |
| Mother emotionally abused her children | 4.7 | 4.4 | .752 | 5.4 | 4.0 | .032 |
| Mother physically abused children | 1.8 | 2.2 | .501 | 1.8 | 2.0 | .597 |
| Partner physically abused children | 1.2 | 1.2 | .910 | 1.3 | 0.8 | .151 |
| Mother's home/car burgled   | 30.1                  | 33.6                  | .070 | 33.5                  | 36.7                  | .024 |
| Mother attempted suicide    | 1.2                   | 0.5                   | .136 | 1.2                   | 0.2                   | < .001 |
| Partner started new job     | 31.0                  | 34.9                  | .040 | 35.1                  | 38.5                  | .018 |
| Pet died                    | 28.8                  | 27.5                  | .478 | 27.5                  | 24.9                  | .046 |
| Mother had an accident      | 8.4                   | 8.4                   | .955 | 10.8                  | 11.1                  | .724 |
| Mother had a miscarriage    | 8.4                   | 8.2                   | .911 | 8.7                   | 9.0                   | .772 |
| Mother had a termination    | 3.1                   | 2.7                   | .608 | 2.9                   | 2.1                   | .080 |
| Numbers studied             | 2607                  | 765                   | 1813 | 3193                  |   |   |

{Percentages concern the proportion of women in the LOC category who had the history. In bold are P values of P < .05.}

4. Discussion

4.1. LOC between spouses and over time

This study is among the few that has obtained LOC scores from a large representative population composed of parental dyads at two time points, but is unique because the initial test took place prenatally, and the second six years later. Hajek and Konig (2017) collected LOC information from a large representative cohort of adults over a five year period from 2005 to 2010, but did not delineate where participants were in regards to family or examined factors that were associated with changes in LOC. On the other hand, Schneewind (1997) did focus on LOC in parents of children who were the first tested when children were aged 10 and tested again 16 years later. However his participants were a select group of nearly two hundred family members whose initial LOC test was not obtained before the child was born. By obtaining mother and father LOC scores prenatally we have the unique advantage of being able to describe parents’ LOC perspectives before the arrival of the child and to evaluate the future impact of their prenatal orientations on their own and their children’s behavior. Studies have already begun to show the benefit of this approach by revealing that the degree of externality in the parent dyad was associated with (1) negative outcomes in children's eating, sleeping and emotion regulation behaviors
Variation in the occurrence of stressors as recorded by the mothers’ partner between 8 months and 4 years post-delivery associated with changes of LOC over 6 years from pregnancy.

Table 3b

| Stressors between 8 and 21 m (father's report) | Father stayed external | Father became internal | P | Father became external | Father stayed internal | P |
|-----------------------------------------------|------------------------|-----------------------|---|------------------------|-----------------------|---|
| Death of friend or relative                   | 60.5                   | 61.5                  | .704 | 58.3                   | 61.0                  | .252 |
| Child was ill                                 | 71.4                   | 73.2                  | .474 | 77.9                   | 78.3                  | .870 |
| Partner was ill                               | 61.2                   | 62.2                  | .458 | 65.7                   | 69.3                  | .101 |
| Friend or relative was ill                    | 54.6                   | 57.2                  | .348 | 57.6                   | 63.0                  | .020 |
| Was hospitalized                              | 18.6                   | 16.0                  | .228 | 15.9                   | 14.6                  | .423 |
| Was divorced                                  | 1.4                    | 0.6                   | .208 | 1.2                    | 0.7                   | .188 |
| Partner rejected the child                    | 1.2                    | 0.4                   | .168 | 0.9                    | 0.9                   | .999 |
| Was very ill                                  | 16.6                   | 15.6                  | .633 | 16.6                   | 13.1                  | .036 |
| His partner lost job                          | 7.1                    | 5.4                   | .293 | 8.4                    | 6.1                   | .052 |
| Partner had problems at work                  | 25.2                   | 29.9                  | .052 | 28.5                   | 27.5                  | .642 |
| Had problems at work                          | 59.8                   | 63.0                  | .241 | 65.0                   | 67.4                  | .280 |
| Lost his job                                  | 20.2                   | 15.0                  | .015 | 16.5                   | 11.4                  | .002 |
| Partner went away                             | 11.3                   | 9.1                   | .217 | 9.6                    | 11.0                  | .353 |
| Partner in trouble with the law               | 1.4                    | 0.6                   | .208 | 1.1                    | 0.6                   | .271 |
| In trouble with the law                       | 7.1                    | 5.0                   | .121 | 4.6                    | 4.7                   | .920 |
| Convicted of an offence                       | 4.2                    | 2.5                   | .098 | 3.0                    | 3.3                   | .669 |
| Separated from partner                        | 4.5                    | 3.7                   | .479 | 3.9                    | 2.4                   | .068 |
| Income was reduced                            | 53.9                   | 47.8                  | .063 | 47.8                   | 37.8                  | <.0001 |
| Argued with partner                           | 85.2                   | 81.1                  | .043 | 82.7                   | 80.0                  | .162 |
| Argued with family and friends                | 41.8                   | 33.3                  | .002 | 39.2                   | 28.5                  | <.0001 |
| Moved home                                    | 33.4                   | 35.1                  | .516 | 36.3                   | 41.0                  | .043 |
| Physically abused by partner                  | 4.3                    | 5.4                   | .363 | 3.7                    | 2.8                   | .315 |
| Became homeless                               | 1.3                    | 0.8                   | .446 | 1.2                    | 0.6                   | .140 |
| Major financial problems                      | 37.2                   | 26.8                  | <.0001 | 30.8                   | 21.2                  | <.0001 |
| Got married                                   | 5.4                    | 5.4                   | .988 | 3.0                    | 2.5                   | .501 |
| Started new job                               | 34.7                   | 41.2                  | .016 | 42.9                   | 47.3                  | .069 |
| Went back to work                             | 5.8                    | 4.1                   | .187 | 3.8                    | 3.0                   | .385 |
| Took an exam                                  | 23.3                   | 21.3                  | .534 | 23.8                   | 25.9                  | .279 |
| Emotionally abused by partner                 | 17.5                   | 15.6                  | .670 | 17.7                   | 14.0                  | .032 |
| Emotionally abused children                   | 4.8                    | 4.3                   | .699 | 3.7                    | 4.3                   | .499 |
| Partner emotionally abused her children       | 4.1                    | 2.3                   | .075 | 3.0                    | 4.4                   | .127 |
| Partner physically abused her children         | 1.1                    | 0.8                   | .647 | 0.9                    | 0.9                   | .904 |
| Physically abused his children                | 1.6                    | 1.9                   | .680 | 1.8                    | 2.4                   | .394 |
| Home/car burgled                              | 32.8                   | 30.4                  | .336 | 35.4                   | 40.0                  | .047 |
| Attempted suicide                             | –                      | –                     | –   | –                      | –                     | –   |
| Partner started new job                       | 33.9                   | 37.0                  | .243 | 40.3                   | 34.2                  | .008 |
| Pet died                                      | 28.7                   | 26.4                  | .356 | 25.6                   | 26.8                  | .567 |
| Had an accident                               | 16.5                   | 19.4                  | .175 | 17.0                   | 16.9                  | .951 |
| Partner had a miscarriage                     | 8.8                    | 8.5                   | .871 | 8.8                    | 9.7                   | .505 |
| Partner had a termination                     | 3.0                    | 2.5                   | .613 | 1.9                    | 1.8                   | .853 |
| Partner became pregnant                       | 43.0                   | 46.6                  | .194 | 46.6                   | 52.1                  | .022 |
| Numbers studied                               | 1013                   | 481                   | 571 | 1826                   |                     |     |

[Percentages concern the proportion of men in the LOC category who had the history]
In bold are P values of P < .05.

during their first 5 years of life (Nowicki, Iles-Caven, Gregory, Ellis, & Golding, 2017a) and (2) the number of teacher-rated emotional and behavioral difficulties when children were 9 and 11 years old (Nowicki, Iles-Caven, Gregory, Ellis, & Golding, 2017b).

The design of the ALSPAC study and the data set it produced not only allowed us to examine various combinations of pre- and post-test scores associated with parent prenatal LOC and child outcomes but also (1) to gather heretofore nonexistent normative data regarding the nature and stability of the spouses’ LOC within their dyads prior to their child’s birth and 6 years later, as well as (2) to obtain indicators of the stability of adult male and female LOC scores from before a child was born to a time 6 years later. We know of no other study that has obtained extensive normative LOC information from a large and representative population of adult women and men who were in a relationship with one another over time.

Our results favor the similarity prediction (Byrne, 1969), but just barely. Correlations were positive but low at both testing times. While mothers and their partners tend to share a similar LOC perspective, it is only that, a tendency, and the reality is that for most parent dyads, various LOC combinations exist. To examine associations that might arise from different combinations with child outcomes, Nowicki et al. (2017a) created four combinations of prenatal LOC; internal/external; mother internal/father external; mother external/father internal; and external/external. They found that as externality increased in the parental dyad so did associations with negative children’s adjustment outcomes.

4.2. Associations with stability and change in LOC over six years

Moderate positive correlations between pre- and post-test scores indicate that many individuals were changing their LOC orientation over time. We predicted and found that LOC changes, especially toward externality, were associated with lifestyle, social, and stressful event variables. What is clear from the findings is that greater stress and less stability in personal relationships, health, and financial matters are related to remaining or becoming external for both mothers and their partners. In terms of relationships perhaps none are more important than the one between the parents themselves. Externality was associated with stressful spousal issues in the relationship including physical or emotional abuse of one another or other indicators of relationship failure such as divorce, trouble with the law or rejection of the child. Although mothers had more relationship stressors associated with externality than their partners, the direction of the association was the same. Besides their own relationship difficulties being related to externality, both parents indicated that “arguing with family and
friends” added to the potential to remain or become external. If mothers and their partners didn’t get along then an inability to relate to family and friends would probably increase the likelihood of being associated with feelings of externality.

The importance of the spousal relationship was further substantiated by the finding that living together or living apart was related to stability and change in LOC. External mothers were more likely to move toward internality if they had a live-in partner in contrast to prenatally internal mothers who, if they did not have a live-in partner, moved toward externality; the same association was found for mothers’ partners as well.

Financial matters and “work” were also associated with externality for both mothers and their partners. For mothers, externality was associated with “having major financial problems” and “not going back to work” while for men it was “losing a job”, “reduction of income”, and “partner starting new job”. “Work” may be especially important for men’s LOC as suggested by the finding that “starting a new job” was the only event associated with internality for them.

Illness was associated with LOC differently for mothers and their partners. For men, “having been very ill himself” was significantly related to externality while for women “having a partner who was very ill” was associated with internality. In this regard, it is noteworthy that the four events endorsed by women who stayed internal (having had a partner who was very ill; having had a partner who had problems at work; having to go back to work herself; and having problems at work) involved problems in their spousal and work relationships. Perhaps meeting challenges and responding successfully to them facilitated internality in women. Unfortunately, we do not have access to what exactly the problems were or what the women thought, felt and did while experiencing them, but we might learn much from interviewing such women to obtain this information.

Lifestyle differences were also related to LOC stability and change. Clearly, smoking was a significant marker of externality in the ALSPAC population. As smoking increased so did externality. While we cannot establish cause and effect with our design, the fact that smoking is associated with externality and externality in turn is associated with negative outcomes in personality, health, achievement, and adjustment is understated by the importance of LOC, yet we have learned little from them about true stability and/or change of LOC over time or what is associated with change when it occurs. The present study provides data to begin to better understand LOC, although it is important to note the paternal attrition over time. We found that: (1) LOC in parent dyads is correlated in a low, positive manner; (2) adult LOC is moderately correlated across time; (3) women become more internal from pregnancy to motherhood, whereas their partners become slightly more external; and (4) greater stress especially in relationships, finances, and health, is associated with increasing externality. Future designs need to build in techniques to gather information that would allow for the assessment of the short-term changes that may have been obscured by adaptation/habituation processes over a 6-year span. In this way we can gather additional information to help us to eventually identify variables that may be linked to change in LOC orientations. Hopefully our findings will help to elucidate the role of stressors in the development of internal and external LOC and bring us closer to being able to construct intervention programs to foster the development of appropriate internality, especially in expectant parents.

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Conflicts of interest

None
