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Mental health of young children after parental separation: the importance of living arrangements and coparenting quality.

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4 **Mental health of young children after parental separation: the importance of**
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7 **living arrangements and coparenting quality**
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Mental health of young children after parental separation: the importance of living arrangements and coparenting quality

ABSTRACT

Background. Parental separation has been associated with adverse child mental health outcomes in the literature. For school aged children, joint physical custody (JPC) i.e. spending equal time in both parents' homes after a divorce, has been associated with better health and wellbeing than single care arrangements. Preschool children's wellbeing in JPC is less studied. The aim of this study was to investigate the association of living arrangements and coparenting quality with mental health in preschool children after parental separation.

Methods. This cross-sectional population-based study includes 12,845 3-year-old children in Sweden. Mental health was measured by parental reports of the Strength and Difficulties Questionnaire (SDQ) and coparenting quality with a four item scale. The living arrangements of the 642 children in non-intact families were categorized into JPC, mostly with one parent and only with one parent.

Results. Linear regression models, adjusted for socio-demographic confounders, showed an association between increased mental health problems and living mostly with, and only with one parent ($B=1.21$; $CI=0.54-1.89$, and $B=1.01$; $CI=0.34-1.67$ respectively), while children in JPC versus intact families did not differ significantly in terms of mental health problems ($B=0.09$; $CI=-0.37-0.55$). Low coparenting quality was strongly associated with child

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3 mental health problems (B=2.05; CI=1.86-2.23). After adjusting the analysis for coparenting
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5 quality, differences in child mental health between living arrangements were minimal.
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8 **Conclusions.** This study suggests that coparenting quality, and not living arrangements
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10 per se, is a key determinant of mental health in preschool children in general and thus should
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12 be targeted in preventive interventions.
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15 **Key words.** Children, Divorce, Joint physical custody, Coparenting, Parental separation,
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17 Psychological problems
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23 **WHAT IS KNOWN ABOUT THIS SUBJECT:**

- 24 • Parental separation is an increasingly common experience of children in high-income countries.
- 25 • Joint physical custody, where children share their time about equally between their parents',
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27 has become an increasingly common living arrangement after parental separation.
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- 30 • There is a dearth of empirical studies of the consequences for mental health of joint physical
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32 custody in the preschool age.
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40 **WHAT THIS ADDS:**

- 41 • We found similar mental health in children in joint physical custody and intact families,
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43 while children living with one parent had more mental health problems.
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- 46 • Once we accounted for coparenting quality, child mental health in the diverse living
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48 arrangements was very similar.
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- 51 • Our results imply that coparenting could be targeted with interventions in families with
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53 young children, regardless of family type.
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INTRODUCTION

Around 35% of Swedish children experience parental separation before reaching the age of 18 years, and previous studies have shown that the experience of parental separation is associated with adverse mental health outcomes in the short as well as the long term (1, 2). During recent decades, parenting norms have changed in the Nordic countries, and sole custody among mothers has become less common than joint physical custody (JPC), where children share their time about equally between their parents' respective homes (3-5). In Sweden, approximately 10% of all school children live in JPC arrangements (3). JPC is also increasingly common even in countries with more conservative family values such as Germany and France (6, 7).

Living arrangements and child wellbeing

A growing body of research has shown that living arrangements and contact with both parents is associated with post-divorce child wellbeing (8). Most studies in the literature have suggested that school-aged children and adolescents in JPC fare better on several outcomes compared to children in single-parent arrangements (9, 10).

JPC arrangements among preschool children has been much less studied. In a recent Swedish study (11), 3- to 5-year-olds who lived in JPC had fewer mental health problems compared to those living in single-parent arrangements. Similar findings were reported in a Nordic study on children aged 2-9 years (12). Studies in contexts outside of the Nordic countries have shown similar but somewhat more diverse results (13-15). Pruett, Ebling (14) found that overnight stays with the second parent were associated with advantages in social functioning and fewer psychological problems among girls. However, McIntosh and Smyth (13) found that generally the 2- to 3-year-olds who spent 35% or more time with their second parent, experienced more problems compared to their peers who has less contact with their second parent. Tornello, Emery (15) did not find any association between custody

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3 arrangements in socially and economically disadvantaged families and psychological problems at age 3,
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5 but nonetheless found fewer problems among 5-year-old children who had JPC versus single-parent
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7 arrangements at age 3.
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10 **Coparenting quality and child wellbeing**

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13 High-quality coparenting has been found to contribute to a positive emotional family climate,
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15 and to affect child mental health and social adjustment positively (16). Children whose parents work
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17 well together in childrearing issues are typically better off during early childhood, adolescence, and
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19 adulthood (17). The association between coparenting quality and child wellbeing outcomes seems to be
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21 even stronger than other characteristics of parental relationships, such as intimacy and love (18).
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25 The lower levels of health and wellbeing observed among children with separated parents may,
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27 thus, hypothetically be linked to their parents' ability to amiably share the responsibilities of childrearing
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29 (19). It is important to highlight that coparenting quality is a broader construct than parental conflict.
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31 Not only does coparenting include positive measures, it is conceptually distinct from the quality of
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33 parental relationships because it directly involves the children (17).
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37 The aim of this study was to investigate whether mental health in 3-year-old children is
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39 associated with their living arrangements after a parental separation, and whether parental coparenting
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41 quality moderates this association.
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METHODS

Study population

The population of this study was sampled from a total population of 19,294 children in a defined geographical area in the Stockholm country, who were invited to a routine visit at the age of three years by the regional Preventive Child Health Care (PCHC) from December 2015 to May 2018. The PCHC is funded by regional taxes and their services are offered to all children who reside in the county free of charge. In the invitation letter, parents were informed about the study and that the survey would be used to individualise the visit at the PCHC. The letter included a web-link to the survey which was only available in Swedish. The study was approved by the Regional Ethical Review Board in Stockholm (Dnr 2015-228631).

In total, 13,493 surveys were submitted. Of these, 112 surveys were excluded because the participants had reported that they were the sole parent of the child since childbirth and 32 surveys were excluded because parents had completed the survey twice for the same child. We also excluded 504 surveys because they were completed by someone other than a parent or because information was missing on the main variables of interest. Thus, 12,845 children were included in the study, equivalent to a participation rate of 64.7% of the total population of 3-year-olds in the area.

Patient and Public involvement statement

Parents to children in the child health services in Stockholm were involved in the piloting phase of this study, where they provided feedback on questionnaires and the procedure in qualitative interviews and in a quantitative evaluation in writing. We do not plan to have parents involved in the dissemination of the results of the study.

Procedure

The survey included questions on sociodemographic background, children's development, behaviours and symptoms, parents' worries, and coparenting quality. Parents were encouraged to complete the survey together.

Measures

Outcome measure. The main outcome in the study was based on parental report of the Swedish version of the Strengths and Difficulties Questionnaire (SDQ) which has been successfully validated for preschool aged children (20). We used the total sum of scores from the four symptom subscales (SDQ Total Difficulties) ranging from 0 to 40.

Living arrangements. Living arrangement groups were based on parents' answers to the question "What does the child's family look like? The child lives with...". The options were: (a) intact family, (b) joint physical custody (about 50/50 in each parent's home), (c) living mostly with mother/father (collapsed here to living mostly with one parent), and (d) living only with mother/father (collapsed here to living only with one parent).

Coparenting quality. Coparenting was measured using a four-item scale inspired by the coparenting scale posited by McHale and Kuersten-Hogan (21). Parents were asked about their ability to cooperate, support each other, and confide in/trust each other, and the extent to which they experienced conflict related to their children. Items were rated on a 5-point scale from 1 (disagree completely) to 5 (agree completely). Higher scores indicated better coparenting. The scale showed good internal consistency (Cronbach's alpha = 0.79). Confirmatory factor analysis revealed an acceptable fit for the one factor model: comparative fit index (CFI) = 0.99; Tucker-Lewis index (TLI) = 0.98; root mean square error of approximation (RMSEA) = 0.066 (90% confidence interval = 0.056 – 0.076).

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3 The coparenting scale was not normally distributed. Thus, for the regression analyses, we used a
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5 dichotomization with the 20th percentile as the cut-off. Coparenting quality of 16 and below was
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7 considered low while coparenting quality of 17 and above was considered high.
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10 **Background data on children and parents.** We used the following background characteristics:
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12 child gender (girl/boy); responding parent (categorised as mother/father/both, where both included a
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14 few cases of same-sex parents); parents' age (categorized as 24 and younger/25 to 34/35 to 44/45 and
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16 older/not reported); parents' highest level of education (less than high school/high school/university
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18 (less than 3 years)/university (3 years or more)/not reported); and parent country of birth (reported for
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20 one or two parents and grouped as only Sweden/Sweden and other/only other/not reported).
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25 **Statistical analyses**

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27 Imputation was used for the coparenting scale if only one item was missing, and for SDQ if only
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29 one or two items per subscale were missing. We imputed the mean of the scale/subscale for the missing
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31 item(s).
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34 Hierarchical regression models were estimated in three steps with the SDQ total score as the
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36 outcome and living arrangements as the exposure variable. Model 1 adjusted for child gender and
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38 whether the survey was filled in by the mother, father or both. Model 2 added parents' age, parental
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40 education and parent country of birth. In the fully adjusted Model 3, coparenting quality (high/low) was
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42 added to Model 2.
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45 To investigate the possibility that coparenting quality moderated the association between family
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47 type and the SDQ total score for children, we estimated hierarchical regression models interacting
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49 family types and coparenting quality (dichotomised into high and low levels).
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RESULTS

Background characteristics

Characteristics of children and parents are presented in Table 1. About 95% of the 3-year-olds lived with both parents, in intact families. Children in equal JPC constituted 2.6% of the total sample, while 1.2% of the children lived mostly with one parent and as many lived only with one parent. The sample included slightly more boys than girls in all family types. In intact families, most parents completed the survey together, while in other family types, mothers often completed the survey alone.

A university-level education of at least three years for mothers and fathers was more common in intact and JPC families compared with the other types of living arrangements, and these parents were also older. Parents of children living with only one parent (versus other living arrangements) were more likely to be born outside of Sweden.

Mental health problems and coparenting

Mental health problems according to SDQ for children in different family types are reported in Table 2. Fewer problems were reported for children in intact families followed by children in JPC. Children living mostly or only with one parent had more mental health problems. The highest level of coparenting quality was reported by parents in intact families and the lowest by parents of children living with only one parent.

The living arrangement groups were then divided into high-quality and low-quality coparenting for each family type. Fewer mental health problems were reported for children with parents with high-quality coparenting (see Table 2).

Multivariate modelling

Table 3 shows the results from linear regression models, which suggest that children living mostly or only with one parent, compared with those in intact families, had more mental health problems. However, children in JPC arrangements were not significantly different from those in intact families in terms of their mental health. When sociodemographic variables were adjusted for, in Model 2, the differences between those living only and mostly with one parent and those in intact families were largely attenuated. Coefficients remained significant, however, indicating that only some of the differences were explained by the background characteristics. In Model 3, after including coparenting, differences in child mental health based on any living arrangements were no longer significant, while low (versus high) coparenting quality was associated strongly with child mental health problems.

Next, to examine whether coparenting moderated the association between living arrangements and child mental health, we estimated the two interaction models shown in Table 4. With intact families with high coparenting quality as the reference group, the results suggest that children in all family types with low coparenting quality had more mental health problems compared to intact families with high coparenting. This also was true for children living mostly or only with one parent with high coparenting quality. After adjusting for all sociodemographic variables (Model 2), the magnitude of the associations decreased, but remained significant (with the exception of children living mostly with one parent with high coparenting quality). The largest effect sizes in the fully adjusted model were for children living mostly with one parent with low coparenting quality closely followed by those in intact families with low coparenting.

DISCUSSION

This cross-sectional study of 12,485 3-year-olds in Stockholm, demonstrated very similar mental health outcomes in children in JPC after parental separation compared with children in intact families, while children living mostly and only with one parent had more mental health problems, net of sociodemographic characteristics. These findings are consistent with another Swedish cohort of 3- to 5-year-olds (11) and studies on older children in Nordic countries (e.g., 12, 22, 23). The addition of coparenting quality in the analyses, however, changed the picture of how children's mental health is related to family type.

The findings in relation to coparenting quality

Once we accounted for coparenting quality, there were nothing but minimal differences in child mental health in different family arrangements. Schoppe-Sullivan & Weldon (24) have previously shown that coparenting quality may moderate the association between children's socioemotional development (such as self-control) and later externalizing behaviours. The impact of parental conflict on children's wellbeing is well established in the literature (19). A systematic review has, previously, concluded that coparenting is a key mechanism within the family system for child mental health outcomes following divorce (25). The results of our study suggest that coparenting quality is a determinant of children's mental health symptoms not only among children with separated or divorced parents, but also for those in intact families. Our study, hence, extends this literature by providing evidence that coparenting quality may be more important for young children's mental health than their family form per se.

Coparenting quality differed between parents in different post-divorce family types and among those still cohabiting, which may explain differences in how children fare across family forms. Indeed, prior research has found similar patterns related to parental conflict. In a longitudinal Swedish study, adults who had grown up in intact families characterized by serious disagreement, reported the lowest

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3 level of psychological wellbeing, followed by those who had experienced parental conflict *and* parental
4 divorce (26). Similarly, another Swedish study found that children who grew up with divorced parents
5 had poorer psychological health as young adults, but parental conflict and economic hardship during
6 childhood attenuated the association (27).
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11 For children living with only one parent, there was still an association (though weaker) between
12 family type and child mental health also in the group with high coparenting quality. It seems plausible
13 that coparenting quality affects children less when one parent is the primary care giver and the need for
14 cooperation between the parents is, thus, limited. Parenting quality of the primary care giver may, for
15 these children, be of greater importance.
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23 Currently, parenting interventions mainly focus on improving the quality of parenting children
24 receive and primarily target mothers (28). Unfortunately, positive effects of such programs have not
25 been extended to coparenting quality (29). Our results suggest that coparenting skills may be an
26 important and distinct dimension that should be given more attention in parenting interventions and
27 that such programs should be evaluated in terms of their impact on child wellbeing and mental health
28 (30, 31).
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36 We previously discussed whether children's wellbeing related to custody arrangements may be
37 explained by socioeconomic status, by an increased closeness to the father in JPC, or by whether
38 children experience a loss of social and economic resources. Earlier studies show that although these
39 factors contributed to children's wellbeing, adjusting for them did not eliminate the differences in
40 wellbeing between children living in different family types (2, 9, 11, 12, 23). By grouping family types
41 according to coparenting quality, we may capture a large proportion of the unmeasured variance; these
42 are differences between groups that have been unexplained in previous studies. The current study did
43 not, however, address the potential interaction between good/poor parenting quality and children's
44 temperaments. Schoppe-Sullivan & Weldon (24) showed that children with low self-control (low on the
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3 effortful control temperament scale) were helped by a supporting coparenting environment. In this
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5 context, the risk of negative behaviours that typically follow such temperament was attenuated.
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8 9 **Methodological considerations**

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11 Compared to earlier studies examining JPC among very young children, this study has
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13 considerable advantages. First, the size of our sample of children in this living arrangement by far
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15 exceeds that of earlier studies. Second, these children live in about equal JPC, whereas JPC in other
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17 studies may be based on overnights or unequal distribution of time between the parents' homes.
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19 Furthermore, the inclusion of the coparenting measure contributes to the explanation of children's
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21 psychological health in different family types. We do, however, acknowledge that our assessment of
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23 coparenting quality was a modified tool of four items, inspired by McHale et al. (2000) and adapted to a
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25 community health care setting. One issue with our measure is that we may not capture the whole
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27 variance, as most families score rather high on the measure, and thus the measure needs further
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29 validation. Even so, factor analysis suggested that the internal validity was good. Third, more parents in
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31 the intact family settings assessed coparenting quality together, whereas one parent more often
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33 assessed coparenting in the non-intact families. To address this issue, we adjusted for whether the
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35 respondent was the father or mother or both parents. Finally, we successfully recruited a high
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37 percentage of the children in the general population to the study (65%), though we were not able to
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39 examine the differences between those who did and did not participate in the study.
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46 It is important to note that the relation between children's mental health problems and
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48 coparenting quality is not causal. Having a toddler with behavioural problems may impact the
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50 coparenting relationship and parents' perceptions of their children's mental health may be influenced
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52 by their common abilities to handle the child. Further longitudinal studies are needed to determine the
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54 direction of this relation. Also, regarding causality, there is no information in this study about what
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3 factors lead to better or worse coparenting quality. Sharing parental responsibilities has previously been
4 shown to be associated with reduced workload (32), more time for leisure activities (33), and improved
5 communication between parents (32, 34).
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10 The results of this study show considerable differences in parental education between living
11 arrangements, with two thirds of JPC mothers versus only one third in the “only with one parent”
12 category having a university degree. This confirms assumptions of socioeconomic selection into living
13 arrangements. It seems probable that other selection factors that were not included in our analysis,
14 such as parental mental health and addictive problems, may have a similar distribution, thus causing
15 residual confounding in the comparison between living arrangements.
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25 **Implications**

26 This study does not support claims that JPC is psychologically harmful for preschool children in general.
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28 Our results, rather, indicate that the promotion of coparenting quality should be emphasized in policy
29 and prevention of mental health for young children living with both parents as well as after parental
30 separation. For children living with one parent only, interventions that focus on parenting skills and
31 positive parenting behaviours should be given priority.
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40 **Conclusion**

41 For the first time, we have shown that coparenting may explain a large part of the differences in
42 child psychological problems between young children in different living arrangements, and explains
43 *more than* the actual living arrangement. This study suggests that this construct is of importance for
44 early mental health problems, particularly because coparenting quality is a health determinant that
45 clinicians and social workers can target with interventions, regardless of the family situation.
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CONFLICTS OF INTEREST

None declared.

CONTRIBUTORS

MB, EF and AH initiated and funded this study and created the framework for the data collection and analysis together with KB. KB supervised the data collection and prepared the collected data for analysis. RS designed and performed all statistical analyses and wrote the first draft of the manuscript together with MB. All authors revised the draft and have approved of the final version.

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Table 1. Characteristics of children and parents in different living arrangements

	Children's living arrangements									
	Total sample		Intact family		Joint physical custody		Mostly with one parent		Only with one parent	
	n	%	n	%	n	%	n	%	n	%
Sociodemographic variables										
Child gender										
Girl	6213	48.4	5897	48.3	163	49.1	75	49.7	78	49.1
Boy	6632	51.6	6306	51.7	169	50.9	76	50.3	81	50.9
Responding parent										
Female (mother)	5315	41.4	4848	39.7	199	59.9	126	83.4	142	89.3
Male (father)	1052	8.2	962	7.9	73	22.0	12	7.9	5	3.1
Two parents together ^a	6478	50.4	6393	52.4	60	18.1	13	8.6	12	7.5
Mother age (mean, SD) ^b	35.39	4.66	35.47	4.58	34.20	5.06	33.99	6.26	32.84	6.49
Father age (mean, SD) ^c	37.61	5.48	37.65	5.46	36.05	5.56	37.85	4.42	33.56	9.00
Mother highest level of education										
Compulsory	203	1.8	168	1.5	15	6.0	7	5.1	13	8.7
High school	2751	23.8	2528	23.0	85	34.0	65	47.4	73	49.0
University less than 3 years	1307	11.3	1238	11.2	35	14.0	16	11.7	18	12.1
University more than 3 years	7284	63.1	7075	64.3	115	46.0	49	35.8	45	30.2
Father highest level of education										
Compulsory	172	2.4	161	2.3	4	3.1	3	13.6	4	28.6
High school	2046	28.1	1984	27.9	52	40.6	5	22.7	5	35.7
University less than 3 years	902	12.4	879	12.3	17	13.3	6	27.3	0	0.0
University more than 3 years	4166	57.2	4098	57.5	55	43.0	8	36.4	5	35.7
Mother country of birth										
Sweden	7051	83.0	6716	82.9	171	90.5	81	86.2	83	76.1
Other	1440	17.0	1383	17.1	18	9.5	13	13.8	26	23.9
Father country of birth										
Sweden	4484	83.7	4374	83.7	89	90.8	14	87.5	7	46.7
Other	872	16.3	853	16.3	9	9.2	2	12.5	8	53.3
Coparenting quality										
High	10284	80.1	9989	81.9	190	57.2	58	38.4	47	29.6
Low	2561	19.9	2214	18.1	142	42.8	93	61.6	112	70.4

^a Includes some same sex parents, ^b n = 9,028, ^c n = 5,697

Table 2. Total scores on Strengths and Difficulties Questionnaires (SDQ) and coparenting quality in relation to children's living arrangements (n=12,845)

	Children's living arrangements									
	Total sample		Intact family		Joint physical custody		Mostly with one parent		Only with one parent	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
<i>SDQ Total Difficulties</i>										
Total sample	7.11	4.27	7.07	4.23	7.26	4.50	8.45	5.28	8.55	5.32
High coparenting quality	6.70	4.05	6.69	4.02	6.39	4.22	7.79	5.66	8.36	5.71
Low coparenting quality	8.76	4.72	8.78	4.70	8.42	4.61	8.86	5.01	8.63	5.18
<i>Total score on coparenting quality</i>	18.10	2.49	18.27	2.20	16.29	3.79	13.88	4.69	12.99	5.00

Table 3. Linear regression models of parental reports of the SDQ Total Difficulties by living arrangement, sociodemographic variables and coparenting quality (n=12,845)

	Model 1			Model 2			Model 3		
	B	95% CI		B	95% CI		B	95% CI	
Child gender									
Girl	ref			ref			ref		
Boy	0.78	0.64	0.93	0.78	0.63	0.92	0.75	0.60	0.89
Living arrangement									
Intact family	ref			ref			ref		
Joint physical custody	0.26	-0.21	0.72	0.09	-0.37	0.55	-0.37	-0.82	0.09
Living mostly with one parent	1.53	0.84	2.21	1.21	0.54	1.89	0.40	-0.27	1.07
Living only with one parent	1.64	0.97	2.31	1.01	0.34	1.67	0.02	-0.64	0.68
Respondent									
Mother	ref			ref			ref		
Father	0.34	0.06	0.62	0.47	0.19	0.75	0.49	0.22	0.77
Two parents together	0.31	0.16	0.47	0.43	0.27	0.60	0.59	0.43	0.75
Parent age									
35 to 44				ref			ref		
24 and younger				2.42	1.51	3.32	2.35	1.46	3.24
25 to 34				0.82	0.64	0.99	0.83	0.66	1.00
45 and older				-0.29	-0.84	0.26	-0.32	-0.86	0.22
Not reported				0.71	0.34	1.09	0.68	0.32	1.05
Parental highest level of education									
University (3 years or more)				ref			ref		
Less than high school				1.79	1.09	2.48	1.90	1.22	2.59
High school				0.72	0.53	0.91	0.68	0.49	0.87
University (less than 3 years)				0.47	0.23	0.71	0.42	0.18	0.66
Not reported				0.92	0.37	1.44	0.90	0.38	1.43
Parent country of birth									
Only Sweden				ref			ref		
Sweden/other				0.22	-0.09	0.53	0.08	-0.22	0.39
Only other				1.06	0.79	1.32	1.00	0.74	1.26
Not reported				-0.09	-0.44	0.26	-0.05	-0.39	0.29
Coparenting quality									
High							ref		
Low							2.05	1.86	2.23

Model 1 was adjusted for child's gender and respondent. Model 2 was also adjusted for parents' age, educational level, and country of birth. Model 3 was additionally adjusted for coparenting quality

Table 4. Linear regression models of parental reports of the SDQ Total Difficulties by living arrangement/level of coparenting quality and sociodemographic variables (n=12,845)

	Model 1			Model 2		
	B	95% CI		B	95% CI	
Living arrangement						
Intact family/ high coparenting	ref			ref		
Intact family /low coparenting	2.12	1,92	2,31	2.10	1,91	2,29
Joint physical custody/ high coparenting	-0.23	-0,83	0,37	-0.39	-0,98	0,21
Joint physical custody/ low coparenting	1.91	1,22	2,61	1.73	1,04	2,42
Living mostly with one parent/ high coparenting	1.27	0,19	2,35	0.95	-0,11	2,02
Living mostly with one parent/ low coparenting	2.42	1,56	3,27	2.11	1,26	2,95
Living only with one parent/ high coparenting	1.87	0,68	3,07	1.34	0,16	2,53
Living only with one parent/ low coparenting	2.18	1,40	2,96	1.52	0,74	2,30

Model 1 was adjusted for child's gender and respondent. Model 2 was also adjusted for parents' age, educational level, and country of birth

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THE IMPORTANCE OF LIVING ARRANGEMENTS AND COPARENTING QUALITY FOR YOUNG CHILDREN'S MENTAL HEALTH AFTER PARENTAL DIVORCE-A CROSS-SECTIONAL PARENTAL SURVEY

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3 1 "THE IMPORTANCE OF LIVING ARRANGEMENTS AND COPARENTING QUALITY
4 2 FOR YOUNG CHILDREN'S MENTAL HEALTH AFTER PARENTAL DIVORCE-A
5 3 CROSS-SECTIONAL PARENTAL SURVEY."
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25 22 Word count: 3081
26 23

27 24 **ABSTRACT**

28 25 **Background** Parental separation has been associated with adverse child mental health
29 26 outcomes in the literature. For school aged children, joint physical custody (JPC) i.e. spending
30 27 equal time in both parents' homes after a divorce, has been associated with better health and
31 28 wellbeing than single care arrangements. Preschool children's wellbeing in JPC is less
32 29 studied. The aim of this study was to investigate the association of living arrangements and
33 30 coparenting quality with mental health in preschool children after parental separation.

34 31 **Methods** This cross-sectional population-based study includes 12,845 3-year-old children in
35 32 Sweden. Mental health was measured by parental reports of the Strength and Difficulties
36 33 Questionnaire (SDQ) and coparenting quality with a four-item scale. The living arrangements
37 34 of the 642 children in non-intact families were categorized into JPC, living mostly with one
38 35 parent and living only with one parent.

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2
3 36 **Results** Linear regression models, adjusted for socio-demographic confounders, showed an
4
5 37 association between increased mental health problems and living mostly and only with one
6
7 38 parent (B=1.18; CI=0.37-2.00, and B=1.20; CI=0.40-2.00 respectively), while children in
8
9 39 intact families versus JPC did not differ significantly (B=-0.11; CI=-0.58-0.36). After
10
11 40 adjusting the analyses for coparenting quality, differences in child mental health between the
12
13 41 post divorce living arrangements were however minimal while children in intact families had
14
15 42 more mental health problems compared with JPC (B=0.70;CI=0.24-1.15). Factorial
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17 43 ANCOVA revealed that low coparenting quality was more strongly related to mental health
18
19 44 problems for children in intact families and JPC compared to children living mostly or only
20
21 45 with one parent.

22 46 **Conclusions** This study suggests that coparenting quality is a key determinant of mental
23
24 47 health in preschool children and thus should be targeted in preventive interventions.
25
26 48

27 49 **Key words** Children, Divorce, Joint physical custody, Coparenting, Parental separation,
28
29 50 Psychological problems
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31 51

32 52 **WHAT IS ALREADY KNOW ON THIS TOPIC:**

- 33 53 Parental separation is a common experience for children in high-income countries.
34 54 Joint physical custody, where children share their time about equally between their parents'
35 55 homes, has become an increasingly common living arrangement after parental separation.
36 56 There is a dearth of empirical studies on child mental health in joint physical custody in the
37 57 preschool age.
38
39 58

40 59 **WHAT THIS STUDY HOPES TO ADD:**

- 41 60 We found similar mental health in three-year-old children in joint physical custody and
42 61 intact families, while children living only and mostly with one parent had more mental health
43 62 problems, net of sociodemographic characteristics.
44 63 Once we accounted for coparenting quality, child mental health in the diverse living
45 64 arrangements after parental divorce was very similar.
46 65 Our results imply that coparenting is of major importance for understanding mental health
47 66 problems that emerge early in life, and could be targeted with interventions in families with
48 67 young children.
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51 69 **INTRODUCTION**

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3 70 Around 35% of Swedish children experience parental separation before reaching the age of 18
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5 71 years, and previous studies have shown that the experience of parental separation is associated
6
7 72 with adverse mental health outcomes in the short as well as the long term.(1, 2) During recent
8
9 73 decades, parenting norms have changed in the Nordic countries, and sole custody among
10
11 74 mothers has become less common than joint physical custody (JPC), where children share
12
13 75 their time about equally between their parents' respective homes.(3-5) In Sweden,
14
15 76 approximately 10% of all school children live in JPC arrangements.(3) JPC is also
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17 77 increasingly common even in countries with more conservative family values such as
18
19 78 Germany and France.(6, 7)

20 80 **Living arrangements and child wellbeing**

21
22 81 A growing body of research has shown that living arrangements and contact with both parents
23
24 82 is associated with post-divorce child wellbeing.(8) Most studies in the literature have
25
26 83 suggested that school-aged children and adolescents in JPC fare better on several outcomes
27
28 84 compared to children in single-parent arrangements.(9,10) JPC arrangements among
29
30 85 preschool children has been much less studied. In a recent Swedish study (11), 3- to 5-year-
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32 86 olds who lived in JPC had fewer mental health problems compared to those living in single-
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34 87 parent arrangements. Similar findings were reported in a Nordic study on children aged 2-9
35
36 88 years.(12) Studies in contexts outside of the Nordic countries have shown similar but
37
38 89 somewhat more diverse results.(13-15) Pruett, Ebling (14) found that overnight stays with the
39
40 90 second parent were associated with advantages in social functioning and fewer psychological
41
42 91 problems among girls. However, McIntosh and Smyth (13) found that generally the 2- to 3-
43
44 92 year-olds who spent 35% or more time with their second parent, experienced more problems
45
46 93 compared to their peers who has less contact with their second parent. Tornello, Emery (15)
47
48 94 did not find any significant association between custody arrangements in socially and
49
50 95 economically disadvantaged families and psychological problems at age 3, but nonetheless
51
52 96 found fewer problems among 5-year-old children who had JPC versus single-parent
53
54 97 arrangements at age 3.

53 99 **Coparenting quality and child wellbeing**

54
55 100 High-quality coparenting has been found to contribute to a positive emotional family climate
56
57 101 and to affect child mental health and social adjustment positively.(16) Children whose parents
58
59 102 work well together in childrearing issues are typically better off during early childhood,
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103 adolescence and adulthood.(17) The association between coparenting quality and child

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3 104 wellbeing outcomes seems to be stronger than other characteristics of parental relationships,
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5 105 such as intimacy and love.(18) The lower levels of health and wellbeing observed among
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7 106 children with separated parents may thus hypothetically be linked to their parents' ability to
8
9 107 amicably share the responsibilities of childrearing.(19) It is important to highlight that
10
11 108 coparenting quality is a broader construct than parental conflict. Not only does coparenting
12
13 109 include positive measures, it is conceptually distinct from the quality of parental relationships
14
15 110 because it directly involves the children.(17)

111

112 The aim of this study was to investigate whether mental health in 3-year-old children is
113 associated with their living arrangements after a parental separation, and whether parental
114 coparenting quality moderates this association.

115

116 **METHODS**

117 **Study population**

118 The population of this study was sampled from a total population of 19,294 children in a
119 defined geographical area in the Stockholm county, who were invited to a routine visit at the
120 age of three years by the regional Preventive Child Health Care (PCHC) from December 2015
121 to May 2018. The PCHC is funded by regional taxes and their services are offered to all
122 children who reside in the county free of charge. In the invitation letter, parents were
123 informed about the study and that the survey would be used to individualise the visit at the
124 PCHC. The letter included a web-link to the survey which was only available in Swedish. The
125 study was approved by the Regional Ethical Review Board in Stockholm (Dnr 2015-228631)
126 and parents to children in the PCHC were involved in the piloting phase of this study.

127

128 In total, 13,493 surveys were submitted. Of these, 112 surveys were excluded because the
129 participants had reported that they were the sole parent of the child since childbirth and 32
130 surveys were excluded because parents had completed the survey twice for the same child.

131 We also excluded 504 surveys because they were completed by someone other than a parent
132 or because information was missing on the main variables of interest. Thus, 12,845 children
133 were included in the study, equivalent to a participation rate of 66.6% of the total population
134 of 3-year-olds in the area.

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136 **Patient and Public involvement statement**

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3 137 Parents to children in the child health services in Stockholm were involved in the piloting
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5 138 phase of this study, where they provided feedback on questionnaires and the procedure in
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7 139 qualitative interviews and in a quantitative evaluation in writing. We do not plan to have
8
9 140 parents involved in the dissemination of the results of the study.
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15 143 **Procedure**

16 144 The survey included questions on sociodemographic background, children's development,
17 145 behaviours and symptoms, parents' worries, and coparenting quality. Parents were
18 146 encouraged to complete the survey together.
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23 148 **Measures**

24 149 *Outcome measure.* The main outcome in the study was based on parental report of the
25 150 Swedish version of the Strengths and Difficulties Questionnaire (SDQ) which has been
26 151 successfully validated for preschool aged children.(20) We used the total sum of scores from
27 152 the four symptom subscales (SDQ Total Difficulties) ranging from 0 to 40.
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32 154 *Living arrangements.* Living arrangement groups were based on parents' answers to the
33 155 question "What does the child's family look like? The child lives with...". The options were:
34 156 (a) intact family, (b) joint physical custody (about 50/50 in each parent's home), (c) living
35 157 mostly with mother/father (collapsed here to living mostly with one parent), and (d) living
36 158 only with mother/father (collapsed here to living only with one parent).
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44 160 *Coparenting quality.* Coparenting was measured using a four-item scale inspired by the
45 161 coparenting scale posited by McHale and Kuersten-Hogan.(21) Parents were asked about their
46 162 ability to cooperate, support each other, and confide in/trust each other, and the extent to
47 163 which they experienced conflict related to their children. Items were rated on a 5-point scale
48 164 from 1 (disagree completely) to 5 (agree completely). Higher scores indicated better
49 165 coparenting. The scale showed good internal consistency (Cronbach's alpha = 0.79).
50 166 Confirmatory factor analysis revealed an acceptable fit for the one factor model: comparative
51 167 fit index (CFI) = 0.99; Tucker-Lewis index (TLI) = 0.98; root mean square error of
52 168 approximation (RMSEA) = 0.066 (90% confidence interval = 0.056 – 0.076). For the
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3 169 ANCOVA analyses, we used a dichotomisation where coparenting quality of 15 and below
4 170 was considered low while coparenting quality of 16 and above was considered high. Parents
5 171 who had chosen the option 3 (neither agree or disagree) for at least one of the four items were
6 172 thus dichotomised as reporting low coparenting quality.
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11 174 *Background data on children and parents.* We used the following background characteristics:
12 175 child gender (girl/boy); responding parent (categorised as mother/father/both, where both
13 176 included a few cases of same-sex parents); mothers' and fathers' age presented as mean and
14 177 standard deviations; mothers' and fathers' highest level of education (compulsory/high
15 178 school/university (less than 3 years)/university (3 years or more)/not reported); and mothers'
16 179 and fathers' country of birth (grouped as Sweden/other/not reported).
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23 181 *Statistical analyses*

24 182 The scores were scaled up pro-rata for the coparenting scale if only one item was missing, and
25 183 for SDQ if only one or two items per subscale were missing. Hierarchical regression models
26 184 were estimated in three steps with the SDQ total score as the outcome, living arrangements as
27 185 the exposure variable and JPC as reference. Model 1 adjusted for child gender and whether
28 186 the survey was filled in by the mother, father or both. Model 2 added maternal education. In
29 187 the fully adjusted Model 3, coparenting quality as a continuous measure was added to Model
30 188 2. To investigate the possibility that coparenting quality moderated the association between
31 189 family type and the SDQ total score for children, we used factorial ANCOVA with children's
32 190 living arrangement and coparenting quality (dichotomised into high and low levels) as factors
33 191 and child gender, the survey being filled in by the mother and mother's education (at least
34 192 three years of university education) entered as covariates.
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46 194 **RESULTS**

47 195 **Background characteristics**

48 196 Characteristics of children and parents are presented in Table 1. About 95% of the 3-year-olds
49 197 lived with both parents, in intact families. Children in equal JPC constituted 2.6% of the total
50 198 sample, while 1.2% of the children lived mostly with one parent and as many lived only with
51 199 one parent. The sample included slightly more boys than girls in all family types. In intact
52 200 families, most parents completed the survey together, while in other family types, mothers
53 201 often completed the survey alone. Separated mothers were slightly younger than those in
54 202 intact families and fathers in single care families were younger than fathers in the other family
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3 203 types. A university-level education of at least three years was most common for mothers and
4 204 fathers in intact families and least common in families where the child only lived with one
5 205 parent. More children to parents born outside of Sweden lived only with one parent compared
6 206 with JPC. Data on father's educational level as well as on parents' country of birth was
7 207 missing for a large part of the sample. Low coparenting quality was more common among
8 208 parents who did not live together and in particular in families where the child only lived with
9 209 one parent.
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Table 1. Characteristics of children and parents in different living arrangements

	Children's living arrangements									
	Total sample		Intact family		Joint physical custody		Mostly with one parent		Only with one parent	
	(n=12845)		(n=12203)		(n=332)		(n=151)		(n=159)	
Sociodemographic variables	n	%	n	%	n	%	n	%	n	%
Child gender										
Girl	6220	48.1	5903	48.0	163	48.5	75	49.7	79	49.1
Boy	6641	51.3	6313	51.4	171	50.9	76	50.3	81	50.3
Not reported	76	0.6	73	0.6	2	0.6	0	0.0	1	0.6
Responding parent										
Female (mother)	5342	41.3	4873	39.7	201	59.8	126	83.4	142	88.2
Male (father)	1058	8.2	968	7.9	73	21.7	12	7.9	5	3.1
Two parents together ^a	6519	50.4	6433	52.3	60	17.9	13	8.6	13	8.1
Not reported	18	0.1	15	0.1	2	0.6	0	0.0	1	0.6
Mother age (mean, SD) ^b	35.39	4.66	35.47	4.58	34.18	5.06	33.99	6.26	32.84	6.49
Father age (mean, SD) ^c	37.60	5.48	37.64	5.46	36.05	5.56	37.85	4.42	33.56	9.00
Mother highest level of education										
Compulsory	203	1.6	168	1.4	15	4.5	7	4.6	13	8.2
High school	2751	21.4	2528	20.7	85	25.6	65	43.0	73	45.9
University less than 3 years	1307	10.2	1238	10.1	35	10.5	16	10.6	18	11.3
University more than 3 years	7284	56.7	7075	58.0	115	34.6	49	32.5	45	28.3
Not reported	1300	10.1	1194	9.8	82	24.7	14	9.3	10	6.3
Father highest level of education										
Compulsory	172	1.3	161	1.3	4	1.2	3	2.0	4	2.5
High school	2046	15.9	1984	16.3	52	15.7	5	3.3	5	3.1
University less than 3 years	902	7.0	879	7.2	17	5.1	6	4.0	0	0.0
University more than 3 years	4166	32.4	4098	33.6	55	16.6	8	5.3	5	3.1
Not reported	5559	43.3	5081	41.6	204	61.4	129	85.4	145	91.2
Mother country of birth										
Sweden	7051	54.9	6716	55.0	171	51.5	81	53.6	83	52.2
Other	1440	11.2	1383	11.3	18	5.4	13	8.6	26	16.4
Not reported	4354	33.9	4104	33.6	143	43.1	57	37.7	50	31.4
Father country of birth										
Sweden	4484	34.9	4374	35.8	89	26.8	14	9.3	7	4.4
Other	872	6.8	853	7.0	9	2.7	2	1.3	8	5.0
Not reported	7489	58.3	6976	57.2	234	70.5	135	89.4	144	90.6
Coparenting quality										
High	11314	88.1	10972	89.9	218	65.7	70	46.4	54	34.0
Low	1531	11.9	1231	10.1	114	34.3	81	53.6	105	66.0

^a Includes some same sex parents, ^b n = 9,028, ^c n = 5,697

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213 **Child mental health in relation to background characteristics**

214 Mental health problems according to SDQ for children in different family types are reported
 215 in Table 2. Fewer problems were reported for children in intact families followed by children
 216 in JPC. Children living mostly or only with one parent had more mental health problems.
 217 Boys had more problems compared with girls and children of mothers with high educational
 218 levels suffered from less problems compared with those with less educated mothers.

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Table 2. Mean values and standard deviations of the SDQ in relation to sociodemographic variables

	SDQ Total score		
	<i>n</i>	Mean	SD
Living arrangement			
Intact family	12203	7.07	4.23
Joint physical custody	332	7.26	4.50
Mostly with one parent	151	8.45	5.28
Only with one parent	159	8.55	5.32
Child gender			
Girl	6213	6.70	4.10
Boy	6632	7.50	4.39
Responding parent			
Female (mother)	5315	6.95	4.26
Male (father)	1052	7.30	4.34
Two parents together ^a	6478	7.21	4.27
Mother highest level of education			
Compulsory	203	8.72	5.56
High school	2751	7.67	4.53
University less than 3 years	1307	7.31	4.31
University more than 3 years	7284	6.77	4.04
Not reported	1300	7.41	4.45

220 ^a Includes some same sex parents

221

222 **Multivariate modelling**

223 Table 3 shows the results from linear regression models, which suggest that children living
 224 mostly or only with one parent, compared with those in JPC, had more mental health
 225 problems. However, children in intact families were not significantly different from those in
 226 JPC in terms of mental health. When sociodemographic variables were adjusted for, in Model
 227 2, the differences between those living only and mostly with one parent and those in JPC were

228 attenuated. Coefficients remained significant, however, indicating that only some of the
 229 differences were explained by the background characteristics. In Model 3, after including
 230 coparenting quality, the differences between those living only and mostly with one parent and
 231 in JPC were no longer significant. Instead, differences between children in intact families and
 232 JPC became significant suggesting that children living in JPC showed fewer problems
 233 compared to children in intact families after controlling for coparenting quality.

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Table 3. Linear regression models of parental reports of the SDQ Total Difficulties by living arrangement, sociodemographic variables and coparenting quality (n=12,845)

	Model 1				Model 2				Model 3			
	B	95% CI		p	B	95% CI		p	B	95% CI		p
Living arrangement												
Joint physical custody	Ref				Ref				Ref			
Intact family	-0.26	-0.72	0.21	0.283	-0.11	-0.58	0.36	0.643	0.70*	0.24	1.15	0.003
Living mostly with one parent	1.27*	0.45	2.09	0.002	1.18*	0.37	2.00	0.004	0.14	-0.66	0.93	0.735
Living only with one parent	1.38*	0.58	2.19	0.001	1.20*	0.40	2.00	0.003	-0.25	-1.03	0.54	0.537
Child gender												
Girl	Ref				Ref				Ref			
Boy	0.78*	0.64	0.93	0.000	0.78*	0.63	0.93	0.000	0.74*	0.60	0.88	0.000
Respondent												
Female (mother)	Ref				Ref				Ref			
Male (father)	0.34*	0.06	0.62	0.019	-0.37	-0.96	0.22	0.220	-0.38	-0.95	0.20	0.199
Two parents together a	0.31*	0.16	0.47	0.000	0.37*	0.21	0.53	0.000	0.60*	0.45	0.75	0.000
Mother's highest level of education												
University (3 years or more)					Ref				Ref			
Compulsory					1.92*	1.32	2.51	0.000	1.99*	1.42	2.57	0.000
High school					0.88*	0.69	1.07	0.000	0.80*	0.62	0.98	0.000
University (less than 3 years)					0.56*	0.32	0.81	0.000	0.52*	0.28	0.76	0.000
Not reported					1.07*	0.53	1.60	0.000	1.06*	0.54	1.58	0.000
Coparenting quality												
									-0.45*	-0.48	-0.42	0.000

236 ^a Includes some same sex parents

237 * $P < .05$

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241 -----Figure 1 in about here-----

242 Factorial ANCOVA

243 The factorial ANCOVA analysis revealed a significant interaction effect for children's living
 244 arrangement by coparenting quality $F(3, 12\ 834) = 3.770, p < .01$. Post hoc comparisons

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3 245 yielded no significant differences between children's living arrangement, while low
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5 246 coparenting quality was associated with more mental health problems. As shown in Figure 1,
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7 247 high quality coparenting was strongly associated with fewer mental health problems for
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9 248 children living in intact families and joint physical custody. For children living mostly or only
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11 249 with one parent this difference was smaller and not statistically significant at the $p < 0.05$ level.
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13 250 In addition, children living in JPC fared better than children in intact families when
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15 251 coparenting quality was low.

15 252

17 253 **Sensitivity analyses**

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19 254 As sensitivity analyses, we used multiple imputation (MI) to impute missing values on SDQ
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21 255 and coparenting scale (imputed at item level), as well as mother education (compulsory and
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23 256 high school had to be combined to run the MI). The regression analyses and estimated
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25 257 marginal means in the ANCOVA model revealed the same pattern of results (not shown).

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27 259 **DISCUSSION**

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29 260 This cross-sectional study of 12,845 3-year-olds in Stockholm, demonstrated very similar
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31 261 mental health outcomes in children in JPC after parental separation compared with children in
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33 262 intact families, while children living mostly and only with one parent had more mental health
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35 263 problems, net of sociodemographic characteristics. These findings are consistent with another
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37 264 Swedish cohort of 3- to 5-year-olds (11) and studies on older children in the Nordic
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39 265 countries.(e.g., 12, 22, 23) The addition of coparenting quality in the analyses, however,
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41 266 changed the picture of how children's mental health is related to family type.

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43 268 **The findings in relation to coparenting quality**

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45 269 Regardless of family type, children with parents with low quality coparenting relationships
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47 270 had more mental health problems than their counterparts in families where parents reported
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49 271 high coparenting quality. Schoppe-Sullivan & Weldon (24) have previously shown that
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51 272 coparenting quality may moderate the association between children's socioemotional
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53 273 development (such as self-control) and later externalizing behaviours. The impact of parental
54
55 274 conflict on children's wellbeing is well established in the literature.(19) A systematic review
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57 275 has previously concluded that coparenting is a key mechanism within the family system for
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59 276 child mental health outcomes following divorce.(25) The results of our study suggest that
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277 coparenting quality is a determinant of children's mental health symptoms not only among
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279 278 children with separated or divorced parents, but in particular for those in intact families. Our

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3 279 study, hence, extends this literature by providing evidence that coparenting quality may be
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5 280 more important for young children's mental health than their family form per se.

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8 282 Coparenting quality differed between parents in different post-divorce family types and
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10 283 among those still cohabiting, which may explain differences in how children fare across
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12 284 family forms. An interesting finding was that fewer child mental health problems were
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14 285 reported in low coparenting quality families when parents shared custody in two separate
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16 286 homes than as an intact family. Indeed, prior research has found similar patterns related to
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18 287 parental conflict. In a longitudinal Swedish study, adults who had grown up in intact families
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20 288 characterized by serious disagreement, reported the lowest level of psychological wellbeing,
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22 289 followed by those who had experienced parental conflict and parental divorce.(26) Similarly,
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24 290 another Swedish study found that children who grew up with divorced parents had poorer
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26 291 psychological health as young adults, but parental conflict and economic hardship during
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28 292 childhood attenuated the association.(27)

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30 294 Coparenting quality played a lesser role for children living mostly or only with one parent. It
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32 295 seems plausible that coparenting quality affects children less when one parent is the primary
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34 296 care giver and the need for cooperation between the parents is, thus, limited. Parenting quality
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36 297 of the primary care giver may, for these children, be of greater importance.

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38 299 Currently, parenting interventions mainly focus on improving the quality of parenting
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40 300 children receive and primarily target mothers.(28) Unfortunately, positive effects of such
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42 301 programs have not been extended to coparenting quality.(29) Our results suggest that
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44 302 coparenting skills may be an important and distinct dimension that should be given more
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46 303 attention in parenting interventions and that such programs should be evaluated in terms of
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48 304 their impact on child wellbeing and mental health.(30, 31)

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50 306 We have previously discussed whether children's wellbeing related to custody arrangements
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52 307 may be explained by socioeconomic status, by an increased closeness to the father in JPC, or
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54 308 by whether children experience a loss of social and economic resources. Earlier studies show
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56 309 that although these factors contributed to children's wellbeing, adjusting for them did not
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58 310 eliminate the differences in wellbeing between children living in different family types.(2, 9,
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60 311 11, 12, 23) By exploring the interaction between coparenting quality and family types, we
312 may capture a large proportion of the unmeasured variance; these are differences between

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3 313 groups that have been unexplained in previous studies. The current study did not, however,
4 314 address the potential interaction between good/poor parenting quality and children's
5 315 temperaments. Schoppe-Sullivan & Weldon (24) showed that children with low self-control
6 316 (low on the effortful control temperament scale) were helped by a supporting coparenting
7 317 environment. In this context, the risk of negative behaviours that typically follow such
8 318 temperament was attenuated.

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14 320 **Methodological considerations**

15 321 Compared to earlier studies examining JPC among very young children, this study has
16 322 considerable advantages. First, the size of our sample of children in this living arrangement by
17 323 far exceeds that of earlier studies. Second, these children live in about equal JPC, whereas
18 324 JPC in other studies may be based on overnights or unequal distribution of time between the
19 325 parents' homes. Furthermore, the inclusion of the coparenting measure contributes to the
20 326 explanation of children's psychological health in different family types. We do, however,
21 327 acknowledge that our assessment of coparenting quality was a modified tool of four items,
22 328 inspired by McHale et al. (2000). The scale was adapted to a community health care setting
23 329 where survey items needed to be related to child wellbeing, suitable for discussion with the
24 330 CHC nurse and possible for parents to complete together as well as individually. The four
25 331 items represent the core dimensions of coparenting as stipulated by McHale and
26 332 Feinberg.(21,32) Three of the items relate to aspects of the parental relationship that are
27 333 important for children's feelings of security and cohesion; ability to cooperate, support each
28 334 other, and confide in/trust each other. The fourth item address parents' conflict over the child,
29 335 which instead disrupts children's security if it is intense or ongoing. Another issue with our
30 336 measure is that we may not capture the whole variance, as most families score rather high on
31 337 the measure, which may be related to self-serving bias due to the lack of anonymity. Parents
32 338 who do not wish to discuss their coparenting relationship with the CHC nurse may be inclined
33 339 to report high coparenting quality while those who are dissatisfied with the relationship
34 340 instead may tend to score low. We acknowledge that the measure thus needs further
35 341 validation. Even so, factor analysis suggested that the internal validity was good. More
36 342 parents in the intact family settings assessed coparenting quality together, whereas one parent
37 343 more often assessed coparenting in the non-intact families. To address this issue, we adjusted
38 344 for whether the respondent was the father or mother or both parents. Finally, we successfully
39 345 recruited a high percentage of the children in the general population to the study (67%),
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3 346 though we were not able to examine the differences between those who did and did not
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5 347 participate.

6 348

7
8 349 It is important to note that the relation between children's mental health problems and
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10 350 coparenting quality is not causal. Having a toddler with behavioural problems may impact the
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12 351 coparenting relationship and parents' perceptions of their children's mental health may be
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14 352 influenced by their common abilities to handle the child. Further longitudinal studies are
15
16 353 needed to determine the direction of this relation. Also, regarding causality, there is no
17
18 354 information in this study about what factors lead to better or worse coparenting quality.
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20 355 Sharing parental responsibilities has previously been shown to be associated with reduced
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22 356 workload (33), more time for leisure activities (34), and improved communication between
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24 357 parents.(33, 35)

25 358

26 359 The results of this study show considerable differences in maternal education between living
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28 360 arrangements, with more mothers in intact families having a university degree versus
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30 361 separated mothers. There were high numbers of data missing on other potentially important
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32 362 socioeconomic covariates. Socioeconomic as well as other selection factors that were not
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34 363 included in our analysis, such as parent mental health and addictive problems, may hence
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36 364 cause residual confounding in the comparison between family types.

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37 366 **Implications**

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39 367 This study does not support claims that JPC is psychologically harmful for preschool children
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41 368 in general. Our results rather indicate that the promotion of coparenting quality should be
42
43 369 emphasized in policy and prevention of mental health for young children living with both
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45 370 parents as well as after parental separation. For children living mostly or only with one parent,
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47 371 interventions that focus on parenting skills and positive parenting behaviours should be given
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49 372 priority.

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51 374 **Conclusion**

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53 375 This study shows that coparenting quality may explain a large part of the differences in child
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55 376 psychological problems between young children in different living arrangements, and
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57 377 explains more than the actual living arrangement. This construct seems to be of importance
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59 378 for early mental health problems, particularly because coparenting quality is a health

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3 379 determinant that clinicians and social workers can target with interventions, regardless of the
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5 380 family situation.

6 381

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13 385

15 386 **CONFLICTS OF INTEREST**

17 387 None declared.

18 388

20 389 **CONTRIBUTORS**

22 390 MB, EF and AH initiated and funded this study and created the framework for the data
23 391 collection and analysis together with KB. KB supervised the data collection and prepared the
24 392 collected data for analysis. RS designed and performed all statistical analyses and wrote the
25 393 first draft of the manuscript together with MB. All authors revised the draft and have
26 394 approved of the final version.

30 395

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37 399

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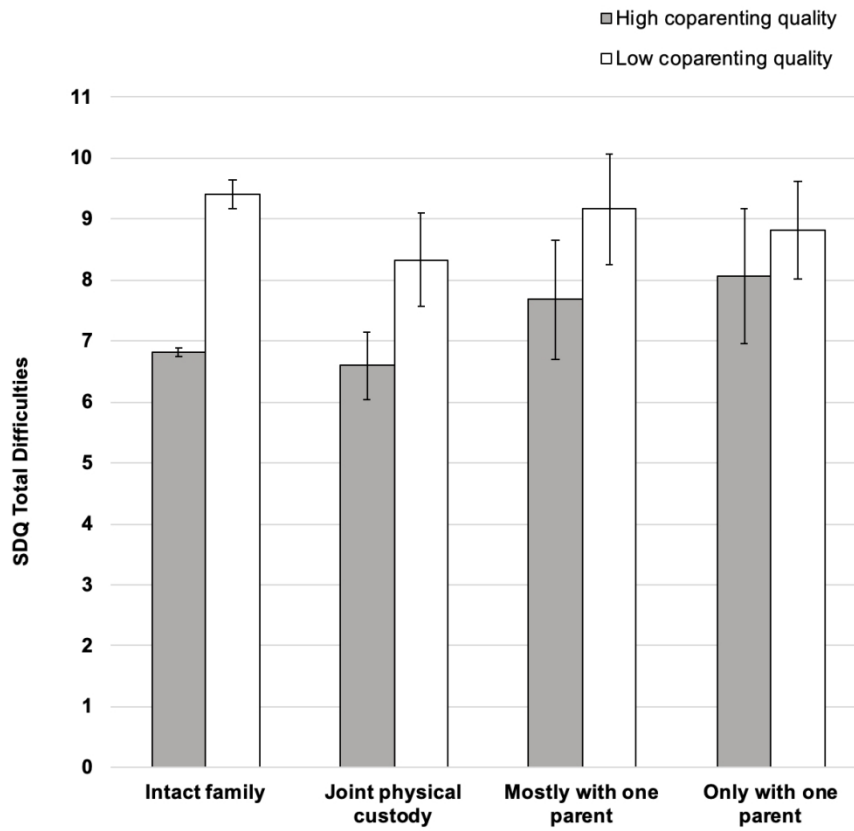


Figure 1
 Estimated marginal means with error bars (95% confidence intervals) for children's living arrangements by coparenting quality

BMJ Paediatrics Open

THE IMPORTANCE OF LIVING ARRANGEMENTS AND COPARENTING QUALITY FOR YOUNG CHILDREN'S MENTAL HEALTH AFTER PARENTAL DIVORCE-A CROSS-SECTIONAL PARENTAL SURVEY

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3 1 "THE IMPORTANCE OF LIVING ARRANGEMENTS AND COPARENTING QUALITY
4 2 FOR YOUNG CHILDREN'S MENTAL HEALTH AFTER PARENTAL DIVORCE-A
5 3 CROSS-SECTIONAL PARENTAL SURVEY."
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24 21
25 22 Word count: 3081
26 23

27 24 **ABSTRACT**

28 25 **Background** Parental separation has been associated with adverse child mental health
29 26 outcomes in the literature. For school aged children, joint physical custody (JPC) i.e. spending
30 27 equal time in both parents' homes after a divorce, has been associated with better health and
31 28 wellbeing than single care arrangements. Preschool children's wellbeing in JPC is less
32 29 studied. The aim of this study was to investigate the association of living arrangements and
33 30 coparenting quality with mental health in preschool children after parental separation.

34 31 **Methods** This cross-sectional population-based study includes 12,845 3-year-old children in
35 32 Sweden. Mental health was measured by parental reports of the Strength and Difficulties
36 33 Questionnaire (SDQ) and coparenting quality with a four-item scale. The living arrangements
37 34 of the 642 children in non-intact families were categorized into JPC, living mostly with one
38 35 parent and living only with one parent.

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3 36 **Results** Linear regression models, adjusted for socio-demographic confounders, showed an
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5 37 association between increased mental health problems and living mostly and only with one
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7 38 parent ($B=1.18$; $CI=0.37-2.00$, and $B=1.20$; $CI=0.40-2.00$ respectively), while children in
8
9 39 intact families versus JPC did not differ significantly ($B=-0.11$; $CI=-0.58-0.36$). After
10
11 40 adjusting the analyses for coparenting quality, differences in child mental health between the
12
13 41 post divorce living arrangements were however minimal while children in intact families had
14
15 42 more mental health problems compared with JPC ($B=0.70$; $CI=0.24-1.15$). Factorial
16
17 43 ANCOVA revealed that low coparenting quality was more strongly related to mental health
18
19 44 problems for children in intact families and JPC compared to children living mostly or only
20
21 45 with one parent.

22 46 **Conclusions** This study suggests that coparenting quality is a key determinant of mental
23
24 47 health in preschool children and thus should be targeted in preventive interventions.
25
26 48

27 49 **Key words** Children, Divorce, Joint physical custody, Coparenting, Parental separation,
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29 50 Psychological problems
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31 51

32 52 **WHAT IS ALREADY KNOW ON THIS TOPIC:**

- 33 53 Parental separation is a common experience for children in high-income countries.
34 54 Joint physical custody, where children share their time about equally between their parents'
35 55 homes, has become an increasingly common living arrangement after parental separation.
36 56 There is a dearth of empirical studies on child mental health in joint physical custody in the
37 57 preschool age.
38
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40 59 **WHAT THIS STUDY HOPES TO ADD:**

- 41 60 We found similar mental health in three-year-old children in joint physical custody and
42 61 intact families, while children living only and mostly with one parent had more mental health
43 62 problems, net of sociodemographic characteristics.
44 63 Once we accounted for coparenting quality, child mental health in the diverse living
45 64 arrangements after parental divorce was very similar.
46 65 Our results imply that coparenting is of major importance for understanding mental health
47 66 problems that emerge early in life, and could be targeted with interventions in families with
48 67 young children.
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50 68

51 69 **INTRODUCTION**

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3 70 Around 35% of Swedish children experience parental separation before reaching the age of 18
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5 71 years, and previous studies have shown that the experience of parental separation is associated
6
7 72 with adverse mental health outcomes in the short as well as the long term.(1, 2) During recent
8
9 73 decades, parenting norms have changed in the Nordic countries, and sole custody among
10
11 74 mothers has become less common than joint physical custody (JPC), where children share
12
13 75 their time about equally between their parents' respective homes.(3-5) In Sweden,
14
15 76 approximately 10% of all school children live in JPC arrangements.(3) JPC is also
16
17 77 increasingly common even in countries with more conservative family values such as
18
19 78 Germany and France.(6, 7)

20 80 **Living arrangements and child wellbeing**

21
22 81 A growing body of research has shown that living arrangements and contact with both parents
23
24 82 is associated with post-divorce child wellbeing.(8) Most studies in the literature have
25
26 83 suggested that school-aged children and adolescents in JPC fare better on several outcomes
27
28 84 compared to children in single-parent arrangements.(9,10) JPC arrangements among
29
30 85 preschool children has been much less studied. In a recent Swedish study (11), 3- to 5-year-
31
32 86 olds who lived in JPC had fewer mental health problems compared to those living in single-
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34 87 parent arrangements. Similar findings were reported in a Nordic study on children aged 2-9
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36 88 years.(12) Studies in contexts outside of the Nordic countries have shown similar but
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38 89 somewhat more diverse results.(13-15) Pruett, Ebling (14) found that overnight stays with the
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40 90 second parent were associated with advantages in social functioning and fewer psychological
41
42 91 problems among girls. However, McIntosh and Smyth (13) found that generally the 2- to 3-
43
44 92 year-olds who spent 35% or more time with their second parent, experienced more problems
45
46 93 compared to their peers who has less contact with their second parent. Tornello, Emery (15)
47
48 94 did not find any significant association between custody arrangements in socially and
49
50 95 economically disadvantaged families and psychological problems at age 3, but nonetheless
51
52 96 found fewer problems among 5-year-old children who had JPC versus single-parent
53
54 97 arrangements at age 3.

53 99 **Coparenting quality and child wellbeing**

54
55 100 High-quality coparenting has been found to contribute to a positive emotional family climate
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57 101 and to affect child mental health and social adjustment positively.(16) Children whose parents
58
59 102 work well together in childrearing issues are typically better off during early childhood,
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103 adolescence and adulthood.(17) The association between coparenting quality and child

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3 104 wellbeing outcomes seems to be stronger than other characteristics of parental relationships,
4
5 105 such as intimacy and love.(18) The lower levels of health and wellbeing observed among
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7 106 children with separated parents may thus hypothetically be linked to their parents' ability to
8
9 107 amicably share the responsibilities of childrearing.(19) It is important to highlight that
10
11 108 coparenting quality is a broader construct than parental conflict. Not only does coparenting
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13 109 include positive measures, it is conceptually distinct from the quality of parental relationships
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15 110 because it directly involves the children.(17)

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16 111

17 112 The aim of this study was to investigate whether mental health in 3-year-old children is
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19 113 associated with their living arrangements after a parental separation, and whether parental
20
21 114 coparenting quality moderates this association.

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23 116 **METHODS**

24 117 **Study population**

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26 118 The population of this study was sampled from a total population of 19,294 children in a
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28 119 defined geographical area in the Stockholm county, who were invited to a routine visit at the
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30 120 age of three years by the regional Preventive Child Health Care (PCHC) from December 2015
31
32 121 to May 2018. The PCHC is funded by regional taxes and their services are offered to all
33
34 122 children who reside in the county free of charge. In the invitation letter, parents were
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36 123 informed about the study and that the survey would be used to individualise the visit at the
37
38 124 PCHC. The letter included a web-link to the survey which was only available in Swedish. The
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40 125 study was approved by the Regional Ethical Review Board in Stockholm (Dnr 2015-228631)
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42 126 and parents to children in the PCHC were involved in the piloting phase of this study.

43 127

44 128 In total, 13,493 surveys were submitted. Of these, 112 surveys were excluded because the
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46 129 participants had reported that they were the sole parent of the child since childbirth and 32
47
48 130 surveys were excluded because parents had completed the survey twice for the same child.
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50 131 We also excluded 504 surveys because they were completed by someone other than a parent
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52 132 or because information was missing on the main variables of interest. Thus, 12,845 children
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54 133 were included in the study, equivalent to a participation rate of 66.6% of the total population
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56 134 of 3-year-olds in the area.

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57 136 **Patient and Public involvement statement**

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3 137 Parents to children in the child health services in Stockholm were involved in the piloting
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5 138 phase of this study, where they provided feedback on questionnaires and the procedure in
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7 139 qualitative interviews and in a quantitative evaluation in writing. We do not plan to have
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9 140 parents involved in the dissemination of the results of the study.
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15 143 **Procedure**

16 144 The survey included questions on sociodemographic background, children's development,
17 145 behaviours and symptoms, parents' worries, and coparenting quality. Parents were
18 146 encouraged to complete the survey together.
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23 148 **Measures**

24 149 *Outcome measure.* The main outcome in the study was based on parental report of the
25 150 Swedish version of the Strengths and Difficulties Questionnaire (SDQ) which has been
26 151 successfully validated for preschool aged children.(20) We used the total sum of scores from
27 152 the four symptom subscales (SDQ Total Difficulties) ranging from 0 to 40.
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32 154 *Living arrangements.* Living arrangement groups were based on parents' answers to the
33 155 question "What does the child's family look like? The child lives with...". The options were:
34 156 (a) intact family, (b) joint physical custody (about 50/50 in each parent's home), (c) living
35 157 mostly with mother/father (collapsed here to living mostly with one parent), and (d) living
36 158 only with mother/father (collapsed here to living only with one parent).
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44 160 *Coparenting quality.* Coparenting was measured using a four-item scale inspired by the
45 161 coparenting scale posited by McHale and Kuersten-Hogan.(21) Parents were asked about their
46 162 ability to cooperate, support each other, and confide in/trust each other, and the extent to
47 163 which they experienced conflict related to their children. Items were rated on a 5-point scale
48 164 from 1 (disagree completely) to 5 (agree completely). Higher scores indicated better
49 165 coparenting. The scale showed good internal consistency (Cronbach's alpha = 0.79).
50 166 Confirmatory factor analysis revealed an acceptable fit for the one factor model: comparative
51 167 fit index (CFI) = 0.99; Tucker-Lewis index (TLI) = 0.98; root mean square error of
52 168 approximation (RMSEA) = 0.066 (90% confidence interval = 0.056 – 0.076). For the
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3 169 ANCOVA analyses, we used a dichotomisation where coparenting quality of 15 and below
4 170 was considered low while coparenting quality of 16 and above was considered high. Parents
5 171 who had chosen the option 3 (neither agree or disagree) for at least one of the four items were
6 172 thus dichotomised as reporting low coparenting quality.
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11 174 *Background data on children and parents.* We used the following background characteristics:
12 175 child gender (girl/boy); responding parent (categorised as mother/father/both, where both
13 176 included a few cases of same-sex parents); mothers' and fathers' age presented as mean and
14 177 standard deviations; mothers' and fathers' highest level of education (compulsory/high
15 178 school/university (less than 3 years)/university (3 years or more)/not reported); and mothers'
16 179 and fathers' country of birth (grouped as Sweden/other/not reported).
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23 181 *Statistical analyses*

24 182 The scores were scaled up pro-rata for the coparenting scale if only one item was missing, and
25 183 for SDQ if only one or two items per subscale were missing. Hierarchical regression models
26 184 were estimated in three steps with the SDQ total score as the outcome, living arrangements as
27 185 the exposure variable and JPC as reference. Model 1 adjusted for child gender and whether
28 186 the survey was filled in by the mother, father or both. Model 2 added maternal education. In
29 187 the fully adjusted Model 3, coparenting quality as a continuous measure was added to Model
30 188 2. To investigate the possibility that coparenting quality moderated the association between
31 189 family type and the SDQ total score for children, we used factorial ANCOVA with children's
32 190 living arrangement and coparenting quality (dichotomised into high and low levels) as factors
33 191 and child gender, the survey being filled in by the mother and mother's education (at least
34 192 three years of university education) entered as covariates.
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46 194 **RESULTS**

47 195 **Background characteristics**

48 196 Characteristics of children and parents are presented in Table 1. About 95% of the 3-year-olds
49 197 lived with both parents, in intact families. Children in equal JPC constituted 2.6% of the total
50 198 sample, while 1.2% of the children lived mostly with one parent and as many lived only with
51 199 one parent. The sample included slightly more boys than girls in all family types. In intact
52 200 families, most parents completed the survey together, while in other family types, mothers
53 201 often completed the survey alone. Separated mothers were slightly younger than those in
54 202 intact families and fathers in single care families were younger than fathers in the other family
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3 203 types. A university-level education of at least three years was most common for mothers and
4 204 fathers in intact families and least common in families where the child only lived with one
5 205 parent. More children to parents born outside of Sweden lived only with one parent compared
6 206 with JPC. Data on father's educational level as well as on parents' country of birth was
7 207 missing for a large part of the sample. Low coparenting quality was more common among
8 208 parents who did not live together and in particular in families where the child only lived with
9 209 one parent.
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Table 1. Characteristics of children and parents in different living arrangements

	Children's living arrangements									
	Total sample		Intact family		Joint physical custody		Mostly with one parent		Only with one parent	
	(n=12845)		(n=12203)		(n=332)		(n=151)		(n=159)	
Sociodemographic variables	n	%	n	%	n	%	n	%	n	%
Child gender										
Girl	6220	48.1	5903	48.0	163	48.5	75	49.7	79	49.1
Boy	6641	51.3	6313	51.4	171	50.9	76	50.3	81	50.3
Not reported	76	0.6	73	0.6	2	0.6	0	0.0	1	0.6
Responding parent										
Female (mother)	5342	41.3	4873	39.7	201	59.8	126	83.4	142	88.2
Male (father)	1058	8.2	968	7.9	73	21.7	12	7.9	5	3.1
Two parents together ^a	6519	50.4	6433	52.3	60	17.9	13	8.6	13	8.1
Not reported	18	0.1	15	0.1	2	0.6	0	0.0	1	0.6
Mother age (mean, SD) ^b	35.39	4.66	35.47	4.58	34.18	5.06	33.99	6.26	32.84	6.49
Father age (mean, SD) ^c	37.60	5.48	37.64	5.46	36.05	5.56	37.85	4.42	33.56	9.00
Mother highest level of education										
Compulsory	203	1.6	168	1.4	15	4.5	7	4.6	13	8.2
High school	2751	21.4	2528	20.7	85	25.6	65	43.0	73	45.9
University less than 3 years	1307	10.2	1238	10.1	35	10.5	16	10.6	18	11.3
University more than 3 years	7284	56.7	7075	58.0	115	34.6	49	32.5	45	28.3
Not reported	1300	10.1	1194	9.8	82	24.7	14	9.3	10	6.3
Father highest level of education										
Compulsory	172	1.3	161	1.3	4	1.2	3	2.0	4	2.5
High school	2046	15.9	1984	16.3	52	15.7	5	3.3	5	3.1
University less than 3 years	902	7.0	879	7.2	17	5.1	6	4.0	0	0.0
University more than 3 years	4166	32.4	4098	33.6	55	16.6	8	5.3	5	3.1
Not reported	5559	43.3	5081	41.6	204	61.4	129	85.4	145	91.2
Mother country of birth										
Sweden	7051	54.9	6716	55.0	171	51.5	81	53.6	83	52.2
Other	1440	11.2	1383	11.3	18	5.4	13	8.6	26	16.4
Not reported	4354	33.9	4104	33.6	143	43.1	57	37.7	50	31.4
Father country of birth										
Sweden	4484	34.9	4374	35.8	89	26.8	14	9.3	7	4.4
Other	872	6.8	853	7.0	9	2.7	2	1.3	8	5.0
Not reported	7489	58.3	6976	57.2	234	70.5	135	89.4	144	90.6
Coparenting quality										
High	11314	88.1	10972	89.9	218	65.7	70	46.4	54	34.0
Low	1531	11.9	1231	10.1	114	34.3	81	53.6	105	66.0

^a Includes some same sex parents, ^b n = 9,028, ^c n = 5,697

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213 **Child mental health in relation to background characteristics**

214 Mental health problems according to SDQ for children in different family types are reported
 215 in Table 2. Fewer problems were reported for children in intact families followed by children
 216 in JPC. Children living mostly or only with one parent had more mental health problems.
 217 Boys had more problems compared with girls and children of mothers with high educational
 218 levels suffered from less problems compared with those with less educated mothers.

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Table 2. Mean values and standard deviations of the SDQ in relation to sociodemographic variables

	SDQ Total score		
	<i>n</i>	Mean	SD
Living arrangement			
Intact family	12203	7.07	4.23
Joint physical custody	332	7.26	4.50
Mostly with one parent	151	8.45	5.28
Only with one parent	159	8.55	5.32
Child gender			
Girl	6213	6.70	4.10
Boy	6632	7.50	4.39
Responding parent			
Female (mother)	5315	6.95	4.26
Male (father)	1052	7.30	4.34
Two parents together ^a	6478	7.21	4.27
Mother highest level of education			
Compulsory	203	8.72	5.56
High school	2751	7.67	4.53
University less than 3 years	1307	7.31	4.31
University more than 3 years	7284	6.77	4.04
Not reported	1300	7.41	4.45

220 ^a Includes some same sex parents

221

222 **Multivariate modelling**

223 Table 3 shows the results from linear regression models, which suggest that children living
 224 mostly or only with one parent, compared with those in JPC, had more mental health
 225 problems. However, children in intact families were not significantly different from those in
 226 JPC in terms of mental health. When sociodemographic variables were adjusted for, in Model
 227 2, the differences between those living only and mostly with one parent and those in JPC were

228 attenuated. Coefficients remained significant, however, indicating that only some of the
 229 differences were explained by the background characteristics. In Model 3, after including
 230 coparenting quality, the differences between those living only and mostly with one parent and
 231 in JPC were no longer significant. Instead, differences between children in intact families and
 232 JPC became significant suggesting that children living in JPC showed fewer problems
 233 compared to children in intact families after controlling for coparenting quality.

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Table 3. Linear regression models of parental reports of the SDQ Total Difficulties by living arrangement, sociodemographic variables and coparenting quality (n=12,845)

	Model 1				Model 2				Model 3			
	B	95% CI		p	B	95% CI		p	B	95% CI		p
Living arrangement												
Joint physical custody	Ref				Ref				Ref			
Intact family	-0.26	-0.72	0.21	0.283	-0.11	-0.58	0.36	0.643	0.70*	0.24	1.15	0.003
Living mostly with one parent	1.27*	0.45	2.09	0.002	1.18*	0.37	2.00	0.004	0.14	-0.66	0.93	0.735
Living only with one parent	1.38*	0.58	2.19	0.001	1.20*	0.40	2.00	0.003	-0.25	-1.03	0.54	0.537
Child gender												
Girl	Ref				Ref				Ref			
Boy	0.78*	0.64	0.93	0.000	0.78*	0.63	0.93	0.000	0.74*	0.60	0.88	0.000
Respondent												
Female (mother)	Ref				Ref				Ref			
Male (father)	0.34*	0.06	0.62	0.019	-0.37	-0.96	0.22	0.220	-0.38	-0.95	0.20	0.199
Two parents together a	0.31*	0.16	0.47	0.000	0.37*	0.21	0.53	0.000	0.60*	0.45	0.75	0.000
Mother's highest level of education												
University (3 years or more)					Ref				Ref			
Compulsory					1.92*	1.32	2.51	0.000	1.99*	1.42	2.57	0.000
High school					0.88*	0.69	1.07	0.000	0.80*	0.62	0.98	0.000
University (less than 3 years)					0.56*	0.32	0.81	0.000	0.52*	0.28	0.76	0.000
Not reported					1.07*	0.53	1.60	0.000	1.06*	0.54	1.58	0.000
Coparenting quality												
-0.45* -0.48 -0.42 0.000												

236 ^a Includes some same sex parents

237 * $P < .05$

238
 239

240

241 -----Figure 1 in about here-----

242 Factorial ANCOVA

243 The factorial ANCOVA analysis revealed a significant interaction effect for children's living
 244 arrangement by coparenting quality $F(3, 12\ 834) = 3.770, p < .01$. Post hoc comparisons

1
2
3 245 yielded no significant differences between children's living arrangement, while low
4
5 246 coparenting quality was associated with more mental health problems. As shown in Figure 1,
6
7 247 high quality coparenting was strongly associated with fewer mental health problems for
8
9 248 children living in intact families and joint physical custody. For children living mostly or only
10
11 249 with one parent this difference was smaller and not statistically significant at the $p < 0.05$ level.
12
13 250 In addition, children living in JPC fared better than children in intact families when
14
15 251 coparenting quality was low.

15 252

17 253 **Sensitivity analyses**

18
19 254 As sensitivity analyses, we used multiple imputation (MI) to impute missing values on SDQ
20
21 255 and coparenting scale (imputed at item level), as well as mother education (compulsory and
22
23 256 high school had to be combined to run the MI). The regression analyses and estimated
24
25 257 marginal means in the ANCOVA model revealed the same pattern of results (not shown).

25 258

27 259 **DISCUSSION**

28
29 260 This cross-sectional study of 12,845 3-year-olds in Stockholm, demonstrated very similar
30
31 261 mental health outcomes in children in JPC after parental separation compared with children in
32
33 262 intact families, while children living mostly and only with one parent had more mental health
34
35 263 problems, net of sociodemographic characteristics. These findings are consistent with another
36
37 264 Swedish cohort of 3- to 5-year-olds (11) and studies on older children in the Nordic
38
39 265 countries.(e.g., 12, 22, 23) The addition of coparenting quality in the analyses, however,
40
41 266 changed the picture of how children's mental health is related to family type.

41 267

43 268 **The findings in relation to coparenting quality**

44
45 269 Regardless of family type, children with parents with low quality coparenting relationships
46
47 270 had more mental health problems than their counterparts in families where parents reported
48
49 271 high coparenting quality. Schoppe-Sullivan & Weldon (24) have previously shown that
50
51 272 coparenting quality may moderate the association between children's socioemotional
52
53 273 development (such as self-control) and later externalizing behaviours. The impact of parental
54
55 274 conflict on children's wellbeing is well established in the literature.(19) A systematic review
56
57 275 has previously concluded that coparenting is a key mechanism within the family system for
58
59 276 child mental health outcomes following divorce.(25) The results of our study suggest that
60
277 coparenting quality is a determinant of children's mental health symptoms not only among
278
279 278 children with separated or divorced parents, but in particular for those in intact families. Our

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3 279 study, hence, extends this literature by providing evidence that coparenting quality may be
4
5 280 more important for young children's mental health than their family form per se.

6 281
7
8 282 Coparenting quality differed between parents in different post-divorce family types and
9
10 283 among those still cohabiting, which may explain differences in how children fare across
11
12 284 family forms. An interesting finding was that fewer child mental health problems were
13
14 285 reported in low coparenting quality families when parents shared custody in two separate
15
16 286 homes than as an intact family. Indeed, prior research has found similar patterns related to
17
18 287 parental conflict. In a longitudinal Swedish study, adults who had grown up in intact families
19
20 288 characterized by serious disagreement, reported the lowest level of psychological wellbeing,
21
22 289 followed by those who had experienced parental conflict and parental divorce.(26) Similarly,
23
24 290 another Swedish study found that children who grew up with divorced parents had poorer
25
26 291 psychological health as young adults, but parental conflict and economic hardship during
27
28 292 childhood attenuated the association.(27)

29 293
30 294 Coparenting quality played a lesser role for children living mostly or only with one parent. It
31
32 295 seems plausible that coparenting quality affects children less when one parent is the primary
33
34 296 care giver and the need for cooperation between the parents is, thus, limited. Parenting quality
35
36 297 of the primary care giver may, for these children, be of greater importance.

37 298
38 299 Currently, parenting interventions mainly focus on improving the quality of parenting
39
40 300 children receive and primarily target mothers.(28) Unfortunately, positive effects of such
41
42 301 programs have not been extended to coparenting quality.(29) Our results suggest that
43
44 302 coparenting skills may be an important and distinct dimension that should be given more
45
46 303 attention in parenting interventions and that such programs should be evaluated in terms of
47
48 304 their impact on child wellbeing and mental health.(30, 31)

49 305
50 306 We have previously discussed whether children's wellbeing related to custody arrangements
51
52 307 may be explained by socioeconomic status, by an increased closeness to the father in JPC, or
53
54 308 by whether children experience a loss of social and economic resources. Earlier studies show
55
56 309 that although these factors contributed to children's wellbeing, adjusting for them did not
57
58 310 eliminate the differences in wellbeing between children living in different family types.(2, 9,
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60 311 11, 12, 23) By exploring the interaction between coparenting quality and family types, we
312 may capture a large proportion of the unmeasured variance; these are differences between

1
2
3 313 groups that have been unexplained in previous studies. The current study did not, however,
4 314 address the potential interaction between good/poor parenting quality and children's
5 315 temperaments. Schoppe-Sullivan & Weldon (24) showed that children with low self-control
6 316 (low on the effortful control temperament scale) were helped by a supporting coparenting
7 317 environment. In this context, the risk of negative behaviours that typically follow such
8 318 temperament was attenuated.

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13 319

14 320 **Methodological considerations**

15 321 Compared to earlier studies examining JPC among very young children, this study has
16 322 considerable advantages. First, the size of our sample of children in this living arrangement by
17 323 far exceeds that of earlier studies. Second, these children live in about equal JPC, whereas
18 324 JPC in other studies may be based on overnights or unequal distribution of time between the
19 325 parents' homes. Furthermore, the inclusion of the coparenting measure contributes to the
20 326 explanation of children's psychological health in different family types. We do, however,
21 327 acknowledge that our assessment of coparenting quality was a modified tool of four items,
22 328 inspired by McHale et al. (2000). The scale was adapted to a community health care setting
23 329 where survey items needed to be related to child wellbeing, suitable for discussion with the
24 330 CHC nurse and possible for parents to complete together as well as individually. The four
25 331 items represent the core dimensions of coparenting as stipulated by McHale and
26 332 Feinberg.(21,32) Three of the items relate to aspects of the parental relationship that are
27 333 important for children's feelings of security and cohesion; ability to cooperate, support each
28 334 other, and confide in/trust each other. The fourth item address parents' conflict over the child,
29 335 which instead disrupts children's security if it is intense or ongoing. Another issue with our
30 336 measure is that we may not capture the whole variance, as most families score rather high on
31 337 the measure, which may be related to self-serving bias due to the lack of anonymity. Parents
32 338 who do not wish to discuss their coparenting relationship with the CHC nurse may be inclined
33 339 to report high coparenting quality while those who are dissatisfied with the relationship
34 340 instead may tend to score low. We acknowledge that the measure thus needs further
35 341 validation. Even so, factor analysis suggested that the internal validity was good. More
36 342 parents in the intact family settings assessed coparenting quality together, whereas one parent
37 343 more often assessed coparenting in the non-intact families. To address this issue, we adjusted
38 344 for whether the respondent was the father or mother or both parents. Finally, we successfully
39 345 recruited a high percentage of the children in the general population to the study (67%),
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3 346 though we were not able to examine the differences between those who did and did not
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5 347 participate.

6 348

7
8 349 It is important to note that the relation between children's mental health problems and
9
10 350 coparenting quality is not causal. Having a toddler with behavioural problems may impact the
11
12 351 coparenting relationship and parents' perceptions of their children's mental health may be
13
14 352 influenced by their common abilities to handle the child. Further longitudinal studies are
15
16 353 needed to determine the direction of this relation. Also, regarding causality, there is no
17
18 354 information in this study about what factors lead to better or worse coparenting quality.
19
20 355 Sharing parental responsibilities has previously been shown to be associated with reduced
21
22 356 workload (33), more time for leisure activities (34), and improved communication between
23
24 357 parents.(33, 35)

25 358

26 359 The results of this study show considerable differences in maternal education between living
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28 360 arrangements, with more mothers in intact families having a university degree versus
29
30 361 separated mothers. There were high numbers of data missing on other potentially important
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32 362 socioeconomic covariates. Socioeconomic as well as other selection factors that were not
33
34 363 included in our analysis, such as parent mental health and addictive problems, may hence
35
36 364 cause residual confounding in the comparison between family types.

36 365

37 366 **Implications**

38
39 367 This study does not support claims that JPC is psychologically harmful for preschool children
40
41 368 in general. Our results rather indicate that the promotion of coparenting quality should be
42
43 369 emphasized in policy and prevention of mental health for young children living with both
44
45 370 parents as well as after parental separation. For children living mostly or only with one parent,
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47 371 interventions that focus on parenting skills and positive parenting behaviours should be given
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49 372 priority.

50 373

51 374 **Conclusion**

52
53 375 This study shows that coparenting quality may explain a large part of the differences in child
54
55 376 psychological problems between young children in different living arrangements, and
56
57 377 explains more than the actual living arrangement. This construct seems to be of importance
58
59 378 for early mental health problems, particularly because coparenting quality is a health
60

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3 379 determinant that clinicians and social workers can target with interventions, regardless of the
4 380 family situation.

5 381

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10 385

11 386 **CONFLICTS OF INTEREST**

12 387 None declared.

13 388

14 389 **CONTRIBUTORS**

15 390 MB, EF and AH initiated and funded this study and created the framework for the data
16 391 collection and analysis together with KB. KB supervised the data collection and prepared the
17 392 collected data for analysis. RS designed and performed all statistical analyses and wrote the
18 393 first draft of the manuscript together with MB. All authors revised the draft and have
19 394 approved of the final version.

20 395

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24 399

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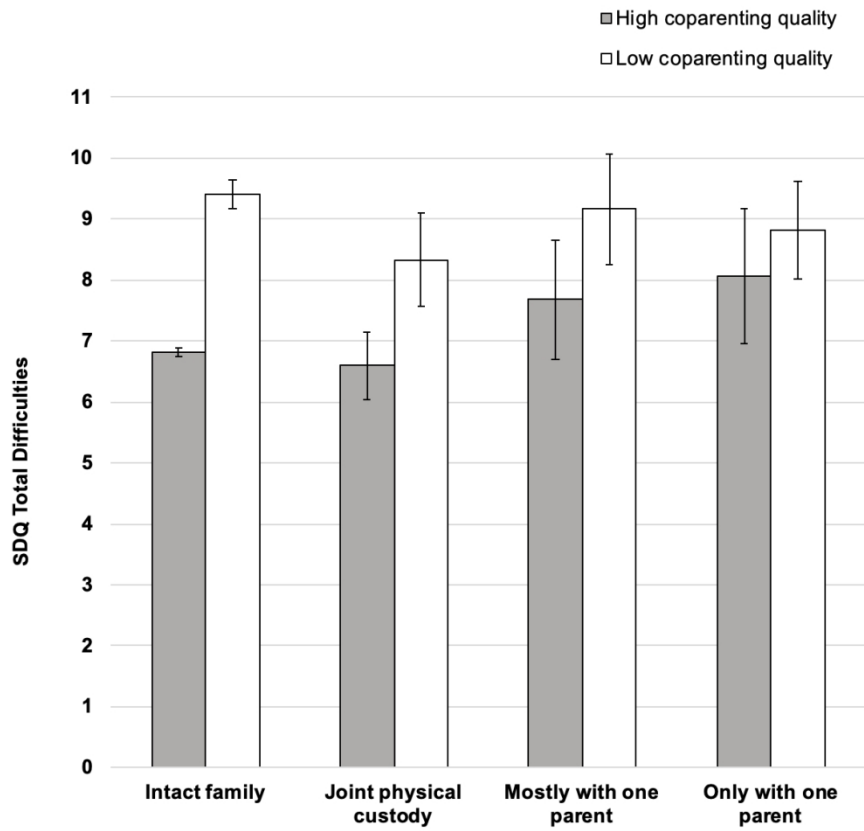


Figure 1
Estimated marginal means with error bars (95% confidence intervals) for children's living arrangements by coparenting quality

BMJ Paediatrics Open

THE IMPORTANCE OF LIVING ARRANGEMENTS AND COPARENTING QUALITY FOR YOUNG CHILDREN'S MENTAL HEALTH AFTER PARENTAL DIVORCE-A CROSS-SECTIONAL PARENTAL SURVEY

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3 1 "THE IMPORTANCE OF LIVING ARRANGEMENTS AND COPARENTING QUALITY
4 2 FOR YOUNG CHILDREN'S MENTAL HEALTH AFTER PARENTAL DIVORCE-A
5 3 CROSS-SECTIONAL PARENTAL SURVEY."
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3 25 **ABSTRACT**

4 26 **Background** Parental separation has been associated with adverse child mental health
5 27 outcomes in the literature. For school aged children, joint physical custody (JPC) i.e. spending
6 28 equal time in both parents' homes after a divorce, has been associated with better health and
7 29 wellbeing than single care arrangements. Preschool children's wellbeing in JPC is less
8 30 studied. The aim of this study was to investigate the association of living arrangements and
9 31 coparenting quality with mental health in preschool children after parental separation.

10 32 **Methods** This cross-sectional population-based study includes 12,845 3-year-old children in
11 33 Sweden. Mental health was measured by parental reports of the Strength and Difficulties
12 34 Questionnaire (SDQ) and coparenting quality with a four-item scale. The living arrangements
13 35 of the 642 children in non-intact families were categorized into JPC, living mostly with one
14 36 parent and living only with one parent.

15 37 **Results** Linear regression models, adjusted for socio-demographic confounders, showed an
16 38 association between increased mental health problems and living mostly and only with one
17 39 parent (B=1.18; CI=0.37-2.00, and B=1.20; CI=0.40-2.00 respectively), while children in
18 40 intact families versus JPC did not differ significantly (B=-0.11; CI=-0.58-0.36). After
19 41 adjusting the analyses for coparenting quality, differences in child mental health between the
20 42 post divorce living arrangements were however minimal while children in intact families had
21 43 more mental health problems compared with JPC (B=0.70; CI=0.24-1.15). Factorial
22 44 ANCOVA revealed that low coparenting quality was more strongly related to mental health
23 45 problems for children in intact families and JPC compared to children living mostly or only
24 46 with one parent.

25 47 **Conclusions** This study suggests that coparenting quality is a key determinant of mental
26 48 health in preschool children and thus should be targeted in preventive interventions.

27 49
28 50 **Key words** Children, Divorce, Joint physical custody, Coparenting, Parental separation,
29 51 Psychological problems
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3 54 **WHAT IS ALREADY KNOW ON THIS TOPIC:**
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- 5 55 Parental separation is a common experience for children in high-income countries.
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7 56 Joint physical custody, where children share their time about equally between their parents'
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9 57 homes, has become an increasingly common living arrangement after parental separation.
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11 58 There is a dearth of empirical studies on child mental health in joint physical custody in the
12
13 59 preschool age.
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16 61 **WHAT THIS STUDY ADDS:**

- 17 62 We found similar mental health in three-year-old children in joint physical custody and
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19 63 intact families, while children living only and mostly with one parent had more mental health
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21 64 problems, net of sociodemographic characteristics.
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23 65 Once we accounted for coparenting quality, child mental health in the diverse living
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25 66 arrangements after parental divorce was very similar.
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27 67 Our results imply that coparenting is of major importance for understanding mental health
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29 68 problems that emerge early in life, and could be targeted with interventions in families with
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31 69 young children.
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73 INTRODUCTION

74 Around 35% of Swedish children experience parental separation before reaching the age of 18
75 years, and previous studies have shown that the experience of parental separation is associated
76 with adverse mental health outcomes in the short as well as the long term.(1, 2) During recent
77 decades, parenting norms have changed in the Nordic countries, and sole custody among
78 mothers has become less common than joint physical custody (JPC), where children share
79 their time about equally between their parents' respective homes.(3-5) In Sweden,
80 approximately 10% of all school children live in JPC arrangements.(3) JPC is also
81 increasingly common even in countries with more conservative family values such as
82 Germany and France.(6, 7)

84 **Living arrangements and child wellbeing**

85 A growing body of research has shown that living arrangements and contact with both parents
86 is associated with post-divorce child wellbeing.(8) Most studies in the literature have
87 suggested that school-aged children and adolescents in JPC fare better on several outcomes
88 compared to children in single-parent arrangements.(9,10) JPC arrangements among
89 preschool children has been much less studied. In a recent Swedish study (11), 3- to 5-year-
90 olds who lived in JPC had fewer mental health problems compared to those living in single-
91 parent arrangements. Similar findings were reported in a Nordic study on children aged 2-9
92 years.(12) Studies in contexts outside of the Nordic countries have shown similar but
93 somewhat more diverse results.(13-15) Pruett, Ebling (14) found that overnight stays with the
94 second parent were associated with advantages in social functioning and fewer psychological
95 problems among girls. However, McIntosh and Smyth (13) found that generally the 2- to 3-
96 year-olds who spent 35% or more time with their second parent, experienced more problems
97 compared to their peers who has less contact with their second parent. Tornello, Emery (15)
98 did not find any significant association between custody arrangements in socially and
99 economically disadvantaged families and psychological problems at age 3, but nonetheless
100 found fewer problems among 5-year-old children who had JPC versus single-parent
101 arrangements at age 3.

103 **Coparenting quality and child wellbeing**

104 High-quality coparenting has been found to contribute to a positive emotional family climate
105 and to affect child mental health and social adjustment positively.(16) Children whose parents
106 work well together in childrearing issues are typically better off during early childhood,

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3 107 adolescence and adulthood.(17) The association between coparenting quality and child
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5 108 wellbeing outcomes seems to be stronger than other characteristics of parental relationships,
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7 109 such as intimacy and love.(18) The lower levels of health and wellbeing observed among
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9 110 children with separated parents may thus hypothetically be linked to their parents' ability to
10
11 111 amicably share the responsibilities of childrearing.(19) It is important to highlight that
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13 112 coparenting quality is a broader construct than parental conflict. Not only does coparenting
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15 113 include positive measures, it is conceptually distinct from the quality of parental relationships
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17 114 because it directly involves the children.(17)

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18 116 The aim of this study was to investigate whether mental health in 3-year-old children is
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20 117 associated with their living arrangements after a parental separation, and whether parental
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22 118 coparenting quality moderates this association.

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120 **METHODS**

121 **Study population**

122 The population of this study was sampled from a total population of 19,294 children in a
123 defined geographical area in the Stockholm county, who were invited to a routine visit at the
124 age of three years by the regional Preventive Child Health Care (PCHC) from December 2015
125 to May 2018. The PCHC is funded by regional taxes and their services are offered to all
126 children who reside in the county free of charge. In the invitation letter, parents were
127 informed about the study and that the survey would be used to individualize the visit at
128 the PCHC. The letter included a web-link to the survey which was only available in Swedish.
129 The study was approved by the Regional Ethical Review Board in Stockholm (Dnr 2015-
130 228631) and parents to children in the PCHC were involved in the piloting phase of this
131 study.

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133 In total, 13,493 surveys were submitted. Of these, 112 surveys were excluded because the
134 participants had reported that they were the sole parent of the child since childbirth and 32
135 surveys were excluded because parents had completed the survey twice for the same child.
136 We also excluded 504 surveys because they were completed by someone other than a parent
137 or because information was missing on main variables of interest. Thus, 12,845 children were
138 included in the study, equivalent to a participation rate of 66.6% of the total population of 3-
139 year-olds in the area.

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141 **Patient and Public involvement statement**

142 Parents to children in the child health services in Stockholm were involved in the piloting
143 phase of this study, where they provided feedback on questionnaires and the procedure in
144 qualitative interviews and in a quantitative evaluation in writing. We do not plan to have
145 parents involved in the dissemination of the results of the study.

147 **Procedure**

148 The survey included questions on sociodemographic background, children's development,
149 behaviours and symptoms, parents' worries, and coparenting quality. Parents were
150 encouraged to complete the survey together.

152 **Measures**

153 *Outcome measure.* The main outcome in the study was based on parental report of the
154 Swedish version of the Strengths and Difficulties Questionnaire (SDQ) which has been
155 successfully validated for preschool aged children.(20) We used the total sum of scores from
156 the four symptom subscales (SDQ Total Difficulties) ranging from 0 to 40.

158 *Living arrangements.* Living arrangement groups were based on parents' answers to the
159 question "What does the child's family look like? The child lives with...". The options were:
160 (a) intact family, (b) joint physical custody (about 50/50 in each parent's home), (c) living
161 mostly with mother/father (collapsed here to living mostly with one parent), and (d) living
162 only with mother/father (collapsed here to living only with one parent).

164 *Coparenting quality.* Coparenting was measured using a four-item scale inspired by the
165 coparenting scale posited by McHale and Kuersten-Hogan.(21) Parents were asked about their
166 ability to cooperate, support each other, and confide in/trust each other, and the extent to
167 which they experienced conflict related to their children. Items were rated on a 5-point scale
168 from 1 (disagree completely) to 5 (agree completely). Higher scores indicated better
169 coparenting. The scale showed good internal consistency (Cronbach's alpha = 0.79).
170 Confirmatory factor analysis revealed an acceptable fit for the one factor model: comparative
171 fit index (CFI) = 0.99; Tucker-Lewis index (TLI) = 0.98; root mean square error of
172 approximation (RMSEA) = 0.066 (90% confidence interval = 0.056 – 0.076). For the
173 ANCOVA analyses, we used a dichotomization where coparenting quality of 15 and below
174 was considered low while coparenting quality of 16 and above was considered high. Parents

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3 175 who had chosen the option 3 (neither agree or disagree) for at least one of the four items were
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5 176 thus dichotomized as reporting low coparenting quality.

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8 178 *Background data on children and parents.* We used the following background characteristics:
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10 179 child gender (girl/boy); responding parent (categorized as mother/father/both, where both
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12 180 included a few cases of same-sex parents); mothers' and fathers' age presented as mean and
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14 181 standard deviations; mothers' and fathers' highest level of education (compulsory/high
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16 182 school/university (less than 3 years)/university (3 years or more)/not reported); and mothers'
17
18 183 and fathers' country of birth (grouped as Sweden/other/not reported).

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20 185 *Statistical analyses*

21
22 186 The scores were scaled up pro-rata for the coparenting scale if only one item was missing, and
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24 187 for SDQ if only one or two items per subscale were missing. Hierarchical regression models
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26 188 were estimated in three steps with the SDQ total score as the outcome, living arrangements as
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28 189 the exposure variable and JPC as reference. Model 1 adjusted for child gender and whether
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30 190 the survey was filled in by the mother, father or both. Model 2 added maternal education. In
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32 191 the fully adjusted Model 3, coparenting quality as a continuous measure was added to Model
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34 192 2. To investigate the possibility that coparenting quality moderated the association between
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36 193 family type and the SDQ total score for children, we used factorial ANCOVA with children's
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38 194 living arrangement and coparenting quality (dichotomized into high and low levels) as factors
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40 195 and child gender, the survey being filled in by the mother and mother's education (at least
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42 196 three years of university education) entered as covariates. Due to small sample sizes the
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44 197 categories of children living mostly or only with one parent were collapsed in the sensitivity
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46 198 analyses.

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46 200 **RESULTS**

47 201 **Background characteristics**

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49 202 Characteristics of children and parents are presented in Table 1. About 95% of the 3-year-olds
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51 203 lived with both parents, in intact families. Children in equal JPC constituted 2.6% of the total
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53 204 sample, while 1.2% of the children lived mostly with one parent and as many lived only with
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55 205 one parent. The sample included slightly more boys than girls in all family types. In intact
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57 206 families, most parents completed the survey together, while in other family types, mothers
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59 207 often completed the survey alone. Separated mothers were slightly younger than those in
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208 intact families and fathers in single care families were younger than fathers in the other family

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3 209 types. A university-level education of at least three years was most common for mothers and
4 210 fathers in intact families and least common in families where the child only lived with one
5 211 parent. More children to parents born outside of Sweden lived only with one parent compared
6 212 with JPC. Data on father's educational level as well as on parents' country of birth was
7 213 missing for a large part of the sample. Low coparenting quality was more common among
8 214 parents who did not live together and in particular in families where the child only lived with
9 215 one parent.
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Table 1. Characteristics of children and parents in different living arrangements

	Children's living arrangements									
	Total sample		Intact family		Joint physical custody		Mostly with one parent		Only with one parent	
	(n=12845)		(n=12203)		(n=332)		(n=151)		(n=159)	
Sociodemographic variables	n	%	n	%	n	%	n	%	n	%
Child gender										
Girl	6220	48.1	5903	48.0	163	48.5	75	49.7	79	49.1
Boy	6641	51.3	6313	51.4	171	50.9	76	50.3	81	50.3
Not reported	76	0.6	73	0.6	2	0.6	0	0.0	1	0.6
Responding parent										
Female (mother)	5342	41.3	4873	39.7	201	59.8	126	83.4	142	88.2
Male (father)	1058	8.2	968	7.9	73	21.7	12	7.9	5	3.1
Two parents together ^a	6519	50.4	6433	52.3	60	17.9	13	8.6	13	8.1
Not reported	18	0.1	15	0.1	2	0.6	0	0.0	1	0.6
Mother age (mean, SD) ^b	35.39	4.66	35.47	4.58	34.18	5.06	33.99	6.26	32.84	6.49
Father age (mean, SD) ^c	37.60	5.48	37.64	5.46	36.05	5.56	37.85	4.42	33.56	9.00
Mother highest level of education										
Compulsory	203	1.6	168	1.4	15	4.5	7	4.6	13	8.2
High school	2751	21.4	2528	20.7	85	25.6	65	43.0	73	45.9
University less than 3 years	1307	10.2	1238	10.1	35	10.5	16	10.6	18	11.3
University more than 3 years	7284	56.7	7075	58.0	115	34.6	49	32.5	45	28.3
Not reported	1300	10.1	1194	9.8	82	24.7	14	9.3	10	6.3
Father highest level of education										
Compulsory	172	1.3	161	1.3	4	1.2	3	2.0	4	2.5
High school	2046	15.9	1984	16.3	52	15.7	5	3.3	5	3.1
University less than 3 years	902	7.0	879	7.2	17	5.1	6	4.0	0	0.0
University more than 3 years	4166	32.4	4098	33.6	55	16.6	8	5.3	5	3.1
Not reported	5559	43.3	5081	41.6	204	61.4	129	85.4	145	91.2
Mother country of birth										
Sweden	7051	54.9	6716	55.0	171	51.5	81	53.6	83	52.2
Other	1440	11.2	1383	11.3	18	5.4	13	8.6	26	16.4
Not reported	4354	33.9	4104	33.6	143	43.1	57	37.7	50	31.4
Father country of birth										
Sweden	4484	34.9	4374	35.8	89	26.8	14	9.3	7	4.4
Other	872	6.8	853	7.0	9	2.7	2	1.3	8	5.0
Not reported	7489	58.3	6976	57.2	234	70.5	135	89.4	144	90.6
Coparenting quality										
High	11314	88.1	10972	89.9	218	65.7	70	46.4	54	34.0
Low	1531	11.9	1231	10.1	114	34.3	81	53.6	105	66.0

^a Includes some same sex parents, ^b n = 9,028, ^c n = 5,697

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219 **Child mental health in relation to background characteristics**

220 Mental health problems according to SDQ for children in different family types are reported
 221 in Table 2. Fewer problems were reported for children in intact families followed by children
 222 in JPC. Children living mostly or only with one parent had more mental health problems.
 223 Boys had more problems compared with girls and children of mothers with high educational
 224 levels suffered from less problems compared with those with less educated mothers.

Table 2. Mean values and standard deviations of the SDQ in relation to sociodemographic variables

	SDQ Total score		
	<i>n</i>	Mean	SD
<i>Living arrangement</i>			
Intact family	12203	7.07	4.23
Joint physical custody	332	7.26	4.50
Mostly with one parent	151	8.45	5.28
Only with one parent	159	8.55	5.32
<i>Child gender</i>			
Girl	6213	6.70	4.10
Boy	6632	7.50	4.39
<i>Responding parent</i>			
Female (mother)	5315	6.95	4.26
Male (father)	1052	7.30	4.34
Two parents together ^a	6478	7.21	4.27
<i>Mother highest level of education</i>			
Compulsory	203	8.72	5.56
High school	2751	7.67	4.53
University less than 3 years	1307	7.31	4.31
University more than 3 years	7284	6.77	4.04
Not reported	1300	7.41	4.45

225 ^a Includes some same sex parents

227 **Multivariate modelling**

228 Table 3 shows the results from linear regression models, which suggest, in model 1
 229 controlling for child gender and respondent parent, that 3-year-olds living mostly or only with
 230 one parent, compared with those in JPC, had more mental health problems. However, 3-year-
 231 olds in intact families were not significantly different from those in JPC in terms of mental
 232 health. When maternal education was added, in Model 2, the differences between those living

233 only and mostly with one parent and those in JPC were attenuated. Coefficients remained
 234 significant, however, indicating that only some of the differences were explained by the
 235 background characteristics. In Model 3, after including coparenting quality, the differences
 236 between those living only and mostly with one parent and in JPC were no longer significant.
 237 Instead, differences between children in intact families and JPC became significant suggesting
 238 that children living in JPC showed fewer problems compared to children in intact families
 239 after controlling for coparenting quality.

Table 3. Linear regression models of parental reports of the SDQ Total Difficulties by living arrangement, sociodemographic variables and coparenting quality (n=12,845)

	Model 1				Model 2				Model 3			
	B	95% CI		p	B	95% CI		p	B	95% CI		p
Living arrangement												
Joint physical custody	Ref				Ref				Ref			
Intact family	-0.26	-0.72	0.21	0.283	-0.11	-0.58	0.36	0.643	0.70*	0.24	1.15	0.003
Living mostly with one parent	1.27*	0.45	2.09	0.002	1.18*	0.37	2.00	0.004	0.14	-0.66	0.93	0.735
Living only with one parent	1.38*	0.58	2.19	0.001	1.20*	0.40	2.00	0.003	-0.25	-1.03	0.54	0.537
Child gender												
Girl	Ref				Ref				Ref			
Boy	0.78*	0.64	0.93	0.000	0.78*	0.63	0.93	0.000	0.74*	0.60	0.88	0.000
Respondent												
Female (mother)	Ref				Ref				Ref			
Male (father)	0.34*	0.06	0.62	0.019	-0.37	-0.96	0.22	0.220	-0.38	-0.95	0.20	0.199
Two parents together a	0.31*	0.16	0.47	0.000	0.37*	0.21	0.53	0.000	0.60*	0.45	0.75	0.000
Mother's highest level of education												
University (3 years or more)					Ref				Ref			
Compulsory					1.92*	1.32	2.51	0.000	1.99*	1.42	2.57	0.000
High school					0.88*	0.69	1.07	0.000	0.80*	0.62	0.98	0.000
University (less than 3 years)					0.56*	0.32	0.81	0.000	0.52*	0.28	0.76	0.000
Not reported					1.07*	0.53	1.60	0.000	1.06*	0.54	1.58	0.000
Coparenting quality									-0.45*	-0.48	-0.42	0.000

^a Includes some same sex parents

* $P < 0.05$

Figure 1. Estimated marginal means with error bars with 95% confidence intervals for children's living arrangements by coparenting quality.

-----Figure 1 in about here-----

250 **Factorial ANCOVA**

251 The factorial ANCOVA analysis revealed a significant interaction effect for children's living
252 arrangement by coparenting quality $F(3, 12\ 834) = 3.770, p = 0.010$. Figure 1 shows the
253 estimated marginal means for children's living arrangement by coparenting quality. Separate
254 one-way ANCOVAs on low and high coparenting groups showed that the overall effect of
255 family type was significant for the high coparenting group ($F(3, 11\ 307) = 2.83, p = 0.037$)
256 and non-significant for the low coparenting group ($F(3, 1\ 524) = 2.11, p = 0.097$). To limit the
257 number of post-hoc comparisons and in line with our main research question, we only tested
258 the differences between JPC and other family types. In the high coparenting group, children in
259 JPC showed fewer problems compared to those living only with one parent (mean difference
260 = -1.44, $p = 0.020$). No significant differences were found between children living in JPC
261 families and those in intact families or living mostly with one parent (mean difference = -
262 0.21, and -1.06, $p = 0.458$, and 0.058 , respectively).

263
264 Next, separate one-way ANCOVAs on the four family types showed that high quality
265 coparenting was associated with fewer mental health problems for children living in intact
266 and JPC families ($F(1, 12\ 198) = 435.25, p < 0.001$, and $F(1, 327) = 9.40, p = 0.002$,
267 respectively). For children living mostly or only with one parent this difference was smaller
268 and not statistically significant ($F(1, 146) = 2.38, p = 0.125$ and $F(1, 154) = 0.54, p = 0.463$,
269 respectively).

271 **Sensitivity analyses**

272 As sensitivity analyses, we used multiple imputation (MI) to impute missing values on SDQ
273 and coparenting scale (imputed at item level), as well as mother education (compulsory and
274 high school had to be combined to run the MI). The regression analyses and estimated
275 marginal means in the ANCOVA model revealed the same pattern of results (not shown).

276
277 Furthermore, considering that (1) the overall pattern of results was very similar for children
278 living mostly and only with one parent, and (2) the sample size was smaller in these two
279 groups, we repeated all the ANOCVA analyses with these two family types grouped together.

280
281 The factorial ANCOVA analysis revealed a significant interaction effect for children's living
282 arrangement by coparenting quality $F(2, 12\ 836) = 5.48, p = 0.004$. Separate one-way
283 ANCOVAs on low and high coparenting groups indicated that the overall effect of family

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3 284 type was significant for both high and low coparenting groups ($F(2, 11\ 308) = 4.12, p = 0.016$
4 and ($F(2, 1\ 525) = 3.05, p = 0.048$). Post-hoc comparisons showed that in the high coparenting
5 285 group, children in JPC showed similar levels of problems to those living in intact families
6 286 (mean difference = $-0.21, p = 0.458$), but fewer problems compared to those living
7 287 mostly/only with one parent (mean difference = $-1.23, p = 0.008$). In the low coparenting
8 288 group, children in JPC showed fewer problems compared to those living in intact families
9 289 (mean difference = $-1.10, p = 0.018$), but did not differ significantly from children living
10 290 mostly/only with one parent (mean difference = $-0.687, p = 0.222$). Separate one-way
11 291 ANCOVA on children living mostly/only with one parent revealed a non-significant overall
12 292 effect of the two coparenting levels ($F(1, 305) = 2.43, p = 0.120$).
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295 **DISCUSSION**

296 This cross-sectional study of 12,845 3-year-olds in Stockholm, demonstrated very similar
297 mental health outcomes in children in JPC after parental separation compared with children in
298 intact families, while children living mostly and only with one parent had more mental health
299 problems, net of sociodemographic characteristics. These findings are consistent with another
300 Swedish cohort of 3- to 5-year-olds (11) and studies on older children in the Nordic
301 countries.(e.g., 12, 22, 23) The addition of coparenting quality in the analyses, however,
302 changed the picture of how children's mental health is related to family type.
303

304 **The findings in relation to coparenting quality**

305 Coparenting quality varied largely between the different family forms, with intact families
306 reporting the highest quality and single care parents the lowest. When we adjusted for
307 coparenting quality the differences in mental health between children in JPC and those living
308 mostly or only with one parent disappeared. This finding confirms the conclusion of a
309 systematic review describing coparenting as a key mechanism within the family system for
310 child mental health outcomes following divorce.(24)
311

312 Interestingly, the differences between children in intact families and JPC instead became
313 significant in this analysis, suggesting better mental health in children in JPC. This is
314 surprising since JPC for young children has been questioned by scientists and child
315 experts.(25) In the debate the frequent separations from the parents imposed by JPC have
316 been assumed to harm children's ability to regulate stress and emotions as well as the security
317 in their attachment relations.(25) A potential explanation for the positive outcome for children

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3 318 in JPC may however be the positive prerequisites for parenting involved in this living
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5 319 arrangement, as described by parents of 1-4-year-olds in JPC in an interview study.(26) For
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7 320 young children's mental health, positive parenting practices and high quality in the parent-
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9 321 child relations are particularly important and the interviewed parents described improved
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11 322 parent-child relationships and increased satisfaction in parenting after their divorce.(26, 27)
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13 323 JPC allowed them to focus entirely on the child when together and they could make decision
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15 324 without having to compromise with a coparent. In a previous study of 3-5-year-olds, we found
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17 325 no differences in parent reported child mental health between JPC and intact families but
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19 326 could then not include information on coparenting quality or parental conflict. (11) It is
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21 327 however possible that this finding is an artefact and it needs to be confirmed in future studies.

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24 329 The interaction analyses revealed significant interaction effects for living arrangement by
25
26 330 coparenting quality for both the high and the low coparenting groups when the categories
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28 331 mostly/only with one parent were collapsed. When coparenting quality is high children in JPC
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30 332 and intact families show similar levels of problems and children in JPC have fewer problems
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32 333 compared with those living mostly/only with one parent.

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35 335 For families with low coparenting quality the results were similar to those of the main
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37 336 analysis; children in JPC showed fewer problems compared to those living in intact families
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39 337 but did not differ significantly from children living mostly/only with one parent. Coparenting
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41 338 quality hence seems to be a determinant of children's mental health not only among children
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43 339 with JPC parents, but may be particularly troublesome in intact families. Obviously fights
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45 340 over the children and lack of support, trust and cooperation in the parental relationship
46
47 341 influences the family atmosphere to a higher degree when parents live together, compared
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49 342 with when they have separate homes. Low coparenting quality may also hamper parent's
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51 343 individual relationships to the child and parental efficacy more in intact families. Indeed, prior
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53 344 research has found similar patterns related to parental conflict. In a longitudinal Swedish
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55 345 study, adults who had grown up in intact families characterized by serious disagreement,
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57 346 reported the lowest level of psychological wellbeing, followed by those who had experienced
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59 347 parental conflict and parental divorce. (28) Similarly, another Swedish study found that
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348 children who grew up with divorced parents had poorer psychological health as young adults,
349 but parental conflict and economic hardship during childhood attenuated the association.(29)

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3 351 We found high quality coparenting to be associated with fewer mental health problems for
4 352 children living in intact and JPC families but not for children living mostly or only with one
5 353 parent. Coparenting quality hence seems to play a lesser role for children when one parent is
6 354 the primary care giver and the need for cooperation between the parents is limited. Parenting
7 355 quality of the primary care giver may, for these children, be of greater importance.
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11
12 357 We have previously discussed whether children's wellbeing related to custody arrangements
13 358 may be explained by socioeconomic status, by an increased closeness to the father in JPC, or
14 359 by whether children experience a loss of social and economic resources. Earlier studies show
15 360 that although these factors contributed to children's wellbeing, adjusting for them did not
16 361 eliminate the differences in wellbeing between children living in different family types.(2, 9,
17 362 11, 12, 23) By exploring the interaction between coparenting quality and family types, we
18 363 may capture a large proportion of the unmeasured variance; these are differences between
19 364 groups that have been unexplained in previous studies.
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29 366 Currently, parenting interventions mainly focus on improving the quality of parenting
30 367 children receive and primarily target mothers.(30) Unfortunately, positive effects of such
31 368 programs have not been extended to coparenting quality.(31) Our results suggest that
32 369 coparenting skills may be an important and distinct dimension that should be given more
33 370 attention in parenting interventions and that such programs should be evaluated in terms of
34 371 their impact on child wellbeing and mental health.(32, 33)
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41 373 **Methodological considerations**

42 374 Compared to earlier studies examining JPC among very young children, this study has
43 375 considerable advantages. First, the size of our sample of children in this living arrangement by
44 376 far exceeds that of earlier studies and enables more detailed groupings. However, in some
45 377 analyses the smallest groups were collapsed to gain power. Second, these children live in
46 378 about equal JPC, whereas JPC in other studies may be based on overnights or unequal
47 379 distribution of time between the parents' homes. Furthermore, the inclusion of the coparenting
48 380 measure contributes to the explanation of children's psychological health in different family
49 381 types. We do, however, acknowledge that our assessment of coparenting quality was a
50 382 modified tool of four items, inspired by McHale et al. (2000). The scale was adapted to a
51 383 community health care setting where survey items needed to be related to child wellbeing,
52 384 suitable for discussion with the CHC nurse and possible for parents to complete together as
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3 385 well as individually. The four items represent the core dimensions of coparenting as stipulated
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5 386 by McHale and Feinberg.(21,34) Three of the items relate to aspects of the parental
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7 387 relationship that are important for children's feelings of security and cohesion; ability to
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9 388 cooperate, support each other, and confide in/trust each other. The fourth item address
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11 389 parents' conflict over the child, which instead disrupts children's security if it is intense or
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13 390 ongoing.

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15 392 Another issue with our measure is that we may not capture the whole variance, as most
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17 393 families score rather high on the measure, which may be related to self-serving bias due to the
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19 394 lack of anonymity. Parents who do not wish to discuss their coparenting relationship with the
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21 395 CHC nurse may be inclined to report high coparenting quality while those who are
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23 396 dissatisfied with the relationship instead may tend to score low. Furthermore, it seems quite
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25 397 probable that this tendency, leading to overadjustment, may explain the unexpected better
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27 398 mental health of children in JPC compared with children in intact families. We acknowledge
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29 400 that the measure thus needs further validation. Even so, factor analysis suggested that the
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31 401 internal validity was good. More parents in the intact family settings assessed coparenting
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33 402 quality together, whereas one parent more often assessed coparenting in the non-intact
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35 403 families. To address this issue, we adjusted for whether the respondent was the father or
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37 404 mother or both parents. Finally, we successfully recruited a high percentage of the children in
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39 405 the general population to the study (67%), though we were not able to examine the differences
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41 406 between those who did and did not participate.

41 407 It is important to note that the relation between children's mental health problems and
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43 408 coparenting quality is not causal. Having a toddler with behavioural problems may impact the
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45 409 coparenting relationship and parents' perceptions of their children's mental health may be
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47 410 influenced by their common abilities to handle the child. Further longitudinal studies are
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49 411 needed to determine the direction of this relation. Also, regarding causality, there is no
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51 412 information in this study about what factors lead to better or worse coparenting quality.
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53 413 Sharing parental responsibilities has previously been shown to be associated with reduced
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55 414 workload (35), more time for leisure activities (36), and improved communication between
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57 415 parents.(35, 37)

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59 417 The results of this study show considerable differences in maternal education between
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418 livingarrangements, with more mothers in intact families having a university degree versus

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3 419 separated mothers. There were high numbers of data missing on other potentially important
4 420 socioeconomic covariates. Socioeconomic as well as other selection factors that were not
5 421 included in our analysis, such as parent mental health and addictive problems, may hence
6 422 cause residual confounding in the comparison between family types.
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11 424 **Implications**

12 425 This study does not support claims that JPC is psychologically harmful for preschool children
13 426 in general. Our results rather indicate that the promotion of coparenting quality should be
14 427 emphasized in policy and prevention of mental health for young children living with both
15 428 parents as well as after parental separation. For children living mostly or only with one parent,
16 429 interventions that focus on parenting skills and positive parenting behaviours should be given
17 430 priority.
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25 432 **Conclusion**

26 433 This study shows that 3-year-olds in joint physical custody have better mental health than
27 434 their counterparts who live mostly or only with one parent and that coparenting quality
28 435 contributes to the understanding of early child mental health, not only in children with
29 436 separated parents but also in intact families. Coparenting quality is hence an important health
30 437 determinant that clinicians and social workers can target with interventions, regardless of the
31 438 family situation.
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46 444 **CONFLICTS OF INTEREST**

47 445 None declared.
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51 447 **CONTRIBUTORS**

52 448 MB, EF and AH initiated and funded this study and created the framework for the data
53 449 collection and analysis together with KB. KB supervised the data collection and prepared the
54 450 collected data for analysis. RS designed and performed all statistical analyses and wrote the
55 451 first draft of the manuscript together with MB. All authors revised the draft and have
56 452 approved of the final version.
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