Research paper

Maternal psychological distress and child decision-making

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ABSTRACT

Background: There is much research to suggest that maternal psychological distress is associated with many adverse outcomes in children. This study examined, for the first time, if it is related to children's affective decision-making.

Methods: Using data from 12,080 families of the Millennium Cohort Study, we modelled the effect of trajectories of maternal psychological distress in early-to-middle childhood (3–11 years) on child affective decision-making, measured with a gambling task at age 11.

Results: Latent class analysis showed four longitudinal types of maternal psychological distress (chronically high, consistently low, moderate-accelerating and moderate-decelerating). Maternal distress typology predicted decision-making but only in girls. Specifically, compared to girls growing up in families with never-distressed mothers, those exposed to chronically high maternal psychological distress showed more risk-taking, bet more and exhibited poorer risk-adjustment, even after correction for confounding. Most of these effects on girls' decision-making were not robust to additional controls for concurrent internalising and externalising problems, but chronically high maternal psychological distress was associated positively with risk-taking even after this adjustment. Importantly, this association was similar for those who had reached puberty and those who had not.

Limitations: Given the study design, causality cannot be inferred. Therefore, we cannot propose that treating chronic maternal psychological distress will reduce decision-making pathology in young females.

Conclusions: Our study suggests that young daughters of chronically distressed mothers tend to be particularly reckless decision-makers.

1. Introduction

There is much research to suggest that maternal psychological distress is associated with many adverse outcomes in children (Choe et al., 2013; Ciciolla et al., 2014) This study examines, for the first time, if it is related to children's affective decision-making. Usually measured with gambling tasks, affective decision-making (henceforth decision-making) is associated with clinical diagnoses in both adults (Buelow and Suhr, 2009) and youth (Sonuga-Barke et al., 2016), but also with youth risky behaviours (such as smoking, alcohol and drug use) and internalising and externalising problems. In general, poor decision-making reflecting reward-hyposensitivity and diminished reward-seeking is related to internalising problems (Rawal et al., 2013). Poor decision-making, as reflected in enhanced responses to rewarding outcomes and deficits in the activity of motivational circuitry during anticipation of rewards, is generally related to externalising behaviours (Ernst et al., 2003). Although it differs by gender (Hooper et al., 2004), decision-making, if impaired, is associated with adverse outcomes in both boys and girls.

Although there is no research into the role of maternal (or paternal) psychological distress in offspring decision-making, there is some into the role of parental depressive symptomatology or parental depression. As far as we are aware, there are three studies, all with adolescents (Rawal et al., 2014; Qu et al., 2016) or late adolescents (aged 16–20 years; Mannie et al., 2015), that have explored this. These studies generally suggest that parental depression or depressive symptomatology causes impaired decision-making in offspring but disagree over whether it increases or reduces risk-taking, the aspect of decision-making that is of interest to probably all the social and behavioural sciences. Two of these three studies have explored associations between exposure to parental depression or depressive symptoms and offspring risk-taking, but one suggests that such an exposure leads to diminished risk-taking in late adolescence (Mannie et al., 2015) and the other that it leads to increased risk-taking in middle adolescence (Qu et al., 2016). The impetus for the present investigation was to shed light into the link between parental psychological distress and offspring risk-taking in

childhood, but also to examine the role of parental psychological distress in child decision-making in general. An important improvement over the previous studies was that, by using longitudinal data, it could explore prospectively the role of the timing and pattern of exposure to parental symptoms.

2. Method

2.1. Sample

The sample was drawn from the Millennium Cohort Study (MCS), a population-based longitudinal birth cohort study of children born in the UK over 12 months from 1 September 2000. MCS children were around 9 months old at Sweep 1, and around 3, 5, 7 and 11 years old at Sweep 2, 3, 4 and 5, respectively. MCS was designed to over-represent families living in areas of high child poverty, areas with high proportions of ethnic minority populations across England, and the three smaller UK countries. Parent-reported data were collected through interviews and self-completion questionnaires. Ethical approval was gained from NHS Multi-Centre Ethics Committees, and parents gave informed consent before interviews took place. At Sweep 1, 18,522 families participated in MCS. The numbers of productive families at Sweeps 2, 3, 4 and 5 were 15,590, 15,246, 13,857 and 13,287 respectively. In all, 19,244 families participated in MCS. MCS has data on maternal psychological distress in all families at all sweeps, and on child decision-making at Sweep 5. The study's analytic sample was children (singletons and first-born twins or triplets) whose mothers had valid data on psychological distress in at least one of Sweeps 2–5 and with at least one valid measure of child decision-making at Sweep 5 (N = 12,080, of whom 6053 were male). We excluded Sweep 1 as maternal psychological distress was measured differently at the beginning of MCS.

2.2. Measures

Decision-making was assessed with the Cambridge Gambling Task (CGT; Rogers et al., 1999), which measures decision-making under risk, at age 11 years. The task was administered in the homes of cohort members as part of the main interview. The standard software which administers the procedure was integrated into the computer-assisted personal interview (CAPI) scripts. Responses were recorded using in-built touchscreens on interviewers' CAPI machines. All interviewers were provided with scripts to read out while demonstrating the test to cohort members. On each CGT trial, participants are presented with a row of ten boxes across the top of the screen, of which some are red and some are blue. At the bottom of the screen are rectangles containing the words 'Red' and 'Blue'. Participants must guess whether a yellow token is hidden in a red box or a blue box. The task consists of five stages, each of which is a block of trials. In the first, decision-only stage, participants simply have to guess whether the token is hidden under a red or blue box. The latter four stages are gambling stages. Following the colour decision, participants can bet a proportion of their points (from an initial 100 on each stage) on their confidence in the location of the yellow token. Two of the gambling stages are practice sessions undertaken prior to a test session, so that participants' performance is ultimately assessed by the two test gambling stages. In the gambling stages, participants start with a number of points displayed on the screen and select a proportion of these points, displayed in either rising or falling order, in a second box on the screen to gamble on their confidence in this judgement. A stake box on the screen displays the current amount of the bet. Participants are informed that correct bets will be added onto their points score (and incorrect ones will be taken away) and that they should try to win as many points as possible. The task produces six outcome measures, all of which were examined in this study. One, *risk-taking,* is of particular interest, as explained above. Risk-taking is the mean proportion of points bet on trials where the most likely outcome was chosen. The remaining five are: *quality of*

decision-making, deliberation time, risk adjustment, delay aversion and *overall proportion bet.* Quality of decision-making is the mean proportion of trials where the participant selects the correct colour outcome. Deliberation time is the mean time (in milliseconds) taken to make a box colour response. Risk adjustment is the extent to which betting behaviour is moderated by the ratio of boxes, and reflects the tendency to stake higher bets on favourable compared to unfavourable trials. Delay aversion is the difference in percentage bet in ascending versus descending conditions. Overall proportion bet is the mean proportion of points bet across all trials. The CGT is not normed in children although previous studies have used it with both high-risk (Rawal et al., 2013) and clinical (DeVito et al., 2008; Sorensen et al., 2016) child populations.

Maternal psychological distress was measured at children's ages 3, 5, 7 and 11 years with the Kessler K6, a 6-item screener of psychological distress with robust psychometric qualities (Kessler et al., 2003). The K6 was developed with support from the U.S. Government's National Centre for Health Statistics for use in the redesigned U.S. National Health Interview Survey. The scale was designed to be sensitive around the threshold for the clinically significant range of the distribution of nonspecific distress in an effort to maximise the ability to discriminate cases of serious mental illness from non-cases. The K6 is included in many national surveys both in the U.S. and elsewhere as a tool to identify those with serious mental illness (about 5–8% of the population). A score of 13+ on the K6 (when its items are scored 0–4) signals the presence of serious mental illness. More information on the K6 and its psychometric properties is available at: https://www.hcp.med. harvard.edu/ncs/k6_scales.php.

To minimise confounding we included important correlates of psychological distress in mothers (Evans et al., 2005) and child decision-making as *covariates* in the regression models. These were maternal age at the beginning of the study period (Sweep 2), child ethnicity (white, black, Indian, Pakistani/Bangladeshi, mixed and other), number of children in the household, maternal education (university degree or not) by the end of the study period (Sweep 5), number of family disruptions (family-status changes) throughout the study period (Sweeps 2–5), and number of sweeps in poverty (below the poverty line, defined as 60% of the UK median household income) throughout the study period.

2.3. Analytic approach

To explore how psychological distress may develop over time, we fitted a latent class model in Mplus. In latent class analysis, longitudinal trajectories are unknown but can be inferred from patterns of responses on observed indicators (in this case, maternal psychological distress scores) measured over time. Latent class analysis can summarise these patterns by creating longitudinal profiles in a parsimonious way (Nagin and Tremblay, 2005). We used the full information maximum likelihood method, which is naturally incorporated into the generalised latent variable modelling framework to estimate parameters and standard errors from the available data, under the assumption that missingness is at random given the variables in the model and that the models are correctly specified. To determine whether the identified maternal trajectories predicted later child outcomes, decision-making at age 11 years was regressed on the trajectory membership variables and the covariates in linear regression models using SPSS. All regression models were stratified by gender in view of the gender differences in decision-making. Attrition/non-response and survey design were taken into account by using weights. In the linear regression models in SPSS, we used the Complex Samples General Linear Model module to account for this weighting. In general, there was little missingness. We had no missingness in the main and response variables, given that the analytic sample was those with valid data on both. Missingness was 0–9% in most of the covariates, with two exceptions: number of sweeps in poverty (18%) and number of family-status changes (20%).