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Research Paper

Parental monitoring longitudinally associates with reduced risk of adolescent mental health problems

Tim Cadman^{a,*}, Elise Paul^b, Iryna Culpin^{b,c}, Hannah Sallis^b, Helen Bould^b, Rebecca Pearson^{b,c}

^a Section of Epidemiology, University of Copenhagen, Øster Farimagsgade 5, Copenhagen K DK-1353, Denmark

^b Centre for Academic Mental Health, Population Health Sciences, Bristol Medical School, University of Bristol, Oakfield House, Bristol BS8 2BN, United Kingdom

^c Department of Psychology, Manchester Metropolitan University, Manchester M15 6BH, United Kingdom



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ABSTRACT

Introduction: Prior research examining the impact of parenting on adolescent mental health has been limited by the use of cross-sectional designs and small or clinical samples.

Methods: We used data ($N = 6,212$) from the Avon Longitudinal Study of Parents and Children, a UK-based birth cohort study.

Results: We found longitudinal evidence that parental monitoring in late childhood/early adolescence (ages 9.5–13.5), but not the emotional quality of the parent-child relationship, reduces the likelihood of offspring major depressive disorder (Odds Ratio (OR) = 0.64, 95% Confidence Interval (CI) = 0.56 – 0.76), anxiety disorder (OR = 0.60, 95% CI = 0.53 – 0.69), and self-harm (OR = 0.65, 95% CI = 0.57 – 0.75) at age 18. Associations did not vary according to adolescent sex.

Discussion: Findings indicate that parenting monitoring may be important for later adolescent mental health. Future research is needed to understand why this aspect of parenting is associated with better adolescent outcomes.

1. Introduction

Mental health problems in adolescence such as depression, anxiety and self-harm are significant public health concerns and a leading cause of disability worldwide (Deighton et al., 2019; Merikangas et al., 2009). The prevalence of depression and anxiety disorders in children and adolescents has been steadily rising (Collishaw, 2015; Twenge et al., 2017), further aggravated by the Covid-19 pandemic (Ma et al., 2021). In Great Britain, recent evidence suggests that in 2020 potentially one in six people aged 5 to 16 years had a diagnosable mental health disorder, up from one in nine in 2017 (Sadler et al., 2018). In addition, one study reported a rise in the incidence of non-fatal self-harm in adolescent girls by 68% between 2011 and 2014 (increase from 45.9 per 10 000 in 2011 to 77.0 per 10 000 in 2014), but no changes were seen for boys in this study (Morgan et al., 2017).

Mental health difficulties in adolescence are associated with a number of adverse outcomes, including ill health (Murray et al., 2012), early mortality (Maughan et al., 2014), increased risk of suicide (Balázs et al., 2013), and long-term psychosocial problems (Clayborne et al., 2019), with the majority of adolescents experiencing these disorders

again in adulthood (Patton et al., 2014). It is vital therefore to identify potentially modifiable protective factors to reduce the burden of mental health problems experienced in adolescence.

A key source of potential to support mental health in adolescence is the parent-adolescent relationship (Pinquart, 2017b, 2017a; Yap et al., 2014). Whilst some aspects of parenting are relevant throughout development, as the child nears adolescence parental knowledge of the child's whereabouts and activities may help the child safely transition to more independently navigating education, peer relationships, and free time. Parental monitoring describes parents' knowledge of adolescents' whereabouts, peer relationships, social and school activities (Stattin and Kerr, 2000). It also reflects whether the adolescent will come to their parent for support and share information. Thus, any protective mechanism may reflect a sense of trust and safety that comes with appropriate levels of involvement. The emotional quality of the parent-child relationships also influences adolescent mental health throughout life. Parent-child relationships characterised by high levels of conflict and low levels of shared positive affect have been linked with a variety of negative adolescent outcomes, including depression and anxiety (Pinquart, 2017a; Yap et al., 2014) and self-harm (Arbuthnott and Lewis,

* Corresponding author.

E-mail address: tica@sund.ku.dk (T. Cadman).

2015; Victor et al., 2019).

In cross-sectional research, high rates of observed parental expressed negative emotion and low rates of expressed positive emotion were associated with symptoms of adolescent depression (Messer and Gross, 1995; Sheeber et al., 2007). Parent expressed positive regard towards the child, and pleasant parent-child relationships (characterised by high expressed positive regard towards the child and pleasant interactions) are associated with lower reported adolescent depressive but not anxiety symptoms in longitudinal research (Yap et al., 2014).

Less parental monitoring has been linked with a variety of negative child and adolescent outcomes, including substance misuse (Villarreal and Nelson, 2018), suicidal ideation (Boyas et al., 2019) and self-injury (Victor et al., 2019). A meta-analysis found that higher levels of parental monitoring are cross-sectionally associated with lower levels of adolescent depressive symptoms (Yap et al., 2014). However, evidence for a link between parental monitoring and other forms of psychopathology is mixed. In terms of anxiety, one study reported that higher monitoring was associated with lower anxious symptoms, whilst three studies reported that more monitoring was associated with more anxious symptoms (Yap et al., 2014). Findings from studies of parental monitoring and adolescent self-harm have also been inconsistent. In longitudinal (Victor et al., 2019) and cross-sectional (Swahn et al., 2012) studies, adolescent-reported parental monitoring was associated with reduced likelihood of self-injury, but only in bivariate models suggesting other factors may also be important.

A possible explanation of inconsistency in findings is that the relationship between monitoring and adolescent mental health differs according to the attributes of the sample and outcomes assessed. For example, there is some evidence that associations differ by adolescent sex, with one longitudinal study reporting that the relationship between parental monitoring and adolescent depressive symptoms was specific to girls (Hamza and Willoughby, 2011). There is also evidence that the impact of parenting on adolescent internalising problems such as depressive and anxious symptoms may also be stronger in clinical compared to population-based samples (Pinquart, 2017a), which may not be representative of those in the general population, highlighting the need for more population based research to understand whether parental monitoring could have universal prevention potential. To our knowledge, no study has examined parental monitoring as a risk factor for later depression or anxiety diagnoses.

Overall, research to date suggests that parental monitoring and the emotional quality of the parent-child relationships could be associated with adolescent depression, anxiety and self-harm. However, with few exceptions (Hamza and Willoughby, 2011; Victor et al., 2019), most of this work has been cross-sectional which limits our understanding of temporal sequence, is prone to recall bias and has not accounted for a range of early life covariates including genetic risk with may influence both parenting and mental health risk. It is important to separate the role of parenting in adolescents from alternative pathways, in order to understand the potential power of targeting parenting support in interventions.

1.1. Objective

Thus the aim of this paper is to address the gaps in previous work on the relationships between two domains of parenting (monitoring and the emotional quality of the parent-child relationships), with anxiety, depression, and self-harm in a large UK-based birth cohort. We build upon prior research by using a longitudinal design, examining diagnoses of adolescent depression and anxiety, rather than symptoms, and by accounting for maternal mental health and utilising a population-based rather than a clinical sample. We also improve on the measurement of parenting by including both observational measures and parent and child reports, as well as by modelling latent factors which reduce measurement error (Fornell and Larcker, 1981). Neuroticism is a trait which increases risk for depression and anxiety (Calvete et al., 2016), and may

also increase the likelihood of less or more parental monitoring (for example, more neurotic adolescents may be more sensitive and defensive to parental involvement and withdraw, or they may require more attention due to sensitivity). To account for this potential genetic vulnerability, we include controls for children's polygenic scores (PGS) for neuroticism.

2. Methods

2.1. Study design

The sample comprised participants from the Avon Longitudinal Study of Parents and Children (ALSPAC), an ongoing population-based study. The study website contains details of all data available through a fully searchable data dictionary and variable search tool (<http://www.bristol.ac.uk/alspac/researchers/our-data/>). In total, 14,451 pregnant mothers residing in the former Avon Health Authority in the south-west of England with expected dates of delivery between 1 April 1991 and 31 December 1992 were initially enrolled in the study. These pregnancies resulted in 14 062 live births, of which 13 998 were alive at 1 year of age. For further details on the cohort profile, representativeness, and phases of recruitment, see (Boyd et al., 2013; Fraser et al., 2013; Northstone et al., 2019).

2.2. Study sample

Non-missing data were available on all parenting items for 3078 participants, all mental health outcomes for 4560 participants, and all confounders for 4666 participants. Overall, complete data for all measures across exposure, outcome and confounding variables were available for 1462 participants. However, we were able to include those with partial data by using surrounding measures of exposure and outcome data to predict missing data in imputation models. Therefore, the total sample used was ($n = 6212$), including those participants with non-missing polygenic risk-score data, non-missing data on at least one parenting questionnaire at any time, and one measure of offspring depression at any age up to age 24.

2.3. Measures

Development of parenting factors at time 1 (T1). Fifty-nine parenting items were extracted from child-report and maternal-report questionnaires and observer rated measures administered from ages 9.5–13.5. A full list of items can be found in the online supplement (eTable 1). The first parenting factor, "Emotional Quality" consisted of 11 items; three from child reports, three from mother reports and five from observer ratings. An exemplar child item in this factor was "parent is easy to talk to", and an example of a parent item was "child refuses to do what they don't want to do". Five items were drawn from observer ratings of the parent-child relationships from a video-recorded Etch-a-sketch task when children were aged 12.5 (e.g. parent criticism, harmony of parent-child interaction).

The second parenting factor was Parental Monitoring, which comprised adolescent-reported items from Stattin and Kerr's Parenting Practices Scale (Stattin and Kerr, 2000). The 24-item scale was administered to adolescents when they were aged 12.5 and 13.5 (total of 48 items). The questionnaire was designed to capture four aspects of monitoring: parental solicitation (6 items), parental control (3 items), adolescent disclosure (6 items), and parental knowledge (9 items). Parental solicitation assessed how often the parents ask the adolescent about unsupervised time, for instance "During the past month, how often have your parents initiated a conversation with you about your free time?". The parental control scale measured the way in which parents set boundaries and rules regarding the adolescent's activities. An example of an item is "Must you have your parents' permission before you go out during the weeknights?". Adolescent disclosure

measured adolescents' voluntary and spontaneous revelations to their parents about friends, activities (e.g. "Do you spontaneously tell your parents about your friends (which friends you hang out with and how they think and feel about various things?"). Parental knowledge concerns the knowledge that parents have on the adolescents' activities, friends, and whereabouts, for example "Do your parents know what you do during your free time?".

Mental health outcomes at adolescent age 18 (time 2 [T2]). Predicted depression and anxiety diagnoses in the past month, and self-harm within the past year age 18 were assessed via a self-administered computerized version of the Clinical Interview Schedule – Revised (CIS-R) (Lewis, 1994). This interview assesses symptoms across multiple domains, and computer algorithms are used to identify current psychiatric disorders according to ICD-10 diagnostic criteria. This computerized version demonstrates good agreement with interviewer assessment (Lewis, 1994). Three binary outcomes were derived indicating whether the participant had (i) at least one of four anxiety disorders (generalised anxiety disorder, panic, agoraphobia or social phobia), (ii) self-harmed in the past year, and (iii) met ICD-10 criteria for Major Depressive Disorder (MDD).

Confounders. All models were adjusted on a priori grounds for the following socio-demographic and family factors previously linked with both parental monitoring and child mental health problems: child sex, child age, parental age at child birth (years), parental drinking in period of pregnancy (yes/no), parental depression during the postnatal period taken as the average score on the Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987) measured at 2 months and 8 months postpartum as used in previous studies (Stein et al., 2010), smoking in pregnancy (yes/no) and mothers' self-report of inter-parental conflict using the Conflict Tactics Scale, Partner-Partner (Straus et al., 1996).

Child polygenic scores for neuroticism. Genotyped data were available on 8237 children and 8196 mothers in the ALSPAC study. Full details of genotyping procedures can be found in the supplementary materials. Of the 116 independent variants previously found to be associated with neuroticism (Luciano et al., 2018), 109 were available in ALSPAC. Weighted PGS for neuroticism were calculated for each child with genetic data. For each variant, the number of copies of the effect allele carried by an individual (this ranged from 0 to 2) was multiplied by the effect estimate identified in the original genome-wide association study (GWAS). These were summed across all variants and the weighted sum scores were then standardised prior to use in analyses.

2.4. Statistical analyses

Missing data were imputed for all study variables using multiple chained equations for participants who met inclusion criteria outlined above. The imputation model contained all study variables and additional variables known to be predictors of missingness. A comparison of the unimputed and imputed samples is available online in eTable 2. Estimates from 20 imputed datasets were combined using Rubin's rules with the MICE package in R 3.53 (Van Buuren and Groothuis-Oudshoorn, 2011).

Confirmatory factor analysis (CFA) was used to model two broad parenting constructs in late childhood and early adolescence: Parental Monitoring and Emotional Quality. Each item was specified to load on its assigned factor and factors were allowed to correlate. Additional correlations were specified between the residuals of items which were measured on the same questionnaire. Items with standardised loadings > 0.10 were retained. Models were estimated using robust weighted least squares (WLSMV) (Brown and Moore, 2012) using the Lavaan package in R 3.53 (Rosseel, 2012). The meaning of the factors was evaluated based on the questions loading on each factor and the direction of the loadings.

Separate logistic regression models were estimated with depression, anxiety and self-harm as the outcomes and the parenting factors as predictors. Unadjusted and adjusted models were estimated. The

unadjusted models included both parenting factors, whilst adjusted models also included confounders as specified above. As child sex was strongly associated with mental health outcomes, we repeated analyses stratified by child sex.

3. Results

A little over half of the adolescents in the sample were female (51.0%), 15.3% met criteria for MDD, 14.9% for an anxiety disorder, and 20.6% had self-harmed in the past year.

3.1. Latent factor model of T1 parenting behaviours

A two-factor model (Emotional Quality, Parental Monitoring) showed good fit according to two fit statistics (CFI = 0.94, TLI = 0.93) and borderline acceptable fit based on other statistics (RMSEA = 0.17, SRMR = 0.14). Emotional Quality and Parental Monitoring were moderately correlated ($r = 0.58$, 95% CIs 0.54, 0.63), and item loadings ranged from +/- 0.04 to 0.96 (eTable 2, available online). Internal consistency of both factors was good (Emotional Quality: $\alpha = 0.74$; Parental Monitoring: $\alpha = 0.96$). We also tried fitting a five-factor model containing the Emotional Quality factor and the four monitoring subscales. However, the fit of this model was very similar to the 2-factor model (eTable 3) and correlations between the four monitoring factors were high (eTable 4). We therefore retained the more parsimonious two-factor model for the remainder of the analysis.

3.2. Associations between T1 parenting and T2 offspring mental health

Next, we examined associations between T1 parenting and T2 mental health (Table 1). There was some evidence for an association between Emotional Quality and MDD (OR = 0.88; 95% CI = 0.74–1.04), but weaker evidence for anxiety disorder and self-harm with the associations with MDD close to null (anxiety disorder OR = 1.01; 95% CI = 0.85–1.22; self-harm OR = 0.99; 95% CI 0.85–1.17). For all outcomes, higher levels of Parental Monitoring were associated with lower odds of adolescent mental health problems after controlling for confounders (OR MDD = 0.65; 95% CI = 0.56 to 0.76; OR anxiety disorder = 0.60; 95% CI = 0.53–0.69; OR self-harm = 0.65; 95% CI = 0.57–0.75).

Due to the strong relationship between sex and all mental health outcomes we repeated the analyses stratified by sex (eTables 5–10, available online). There were minimal differences in the magnitude of associations between parenting factors and outcomes in males and

Table 1
Age 18 adolescent mental health outcomes predicted by T1 parenting (N = 6212).

	Unadjusted model Odds ratio (95% CI)	p-value	Adjusted model Odds ratio (95% CI)	p-value
Major Depressive Disorder				
Emotional Quality	0.87 (0.73–1.02)	.15	0.88 (0.74–1.04)	.19
Parental Monitoring	0.64 (0.55–0.75)	<0.001	0.65 (0.56–0.76)	<0.001
Anxiety Disorder				
Emotional Quality	1.00 (0.83–1.20)	.99	1.01 (0.85–1.22)	.90
Parental Monitoring	0.59 (0.52–0.68)	<0.001	0.60 (0.53–0.69)	<0.001
Self-harm				
Emotional Quality	0.99 (0.85–1.16)	.93	0.99 (0.85–1.17)	.95
Parental Monitoring	0.66 (0.58–0.75)	<0.001	0.65 (0.57–0.75)	<0.001

Note: Adjusted model included both parenting constructs and all confounding variables.

females (OR range for Emotional Quality with outcomes: 0.86 to 1.04; OR range for Parental Monitoring with outcomes: 0.55 to 0.68). Complete case analyses showed a similar pattern of results, but with less precision, as indicated by the wider confidence intervals (e.g., Parental Monitoring on MDD: OR = 0.77; 95% CI = 0.55–1.08) (eTables 11–13, available online).

4. Discussion

In this population-based cohort study we examined the prospective relationship between two aspects of parenting and adolescent mental health: the Emotional Quality of the parent-child relationships and Parental Monitoring. We found evidence that higher levels of parental monitoring in late childhood and early adolescence were associated with lower likelihood of MDD, anxiety and self-harm in late adolescence after adjusting for known confounders. Adolescent sex was strongly related to all three outcomes, but there were minimal sex differences in associations between parenting constructs and adolescent mental health.

There are a number of potential mechanisms by which parental monitoring may reduce the risk of depression, anxiety and self-harm. Firstly, from a practical perspective parents who are more involved in and know more about their children's problems may be better able to offer support and help. Parents who are more involved in their child's lives could also be in a better position to facilitate professional help-seeking once mental health problems have arisen. Future research could examine how monitoring is related to referrals to mental health services or accessing support from schools. Secondly, parents' expressed concern and interest in their child's activities and whereabouts may lead to an internalised sense of care and attention which may in turn, reduce the likelihood of developing the emotional insecurity and low self-esteem which contribute to risk of depression, anxiety and self-harm (Fröjd et al., 2007). Our measure of monitoring also included items on child disclosure and could therefore reflect parent-child relationships which are more trusting, open, communicative and non-judgemental, allowing the child to disclose difficult thoughts and feelings. Trust is a key component in a healthy parent-adolescent relationship. In a longitudinal analysis using the same UK-based cohort as the present study Pesola and colleagues (Pesola et al., 2015) examined four subconstructs of parental monitoring (Stattin and Kerr, 2000) and found that parental control (e.g. boundary setting) and active solicitation assessed at child age 14 reduced the impact of having delinquent friends on harmful alcohol use at age 19, but child disclosure and parental knowledge did not. Emotional quality as measured here was not associated with mental health outcomes in adolescents, which may suggest that promoting monitoring and involvement rather than emotional quality (which is more complex and subjective especially at this age) would be more successful in preventative interventions. Further work however, should explore how emotional quality and support is perceived at this age.

This study had a number of strengths. We had a large sample which gave power to detect associations, and we were able to mitigate bias due to attrition through multiple imputation (Stattin and Kerr, 2000; Taylor et al., 2018). We were able to control for many potential confounders including neuroticism PRS, as we hypothesised that maternal state neuroticism could be causally related to monitoring and child mental health problems. Notwithstanding this, our study had various limitations. First, as collection of follow-up data took place in 2009–10 the applicability of the study to current adolescent mental health may be limited; however we have little theoretical reason to believe that the relationship between parental monitoring and adolescent mental health would have substantially changed over the past 12 years. Another limitation of this study is unmeasured confounding, i.e., that factors not measured in this study are associated with both monitoring and offspring mental health problems. However, there is evidence from experimental studies showing that parenting programs which target monitoring as an aspect of family functioning can prevent or reduce adolescent substance misuse, externalising behaviours, and unsafe sexual behaviours (Pantini

et al., 2009). For example, the Familias Unidas program promoted parental investment in their adolescents through parent group discussions, activities with adolescent's peers and school counsellors over a nine-month period (Pantini et al., 2003). Another intervention program which targets parental monitoring has also been successful in reducing adolescent alcohol misuse (Schinke et al., 2009), which suggest that this aspect of parenting can be changed and has a causal association with adolescent outcomes. Despite its potential importance, there are few existing prevention and intervention programs for adolescent depression which specifically target parental monitoring (Restifo and Bögels, 2009). Our finding that parental monitoring is associated with positive mental health outcomes, along with this experimental evidence suggests that monitoring could be an important target for intervention. Future RCTs could test whether interventions to improve parental monitoring in adolescence are effective at improving later mental health outcomes.

In conclusion, adolescents whose parents had more closely monitored and were also more aware of their whereabouts and activities in late childhood and early adolescence were less likely to meet diagnostic criteria for major depression and anxiety disorder, as well as engage in self-harm at age 18. This could suggest that intervention strategies facilitating appropriate parental monitoring and encouraging parent-child trust are potential candidates to prevent depression and anxiety.

Ethical standards

Ethical approval for the study was obtained from the ALSPAC Ethics and Law Committee and the Local Research Ethics Committees. Consent for biological samples has been collected in accordance with the Human Tissue Act (2004). Informed consent for the use of data collected via questionnaires and clinics was obtained from participants following the recommendations of the ALSPAC Ethics and Law Committee at the time.

Contributors

RP and TC designed the study. RP funded the study. Data were analysed by TC. EP & TC drafted the manuscript with input from all authors. All authors approved the final version of the manuscript. All authors had full access to and verified the data.

Role of the funding source

The funders had no role in the study design; in the collection, analysis, and interpretation of data; in the writing of the report; or in the decision to submit the paper for publication. All researchers listed as authors are independent from the funders and all final decisions about the research were taken by the investigators and were unrestricted. All authors had full access to the data and had final responsibility for the decision to submit for publication.

Declaration of Competing Interest

The authors have no interests to declare.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.jadr.2022.100420](https://doi.org/10.1016/j.jadr.2022.100420).

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