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## Parents' nonstandard work schedules and parents' perception of adolescent social and emotional wellbeing

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### Abstract

**Objective:** We investigated the association between joint parents' work schedules and parent-reported adolescent mental health and test parental time for adolescents and parenting style as mediators.

**Background:** Increasing evidence shows that parents' evening/night/irregular work schedules have a negative impact on children's physical and mental health. Few studies examine adolescents and joint parental work schedules.

**Method:** We analysed one wave of the Australian Raine Study data, focusing on adolescents who were followed up at ages 16-17 and lived in dual earner-households (N=607). Adolescent mental health was measured in the Child Behavioural Checklist (morbidty, internalising behaviour, externalising behaviour, anxiety/depression). Parental work schedules were defined as: both parents work standard daytime schedules (reference), both parents work evening/night/irregular shifts; fathers work evening/night/irregular shifts – mothers day schedules, mothers work evening/night/irregular shifts – fathers daytime schedules. We estimated a linear regression model with robust standard errors and log transformation of the dependent variables.

**Results:** Compared to the reference group, when one or both parents worked evening/night/irregular schedules, there was a significant increase in parent-reported total morbidty, externalizing behaviour and anxiety/depression in adolescents. Fathers' only evening/night/irregular schedules was associated with a significant increase in parent-reported total morbidty and externalizing behaviour. Inconsistent parenting partially mediated this association. Mothers' only evening/night/irregular schedules was not significantly associated with parent-reported adolescent mental health.

**Conclusion:** Our findings underscore the importance of fathers' work-family balance with implications for adolescent mental health.

**Key words:** evening/nights/irregular shifts, parental joint work schedules, adolescent mental health, social and emotional wellbeing, the Raine Study



## 1. Introduction

Under rapid social, economic, and technological transformations and globalization, we work increasingly longer hours (Messenger, 2018) and nonstandard work schedules (referring to a majority of work hours falling outside a typical Monday to Friday daytime schedule). In most existing studies and data collections nonstandard schedules refer to evenings, nights, rotating shifts (i.e., alternating between day, evening, or night shifts, but on a fixed schedule), irregular or split shifts, casual hours and regular weekend work (Li et al., 2014). Research to date has documented a high prevalence of nonstandard work schedules among all employees in developed economies. For example, in Australia, based on the nationally representative household panel data HILDA, about 26 percent of Australian workers regularly worked schedules other than a regular daytime schedule in 2013, excluding weekends (Dockery et al., 2016). Among families with adolescents aged 15-20, 27.9 percent had at least one parent working nonstandard schedules from 2001 to 2013. Across 28 European countries, 19.6 percent of the employees regularly work evenings or nights and 26.3 percent regularly work on weekends (Eurostat, 2019). The prevalence of working unsociable schedules among parents with children under age 15 is even higher: In 2015, between 34 and 42 percent of parents with a child under age 15 work evenings, nights, rotating or split shifts, or on weekends (Gracia et al., 2021). The prevalence is likely much higher in dual-earner households with dependent children and adolescents, as parents maximize their time with children while working by doing “tag-team” parenting (Barnett & Gareis, 2007)

Extensive evidence has shown that working evening and night shifts has a detrimental impact on workers’ health (Kantermann et al., 2010; Moreno et al., 2019), and emerging research demonstrates that this impact can extend to workers’ children (Li et al., 2014). These children have an increased risk of social and emotional problems, a negative impact shown to be partially mediated through poor parental mental health (Strazdins et al., 2006), low quality parenting (Han et al., 2010; Kaiser et al., 2019; Rosenbaum & Morett, 2009) and reduced parent-child interaction (Han et al. 2010).

Despite consistent evidence for negative effects of parents’ nonstandard work schedules on young children (Grzywacz et al., 2016; Han, 2020; Kaiser et al., 2019; Li et al., 2014; Li et al., 2020), relatively few studies have examined the association between such work schedules and adolescent mental health (Dockery et al., 2009; Dockery et al., 2016; Han et al., 2010; Han & Miller, 2009). This is despite the fact that adolescents are at greater risk of anxiety and depression than young children (Andersen & Teicher, 2008), have a high incidence of suicide (Andersen & Teicher, 2008) and engage in more risk-taking behaviour (e.g., excessive alcohol consumption and substance use) (Squeglia et al., 2009). Adolescence represents a critical developmental stage where extensive neurobiological, psychological, and physical changes continue to take place (Pokhrel et al., 2013; Squeglia et al., 2009), while at the same time adolescents face significant challenges related to developing social and sexual identity, making school-to-school and school-to-work transitions, forming intimate relationships, and dealing with peer pressures (Lawrence, 2005). Hence adolescents still need a great deal of support from parents.

Over 80 percent of adolescents live in two-parent families in Australia (Australian Bureau of Statistics, 2019), and it is important to consider the work schedules of both parents. Few studies have examined the interaction between fathers’ and mothers’ nonstandard work schedules (Han, 2020; Kaiser et al., 2019). The degree to which the work schedules of both parents in dual-earner families overlap has important implications for parental relationships, the division of household labour, and parental participation in children’s activities, all of which may influence children’s health and developmental outcomes. None of the four previous studies on the association between parental work schedules and adolescent mental health have considered the interaction between fathers’ and mothers’ work schedules (Dockery et al., 2009; Dockery et al., 2016; Han et al., 2010; Han & Miller 2009). In this study we used data for families residing in Western Australia to examine the association between joint parental work schedules and mental health of adolescents as reported by parents and by adolescents and test the hypotheses that parental time spent with adolescents and parenting style mediate this association.

## 2. Theoretical background

Our study is motivated by two theoretical perspectives: the family and community resource framework (Brooks-Gunn et al., 1995; Kendall & Li, 2005) and work-family conflict theory (Bakker et al., 2008;

Greenhaus & Beutell, 1985). Brooks-Gunn and colleagues (1995) identified four categories of intra-familial resources that are important for optimal child development: income, time, human capital, and psychological capital (e.g., parents' mental health). Parents' nonstandard work schedules can influence children's wellbeing through these familial resources. For example, stress, fatigue and sleep deprivation associated with working nonstandard work schedules likely diminish the amount and quality of time parents spend with their children and also lower the quality of parenting and interaction with children. Previous studies have found that working nonstandard schedules is generally associated with less time spent with children (Connelly & Kimmel, 2011; Rapoport & Le Bourdais, 2008) and that reduced child-parent interaction and closeness underpin the link between parents' nonstandard work schedules and increased risk for social and emotional problems in American children (Han et al., 2010; Han & Miller, 2009; Rosenbaum & Morett, 2009).

Depressive symptoms in parents have been found to partially mediate the negative impact of nonstandard work schedules on Canadian children's mental health (Strazdins et al., 2006). One plausible explanation for this mediation effect is that depressed parents may be less engaged with children or interact with children with less affection and closeness. Working nonstandard work schedules has been linked to insensitive and harsh parenting practices (Grzywacz et al., 2011). This suggests that the time parents spend with their children and the way they interact with their children (parenting behaviour) both play a significant role in the association between nonstandard work schedules and child or adolescent health. Previous research has shown that both mothers' and fathers' evening/night work schedules are associated with an increase in children's externalizing and internalizing behaviour and harsh and strict parenting in part mediated this association (Kaiser et al., 2019).

Work-family conflict occurs due to time, energy, and behavioural constraints and a psychological carryover of strains from work to family life (Greenhaus & Beutell, 1985) or vice versa. A poor fit between work and family life can cause stress (Barnett et al., 2008; Davis et al., 2008; Liu et al., 2011), which in turn leads to negative child outcomes (Van den Eynde et al., 2020). Working nonstandard schedules increases the risk of work-family conflict by negatively impacting workers' mental and physical health and reducing their capacity to cope with both work and family demands (Dhaini et al., 2018; Moreno et al., 2019). Experience of work-family conflict can also negatively impact the time parents spend with children and parenting behaviour, which in turn may negatively influence adolescent social emotional wellbeing. Hence, even though we do not test work-family conflict per se as a mechanism due to the limitations of our dataset, this factor is useful for exploring other potential mechanisms underpinning the link between nonstandard work schedules and adolescent wellbeing.

To summarise the theoretical and empirical literature discussed above, time parents spend with their children and parent-child interaction (parenting behaviour and parenting styles) are important predictors for child and adolescent social emotional wellbeing. Parents' nonstandard work schedules can reduce the time spent with children and lower the quality of parenting, thus in turn negatively impacting child and adolescent social and emotional wellbeing. Nonstandard work schedules can also indirectly diminish parental time for children and reduce parenting quality through work-family conflict and mental health issues (e.g., stress) associated with working such schedules. This suggests that parental time spent with children and parenting style are two plausible mediators linking nonstandard work schedules to lower social and emotional wellbeing in adolescents.

### 3. Methods

#### 3.1 *Study sample*

We analysed data from the Raine Study, a prospective cohort study of 2,868 live births followed from 18 weeks gestation. More detailed information on the Raine Study recruitment and method has been documented elsewhere (Newnham et al., 1993). The primary caregiver (mostly mother) and the child were followed up at birth, and at ages one, two, three, five, eight, 10, 14, 17, 20, 22, and 27 years. The Raine Study represents the broader Western Australian population at every wave (Straker et al., 2017), and the Raine Study protocol was approved by the Human Research Ethics Committees at King Edward Memorial Hospital and Princess Margaret Hospital for Children in Perth.

This study used only data from the ninth follow-up, when the children were aged 16-17 years, because this is the only follow-up when information on parent work schedule was collected. Like any existing cohort studies, the Raine Study has considerable attritions across various waves, for example, parents' participation rate is 91.2 percent (N=2422) at the first follow-up, before gradually dropping to 64.3 percent (N=1419) at the ninth follow-up. For children, the participation rate is 92.2 percent (N=2440) at the first follow-up versus 59.6 percent (N=1709) at the ninth follow-up. As we are interested in joint parental work schedules and its association with adolescent mental health, our study sample consisted of 662 participants (adolescent children) living in both-parent families where both parents were working. The final effective sample for multivariate models included 607 adolescents with no missing data on the outcome variables, main predictors and co-variables.

## 4. Measures

### 4.1 *Dependent variables*

Adolescent mental health was measured by the Child Behavioral Checklist (CBCL), developed by Achenbach (Achenbach & Edelbrock, 1991). The CBCL is intended to measure variability in child and adolescent behaviour in a nonclinical population. It has demonstrated good test-retest reliability, good sensitivity (83 percent overall), and reasonable specificity (67 percent overall) (Zubrick et al., 1997). We analysed: total morbidity, internalizing behaviour, externalizing behaviour, and anxiety and depression. Adolescents and their primary caregivers answered the CBCL questionnaires from which these four scores were derived. We analysed both sets of scores: parent-reported and adolescent-reported.

Three commonly reported variations on CBCL scores are: raw scores, t-scores, and z-scores, with raw scores and t-scores available in the Raine Study dataset. Raw scores are the unadjusted scores from the CBCL questionnaires included in the Raine Study. Achenbach (Achenbach & Edelbrock, 1991) recommends using raw scores because they are often "more precise and uniform than t-scores" at the high end of the distribution (Achenbach & Edelbrock, 1991: 190). T-scores are age standardized scores with mean 50 and standard deviation 10. This score is recommended if gender differences are not controlled for, or if respondent age differences are non-trivial. This study met neither of these criteria. We controlled for gender and our sample has a narrow age range within 1-2 years. Additionally, the t-scores for externalizing and internalizing behaviours have been truncated at 50 such that t-score values below 50 are computed as 50 (Achenbach & Edelbrock, 1991: 190). This reduces variation at the low end of the distribution, which would have been an unnecessary drawback for our analysis. The z-scores are standardised with mean 0 and standard deviation 1. On the one hand they reduce variation by collapsing point-based scores into a much smaller scale, but on the other hand they are useful for comparing scores between different groups or populations and they are also useful for comparing effect sizes of the main predictors on CBCL scores across subdomains with different distributions within the same population (total morbidity, internalizing and externalising, and anxiety/depression). We followed Achenbach's recommendation and analysed raw scores in our analysis and we also analysed the Z scores to obtain standardised coefficients for comparing the effects of nonstandard work on CBCL scores across subdomains.

### 4.2 *Independent variables*

The Raine Study used the same questions about work schedules and work days as those used in the Household, Income and Labour Dynamics in Australia (HILDA) (Watson, 2010). The parents in the Raine Study were asked whether they worked the following schedules on their main job at the time of survey: a) a regular daytime schedule; b) a regular evening shift; c) a regular night shift; d) rotating shifts (changes from days to evenings to nights); e) split shifts (two distinct periods each day); f) on call; g) irregular schedules; h) other. We defined nonstandard work schedules as regular evening and night shifts, rotating and split shifts, on call, irregular and other types of irregular schedules (b through h); and regular daytime schedule (a) as the standard work schedules (reference group). The main predictor variable described the joint work schedules for the main job of both parents and was coded as a categorical variable: both parents worked regular daytime schedules (reference); both parents worked nonstandard schedules; only fathers worked

nonstandard schedules; only mothers worked nonstandard schedules. For the last two categories, the other parent worked regular daytime shifts. We also specified models using a dichotomous predictor variable, with 1 = one or both parents worked nonstandard schedule, and 0 = neither parent worked nonstandard schedule. The collapsed, dichotomous work schedule variable helps to maximize statistical power, as some of the nonstandard work schedule categories have small cells, potentially obscuring observable direct and mediation effects.

### 4.3 Mediating variables

We examined two plausible mediators that link parents' nonstandard work schedules to adolescents' mental health: parental time spent with adolescents on weekends and parenting style (inconsistent and nurturing parenting). These variables were non-interval ordinal indicators, which are not suitable for summation. Thus, we tested each of these items individually. The questions on the two parenting styles were answered by adolescents. The parenting style scale was drawn from the Lempers Parenting Questionnaire, with Cronbach's alpha of 0.80 and good construct validity (Lempers et al., 1989). We tested the two parenting style indicators by taking the mean rather than the sum of the numeric value of each item (between 0 and 3) because both parenting scales had different numbers of items.

Table 1: Hypothesized mediators

<b>Inconsistent parenting</b>	Never	Sometimes	Often	Very often
Parent soon forgets a rule they have made	0	1	2	3
Parent nags about little things	0	1	2	3
Parent threatens punishment more often than they use it	0	1	2	3
Parent threatens or hit child	0	1	2	3
Parent enforces rules only when it suits them	0	1	2	3
Parent enforces rules only depending on their mood	0	1	2	3
<b>Nurturing parenting</b>				
Parent smiles at child	0	1	2	3
Parent praises child	0	1	2	3
Parent tells child they appreciate them	0	1	2	3
Parent speaks of good things child does	0	1	2	3
Parent seems proud of child	0	1	2	3
<b>Parent time with adolescents on weekend</b>	None / < 1 hour / 1-6 / 6-10 / 11-20 hours			

Source: Source for parent time with adolescents: The Raine Study Data: The Gen2-17 years follow-up. Source for parenting styles: Lempers et al. 1989

### 4.4 Co-variates

We controlled for mothers' education, mothers' ethnicity, and both parents' occupations as previous research has shown that these variables are associated with both adolescent mental health (British Medical Association, 2006) and working nonstandard work schedules (McMenamin, 2007; Presser, 2003), thus potentially confounding the effect of parental nonstandard work schedules on adolescent mental health. Due to a large number of missing observations for fathers' education, only mothers' education was controlled for, as a categorical variable indicating highest completed educational qualification: none or primary (reference), secondary education including trade/vocational schooling, and tertiary education (university and higher). These categories represent three meaningful levels of credentials for employment in the Australian labour market. Parents' occupation was coded as: Manager, professional, paraprofessional, clerical or sales, trade, plant operator or labourer. Family income was not included as a control due to some

missing cases and potential multicollinearity (a sensitivity test controlling for family income is provided in the [Online Appendix](#), Table S2). Maternal ethnicity was a dichotomous indicator (Caucasian vs other). Parent work hours were also controlled for because long working hours of fathers have been shown to affect child behavioural problems (Johnson et al., 2013) and long work hours may spread to evenings, nights or weekends. We also controlled for maternal age, child gender, child birth weight, and substance use in the household. Maternal age at birth was coded as: 14-24 (reference), 25-29, 30-34, and 35 or older. Child gender and substance use were dichotomous indicators.

#### 4.5 Analytic strategy

We used a linear regression model to analyse the association between parents' nonstandard work schedules and parent-reported and adolescent-reported CBCL raw scores for total morbidity, internalizing and externalizing behaviours, and anxiety-depression. As the CBCL scores were skewed and kurtotic ([Online Appendix](#), Figures S1-S2), we first tested for heteroskedasticity of residuals using the Breusch-Pagan test (Breusch & Pagan, 1979). The test indicated heteroskedasticity. To address this problem, we used a log-transformation of the CBCL scores. The Breusch-Pagan test was re-run using the log-transformed CBCL scores and the normality assumption was met for total morbidity, internalizing and externalizing scores, but heteroskedasticity to some extent remained for anxiety/depression. Thus, we used Huber-White robust standard errors for analysing log-transformed anxiety/depression scores.

#### 4.6 Mediation analysis

The mediation analysis proceeded along three steps: 1) testing for possible mediation effect; 2) estimating the effect sizes; and 3) estimating confidence intervals. First, we tested for initial evidence of mediation effect (Baron & Kenny, 1986) by estimating linear regression models including all covariates, with and without each mediator. The initial evidence of mediation is a reduction of the effect size or statistical significance of the effect of parent work schedule on CBCL scores when the mediator is included, compared with the model excluding the mediator. Only for mediators that showed this initial evidence of mediation, we estimated the magnitude of the indirect, direct, and total effects using the general linear modelling approach to estimating mediation effects in models with a categorical independent variable (Preacher & Hayes, 2008). This approach is operationalised in STATA using a combination of linear regression and non-linear estimation tools.

Using these STATA tools, we estimated mediation effect sizes with our two predictor variables: the four categories of joint parent work schedule variable and the dichotomous parent work schedule variable as described above. To estimate confidence intervals and significance levels for these effects, we used the resampling method of bootstrapping with bias-corrected confidence intervals (Hayes, 2013), with 1000 iterations. This is the most robust approach as it minimizes downward bias in mediation effect estimation (Hayes & Scharkow, 2013).

#### 4.7 Post-hoc analysis

We tested for an association between parent work schedule at age 16/17 and child behavioural outcomes at age 13/14 to address the possibility of a reverse causal relationship: child behavioural problems leading to parent nonstandard work schedules.

## 5. Results

### 5.1 CBCL scores

For parent-reported CBCL scores, the mean score for total morbidity is much higher than those for externalizing behaviour, internalizing behaviour, and anxiety/depression which has the lowest mean value

(Table 2). Parent-reported CBCL scores are highly skewed towards the low end of the scale for total and all three subdomain scores, whereas adolescent-reported CBCL scores ([Online Appendix](#), Figures S1-S2) are much less skewed for internalizing behaviour and anxiety-depression with a wider range, and moreover the scores for total morbidity and externalizing behaviour show almost a normal distribution. These differences suggest that parents might be unaware of some mental health issues confronting their adolescent children.

## 5.2 Sample characteristics

Fifty percent of adolescents had at least one parent who worked a nonstandard work schedule (evening, night, rotating, irregular, variable, on-call, or weekends). In the total sample, 11 percent of adolescents lived in households with both the mother and father working nonstandard work schedules, 22 percent with only the mother working a nonstandard work schedule, and about 17 percent with only the father working such schedules. Mothers on average worked 15 hours per week less than fathers did, but mothers spent considerably more time with their adolescent children on weekends than fathers (71 percent of mothers spent 1-6 hours versus about 52 percent of fathers who did so). The sample of adolescents was slightly overrepresented by boys (about 53 percent boys versus 47 percent girls). In about 10 percent of the households, illicit drug use by a family member was reported.

*Table 2:* Descriptive statistics for all analysed variables for the study population (two-parent families with working parent(s))

	n = 662	%	Mean (SD)	Min	Max
Parent-reported raw CBCL scores	645	97.43			
Missing (for total score and all subdomains)	17	2.57			
Total score	645		11.60 (12.71)	0	85
Externalizing behaviour score	645		4.20 (5.66)	0	34
Internalizing behaviour score	645		3.73 (4.68)	0	32
Anxiety depression score	645		1.71 (2.60)	0	18
Adolescent birthweight (in grams)	661	99.85	3361.34 (550.77)	1020	5185
Missing	1	0.15			
Father's work hours	658		45.53 (12.82)	5	100
Missing	4	0.60			
Mother's work hours	660		30.35 (13.67)	2	100
Missing	2	0.30			
Dichotomous parent work schedules	662				
Both parents – standard	331	50.00			
One or both parents – nonstandard	331	50.00			
Categorical parent work schedules	662				
Both parents – standard	331	50.00			
Both parents – nonstandard	73	11.03			
Father – nonstandard/Mother – standard	114	17.22			
Mother – nonstandard/Father – standard	144	21.75			
Gender	662				
Girl	314	47.43			
Boy	348	52.57			
Illegal drug use in home – total	661				
No	598	90.47			
Yes	63	9.53			
Missing	1	0.15			



Table 2: Descriptive statistics for all analysed variables for the study population (two-parent families with working parent(s) (continued)

	n = 662	%	Mean (SD)	Min	Max
Mother's age at 18 weeks pregnancy	662				
14 – 24	110	16.62			
25 – 29	203	30.66			
30 – 34	233	35.20			
35 or over	116	17.52			
Mother's race	662				
Caucasian	610	92.15			
Other	52	7.85			
Mother's education	634				
Primary	101	15.93			
Secondary	324	51.10			
Tertiary	200	32.97			
Missing	28				
Manager or professional	248	37.46			
Paraprofessional, clerical, or sales	368	55.59			
Trade, plant operator, or labourer	46	6.95			
Father's occupation	657				
Manager	107	16.29			
Professional	200	30.44			
Paraprofessional, clerical, or sales	160	24.35			
Trade	105	15.98			
Plant operator or labourer	85	12.94			
Missing	5	0.76			
Time mother spent with adolescent on weekends	662				
None	5	0.76			
< 1 hour	60	9.06			
1 – 6 hours	470	71.00			
6 – 10 hours	100	15.11			
11 – 20 hours	21	3.17			
Missing	6	0.91			
Time father spent with adolescent on weekends	662				
None	27	4.08			
< 1 hour	81	12.24			
1 – 6 hours	343	51.81			
6 – 10 hours	66	9.97			
11 – 20 hours	14	2.11			
Missing	131	19.79			
Nurturing parenting (scale)	662				
Valid	539	81.42	1.97 (0.76)	0	3
Missing	123	18.58			
Inconsistent parenting (scale)	662				
Valid	537	81.12	1.14 (0.57)	0	3
Missing	125	18.88			

Source: The Raine Study: The Gen2-17 years follow-up.

### 5.3 Association between nonstandard work schedules and parent-reported CBCL scores

Table 3 shows standardized coefficients for the main independent variables and co-variates. Having one or both parents working nonstandard schedules was associated with higher scores for total morbidity, externalizing and anxiety/depression, and internalizing to a lesser extent. When breaking down the dichotomy of nonstandard schedule into four categories reflecting joint parent work schedules, we observed that: 1) having both parents working nonstandard schedules was associated with higher CBCL scores, but this association was only marginally significant for anxiety/depression; 2) fathers' nonstandard work schedules combined with mothers' standard schedules were associated with higher scores for total morbidity and externalizing behaviour, and to lesser extent anxiety/depression; 3) these associations were

independent of parents' total work hours, maternal education and both parents' occupation, and adolescent birth weight and gender. Mothers' nonstandard work schedules with fathers' standard schedules were not significantly associated with adolescent CBCL scores. It should be noted that these estimated outcomes are based on parent-reported CBCL scores and thus reflect parents' perception, rather than the true status of their adolescents' mental health.

Additionally, mothers' total number of work hours per week was associated with higher total and externalizing scores, boys had lower scores than girls for internalizing behaviour and anxiety/depression, and illicit drug use in the household was associated with a higher score for total morbidity and externalizing behaviour. Older maternal age at 18 weeks pregnancy ( $\geq 30$  years) was associated with lower externalizing score. In further analysis we examined possible interactions between adolescent gender and nonstandard work schedules but the results were not significant.

Table 3: Multivariate linear regression analysis of log-transformed CBCL Z-scores (parent-reported), N = 607

	Total score b (SE) <sup>1</sup>	Externalizing score b (SE)	Internalizing score b (SE)	Anxiety/ depression score b (SE)
Parent work schedules (dichotomous) <sup>2</sup>				
Both parents – standard (ref.)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
One or both parents – nonstandard	0.189*** (0.077)	0.161** (0.064)	0.112* (0.073)	0.138** (0.063)
Parent work schedules (multi-categorical)				
Both parents – standard (ref.)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Both parents – nonstandard	0.160 (0.131)	0.163 (0.109)	0.147 (0.124)	0.182* (0.108)
Father – nonstandard / Mother – standard	0.320*** (0.108)	0.264*** (0.090)	0.152 (0.102)	0.146* (0.089)
Mother – nonstandard / Father – standard	0.102 (0.098)	0.081 (0.082)	0.066 (0.093)	0.11 (0.081)
Fathers' work hours	-0.005 (0.003)	-0.002 (0.003)	-0.004 (0.003)	-0.001 (0.002)
Mothers' work hours	0.005* (0.003)	0.005** (0.002)	0.003 (0.003)	0.001 (0.002)
Gender (boy)	-0.007 (0.078)	0.078 (0.065)	-0.242*** (0.074)	-0.224*** (0.064)
Adolescent birthweight	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Illicit drug use in the home	0.309** (0.129)	0.294*** (0.113)	0.134 (0.122)	0.173 (0.106)
Mother's age at 18 weeks pregnancy				
14 – 24 (ref.)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
25 – 29	-0.044 (0.120)	-0.060 (0.010)	-0.095 (0.133)	-0.069 (0.098)
30 – 34	-0.171 (-.120)	-0.205** (0.010)	-0.175 (0.114)	-0.118 (0.099)
35 or over	-0.146 (0.134)	-0.228** (0.112)	-0.073 (0.127)	-0.085 (0.110)
Mother's race	0.068 (0.144)	0.037 (0.122)	-0.046 (0.136)	0.019 (0.118)
Mother's education				
Primary education (ref.)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Secondary	-0.121 (0.113)	-0.119 (0.094)	-0.094 (0.107)	-0.101 (0.092)
Tertiary	-0.117 (0.136)	-0.134 (0.113)	-0.102 (0.129)	-0.045 (0.112)
Mother's occupation				
Manager or professional (ref.)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Paraprofessional, clerical, or sales	0.060 (0.097)	0.017 (0.081)	0.08 (0.092)	0.052 (0.080)
Trade, plant operator, or labourer	-0.248 (0.170)	-0.180 (0.142)	-0.183 (0.161)	-0.157 (0.140)
Father's occupation				
Manager (ref.)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Professional	0.008 (0.120)	0.062 (0.010)	-0.089 (0.114)	-0.050 (0.098)
Paraprofessional, clerical, or sales	-0.003 (0.125)	-0.060 (0.104)	0.021 (0.119)	0.018 (0.103)
Trade	0.04 (0.137)	0.32 (0.114)	-0.78 (0.130)	-0.32 (0.112)
Plant operator or labourer	0.129 (0.149)	0.234* (0.125)	-0.030 (0.142)	-0.054 (0.123)
Constant	-0.606 (0.377)	-0.682** (0.315)	-0.153 (0.358)	-0.190 (0.310)
R <sup>2</sup>	0.057	0.080	0.052	0.051

Note: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

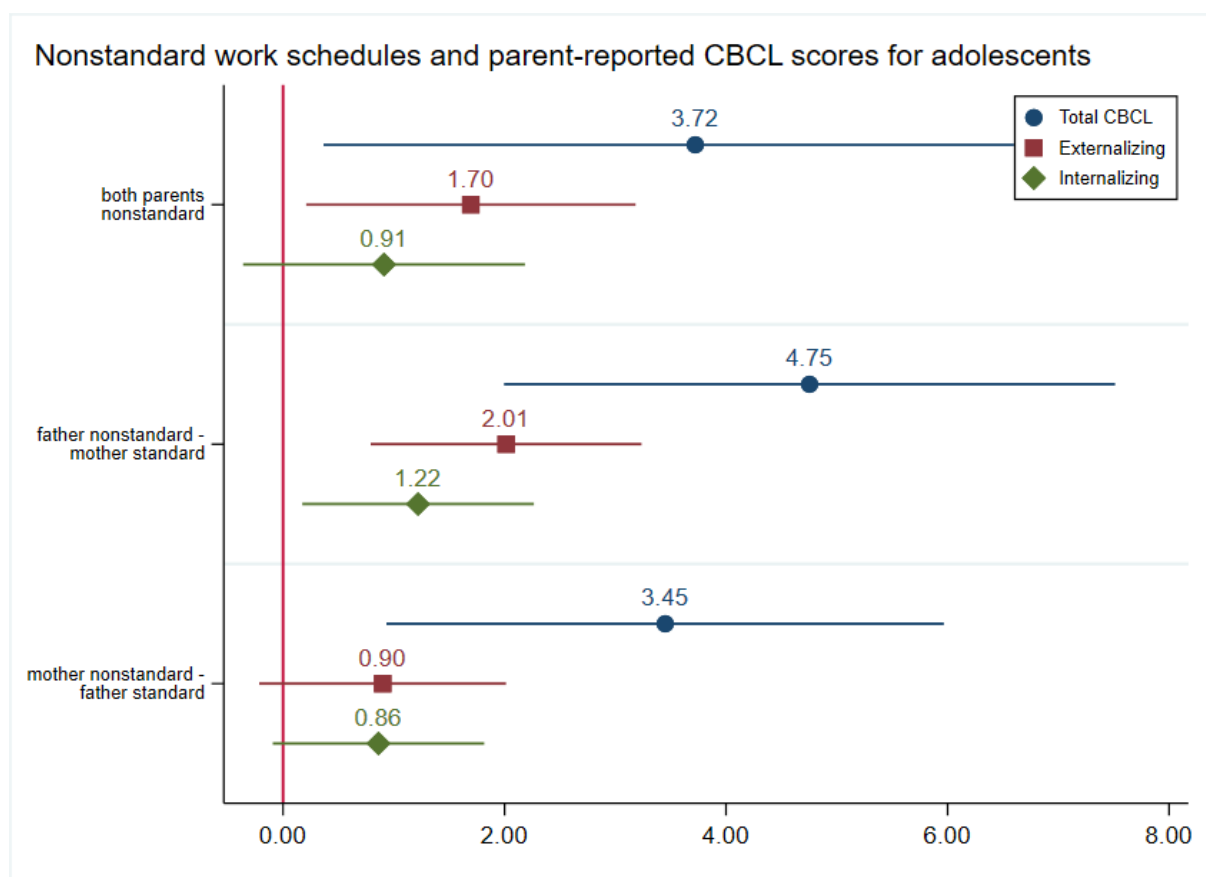
<sup>1</sup> Logged, standardized coefficients with standard errors in parentheses.

<sup>2</sup> Dichotomous indicator of parental work schedules was tested in separate models using the same set of control variables.

To facilitate the interpretation of the coefficients, presented in logged CBCL scores in Table 3, we back-transformed the outcome variables to the original raw CBCL scores. Figure 1 shows that, when both parents worked nonstandard schedules, the parent-reported total CBCL score increased by 3.72 points, the score for

externalizing behaviour by 1.7, and internalizing behaviour by 0.91. When only the father worked nonstandard schedules, there was an increase of 4.75 points for the total CBCL score, 2.01 for externalizing and 1.22 for internalizing scores. Nonstandard work schedules among mothers were associated with an increase of 3.45 points in total morbidity. While all these scores are continuous measures, they have different distributions (see ranges and standard deviations in Table 2). Thus, the effect sizes should not be directly compared across the CBCL scores in Figure 1.

Figure 1: Effects of parent nonstandard work schedules on parent-reported CBCL raw scores for adolescents



Source: The Raine Study: The Gen2-17 years follow-up.

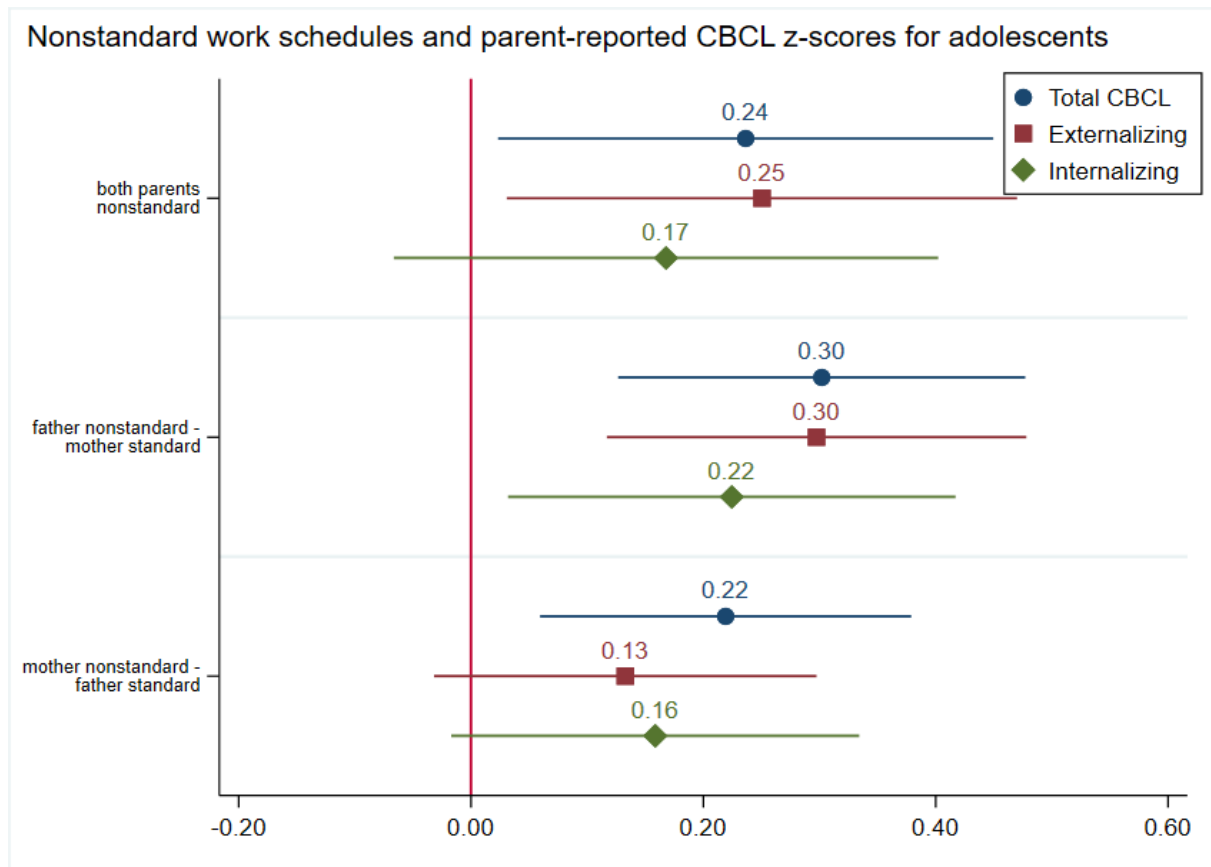
Figure 2 shows the magnitude of the effects of the nonstandard work schedules on standardized CBCL z-scores, which allows for direct comparisons of the effect size cross the four outcome variables. When both parents worked nonstandard schedules, there were similar increases in total and externalizing scores (0.24 and 0.25); when only the father worked nonstandard schedules, total and externalizing scores both increased by 0.30, and internalizing scores increased by 0.22; mothers' nonstandard work schedules led to an increase of 0.22 in total morbidity scores and smaller, insignificant increases in externalizing and internalizing scores.

#### 5.4 Mediation effects

In Table 3 we observed that fathers' nonstandard work schedules were significantly associated with higher total CBCL scores, giving us a basis for investigating mediation effects for this predictor variable. Table 4 shows the estimated mediation effects of inconsistent parenting on total CBCL scores: inconsistent parenting was associated with an increase in total CBCL scores ( $b=0.302$ ,  $p<0.01$ ) and it also partially mediated the effect of fathers' nonstandard work schedules on total morbidity ( $b=0.044$ ,  $p<0.05$ ).

None of the results from the mediation tests of parental time spent with adolescents were significant. When modelling with the dichotomous parent nonstandard work schedules predictor variable ([Online Appendix](#), Table S4), parental time spent with adolescents on weekends was associated with higher total and externalizing scores, but it did not mediate the effect of this indicator of nonstandard work schedules on the outcome variables. This suggests that the association between having one or both parents working nonstandard work schedules and all CBCL scores, observed in Table 3, are primarily direct effects.

Figure 2: Effects of parent nonstandard work schedules on parent-reported CBCL Z-scores for adolescents



Source: The Raine Study: The Gen2-17 years follow-up.

## 5.5 Robustness check

### 5.5.1 Reverse Causality

There was a significant correlation between parent-reported CBCL scores at the previous follow-up (age 13-14) and parent work schedules at age 16-17. However, the statistical significance of this correlation disappeared when we adjusted for the same socioeconomic and demographic co-variables as in the main models. Hence the likelihood of a reverse causal effect of child CBCL score on parents' nonstandard work schedules is unlikely.

### 5.5.2 Family income as a confounder

We controlled for maternal education and both parents' occupation status, which partially address possible confounding by income. In further analysis we re-ran all the models in Table 3 including family income in deciles as an additional control. The estimated effects of the main independent variables and co-variables remain large unchanged (see [Online Appendix](#), Table S2).

Table 4: Mediation effect of parenting on log-transformed Total CBCL Score (parent-reported) for fathers' nonstandard work schedule, N = 565

	Total CBCL Score (Bootstrap SEs)
<i>Inconsistent Parenting Style as mediator</i>	
Mother works nonstandard work schedule	
Direct effect <sup>1</sup>	-.036 (.134)
Indirect effect <sup>2</sup>	.009 (.020)
Father works nonstandard work schedule	
Direct effect	.291* (.127)
Indirect effect	.044* (.029)
Both parents work nonstandard work schedule	
Direct effect	.123 (.179)
Indirect effect	.038 (.029)
<i>Effect of inconsistent parenting on Total CBCL score<sup>3</sup></i>	<i>.302** (.057)</i>

Notes: Controls: Adolescent gender; mother's age at 18 weeks pregnancy; mother's race; mother's educational attainment; illicit drug use in the home; adolescent birthweight; mother's occupation; father's occupation; mother's work hours; father's work hours. Significance of indirect effects obtained from 95% bootstrap bias-corrected confidence intervals.

\*p<0.05, \*\*p<0.01, \*\*\* p<0.001

<sup>1</sup> Refers to direct effect of parents' nonstandard work schedules on adolescent CBCL scores, when the mediator was included in the model.

<sup>2</sup> Refers to indirect effect of parents' nonstandard work schedules on adolescent CBCL scores via inconsistent parenting. Note that direct effect and indirect effect sum to equal the total effect which is estimated in the multivariate models without the mediators (Table 3). However, since mediation effects were estimated in a model separate from the main models reported in Table 3, there is an infinitesimal difference between total effects as reported in Table 3 and the sum of direct and indirect effects reported here in Table 4.

<sup>3</sup> The intermediate step of establishing mediation.

## 5.6 Results based on adolescent-reported CBCL scores

Further analysis showed that adolescent-reported CBCL scores were not significantly associated with parental work schedules (Online Appendix, Table S3). However, the effect of some of the covariates was consistent with the models of parent-reported CBCL scores. Illicit drug use in the household showed a positive association with both externalizing behaviour and total scores. Being male was associated with a lower internalizing behaviour, anxiety/depression, and total morbidity scores. Mothers' work hours were associated with higher total CBCL and externalizing scores. Higher maternal education was associated with lower total scores and lower anxiety/depression.

## 6. Discussion

Our findings show that when one or both parents worked nonstandard schedules, there was a significant increase in the parent-reported scores for total morbidity, externalizing and anxiety/depression, and internalizing to a lesser extent, independent of the covariates. When analysing both parent work schedules as interactions, we found that fathers' nonstandard work schedules were associated with higher CBCL score for total morbidity and externalizing behaviour. When both parents worked nonstandard work schedules, there was also an increase in all CBCL scores as expected, but the effect did not reach statistical significance. Due to small subsample size (11 percent, or 73 parents), the lack of statistical significance ought to be interpreted with caution. The effect magnitude is equivalent to an increase 1/4 standard deviation of total and externalizing scores, which does not seem trivial. This warrants further investigation with a larger sample.

Mothers' nonstandard work schedules were not associated with significant increases in parent-reported adolescent CBCL scores. It is plausible that mothers working evening/night/irregular schedules during the week made up their time with adolescents on weekends. Parental time with adolescents was associated with lower total morbidity and externalizing scores (Online Appendix, Table S4). Mothers worked 15 hours less

per week on average but they spent more time with adolescents on weekends than fathers did (Table 2), lending plausibility to this interpretation.

Our findings further demonstrate that the effect of fathers' nonstandard work schedules on perceived adolescent mental health was partly mediated through inconsistent parenting on the part of the primary caregivers (mostly mothers). This suggests a spill-over effect of fathers' work schedules onto the parenting behaviour of mothers who worked standard schedules and in turn on parent perception of their adolescents' social and emotional wellbeing. Similar spill-over effects were also reported in a previous study of younger children in Germany (Kaiser et al., 2019): strict and harsh parenting on the part of mothers partially mediated the effect of fathers working in evenings and nights on child conduct problems and vice versa, with a stronger effect of fathers' evening/night schedules and parenting on child social and emotional outcomes. Our results show that the number of hours both parents spent with their adolescents were associated lower total and externalizing scores, but they did not mediate the effect of nonstandard work schedules on adolescent CBCL scores. The quality of time parents spend with children should be investigated in future research.

Our analysis did not show a significant association between parents' work schedules and adolescent-reported CBCL scores. The distributions of parent-reported and adolescent-reported CBCL scores differ considerably: parent-reported scores concentrated towards the lower end of the scale, indicating less severe behavioural morbidity, whereas the adolescent-reported scores stretched more towards the higher end of the scale, implicating more severe behavioural and emotional problems. There is no evidence that child-reported CBCL scores are more accurate than parent- and teacher-reported CBCL scores. The accuracy of reported child behavioural problems is determined by the saliency of behavioural problems to parents and children, and the willingness of both to report them (Karver, 2006). Our study suggests that the degree and types of behavioural morbidity may differ by parents' observation and adolescents' awareness of and willingness to report mental health issues they are faced with. Adolescents likely experience behavioural problems, such as binge drinking and experimenting with cigarettes and illicit drugs outside the home. Parents may not be aware of these problems. Such behavioural problems are more likely to be influenced by peer pressure than current parental work schedules. A longitudinal study of US adolescents (ages 13-14) showed that the number of years when mothers worked evening or night schedules was associated with increasing risk for drinking, smoking and drug use reported by the adolescents (Han et al., 2010). This suggests that longitudinal data are required in the future to understand the connection between joint parental nonstandard work schedules and more severe social and emotional problems in adolescents, such as risk-taking behaviours. However, we remain cautious about potential parents' bias in observing and reporting social and emotional difficulties in their adolescent children under our study. Parents working nonstandard schedules are less likely to have close interactions with their children (Han et al., 2010; Han & Miller 2009; Rosenbaum & Morett, 2009) due to stress and fatigue associated with working such schedules. This can lead to a tendency for parents to perceive their children's emotions, behaviours and changes in them as negative or problematic. Parental distress has been shown to influence parent-reported child mental health issues with either downward or upward bias (Hsueh & Yoshikawa, 2007; Sawyer et al., 1998). In light of these factors and the lack of association between parent work schedules and adolescent-reported CBCL scores, our main findings should be interpreted as evidence of the association between parents' nonstandard work schedules and parents' perception of their adolescent children's social and emotional wellbeing, but not evidence for a link between working nonstandard schedules and actual social and emotional problems in adolescents.

### *6.1 Limitations and strengths*

Our study has several limitations. First, the study was cross-sectional due to the fact that data on parents' work schedules were only collected at the follow up when children turned 16-17 years of age. Thus, the causal inference of parental nonstandard work schedules cannot be established from our findings. Second, the sample size for the analysis was generally small and the effect of parental nonstandard work schedules might have been underestimated, particularly for the category of both parents working nonstandard schedules which had a low prevalence (11 percent). Third, as our study was based on a selected sample of adolescents living in both-parent and dual-earner families, the findings cannot be generalized to adolescents living in other types of households including more traditional one-earner households and much less common none-earner families or one-parent families. However, dual-earner households (including two

full-time earners or one full time, one part time earner households) are becoming more common in Australia and other developed economies (OECD Family Database, 2022). In Australia and the vast majority of the OECD countries, more than 30 percent of the households with children ages 1-14 have two income earners in 2019. In this context, our results have significant implications.

Finally, the explanatory power of our models is very low, however it is not uncommon for models predicting psychological attributes, such as social and emotional wellbeing at individual-level, to have such low explanatory power. Factors influencing social and emotional wellbeing are many and highly complex, involving not only socioeconomic dimensions of the family environment, but also the psychological and biological characteristics of the parents and the adolescent. Our analysis simply demonstrates that one aspect of the socioeconomic environment, namely parents' working nonstandard schedules, matters for parents' perception of adolescent social and emotional wellbeing. Whether or not this effect may be confounded by some unobserved characteristics of the parents or adolescents, despite having taken adolescent birthweight (as a biomarker of physical and mental health issues) into consideration, warrants further investigation with longitudinal data.

The study also has several strengths. We have analysed the CBCL scores based on both parents' and adolescents' reports, as experts recommend using information from multiple informants when analysing behavioural problems to minimize bias (Karver, 2006; Salbach-Andrae et al., 2009). Moreover, with the limited data available, we have explored and analysed the data exhaustively. We examined both a binary indicator of work schedules and different categories of joint work schedules of both parents to reveal which combined work schedules were most strongly and negatively associated with adolescent mental wellbeing as perceived by parents; we also tested for mediation in a thorough manner and addressed possible reverse causality.

Previous studies have shown that joint parental work schedules matter for young children's emotional and behavioural problems or academic performance, with a stronger negative effect of paternal evening/night work schedules (Han, 2020; Kaiser et al. 2019). Our findings corroborate these previous studies on young children and demonstrate that joint work schedules in dual earner families are also important to adolescent children's social and emotional wellbeing as perceived by parents. Moreover, we show that fathers' nonstandard work schedules have a much more salient negative effect on their perception of adolescent children's social and emotional wellbeing, relative to mothers' nonstandard work schedules. The findings from our study thus underscore the importance of understanding work-family interface among fathers, and its connection to parents' perception of adolescent health and wellbeing. This also calls for further investigation of the link between fathers' work schedules and adolescent social and emotional wellbeing from adolescents' own point of view, using longitudinal data with larger samples. Current policy remains largely focused on mothers' working hours and schedules and research in this field continues to concentrate primarily on young children. This focus needs to be broadened to include fathers' work-family balance and its impact on adolescents in the future.

## Data availability statement

The analysis was based on the Raine Cohort Study data from the 9th follow-up, when the children were aged 16-17 years. For the sake of security and confidentiality, this data is only accessible to the researchers who have been granted the access through a formal application procedure. More detailed information on data access policies for the Raine Study data can be found through the link: <https://rainestudy.org.au/information-for-researchers/available-data/>.

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We declare that none of the authors has conflict of interest and all authors have approved the submission of the manuscript to the Journal of Family Research.

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## Information in German

### Deutscher Titel

Atypische Arbeitszeiten der Eltern und die Wahrnehmung des sozialen und emotionalen Wohlbefindens von Jugendlichen durch die Eltern

### Zusammenfassung

**Fragstellung:** Wir untersuchen den Zusammenhang zwischen den Arbeitszeiten der Eltern in Kombination und der von den Eltern berichteten psychischen Gesundheit von Jugendlichen und testen als mögliche Mediatoren die elterliche Zeit für Jugendliche sowie den Erziehungsstil.

**Hintergrund:** Es gibt immer mehr Belege dafür, dass die abendliche/nächtliche/unregelmäßige Arbeitszeit der Eltern einen negativen Einfluss auf die körperliche und psychische Gesundheit der Kinder hat. Nur wenige Studien befassen sich mit Jugendlichen in Zusammenhang mit den Arbeitszeiten der Eltern in Kombination.

**Methode:** Wir haben eine Kohorte der Raine-Studie (Westaustralien) analysiert und uns dabei auf Jugendliche konzentriert, die im Alter von 16 bis 17 Jahren nachbeobachtet wurden und in Doppelverdienerhaushalten lebten (N=607). Die psychische Gesundheit von Jugendlichen wurde anhand der Child Behavioural Checklist (Gesamtmorbidität, internalisierende und externalisierende Störungen, Angst/Depression) gemessen. Die Arbeitszeiten der Eltern wurden wie folgt definiert: beide Elternteile arbeiten tagsüber (Referenz), beide Elternteile arbeiten abends/nachts/unregelmäßig; Väter arbeiten abends/nachts/unregelmäßig - Mutter tagsüber, Mütter arbeiten abends/nachts/unregelmäßig - Vater tagsüber. Wir haben ein lineares Regressionsmodell mit robusten Standardfehlern und Log-Transformation der abhängigen Variablen geschätzt.

**Ergebnisse:** Im Vergleich zur Referenzgruppe war bei Jugendlichen, bei denen ein oder beide Elternteile abends/nachts/unregelmäßig arbeiteten, ein signifikanter Anstieg der von den Eltern berichteten Gesamtmorbidität, des externalisierenden Verhaltens und der Angst/Depression zu verzeichnen. Wenn Väter abends/nachts/unregelmäßig arbeiteten, war das mit einem signifikanten Anstieg der von den Eltern berichteten Gesamtmorbidität und des externalisierenden Verhaltens verbunden. Inkonsistente Elternschaft war teilweise ein Mediator für diesen Zusammenhang. Die abendlichen/nächtlichen/unregelmäßigen Arbeitszeiten der Mütter waren nicht signifikant mit der von den Eltern angegebenen psychischen Gesundheit der Jugendlichen verknüpft.

**Schlussfolgerung:** Unsere Ergebnisse unterstreichen die Bedeutung der Vereinbarkeit von Beruf und Familie für Väter, die sich auf die psychische Gesundheit von Jugendlichen auswirkt.

**Schlagwörter:** Abend-/Nacht-/unregelmäßige Schichten, Arbeitszeiten der Eltern in Kombination, psychische Gesundheit von Jugendlichen, soziales und emotionales Wohlbefinden, die Raine-Studie

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