



Long-term collateral effects of parent programs on child maltreatment proxies: Can administrative data provide useful insights?

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ABSTRACT

Collecting child maltreatment data from participants is expensive and time-consuming, and often suffers from substantial attrition rates. Administrative population data may prove fruitful to overcome these barriers. The aim of this study was twofold: (1) to illustrate how administrative data may be used in evaluating long-term intervention effects; and (2) to examine collateral effects of three preventive early childhood interventions offered to families in the Netherlands (*Supportive Parenting*, *VoorZorg*, and *Incredible Years*). Using population data, four proxies of child maltreatment were assessed to examine collateral intervention effects: incidences of child protection orders, placements of children in residential care, crime victimization of children or their parents, and parental registrations as a crime suspect. The results revealed no significant differences between experimental and control conditions on any of these proxies, with very small effect sizes (ranging from Cramer's $V = 0.01$ to Cramer's $V = 0.10$). We conclude that the results do not provide support for collateral effects, but that studying other outcomes may provide this support. We further discuss that small sample sizes and low prevalences challenge studies using administrative data. Notwithstanding these limitations, we conclude that administrative data can strengthen the evidence base for collateral and direct intervention effects.

1. Introduction

Child maltreatment is associated with serious and enduring negative consequences, which underlines the need for effective early prevention. There are many early childhood interventions that contribute to the prevention of child maltreatment by targeting important risk factors. Although a great amount of literature is available on the short-term effects of these preventive early childhood programs, evidence for long-term effects is limited (Euser et al., 2015; Van der Put, Assink, Gubbels, & Boekhout van Solinge, 2018). Therefore, we know little about how the effects of these programs may fade out, sustain, or perhaps increase over time (Gubbels et al., 2021a; Van der Put et al.,

2018). Following families that participate in early childhood interventions is crucial to increase our knowledge on whether and how these families benefit from these interventions over time, and to understand whether changes in behavior occur that were not directly targeted in an intervention (i.e., *collateral intervention effects*; Ledbetter-Cho, Lang, Watkins, O'Reilly, & Zamora, 2017). However, longitudinal collection of child maltreatment data is time-consuming, expensive, and often involves attrition and loss to follow-up (MacMillan et al., 2007). Linking administrative data to experimental intervention data might offer a solution. This study aimed to (1) explore the potential of administrative data in evaluating long-term intervention effects; and to (2) evaluate long-term (up to 20 years) collateral effects of three parent

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programs on proxies of child maltreatment. The programs comprised Supportive Parenting, VoorZorg, and Incredible Years, and were offered to families in the Netherlands.

Child maltreatment is defined by the World Health Organization (WHO) as all types of physical and/or emotional ill-treatment, sexual abuse, neglect, negligence and commercial or other exploitation, which results in actual or potential harm to the child's health, survival, development or dignity in the context of a relationship of responsibility, trust or power (World Health Organization (1999), 1999). The worldwide prevalence rates derived from self-report studies ranged from 12.7 % for sexual abuse to 36.3 % for emotional abuse (Stoltenborgh et al., 2015). Prevalence rates based on reports of professionals working with children as informants were lower (0.3 % for physical abuse and emotional abuse and 0.4 % for sexual abuse; Stoltenborgh, Bakermans-Kranenburg, & Alink, 2015), implying that most child abuse cases are not detected by professionals. In the Netherlands, child maltreatment rates range from 3 % (based on professional-reports; Alink et al., 2018) to 12 % (based on self-reports; Schellingerhout & Ramakers, 2017). No significant changes in prevalence rates were found (Euser et al., 2010; Euser, Alink, Pannebakker, Vogels, & Bakermans-Kranenburg, 2013), indicating that the prevalence of child maltreatment is quite stable over time and that preventive efforts and changes in child protection policies have not yet resulted in the intended decrease over time (Van Berkel, Prevo, Linting, Pannebakker, & Alink, 2020).

There is a wide range of early childhood interventions that contribute to preventing child maltreatment. These interventions aim to improve outcomes for young children and their families, and are generally focused on a specific type of behavior (e.g., improving parenting, or reducing aggression in children). However, these interventions are expected to have broader benefits than just the specific behaviors addressed by the intervention (Hunter, McLay, France, & Blampied, 2020). These benefits can be defined as *collateral intervention effects*, which are changes in behavior that are not directly targeted in an intervention (Ledbetter-Cho et al., 2017). Moreover, although early childhood programs may differ in the outcomes or behaviors they address, they often target similar dynamic risk factors. For instance, programs addressing antisocial behavior of children and programs addressing forms of child maltreatment often target parental risk factors, such as unemployment, parental stress, and mental health problems (see for instance the reviews of Assink et al., 2015, 2019; Mulder, Kuiper, van der Put, Stams, & Assink, 2018; Stith et al., 2009). Additionally, both child maltreatment and antisocial behavior are caused by an accumulation of risk factors (Van der Put et al., 2018, Stith et al., 2009). Therefore, we examined two interventions (i.e., Supportive Parenting and VoorZorg) specifically designed for preventing parentings problems that may lead to child maltreatment, but also an intervention (i.e., Incredible Years) that was developed for decreasing children's antisocial behaviors by improving parents' child rearing skills. Supportive Parenting and VoorZorg target parents with for instance substance abuse problems, financial problems, or trauma symptoms because of a history of violence or abuse; and Incredible Years targets parents who report problematic behavior of their child or children. From a general prevention viewpoint, it is of value to examine how these three interventions are related to long-term proxies of child maltreatment. After all, each intervention targets important risk factors, even though one (Incredible Years) was not specifically designed for addressing child maltreatment nor risks thereof.

A great number of review studies is available on the effectiveness of early childhood interventions aimed at preventing or reducing child maltreatment (i.e., Filene, Kaminski, Valle, & Cachet, 2013; Geeraerts, Van den Noortgate, Grietens, & Ongehena, 2004; Pinquart & Teubert, 2010; Sweet & Appelbaum, 2004). However, recent *meta*-analyses show that only a few of these interventions have been investigated for long-term effects (Euser et al., 2015; Van der Put et al., 2018). Moreover, larger positive effects were found at later follow-up for both preventive child maltreatment interventions in general (Van der Put et al., 2018),

and home visiting programs in particular (Gubbels et al., 2021). Therefore, it is important to thoroughly conduct follow-up evaluations of considerable length, as the true effects on preventive early childhood interventions may be particularly expressed in follow-up rather than in post-treatment evaluations.

To evaluate the long-term effects of prevention programs for child maltreatment, large-scale longitudinal studies provide good evidence and are powerful tools for unraveling the complicated issues around child abuse and neglect (MacMillan et al., 2007). However, longitudinal collection of child maltreatment data is difficult to coordinate, vulnerable to attrition (and therefore selection bias), time-consuming, and expensive. Administrative child welfare data provide a good alternative to evaluate early childhood prevention programs. Brownell and Jutte (2013) suggested several benefits of using administrative data as a resource for research in the field of child abuse and neglect. First, child welfare administrative records are not subject to the social desirability bias associated with self-report measures of child maltreatment or harsh or abusive parenting behavior. Second, population-wide linked administrative records are free from attrition and loss to follow-up, which are common problems in research using longitudinal survey or interview data. Third, because administrative data are available over extended periods of time, researchers can collect data retrospectively and examine patterns of maltreatment for children across a number of years at a significantly lower cost and a shorter timeframe than original-source longitudinal studies. Finally, administrative data cover the entire population (e.g., children in the child protection system), enabling researchers to avoid issues with sampling and selective non-response.

At the same time, challenges of accessing administrative data and using these records for understanding child maltreatment prevention efforts have been noted. For example, as a large proportion of child maltreatment is not reported to child protection authorities, official child welfare records underestimate the actual prevalence of child maltreatment (Cyr et al., 2013; MacMillan et al., 2003). There have also been concerns about using official records in evaluating program effectiveness due to heightened surveillance by mandated reporters (e.g., program staff) for children in the treatment group. Finally, Green and colleagues (2015) report several challenges of obtaining access to and using administrative data, including long delays in access to information and uncertainty about the quality and accuracy of data matching done by state agencies. They conclude that, while accessing and using administrative data is not easy and has several limitations, the benefits can outweigh the challenges and that these administrative child welfare records can be a useful source of information for policy-relevant child welfare research.

Various studies originating from for instance the United States (U.S.), Canada, and Australia describe the use of administrative data in investigating issues around the causal risk factors for, and the outcomes of, child abuse and neglect (e.g., Brownell & Jutte, 2013; English, Brandford, & Coghlan, 2000; Green et al., 2014; 2015; Hurren, Stewart, & Dennison, 2017; Prinz, 2017; Putnam-Hornstein, Needell, & Rhodes, 2013; Sokol, Victor, Mariscal, Ryan, & Perron, 2021). Green et al. (2015), for example, used administrative data from child welfare agencies in six different states in the U.S. to examine the impact of the home visiting program Early Head Start on documented abuse and neglect. In their article they described their experiences with obtaining access to and using these data.

In several Nordic countries, governmental organizations facilitate the use of registers and administrative data sources for statistical purposes (Statistics Finland (2004), 2004; United Nations Economic Commission for Europe (2007), 2007). Register-based statistics were also developed in the Netherlands. These data are centrally stored by Statistics Netherlands, an autonomous agency with the mandate to collect and process data from all Dutch companies and government agencies (Statistics Netherlands (2017), 2017). SN facilitates a standardized storage of data, provides linkage keys on individual-, address, or company-level so that data can be easily linked, and coordinates on

organizational, technical, and content related aspects so that consistency in outcomes are obtained (Bakker, Van Rooijen, & Van Toor, 2014). Linked administrative data from SN have been widely used in scientific research on various constructs. De Jonge, Lagendijk, Saha, Been, and Burdorf (2019), for example, used SN data in their study on the effect of a Dutch perinatal health program on perinatal outcomes. In light of the research on child maltreatment, Van Berkel et al. (2020) used SN data to examine the prevalence of child maltreatment in the Netherlands and Vial, van der Put, Stams, Dinkgreve, and Assink (2021) used these data to validate a risk assessment instrument for child welfare. Yet, no studies are available using SN linked administrative data to examine the collateral effects of prevention programs on proxies of child maltreatment.

1.1. The current study

This is the first study to explore the potential of Dutch population-based administrative data in examining collateral effects of preventive early childhood interventions on proxies of child maltreatment. Moreover, as long-term follow-up evaluations on child maltreatment are scarce, this study contributes significantly to the available knowledge on the long-term (up to 20 years) collateral effects of preventive early childhood interventions. Four proxies of child maltreatment were examined to test collateral effects: incidences of child protection orders, placements of children in residential care, crime victimization of children or parents, and parents being registered as a crime suspect.

In this paper, we provide a detailed description of the step-by-step approach and methodology to accessing and using Dutch administrative data as a means of evaluating three preventive early childhood interventions: (1) Supportive Parenting (in Dutch: *Stevig Ouderschap*), (2) VoorZorg, and (3) Incredible Years (in Dutch: *Pittige Jaren*). Further, we report on the results of the evaluations and discuss the challenges and opportunities of using this type of data in future research.

2. Method

2.1. Step 1: Selecting prevention programs for longitudinal research

For this study, we aimed to find datasets of randomized controlled trials (RCT's) or quasi-experimental studies. These datasets should be used to examine the effect of preventive early childhood interventions in the Netherlands on either child maltreatment or other outcome measures, including increased parenting skills or decreased children's externalizing behavior. To be included in the current study, these datasets had to contain several identifying variables of children in the intervention and control group (e.g., birthday, gender, postal code) that were needed to be assigned a unique identifier, which served as the linkage key to identify individuals in the Dutch administrative data. Further, the datasets had to contain information about the experimental condition of the child (intervention group and control group). Datasets of studies with a waiting-list control group were excluded, as this group received the intervention after the active treatment group did.

Based on these factors, datasets of three preventive early childhood interventions were selected for longitudinal research using administrative data: (1) Supportive Parenting (Bouwmeester-Landweer, 2006), (2) VoorZorg (Mejdoubi et al., 2015), and (3) Incredible Years (Weeland et al., 2017).

2.1.1. Supportive parenting

Supportive Parenting is a home visiting program aimed at preventing serious parenting problems, including child maltreatment, through improving the parent's self-confidence, self-reliance, parenting skills and strengthening their social network. This program is offered by Dutch child health care organizations. Within these organizations the health and development of all children in the Netherlands are assessed and monitored (Verbrugge, 1990). Bouwmeester-Landweer (2006) found

significant effects of Supportive Parenting on parental expectations, child development, the risk of child maltreatment and maltreatment reports that were measured when the participating children were 24 months.

The home visits in this program are conducted by experienced and trained child health care nurses. Over the course of eighteen months a total of six home visits are conducted at the child's age of six weeks, three months, six months, nine months, twelve months, and eighteen months. At fifteen months a consult by phone is held. Each home visit takes about 75 min and the nurses use a file to serve as a general manual for the visits and as a tool to register the progress at each visit. During each visit three main focal points are addressed: (1) the influence of the parental ontogenetic development (i.e., the parents' childhood experiences) on their parenting, (2) improving the family social support system, and (3) improving parental child rearing. If necessary, parents are referred to additional professional treatment. During each home visit an observation checklist is completed by the nurse to assess five domains: nurture and care, child health and behavior, parent-child interaction, affectionate bond, and involvement with spouse.

2.1.2. VoorZorg

The second intervention included in this study is VoorZorg, a Dutch program originally based on the Nurse Family Partnership program (NFP) developed by Olds, Henderson, Chamberlin, and Tatelbaum (1986). NFP was translated and culturally adapted to the Dutch context (Mejdoubi et al., 2011). The main goal of VoorZorg is primary prevention of child maltreatment. Other goals are: to improve the outcomes of pregnancy by improving the mother's health during pregnancy (especially reduce their use of cigarettes and obtain prompt and reliable treatment for health problems such as bladder infection or depression), to improve the child's health and development by helping parents provide more competent care of their children, and to improve the mother's own personal development. The program consists of approximately 10 home visits during pregnancy, 20 during the first life year of the child, and 20 during the second life year conducted by trained and experienced VoorZorg nurses. The home visits are more frequent during the first month of the intervention and six weeks after birth, because these periods are important for the mother. The duration of each visit is between one hour and one and a half hour. The VoorZorg nurses focuses on six domains: (1) health status of the mother, (2) child's health and safety, (3) personal development of the mother, (4) the mother as a role model, (5) relation of the mother with her partner, family, and friends, and (6) use of institutions. A full description of each visit is included in a manual. However, the visits are flexible and nurses are able to improvise when needed. Central to the VoorZorg program is that the nurses establish an enduring and trusting relationship with the participants.

Mejdoubi et al. (2015) studied the effect of this program in the Netherlands and found that the number of child abuse reports to child protection services (CPS) was significantly lower in the intervention group compared to the control group. Additionally, the home environments were improved and internalizing behaviors of the children were significantly reduced in the intervention group.

2.1.3. The incredible years BASIC program

The Incredible Years (Webster-Stratton, 2001) parent training program is a group behavioral parent training program developed to prevent and intervene in the development of child externalizing behavior by building a warm parent-child relationship through fostering positive parenting strategies (i.e., child-directed play, social and emotion coaching, praising children and the use of incentives to promote prosocial behavior) and diminishing negative parenting strategies (such as being critical and inconsistent towards the child). Much research on the effectiveness of Incredible Years is available. Menting, Orobio de Castro, and Matthys (2013) meta-analytically summarized the findings on the effectiveness of the Incredible Years regarding disruptive and prosocial child behavior and found positive effects. In the Dutch context,

Incredible Years has been found to be effective in reducing child disruptive behavior and improving parenting practices (Weeland et al., 2018), with sustained effects on child disruptive behavior at 2.5-year follow-up (Overbeek et al., 2021). As for the child welfare context, the Incredible Years parenting program has positive post-treatment impacts for parents who self-reported a history of child maltreatment (Hurlburt et al., 2013) and for parents monitored in CPS (Leclair Mallette et al., 2021; Letarte, Normandeau, & Allard, 2010; Marcynyszyn, Maher, & Corwin, 2011).

The basic (preventive) variant of Incredible Years consists of 14 weekly 2-hour group sessions and one booster session (15 sessions in total) with groups 8 to 15 parents. The program starts with a focus on positive parenting strategies, such as play, praise, and incentives. Thereafter, effective limit setting, ignoring unwanted behavior, and time-out strategies are discussed. During the sessions parents watch videos of parents and children interacting, discuss parenting with each other, and practice new techniques in role-plays. Before each session, parents read a book chapter on the topic of that particular session. Additionally, parents receive homework assignments to practice skills and are assigned a “buddy” (i.e., another parent of the same group) whom they can call to discuss experiences with the newly learned skills. Trainers use a collaborative leading style during the sessions: they do not instruct, but are part of the group and lead discussions.

2.2. Step 2: Selecting relevant outcome measures

After selecting the preventive early childhood interventions for this study, we searched for adequate sources of administrative data on proxies of child maltreatment that could be linked to the intervention data. We found that data from Statistics Netherlands (SN) could serve this purpose. Most Dutch companies and government agencies are obliged to report to SN, and therefore this source provides the most complete information on child welfare data. Under strict conditions (see Step 3), SN offers the opportunity for Dutch universities, scientific organizations, planning agencies and statistical authorities within the EU to use these data for statistical research. These *microdata* can be linked at the level of individuals, companies and addresses, and comprise of separate datafiles for each year that specific microdata are available.

SN provides a catalogue of microdata that are available for statistical research. In this catalogue we searched for the outcome measures that were indicative of child maltreatment, child abuse victimization, or domestic violence (i.e., proxy variables for child maltreatment), and that were available in the period after the preventive early childhood interventions were implemented. In the end, we retrieved data on the following outcomes: child protection orders (i.e., data on supervision orders, guardianship, and foster care); residential childcare; registered violent or sexual crime victimization of the child, mother, and partner; and whether a child’s mother or her partner were registered as crime suspects of violent or sexual crimes. For the latter two, “partner” refers to the partner of the mother living in the same household. For describing our samples, we also retrieved microdata on demographic background information (e.g., gender, year of birth, migration background, education level).

2.2.1. Child protection orders

In the Netherlands, the child protection council can be notified by an agency if there are concerns about a child’s safety. The council investigates whether the development of the child is in danger and may submit a request for a court order to be issued. If the family court judge rules that the child needs to be protected, a child protection order will be issued. This could entail a *supervision order*, meaning a family supervisor from a certified agency supervises and supports the child and provides mandatory parenting support. The aim of a supervision order is to allow parents to regain fully independent responsibility for parenting following the supervision period. When the parents are not able to take care of the child, the judge could also decide to place the child into

custody of a legal *guardian*. This could be someone close to the child, for example a family member, or a certified agency appointing a guardian. Finally, when parents cannot provide proper care and attention to their children, *foster care* in a foster family can be a solution. Foster care can be voluntary or court ordered. Data regarding child protection orders were provided to SN by all certified youth care providers in the Netherlands. These data were available for the years 2011 to 2020.

2.2.2. Residential care

Residential childcare means that children live day and night outside their own environment. The stay can vary from a few days a week to the whole week, for a short or longer period, and can be voluntary or court ordered. Residential care has different forms: family-oriented residential care (i.e., all forms of residency approximate to a family situation, for example family houses or guest houses), closed placement (i.e., the child stays at a youth care facility based on an authorization for closed youth care), and staying at other youth care providers (such as living in a group or assisted living). Data regarding residential care were available for the years 2011–2020 and were also provided to SN by Dutch certified youth care providers.

2.2.3. Registered crime victimization and suspects

Data on registered victimization and suspects of violent or sexual crimes were extracted from police data on registered crimes in the Netherlands which are provided to SN. We chose to examine these outcomes as they are indicative of potential domestic violence or maltreatment in the child’s household. For the outcome *crime victimization*, we included the child, mother, or partner being registered as a victim of maltreatment, stalking, threat, sexual offenses, or other violent crimes. Data on registered crime victimization were available for the time period 2005–2019. For the outcome *crime suspects* we included the mother or partner being registered as a suspect of maltreatment, stalking, threat, sexual offenses, or other violent crimes. Data on registered crime suspects were available for the time period 1996–2020.

It should be noted that the outcome measures evaluated in this study may include child endangerment not related to child maltreatment. For example, registered crime victimization does not necessarily have to relate to domestic violence or child maltreatment and a child could be placed in residential care due to severe psychological problems. For clarity, we refer to proxies for child maltreatment in this manuscript, but it is important to keep in mind that this may also include child safety problems not directly related to child maltreatment. Unfortunately, we could not include administrative data on more proximal child maltreatment outcome measures, including reports to the Dutch CPS or substantiated cases of child maltreatment. These data could not be used as there were no unique identifiers available needed to assign linkage keys and match these data to the interventions data (also see Section 4.1).

Furthermore, it must be stressed that the three examined programs are aimed at preventing serious parenting problems in at-risk families (Supportive Parenting and VoorZorg) or at reducing child externalizing behavior (Incredible Years), but not at preventing child maltreatment directly. Therefore, strong statements about the effectiveness of these programs should be based on other outcomes than the outcomes that were available for this study. Here, we only evaluated collateral effects of the programs.

2.3. Step 3: The matching procedure

2.3.1. Gaining access to administrative data

To gain access to the administrative or microdata of SN, we had to submit an official institutional authorization request to the Director General of SN. After this request was reviewed and the institution had been authorized, we submitted a description of the intended research and the required microdata from the catalogue. Employees from the microdata department of SN reviewed the project application and

decided whether the requested microdata fit the scope of the research questions. After the application was accepted, SN employees set up a project account within a secure remote access environment. The remote access system offers researchers the possibility to analyze microdata from a remote location via a secured web connection (Schouten & Cigrang, 2003). We received a hardware token, needed to log in to the remote access environment, and we completed an awareness test.

2.3.2. Assignment of linkage keys to intervention data

Microdata are linkable data at the level of individuals, companies and addresses. In our study we linked data on individual level and therefore individuals were identified and assigned a linkage key. This assignment can be based on several identifying variables, including the social security number of an individual which leads to the best linking quality. However, in the intervention datasets these numbers were not available. We linked the microdata to intervention data using other personal identifiers, including date of birth, gender and address information, such as postal code, house number, and the year of validity of the postal code. The latter enabled linkage key assignment, even if families moved to another address during the follow-up period.

The dataset owners of the intervention data uploaded the datasets following the uploading procedure of SN to ensure safe uploading and anonymity of the participants. The authors of the current study (other than the dataset owners) did not have access to personal data of the participants. When the intervention data were uploaded, employees of SN provided the linkage key needed to match the intervention data to the microdata. They also provide a linkage report in which they explain how many cases could be assigned the linkage key based on the available information about the personal identifiers in the dataset. For some of the children in the intervention datasets personal identifiers were missing and they could not be assigned the linkage key. These cases were excluded from this study.

2.3.3. Data matching and analyses

After the intervention datasets were assigned a linkage key, they were made available in the remote access environment. Within the remote access environment the first and third author of the current study prepared the microdata on the proxies for child maltreatment. They selected the datafiles of the relevant years and the variables needed for the analyses, and they matched the prepared data to the intervention data of Supportive Parenting, VoorZorg, and Incredible Years. The statistical software program Stata 16 (StataCorp, 2019) was used to prepare the microdata and to match the microdata to the intervention data. The authors analyzed the differences between the intervention and control groups to examine the long-term effects of the preventive early childhood interventions on the proxies for child maltreatment. In SPSS version 25.0 (IBM Corp, 2017), a chi-square test was performed to examine these differences and effect sizes were calculated with Cramer's V. Finally, the results of the statistical analyses were rigorously checked for identifiability by SN employees before they were released from the secure remote access environment for publication. Data cells containing less than three observations were not released by SN to protect privacy and make sure that the published data are not traceable to specific individuals.

2.4. Ethical agreement

The entire microdata procedure of SN is in accordance with Dutch legislation for use of anonymous data for research purposes without an explicit informed consent (Statistics Netherlands (2017), 2017). The Ethics Committee of – removed for double blind peer-review – approved this study (project number – removed for double blind peer-review –).

3. Results¹

3.1. Sample description

The study samples comprised the children in families that were included in the three RCT's that examined the effectiveness of (1) Supportive Parenting (Bouwmeester-Landweer, 2006), (2) VoorZorg (Mejdoubi et al., 2015), and (3) Incredible Years (Weeland et al., 2017). Cases with missing personal identifiers could not be assigned the linkage key by SN and were thus excluded from the data. The demographic characteristics of the final samples analyzed in this study are shown in Table 1. The demographic variables were measured at the start of each RCT.

3.1.1. Supportive Parenting sample

Bouwmeester-Landweer (2006) examined the effect of Supportive Parenting on the prevention of child maltreatment in at-risk families. In 2001 and 2002, families at risk for maltreatment were selected from the population of families with newborn children in the west of the Netherlands, by means of a questionnaire that addressed risk factors for child maltreatment. In total, 500 of these families were randomized into an intervention and control group. The sampled children were assessed around birth (baseline), at the age of one year, and at the age of two. For the detailed description of the selection procedure and sample composition, see Bouwmeester-Landweer (2006, chapter 8).

For the current study, a sample of 466 children was included in the analyses. The other 34 children of the original sample could not be included due to missing identifying variables. The intervention group consists of 211 children of families who received six home visits by a trained child health care nurse. The 255 families in the control group did not receive the home visits but were sent information about a child rearing telephone-helpline that was available in the Netherlands at that time. Demographic information is shown in Table 1. Comparison of the intervention and control group identified that fathers in the experimental conditions significantly differed in their education level, $\chi^2(2, N = 466) = 11.727, p = .003$, indicating that more fathers in the intervention condition received an education of medium level (i.e., completed high school or vocational training; 52.6 %) compared with fathers in the control condition (36.3 %), and less fathers in the intervention condition received high education (33.2 %) compared with fathers in the control condition (47 %).

3.1.2. VoorZorg sample

To examine the long-term effects of VoorZorg, we included the children of the women participating in the RCT conducted by Mejdoubi et al. (2015) to study the effect of VoorZorg on child maltreatment and development. From January 2007 to April 2009, women were recruited by general practitioners, midwives, gynecologists, and others in 20 municipalities in the Netherlands using the following five criteria for inclusion: younger than 26 years, low educational level (pre-vocational secondary education), first time pregnancy, maximum 28 weeks of gestation, and at least some understanding of the Dutch language. Women who met all five criteria were interviewed by VoorZorg nurses to assess whether at least one of nine additional risk factors was present, including a history of or current domestic violence, psychosocial symptoms, and financial problems. The children were followed until three years after birth. A more detailed description of the study design and sample is provided in the research article of Mejdoubi et al. (2015) and the study protocol of Mejdoubi et al. (2011).

In total, 292 children of the original sample of 460 families could be linked to the microdata based on several identifying variables and were therefore included in the current study. The intervention group

¹ All results are based on calculations by the authors of this paper using non-public microdata from Statistics Netherlands.

Table 1
Sample demographics for the three intervention samples.

	Supportive Parenting				VoorZorg				Incredible Years			
	Total (N = 466) ^a	Intervention (N = 211)	Control (N = 255)	p	Total (N = 292) ^a	Intervention (N = 155)	Control (N = 137)	p	Total (N = 336) ^a	Intervention (N = 158)	Control (N = 178)	p
Age child (in years): M (SD)	0.12 (0.0)	0.12 (0.0)	0.12(0.0)	NA	-0.33 (0.14)	-0.33 (0.14)	-0.34 (0.14)	0.515	6.31 (1.32)	6.27 (1.33)	6.35 (1.30)	0.578
Gender child (%)				0.673				0.187				0.518
Boys	60.1	61.1	59.2		51.4	47.7	55.5		54.5	56.3	52.8	
Girls	39.9	38.9	40.8		48.6	52.3	44.5		45.5	43.7	47.2	
Country of birth (%)				x				x				x
Netherlands	x	x	x		99.0	x	x		98.8	x	x	
Other	x	x	x		1.0	x	x		1.2	x	x	
Age mother (in years): M (SD)	32.08 (4.31)	31.71 (4.36)	32.39 (4.25)	0.087 ⁺	20.38 (3.18)	20.53 (3.28)	20.21 (3.07)	0.388	37.81 (4.75)	37.65 (4.80)	37.95 (4.70)	0.556
Age father ^b (in years): M (SD)	34.70 (5.35)	34.16 (5.16)	35.15 (5.48)	0.050 ⁺	25.42 (6.57)	25.24 (6.57)	25.62 (6.61)	0.702	40.71 (5.45)	40.74 (5.73)	40.68 (5.22)	0.915
Country of birth mother (%)				0.245				0.213				0.362
Netherlands	87.3	89.3	85.6		74.0	71.0	77.4		90.2	88.6	91.6	
Other	12.7	10.7	14.4		26.0	29.0	22.6		9.8	11.4	8.4	
Country of birth father ^b (%)				0.640				0.163				0.571
Netherlands	90.2	89.4	90.8		67.5	63.9	71.5		88.4	87.3	89.3	
Other	9.8	10.6	9.2		32.5	36.1	28.5		11.6	12.7	10.7	
Education mother				0.117				NA				0.675
Low	13.9	14.7	13.2		100.0	100.0	100.0		5.4	4.5	6.2	
Medium	45.2	49.7	41.5		0.0	0.0	0.0		41.9	43.9	40.1	
High	40.8	35.5	45.3		0.0	0.0	0.0		52.7	51.6	53.7	
Education father ^b				0.003 ^{**}	-	-	-					0.787
Low	15.6	14.2	16.7		-	-	-		12.5	12.3	12.8	
Medium	43.6	52.6	36.3		-	-	-		41.9	43.9	40.1	
High	40.8	33.2	47.0		-	-	-		45.6	43.9	47.1	
Number of children; M (SD)	1.89 (1.19)	1.88 (1.30)	1.89 (1.10)	0.890	1 (0.0)	1 (0.0)	1 (0.0)	NA	2.25 (0.80)	2.27 (0.83)	2.24 (0.77)	0.732

Note. Low education = no education, completed primary education or junior high school; Medium education = completed high school or vocational training; High education = completed higher vocational training or university; An 'x' indicates that the number of observations were 0, 1 or 2. Statistics Netherlands does not release data cells less than 3 observations to protect privacy; NA = Not available because no variance was present; An '-' indicates that no data on the specific sample demographic were available.

^a The total sample sizes correspond to the total families included in this study, not to the original sample sizes of the RCT's.

^b The legal father of the child (according to municipal personal records available at Statistics Netherlands).

⁺ $p < .10$; ^{**} $p < .01$.

comprised of 155 children whose mothers received the VoorZorg program. The control group consists of 137 children whose mother received the usual care as described in Mejdoubi et al. (2011). Table 1 shows no significant differences on demographic characteristics between VoorZorg intervention group and control group.

3.1.3. Incredible Years samples

The Incredible Years sample used in the current study was drawn from the 387 parent-child dyads included in the Observational Randomized Trial on Childhood Differential Susceptibility (ORCHIDS) study (Chhangur et al., 2012; Weeland et al., 2017). The primary aim of the ORCHIDS study was to investigate whether some children are more genetically sensitive to the influence of their environment than other children and whether enrichment of the environment, through the Incredible Years program, has more effect on a genetically sensitive subgroup of children. For the ORCHIDS study families were screened and recruited through community records via two Dutch regional health care organizations. All families with children between 4 and 8 years of

age in four municipalities in the Netherlands were asked to complete the Eyberg Child Behavior Inventory (ECBI; Eyberg & Pincus, 1999), which is a parent rating scale to measure disruptive behavior problems in children. Children scoring at or above the 75th percentile of their relative cohort were invited for participation in the study. Questionnaire and observation data from parents and children across pretest, posttest, and 4-month follow-up were analyzed. More information about the study design and sample can be retrieved from the research article of Weeland et al. (2017) and the study protocol of Chhangur, Weeland, Overbeek, Matthys, and Orobio de Castro (2012).

Of the 387 parent-child dyads included in the ORCHIDS study, a total of 336 children could be assigned a linkage key and were included in the current study. The parents of the 158 children in the intervention group received Incredible Years, a group behavioral parent training program. The control group comprised of 178 children whose parents did not receive any intervention, but were allowed to seek mental health care and parenting support through regular services. Table 1 shows no demographic differences between the intervention and control group.

3.2. Long-term associations

For all three samples, we found no significant differences between the intervention and control groups in court ordered supervisions, placements into custody of a legal guardian, placements into foster care, and whether or not children stayed in residential care (see Table 2). The effect sizes for these outcomes were all very small in magnitude. However, it should be noted that data on child protection orders and residential care were only available from the year 2011. The data for the Supportive Parenting and VoorZorg trials were collected in the period 2001–2002 and 2007–2009, respectively. Therefore, for these trials, the follow-up period does not entail the entire period after the programs ended. Further, not all data on child protection orders could be published due to small numbers of observations (indicated with an ‘x’ in Table 2).

We also analyzed whether children, their mother, and their mother’s partner (living together with the child and mother) were registered as victims of maltreatment, stalking, threat, sexual offenses, or other violent crimes in a police database, as victimization of these types of crimes may be indicative of domestic violence or child maltreatment. As shown in Table 3, we did not find significant differences on these variables between the intervention and control groups of the three RCT’s. Again, the effect sizes were very small in magnitude. The participants in the VoorZorg trial showed higher victimization rates than the participants in the other two trials. This may be explained by the fact that more risk factors for child maltreatment are present in the population targeted by VoorZorg than in the populations targeted by Supportive Parenting or Incredible Years. An example of such a maltreatment risk factor is domestic violence in previous or current relationships.

It should be noted that data on crime victimization were available from the year 2005. The data for the Supportive Parenting trial were collected in the period 2001–2002, and therefore the follow-up period does not entail the entire period after the programs ended. Further, for the participants of the Incredible Years trial not all data on crime victimizations could be published due to small numbers of observations (indicated with an ‘x’ in Table 3).

3.2.1. Registered crime suspects

Finally, we analyzed whether the mothers of the children who participated in the Supportive Parenting, VoorZorg, or Incredible Years trial and their partners were registered as suspects of maltreatment, stalking, threat, sexual offenses, or other violent crimes in a police database. This might indicate domestic violence or child maltreatment. Again, no significant differences were found between groups and effect sizes were very small (see Table 4).

4. Discussion

This study explored the potential of administrative child welfare data in evaluating long-term collateral effects of Dutch preventive early childhood interventions on proxies for child maltreatment. We used previously collected datasets of three RCT’s to examine the collateral effects of the prevention programs (1) Supportive Parenting, (2) VoorZorg, and (3) Incredible Years. These datasets were linked to population-based administrative child welfare data that were available up to 20 years after families participated in these programs. Data were retrieved on four proxies for child maltreatment: incidences of child protection orders, residential childcare, registered crime victimization, and being registered as crime suspect. Below, we discuss the results as well as challenges and benefits of using administrative data.

4.1. Collateral intervention effects

We found no collateral benefits of the examined preventive early childhood interventions on these four proxies for child maltreatment. This might indicate that, although these interventions have a short-term

Table 2
Differences in child protection orders and residential care between intervention and control groups.

	Supportive Parenting (2011–2020) ^a			VoorZorg(2011–2020) ^a			Incredible Years (2014–2020) ^a		
	Intervention (N = 211) N (%)	Control (N = 255) N (%)	$\chi^2(1)$ p	Intervention (N = 155) N (%)	Control (N = 137) N (%)	$\chi^2(1)$ p	Intervention (N = 158) N (%)	Control (N = 178) N (%)	$\chi^2(1)$ p
Supervision orders	7 (3.3)	8 (3.1)	0.01 0.913	30 (19.4)	30 (21.9)	0.29 0.591	3 (1.9)	x	x
Guardianship	x	x	x	13 (8.4)	5 (3.6)	2.82 0.093	x	x	x
Foster care	x	x	x	24 (15.5)	23 (16.8)	0.09 0.762	x	x	x
Child protection orders (either one of the three above)	7 (3.3)	8 (3.1)	0.01 0.913	41 (26.5)	42 (30.7)	0.63 0.427	5 (3.2)	x	x
Residential care	10 (4.7)	15 (5.9)	0.30 0.586	11 (7.1)	14 (10.2)	0.91 0.341	6 (3.8)	8 (4.5)	0.10 0.750

Note. V = Cramer’s V; An ‘x’ indicates that the number of observations were 0, 1, or 2. Statistics Netherlands does not release data cells less than 3 observations to protect privacy.
^a The range in years indicate the period and length of follow-up.

Table 3
Differences in registered crime victimization between intervention and control groups.

	Supportive Parenting (2005–2019) ^a			VoorZorg (until 2019) ^{ab}			Incredible Years (2014–2019) ^a					
	Intervention (N = 211) N (%)	Control (N = 255) N (%)	$\chi^2(1)$ p	V	Intervention (N = 155) N (%)	Control (N = 137) N (%)	$\chi^2(1)$ p	V	Intervention (N = 158) N (%)	Control (N = 178) N (%)	$\chi^2(1)$ p	V
Victimization child	9 (4.3)	12 (4.7)	0.05 0.820	0.01	13 (8.4)	6 (4.4)	1.92 0.166	0.08	x	4 (2.2)	x	x
Victimization mother	17 (8.1)	23 (9.0)	0.14 0.712	0.02	61 (39.4)	53 (38.7)	0.01 0.907	0.01	5 (3.2)	4 (2.2)	0.27 0.603	0.03
Victimization partner	6 (2.4)	6 (2.8)	0.11 0.739	0.02	6 (3.9)	6 (4.4)	0.05 0.827	0.01	5 (1.1)	x	x	x
Total victimization	26 (12.3)	35 (13.7)	0.20 0.655	0.02	70 (45.2)	59 (43.1)	0.13 0.719	0.02	11 (7.0)	10 (5.6)	0.26 0.611	0.03

Note. V = Cramer's V; Victimization refers to victims of maltreatment, threat, stalking, sexual offenses, or other violent crimes; An 'x' indicates that the number of observations were 0, 1, or 2. Statistics Netherlands does not release data cells less than 3 observations to protect privacy.

^bThe follow-up period varied. The participating children were born in 2006 through 2009 and VoorZorg ended two years after the birth of the child. The follow-up period started in the years 2009 to 2012 and therefore varied from 8 to 11 years.

^a The range in years indicate the period and length of follow-up.

Table 4
Differences in registered crime suspects between intervention and control groups.

	Supportive Parenting (2003–2020) ^a			VoorZorg (until 2020) ^{ab}			Incredible Years (2014–2020) ^a					
	Intervention (N = 211) N (%)	Control (N = 255) N (%)	$\chi^2(1)$ p	V	Intervention (N = 155) N (%)	Control (N = 137) N (%)	$\chi^2(1)$ p	V	Intervention (N = 158) N (%)	Control (N = 178) N (%)	$\chi^2(1)$ p	V
Mother registered as suspect	5 (2.4)	4 (1.6)	0.39 0.532	0.03	15 (9.7)	11 (8.0)	0.24 0.622	0.03	x	x	x	x
Partner registered as suspect	12 (5.7)	10 (3.9)	0.80 0.371	0.04	12 (7.7)	7 (5.1)	0.83 0.363	0.05	x	3 (1.7)	x	x

Note. V = Cramer's V; Crimes include maltreatment, threat, stalking, sexual offenses, or other violent crimes; An 'x' indicates that the number of observations were 0, 1, or 2. Statistics Netherlands does not release data cells less than 3 observations to protect privacy.

^bThe follow-up period varied. The participating children were born in the years 2006 through 2009 and VoorZorg ended two years after the birth of the child. The follow-up period started in the years 2009–2012 and therefore varied from 8 to 11 years.

^a The range in years indicate the period and length of follow-up.

impact on (important risk factors for) child maltreatment (Bouwmeester-Landweer, 2006; Mejdoubi et al., 2015; Weeland et al., 2017), they do not affect long-term child welfare outcomes. However, as these interventions were not primarily designed to prevent these specific outcomes, it is likely that the intensity or focus of the examined programs are not effective in preventing long-term child welfare outcomes. Tailored programs are needed for effectively preventing the currently studied child maltreatment proxies. Our findings also indicate some important methodological challenges when using administrative data, which we discuss below. Nevertheless, our overall conclusion is that using administrative data in effectiveness research is feasible, and that very useful knowledge can be obtained. We therefore believe that the availability of these data is an important tool for researchers studying child maltreatment outcomes.

4.2. Challenges of using administrative data

Two limitations related to the availability of administrative data are particularly worth noting. First, as administrative databases are preexisting, researchers are reduced in their freedom in choosing what specific constructs will be explored and how they are conceptualized and measured (Drake & Jonson-Reid, 1999). For example, in this study, we were forced to use proxies of child maltreatment rather than variables that more directly assess child maltreatment, such as substantiated cases of child maltreatment or CPS reports. These data could not be used as there were no unique identifiers available in administrative datasets, to match them to the interventions data. It was neither possible to examine less severe outcomes related to child maltreatment, such as child rearing problems. As these less severe outcomes are directly targeted in the examined programs, program effects can be expected on these outcomes.

Second, researchers are reduced in their freedom in choosing the time period for which the administrative data are available. Specifically for this study, we found that the SN data on the assessed outcome measures were not available for all consecutive years following the interventions that we evaluated. For example, data on child protection orders were only available from the year 2011, whereas the Supportive Parenting intervention was offered to children and families in 2001 and 2002, leading to a period of about nine years for which no data were available. It is likely that these datasets were not provided to SN in this period because child welfare outcomes were less digitized in those years, and the digital infrastructure less developed.

One way to overcome these two limitations may be a closer collaboration between administrative data organizations and science, for example to coordinate which data are relevant for research and how this should be collected in order to be used in research. As developments in information technology may lead to a growing number of digital administrative data it is expected that in the future much more administrative child welfare data are available and it becomes easier to extract and link these data for research purposes (Bakker et al., 2014; McGhee, Mitchell, Daniel, & Taylor, 2015).

Further, the statistical analyses suffered from two limitations that resulted in analyzing small numbers: one limitation was related to the general prevalence of the proxies that were examined, and a second to the size of the samples for which intervention data were available. As for the former, administrative data comprise population-wide data on many variables that may serve as dependent variables in research. However, low outcome prevalences pose a power problem in statistical analyses, which occurred in the current study. For example, in 2020 only 0.9 % and 1 % of all children and youths (up to the age of 18) in the Netherlands received child protection orders and residential youth care, respectively (Statistics Netherlands (2021a), 2021a). Additionally, the overall prevalence of violent or sexual crime victimization was 2 % in all Dutch citizens in 2019 (Statistics Netherlands (2020a), 2020), and just 0.3 % of the population was registered as a suspect of violent or sexual crime in that year (Statistics Netherlands (2021b), 2021b). These low

prevalences resulted in small numbers of observations for most outcomes, which in some cases were not released by SN given privacy restrictions (indicated by an 'x' in Tables 1–4).

The small numbers in our analyses could also be due to the relatively small sample sizes of the RCT's that we could include in this study. Previous studies using administrative child welfare data used considerably large study samples. Green and colleagues (2014), for example, included a total of 1247 young children in their RCT examining the effectiveness of Early Head Start and a sample of 2727 first-time mothers were used in another study examining the impact of Healthy Families Oregon through administrative data linkages to Oregon's statewide child welfare system (Green, Sanders, & Tarte, 2017). Therefore, an important condition for program evaluations using administrative data is to include a sample of sufficient size, which will also ensure that information is not traceable to specific individuals and therefore protects the privacy of the participants.

Furthermore, several cases had to be deleted from the intervention data, as insufficient personal identifiers were available to generate a linkage key required for matching the intervention data to the microdata, leading to even smaller sample sizes. Also, a potential selection bias could occur when, for example, personal identifiers for subgroups (e.g., people living in specific regions) were not provided to SN by governmental organizations, or when more personal identifiers are available for participants in the experimental condition relative to the control condition. However, we had no reason to assume that selection bias affected the results of the current study. To increase the probability of successfully linking primary data to administrative data so that all participants in the primary intervention can be retained as much as possible, researchers should consider collecting key child- and parent-level identifiers in future primary effectiveness studies. However, this should always be done in light of rules and regulations for protecting the privacy of participants.

4.3. Benefits of using administrative data

Despite these challenges, we see that administrative data may add important value to effectiveness research. One of the strengths of this type of data refers to the usability and efficiency of using these data in research. In general, we found that using administrative records makes it relatively easy to track a population longitudinally without the problems that are commonly experienced when data are collected from participants, such as attrition and loss to follow-up (MacMillan et al., 2007). Specifically for this study, the administrative data were centrally stored and systematically organized by SN employees, which significantly increased the accessibility and usability of these data. Furthermore, SN ensures the quality of the administrative data by providing (care) organizations with protocols for how data must be formatted and sent to SN. This contrasts with the procedure of assessing and using administrative data in the U.S. as is described by Green et al. (2015). They had to access child welfare records in six different states, as in the U.S. there is no obligation for child welfare agencies to deliver their data to a central organization, or to make their data available to researchers. Furthermore, in the process described by Green et al. (2015), the child welfare agencies matched their data records to the intervention data. Therefore, the quality and accuracy of data matching were unknown, and there was variability in how information was coded.

Second, we found that accessing administrative data and linking it to the intervention data could be done within a much shorter timeframe compared to large-scale longitudinal studies. The administrative data as provided by SN offer the most accurate and complete data on child welfare outcomes, as most Dutch government agencies are obliged to yearly submit their data to SN. In the current study, the process of gaining the administrative data took a relatively short amount of time, as SN was the only organization that we had to contact and finalized agreements with. Moreover, SN facilitated a special microdata department and a contact person for each research project. Queries from

researchers were therefore dealt with quickly. Again, this contrasts with what Green and colleagues (2015) describe. They had to contact and come to agreements on obtaining the necessary data with child welfare agencies across multiple states, which is a far more time-consuming process.

5. Conclusion

The results do not provide support for long-term collateral effects of preventive early childhood interventions for proxies of child maltreatment. However, we found that administrative child welfare data have the potential to boost research on long-term evaluations of preventive early childhood interventions. We believe that the benefits of using administrative data outweigh the potential challenges that researchers may face, and that administrative data can be a useful source of information for future child maltreatment research. Based on our experiences, we encourage future researchers to take advantage of the possibility to match primary study data obtained in effectiveness research to population-based administrative data. A particular advantage is that much less time and resources may be spent on acquiring high-quality data that are needed in longitudinal evaluations of, for instance, preventive early childhood interventions.

For researchers considering using administrative data, we have several recommendations and conditions that should be met. First, the intervention data should have a sample of sufficient size, especially when the population prevalence of the outcome of interest is low. Second, the intervention data should include sufficient personal identifiers. Researchers should carefully consider which personal identifiers are most suitable for linking their primary data to administrative data. The possibilities and best choice for an identifier may differ across countries, as privacy rules and regulations differ across nations. Finally, we advise governmental institutions that collect population-based administrative data, such as SN, to work together with researchers in different fields to determine which data should be collected so that research of most relevance can be conducted. We also encourage these institutions to strengthen their data infrastructure and to further increase the availability of their data for scientific research.

Declarations of interest: Bouwmeester-Landweer is involved in developing and evaluating the Supportive Parenting program and currently advisor on the implementation of the Supportive Parenting and VoorZorg programs. Van den Heijkant is involved in developing and evaluating the VoorZorg program. Weeland and Chhangur are Incredible Years group leaders. None of the authors have any other affiliation or financial interest in one of the three early childhood interventions examined in this study, nor in the present findings.

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CRedit authorship contribution statement

Jeanne Gubbels: Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Mark Assink:** Conceptualization, Writing – review & editing, Supervision. **Bastian Ravesteijn:** Methodology, Formal analysis, Writing – review & editing. **Joyce Weeland:** Resources, Writing – review & editing. **Rabia Chhangur:** Resources, Writing – review & editing. **Merian Bouwmeester-Landweer:** Resources, Writing – review & editing. **Silvia van den Heijkant:** Resources, Writing – review & editing. **Claudia E. van der Put:** Conceptualization, Writing – review & editing, Supervision, Project administration, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

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