Improved Parental Self-Efficacy Reduces Stress in Women Receiving Home Visitation in a Longitudinal Study

Dähne Verena[1]*, Klein Annette[1], Jungmann Tanja[2], Kilem Soren[3] and Sierau Susan[1]

[1]University of Leipzig, Department of Child and Adolescent Psychiatry, Psychotherapy and Psychosomatics, Liebigstrasse 20a, 04103 Leipzig, Germany

[2]University of Rostock, Faculty of Humanities, Institute for Special Educational Intervention and Rehabilitation, August-Bebel-Strasse 28, 18051 Rostock, Germany

[3]Criminological Research Institute of Lower Saxony (KFN), Lützerodestrasse 9, 30161 Hannover, Germany

*For Correspondence: Dähne Verena, University of Leipzig, Department of Child and Adolescent Psychiatry, Psychotherapy, and Psychosomatics, Liebigstrasse 20a, 04103 Leipzig, Germany, Tel: +491634490060; E-mail: verena.daehne@uniklinik-leipzig.de

Review Article

ABSTRACT

Background: A plethora of studies evaluated home-visiting programs like Nurse-Family Partnership (NFP) broadly. Still, the mechanisms behind changes in mothers and children are scarcely considered.

Aim: Pro Kind, the German NFP adaption, investigated the process of change in effective program variables, which are maternal perceived social support and parental self-efficacy (PSE) as coping resources for dealing with general stress within an ecological framework.

Design: Longitudinal randomized controlled trial.

Methods: Between 2006 and 2012 Pro Kind's effectiveness was evaluated in mothers and children from pregnancy until the children's second birthday. Altogether N=755 at-risk first-time mothers referred to the project. The treatment group (TG, n=394) received home visitation, while the control group (CG, n=361) solely had access to standard community services.

Results: Structural equation modeling revealed a protective effect of social support as an environmental resource on general stress in the TG before birth and in the CG until two years postpartum. PSE as a personal resource also showed a protective effect on general stress which was more stable, and also present longitudinally, in the TG compared to the CG. PSE functioned as a mediator between social support and stress, again with a stronger, prolonging effect in the TG.

Conclusion: Pro Kind strengthened mothers' personal competencies (PSE) in regard of handling general stress. Mothers from the CG relied more on their social support network which can be hard to retrieve or in detrimental condition in socially disadvantaged environments. Home visitors should focus more intensely on building stable maternal PSE during the first year postpartum within an ecological perspective.

Keywords: Early prevention; Home-visiting; Parental self-efficacy; Structural equation modelling; Randomized controlled trial

INTRODUCTION

Early prevention programs are one of the most widespread hand effective ways to support socially and financially disadvantaged mothers in improving family environment, parenting abilities, and child development from pregnancy to early infancy [1]. The Nurse-Family-Partnership program [2] provides an evidence-based home-visiting program which is widely implemented in the US, as well as in numerous countries [3] like Canada [4], Ireland [5], the Netherlands [6], England

[7], Scotland [8], Australia [9], France [10] and Germany [11]. Although many publications on program effectiveness exist, only few studies report on the underlying processes explaining improvements in psychosocial program outcomes, for example Eckenrode et al. [12], and mediating mechanisms within intervention effects on child maltreatment. Specifically, in intervention approaches, where multiple domains of mothers' and children's lives are addressed, it is crucial to understand which characteristics are most influential in the mechanisms of change within the family system and thus need to be paid the most attention on during home visits.

Within a multi-centered, longitudinal randomized controlled trial (RCT) targeting at-risk first-time mothers from pregnancy until the children's second birthday, positive treatment effects of the German NFP adaption "Pro Kind" were detected on mothers' perceived stress, feelings of attachment, perceived social support, parental self-efficacy (PSE), and knowledge on child rearing [13]. In line with NFP, the primary domains of change in Pro Kind were mothers' parenting competencies and family environment to make secondary improvements in children's development. In order to shed light on the process of change of the most important program domains, as well as on their interrelations, we tested a multi-group structural equation model linking variables of family environment (social support) to maternal parenting competencies (PSE and perceived stress). The model structure of mothers who received home visitation was compared to the model structure of mothers from the control group.

In the following sections, we provide a theoretical framework, define the concepts of stress, PSE, as well as social support, and outline their interrelations in the current literature to give a theoretical rationale for our tested model.

STRESS WITHIN AN ECOLOGICAL FRAMEWORK

We define stress in dependence on Lazarus et al. [14] as the imbalance between demands and the personal resources to cope with these demands. Especially during the process of secondary appraisal, accessible personal and environmental resources are considered to cope with a stressor. Adding an ecological perspective to this view of stress and coping provides a comprehensive theoretical framework for this study. According to the ecological framework by Egelund et al. [15] an individual's development takes place within a multilevel environment. Regarding mothers' stress this includes (a) the microsystem which represents the immediate family context like the personality, parenting behaviours, or attitudes including PSE, as well as (b) the exosystem which contains aspects from the broader environment like exposure to stressors and availability of social support [15,16]. Integrating the stress theory [14] and the ecological framework [15] we consider the development of stress during mothers' transition to parenthood as the centre of the ecological model with PSE as a personal resource from the microsystem level, and social support as an environmental resource from the exosystem.

Stress during the Transition to Parenthood

The transition to parenthood is a uniquely vulnerable period to experience stress, and like other major events in women's life it is causing stressful emotions when a new-born needs most of a mother's attention, subsequently other demands cannot be addressed as before birth. This may lead to advanced levels of stress. For example, during the transition to parenthood the quality of marital relationship changes, which causes increased levels of stress [17]. During the first month postpartum, as Perren et al. [18] showed, stress in several everyday domains like job, household, or finances remained stable compared to the prenatal level. DiPietro et al. [19] even found an increase of perceived general stress from the prenatal period to 6 weeks postpartum. An increase was also detected by Perren et al. [18] at 12 moths postpartum. Both studies showed later on at 18, and 24 months postpartum, respectively, decreased levels of stress which points at the first year postpartum as a period especially sensitive to stress.

A broader view on stress takes into account various challenges like child-raising, indebtedness, unemployment, living in a run-down home, partnership problems, or experienced violence [20]. Specifically, a low socioeconomic status (SES) often goes along with elevated amounts of stressors, combined with limited personal and environmental resources to cope with these, for example no high-school diploma, low income, presence of a psychiatric disorder, low self-esteem or lack of social support. This leads to an elevated risk of experiencing high levels of general stress [21].

Stress during parenthood is often discussed as predictive on other outcomes but studies on what determines stress during this time are rather scarce [22]. General (not only parenting-related) stress in parents is connected to various adverse conditions like diminished PSE and difficult child temperament [21], depressive symptoms in mothers [23] or child adjustment [24]. Taking this into account, it is even more important to address general stress, and ways of coping with it, in early interventions. To provide effective support Farkas et al. [25] demand to investigate what is crucial for maternal well-being and parenting competencies.

In the present study of psychosocially and financially disadvantaged first-time mothers we assessed their perceived general levels of stress during pregnancy and in the first two years after the children's birth, which was lowered during

the first year postpartum by the home visiting intervention in contrast to the control group, where stress levels constantly rose [13].

PARENTAL SELF-EFFICACY

Parental self-efficacy (PSE) is a key factor when dealing with parenting issues, originating in Bandura's general concept of perceived self-efficacy [26]. Perceived self-efficacy is a "judgment of personal capability" [26]. More specifically, Bloomfield, et al. [27] conceptualized PSE "as an individual's appraisal of his or her competence in the parenting role". According to Bandura [28] there are four components which shape PSE: (1) enactive mastery experiences like caring for children before the own first child, (2) vicarious experiences like observation of other parents or even home visitors as reference point, (3) physiological and affective states like (mental) health problems or well-being, and (4) verbal persuasion which means for example reinforcement by significant others. The Pro Kind home-visiting enhanced mothers' PSE in contrast to the CG [13].

PSE and Stress

Our theoretical framework of stress from an ecological perspective includes PSE as a personal coping resource from the microsystem level to deal with general stress in mothers. PSE is inversely related to parental stress [21,25,29,30]. Gross et al. [31] showed that improvements in PSE through a parent-training program with toddlers came along with decreased levels of stress. Mothers who are confident about their abilities in raising a child experience stressful situations as less threatening and hence, perceive less stress [32].

Most research about the connection of PSE and stress in disadvantaged mothers deals with the effects on parenting stress [25,31,30]. There is only little evidence for the relation between PSE and general levels of stress [21,29,33]. As Pro Kind unfolded intervention effects on mothers' PSE as well as on general levels of stress [13], we want to explore PSE as personal coping resource from the microsystem over time in the intervention group and in the control group.

SOCIAL SUPPORT

There are different aspects of social support that can be considered, like the quality of relationships, perceived connectedness from an attachment point of view, or social support as individual resource one can turn to [34]. In this study, we focus on the quality of social support provided by others in difficult situations [35] as a mother's resource to cope with stress. The Pro Kind intervention showed positive effects on social support within the first two years after birth [13].

Social Support and Stress

Social support within the ecological framework of stress is one important environmental coping resource from the exosystem level which is considered to reduce stress in mothers. Green et al. [34] showed that in low-income mothers of an infant, only emotional support predicted general perceived stress one year later, but not instrumental support or giving advice. Hoven [29] demonstrated a beneficial relation between various aspects of social support like guidance, attachment, or social integration and perceived general stress.

Especially during the transition to parenthood social support is an important resource for mothers. Tarkka [36], as well as Leahy-Warren [37] found that support from family and friends, as well as appraisal by professionals are most helpful during the first postpartum period. Цstberg et al. [38] examined predictors of parenting stress during toddlerhood and found a substantial rise of parenting stress in mothers with low social support. Conclusively, several sources and variations of social support as aspect from the environmental exosystem can help women to cope with general and parenting stress. In this study, we want to examine the coping effect of social support in the intervention and control group.

Social Support and PSE

As described previously, the fourth of Bandura's [26] antecedents of PSE is verbal persuasion, which includes effects of relational or informational social support [29,39]. Several studies demonstrated an increase in PSE as a result of social support: Mothers, whose parenting behaviors are praised and appreciated by persons around them, feel more confident in their parenting abilities [40,41]. This increase of PSE was observed already at 4 weeks postpartum as a result of support from mothers' parents [39] and at 6 weeks postpartum as a result of appraisal by mothers' partners and own mothers [37] and it also was evident at 4 months of children's age due to specific support for parenting issues [33]. At 8 months postpartum instrumental help like domestic work or lending money from family and friends enhanced PSE, whereas social isolation diminished maternal PSE [36].

Regarding the directionality between social support and PSE the body of research gives evidence that social support effects PSE and not the other way around [42,43], which is in line with the explanations above that PSE is shaped by a mother's social network. PSE also acts as a mediator concerning the effect of social support on different outcomes like depression or parenting [44]. Considering the ecological perspective of this study, the directionality of effects from the exosystem (social support) via the microsystem (PSE) on the individual's development of stress, is the most reasonable way.

Based on these results, we assume that PSE mediates the relation between social support and maternal stress. Again, we want to explore if this mediating relationship differs between intervention group and control group.

THE PRESENT RESEARCH

To conclude, previous research on NFP and NFP-based programs yet focused mainly on changes of single outcomes, but hardly investigated processes of change underlying program effectiveness. Regarding this study's variables, all proven to show a positive intervention effect [13], the body of research found interrelations between single variables (i.e., PSE and social support, PSE and perceived stress, social support and perceived stress) with only a scarce comprehensive perspective on possible mediating pathways over time. We therefore aim to examine the interrelations of maternal social support, PSE and general stress conjointly within an ecological framework on the development of stress during the transition to parenthood across all assessment times of the intervention study, using structural equation modeling. Since the Pro Kind intervention had positive effects on all three outcomes, we expect social support and PSE to prove more stable coping resources effecting maternal stress positively in the TG compared to the CG. Further, we expect a directional effect of the coping resource from the exosystem level (social support), via the microsystem level (PSE) as mediator, on the individual's perception of general stress.

Differences of underlying processes between the home-visited intervention group and the control group will be analyzed within a multi-group comparison.

METHOD

Design

The present study was designed to evaluate intervention outcomes of the home visiting program Pro Kind, which was implemented in rural and city areas of three German federal states: Lower Saxony, Saxony, and Bremen. From 2006 to 2009, 1157 financially and socially disadvantaged first-time mothers were voluntarily referred to the project. N=755 met the inclusion criteria: being between the 12th and 28th week of gestation, no live-birth before, economic risk factors (e.g. low income, no graduation from school, over-indebtedness), and psychosocial risk factors (e.g. being under age, social isolation, experienced present or life-time violence, mental illness, drug or alcohol misuse). Women were randomly assigned either to the treatment or to the control group (TG/CG) by Efron's biased coin design [44]. Mothers of both groups signed written informed consent and were given information about available health or social services, repayment for travel expenses to preventive medical check-ups, reimbursement for participation at regular research interviews, and feedback about the children's developmental status. Mothers in the TG additionally received regular home visits from pregnancy up to the children's second birthday by specially trained midwives or social workers. On the background of Bronfenbrenner's human ecology theory [45], Bandura's social learning theory [28] and Bowlby's attachment theory [46] different aspects of motherhood in psychosocial difficult situations were broached like dealing with the infant's needs, relationships issues, getting back to work, receiving social services, or providing healthy habits for mother and infant. For detailed information about the intervention see Jungmann et al. [47], as well as Sierau et al. [13].

Interviews at five assessment times (t0 at program intake, t1 at 36th week of gestation, t2, t3 and t4 at 6, 12 and 24 months postpartum, respectively, **Figure 1**) took place between 2006 and 2012 at the families' homes providing a face-to-face situation which was necessary due to different levels of literacy. Women were given a set of questionnaires they answered with the interviewers' help. Further, developmental tests with the children were conducted.
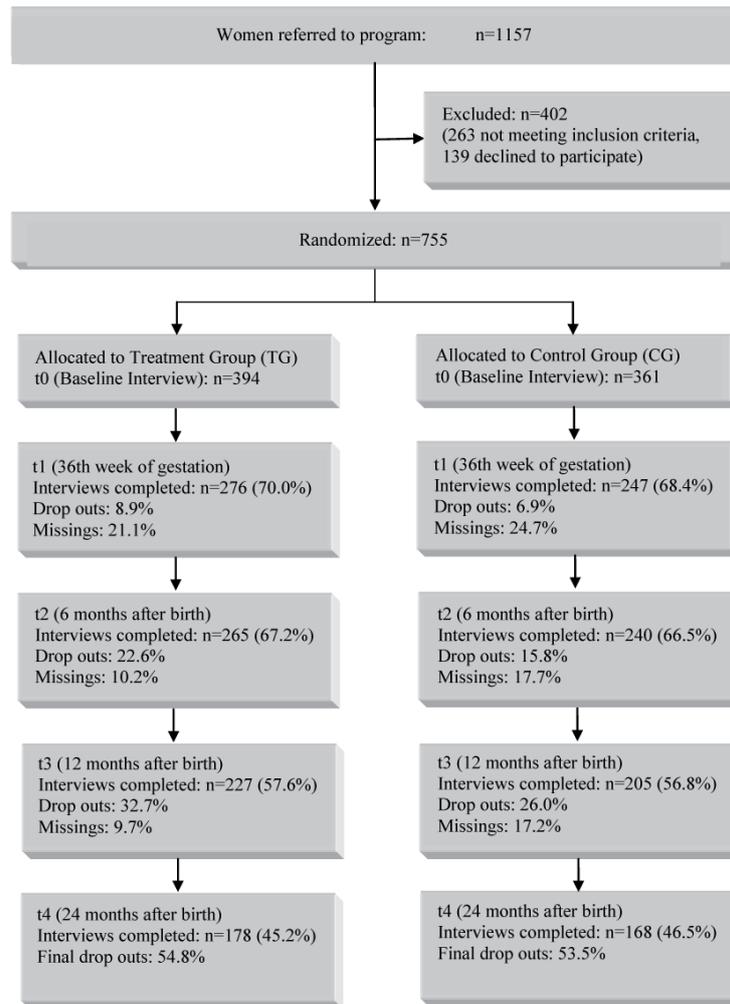
Women referred to program: n=1157

Excluded: n=402
(263 not meeting inclusion criteria,
139 declined to participate)

Randomized: n=755

Allocated to Treatment Group (TG)
t0 (Baseline Interview): n=394

Allocated to Control Group (CG)
t0 (Baseline Interview): n=361

t1 (36th week of gestation)
Interviews completed: n=276 (70.0%)
Drop outs: 8.9%
Missings: 21.1%

t1 (36th week of gestation)
Interviews completed: n=247 (68.4%)
Drop outs: 6.9%
Missings: 24.7%

t2 (6 months after birth)
Interviews completed: n=265 (67.2%)
Drop outs: 22.6%
Missings: 10.2%

t2 (6 months after birth)
Interviews completed: n=240 (66.5%)
Drop outs: 15.8%
Missings: 17.7%

t3 (12 months after birth)
Interviews completed: n=227 (57.6%)
Drop outs: 32.7%
Missings: 9.7%

t3 (12 months after birth)
Interviews completed: n=205 (56.8%)
Drop outs: 26.0%
Missings: 17.2%

t4 (24 months after birth)
Interviews completed: n=178 (45.2%)
Final drop outs: 54.8%

t4 (24 months after birth)
Interviews completed: n=168 (46.5%)
Final drop outs: 53.5%

Figure 1. Consort diagram of program participants.

Sample

Demographic characteristics are presented in **Table 1**. Risk factors for all n=755 women included in the project from the baseline assessment t0 are reported in Sierau et al. [13].

Table 1. Demographic characteristics of participants at baseline assessment; Note: Age is reported in average years (SD; Range).

Demographic characteristics	Treatment Group	Control Group
Age	21.27 (4.2; 14-40)	21.53 (4.4; 14-40)
Not married	85.50%	89.20%
Born in Germany	89.10%	84.20%
Less than high school diploma	54.50%	49.50%
Over-indebtedness	47.80%	53.50%

Drop-out rates (Figure 1) constantly rose from t1 to t4 with a final drop-out of 54.8% in the TG and 53.5% in the CG. Most common reasons for leaving the program were refusal of service by participants, loss of contact with the family (participants refusing attempts to contact), or relocation. Attrition was predicted by younger age, own experiences of foster care, and a lower income in mothers [13]. Attrition rates were comparable in both groups and did not influence potential differences in maternal and familial characteristics between TG and CG longitudinally [48].

Measures

Maternal perceptions of stress were assessed from t1 to t4 by the General Level of Stress Scale [20]. Mothers rated how stressed they feel by certain daily activities like housekeeping, work, social life, and their children (assessed post-natally). The scale reached from "1 – not at all stressed" to "4 – strongly stressed", estimating the mean value of 10 (at t1) to 11 (from t2 to t4) items. Cronbach's Alpha was quite low due to the very different domains of stress covered, but still acceptable, ranging from $\alpha=0.68$ to $\alpha=0.76$.

The Perceived Social Support scale [35] was used at t0, t1 and t4, using items like "There are people…who give me good advice" or "…who care about me when I am sick". Mothers rated 15 items from "1 – not at all true" to "4 – exactly true", combining answers as mean value. Cronbach's Alpha varied from $\alpha=0.91$ to $\alpha=0.93$.

From t1 to t3, parental self-efficacy (PSE) was assessed with a German translation we created (forward-backward translated) of the Parent Expectations Survey [33], asking for the parents' trust in their own abilities in coping with a child. Mothers rated from "1 – very unsure" to "4 – very sure" for example their ability to visit a doctor with the child, to recognize when the child is hungry, or to make the right decisions regarding the child. The mean value was scored from 25 items. Cronbach's Alpha varied between $\alpha=0.83$ to $\alpha=0.91$ was very close to reliabilities reported by Reece et al. [33].

Statistical Analyses

Preliminary analyses were conducted using SPSS 20. For structural equation modeling (SEM) we used AMOS 20.

To treat missing data within the SEM we used the full information maximum likelihood (FIML) estimation. FIML uses all values available and holds evidence that it conducts an unbiased estimation of missing values [49]. Therefore, this procedure is more efficient than deleting cases with missing values or imputing missing data [49-51]. Attrition analyses disclosed that mothers who dropped out were younger at baseline (OR=0.897; p=0.000), had lower incomes (OR=1.734; p=0.007), and underwent more often foster care placement in childhood (OR=1.651; p=0.012). This indicates that our data are missing at random [49,50] because the likelihood of attrition offers some dependency but not from the model's variables.

In order to assess possible group differences between TG and CG, we performed a multi-group analysis. To assess the model fit, we used the Root Mean Square Error of Approximation (RMSEA, cut-off for a good fit <0.05 [52]), the Comparative Fit Index (CFI, cut-off for a good fit >0.90 [53]) and the ratio χ^2/df (cut-off for a good fit ≤ 5 [53]). Sobel-tests [54,55] determined possible mediational roles of PSE.

RESULTS

Descriptive statistics for all variables included in the model are presented in **Table 2**.

Table 2. Descriptive statistics of study variables across assessment times, Note: t0– baseline; t1– 36th week of gestation; t2– 6 months postpartum; t3– 12 months postpartum; t4– 24 months postpartum.

		t0	t1	t2	t3	t4
		M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Social support	TG	3.41 (0.50)	3.52 (0.42)	-	-	3.42 (0.55)
	CG	3.36 (0.55)	3.47 (0.46)	-	-	3.33 (0.59)
PSE	TG	3.42 (0.36)	3.41 (0.37)	3.65 (0.25)	3.69 (0.26)	-
	CG	3.40 (0.40)	3.42 (0.33)	3.63 (0.25)	3.64 (0.24)	-
Maternal stress	TG	-	1.76 (0.45)	1.72 (0.43)	1.71 (0.39)	1.75 (0.41)
	CG	-	1.74 (0.43)	1.76 (0.42)	1.81 (0.41)	1.87 (0.40)

A total of N=755 participants were included for SEM. Two models for the TG and CG were calculated simultaneously by multi-group analyses with nTG=394 and nCG=361. The overall model resulted in $\chi2=147.1$, and df=60 and revealed a good fit with $\chi^2/df=2.45$, CFI=0.956 and RMSEA=0.044. **Figures 2 and 3** displays the SEM for TG and CG, respectively. Corresponding path coefficients are presented in **Table 3**. We describe the model's results bottom-up, starting with the development of each variable over time, continuing with the link of social support and PSE, followed by the influence of social support and PSE on stress. Finally, results of mediation analyses are presented.
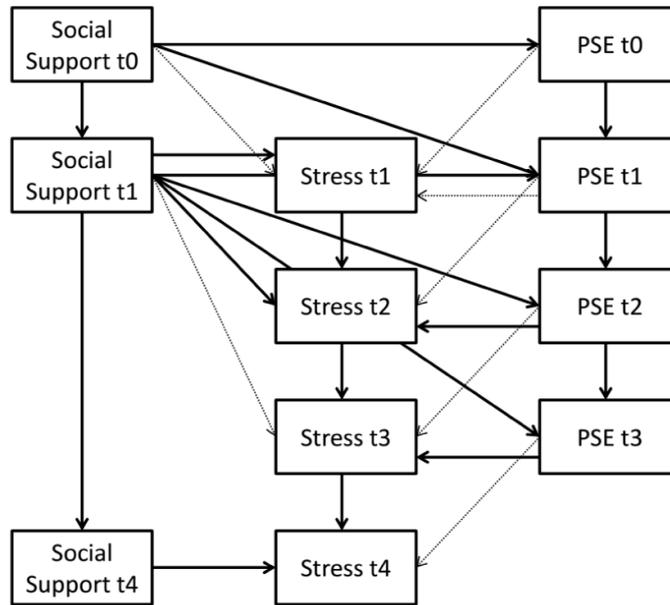
Figure 2. SEM of the treatment group, Significant paths (p<0.05) are displayed bold.
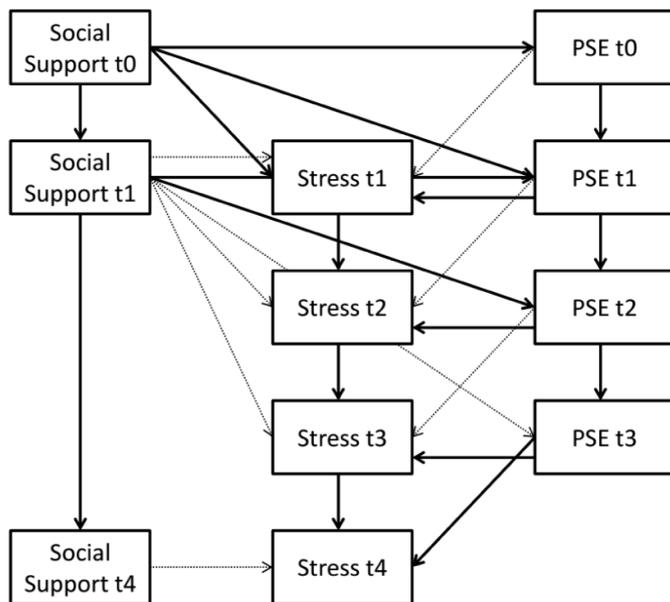

Figure 3. SEM of the control group, Significant paths (p<.05) are displayed bold.

Table 3. Unstandardized (B) and standardized (β) path coefficients and significance levels (p), (standard errors in parentheses; N_{TG}=394; N_{CG}=361), Note: χ^2=147.1; df=60; χ^2/df=2.45; CFI=0.956; RMSEA=0.044.

Parameter estimate	Treatment group			Control group		
	B (S.E.)	β	p	B (S.E.)	β	p
Social Support t0						
Social Support t1	0.58 (0.04)	0.67	<0.001**	0.58 (0.04)	0.65	<0.001**
PSE t0	0.23 (0.04)	0.31	<0.001**	0.22 (0.04)	0.3	<0.001**
PSE t1	-0.09 (0.04)	-0.13	0.034*	-0.12 (0.04)	-0.19	<0.001**

	TG			CG		
Stress t1	-0.15 (0.07)	-0.16	0.37*	-0.02 (0.06)	-0.02	0.767
Social Support t1						
Social Support t4	0.59 (0.09)	0.46	<0.001**	0.70 (0.08)	0.58	<0.001**
PSE t1	0.31 (0.05)	0.37	<0.001**	0.20 (0.04)	0.3	<0.001**
PSE t2	0.08 (0.03)	0.13	0.025*	0.12 (0.03)	0.23	<0.001**
PSE t3	0.00 (0.03)	0	0.977	0.12 (0.03)	0.23	<0.001**
Stress t1	0.12 (0.09)	0.11	0.173	-0.20 (0.07)	-0.23	0.006**
Stress t2	-0.11 (0.06)	-0.11	0.059	-0.14 (0.05)	-0.16	0.011*
Stress t3	0.08 (0.05)	0.09	0.141	-0.03 (0.05)	-0.04	0.536
Social Support t4						
Stress t4	-0.05 (0.04)	-0.06	0.296	-0.15 (0.05)	-0.19	0.001**
PSE t0						
PSE t1	0.60 (0.04)	0.6	<.001**	0.58 (0.04)	0.71	<0.001**
Stress t1	-0.09 (0.09)	-0.07	0.334	-0.14 (0.10)	-0.13	0.137
PSE t1						
PSE t2	0.33 (0.04)	0.48	<0.001**	0.30 (0.05)	0.39	<0.001**
Stress t1	-0.30 (0.10)	-0.24	0.003**	-0.16 (0.12)	-0.12	0.185
Stress t2	-0.00 (0.08)	0	0.978	0.11 (0.09)	0.09	0.187
PSE t2						
PSE t3	0.72 (0.06)	0.68	<.001**	0.53 (0.06)	0.53	<0.001**
Stress t2	-0.45 (0.11)	-0.26	<0.001**	-0.40 (0.11)	-0.24	<0.001**
Stress t3	0.60 (0.12)	0.04	0.622	0.14 (0.11)	0.08	0.233
PSE t3						
Stress t3	-0.28 (0.11)	-0.19	0.008**	-0.46 (0.11)	-0.28	<0.001**
Stress t4	-0.21 (0.10)	-0.13	0.038*	-0.09 (0.12)	-0.05	0.468
Stress t1						
Stress t2	0.40 (0.05)	0.43	<0.001**	0.38 (0.06)	0.4	<0.001**
Stress t2						
Stress t3	0.55 (0.05)	0.6	<0.001**	0.55 (0.06)	0.56	<0.001**
Stress t3						
Stress t4	0.61 (0.07)	0.58	<0.001**	0.72 (0.07)	0.62	<0.001**

Longitudinal Development of Each Variable

In both groups social support, PSE, and maternal stress are significantly related over time respectively. From a descriptive point of view, as can be seen in **Table 2**, social support slightly increases from t0 to t1 in the TG and CG, followed by a slight decrease from t1 to t4. PSE constantly rises in both groups. While maternal stress increases in the CG from t1 to t4 steadily, stress decreases in the TG from t1 to t3 and then slightly increases again at t4, but not as high as in the CG.

Social Support and PSE

Social support and PSE are positively linked cross-sectional at t0 and t1. Furthermore, in both groups there are negative connections from social support t0 to PSE t1, which means higher social support during pregnancy leads to lower PSE shortly before birth and the other way around for low social support leading to higher PSE. From t1 to t2 this association is positive. Additionally, in the CG only, social support at t1 is positively related to PSE at t3. In sum, higher levels of social support hold a mostly positive effect on maternal PSE, while a lack of social support impedes PSE.

Social Support and Stress

The influence of social support on maternal stress differs substantially between the TG and the CG. While social support in the TG is connected to maternal stress only from t0 to t1, social support in the CG is related to maternal stress from t1 to t2 as well as at t1 and t4 cross-sectional.

PSE and Stress

Differences between both groups also occur regarding the effect of PSE on stress. Cross-sectional, PSE is related to stress in both groups at t2 and t3 and in the TG also at t1. Longitudinally, no effects can be found in the CG. In the TG there is a relation between PSE at t3 and maternal stress at t4.

Mediation Analyses

For mediation analyses we considered social support as independent, maternal stress as dependent, and PSE as mediating variable (Table 4). In the TG, the effects from social support at t1 to maternal stress at t2, as well at t3 are both fully mediated by PSE at t2. In the CG, the effect of social support at t1 on stress at t2 was partially mediated by PSE at t2. Furthermore, in the CG, the effect from social support at t1 on stress at t3 was fully mediated by PSE at t3. No mediation in the CG was found when PSE and stress were assessed at different times.

Table 4. Mediation analyses via Sobel-tests.

Independent Variable	Mediator variable	Dependent variable	Treatment group		Control group	
			Z	p	Z	p
Social support t0	PSE t0	Stress t1	-0.99	0.325	-1.36	0.175
	PSE t1	Stress t1	1.8	0.072	1.22	0.223
	PSE t1	Stress t2	0	1	-1.13	0.258
Social support t1	PSE t1	Stress t2	0	1	1.19	0.235
	PSE t2	Stress t2	-2.23	0.025*	-2.69	0.007*
	PSE t2	Stress t3	2.35	.019*	1.21	0.225
	PSE t3	Stress t3	0	1	-2.89	0.004*
	PSE t3	Stress t4	0	1	-0.74	0.461

DISCUSSION

By testing a multi-group path model we revealed different associations between social support, PSE and general stress in mothers from the TG compared to the CG of the German home-visiting program "Pro Kind" from pregnancy until the children's second birthday. The ecological perspective on the development of mothers' stress during the transition to parenthood provided a broader understanding of underlying mechanisms in dealing with general stress.

Women from the CG received treatment as usual and thus are comparable to socially and financially disadvantaged first-time mothers in Germany. We included maternal aspects on which "Pro Kind" exerted an influence to the model.

Social Support and PSE

Social support and PSE represent the environmental coping resource from the exosystem, and the personal coping resource from the microsystem. Equal interrelations between social support and PSE occurred in both groups. Cross-sectional, as well as longitudinal, social support and PSE were positively connected to each other prenatal and at 6

months postpartum (except one path that will be discussed below), as it is assumed by the social learning theory [26], and evident in the body of research [41]. Both coping resources are related, with directionality from the exosystem resource to the microsystem resource. Additionally, that connection continued in the CG from 36th week of gestation to 12 months postpartum, but not in the TG, which gave a first hint that home-visited women relied less on their social support system.

Counter-intuitively, and contrary to previous research, social support at the baseline (approximately 25th week of gestation) offered a negative relation to PSE at 36th week of gestation. This represented lower social support leading to higher PSE, and higher social support leading to lower PSE. Looking at the same connection from social support at 36th week of gestation to PSE at 6 months postpartum, the relation was positive, which is in line with existing theories and research. How to explain the difference between two similar paths which held opposite results? The main difference was that the negative relation occurred only during pregnancy, while the positive relation was evident from the pre- to the post-natal period. Possibly, at-risk mothers perceive social support not necessarily as enhancing for their abilities, feelings, and well-being, but also experience it as controlling and limiting, and thus social support inhibits the development of mothers' autonomy and self-efficacy [56]. This may be especially true during a first-time mother's pregnancy in socially disadvantaged families where a pregnancy is not always considered as a favorable event by supporting persons, who may estimate the mothers' competencies and resources as insufficient, or may only give feedback on failures, what impedes PSE [32] by supporting in a dysfunctional way (e.g., a high amount of criticism, or too much advice which unsettles mothers). At 36th week of gestation, when childbirth comes close, women are worried about becoming a mother for first time, anyway; they anticipate the strains of parenting more intensely. Advice or criticism by others that was given some weeks before (at the time of the baseline assessment) may then contribute negatively to PSE when reinforcing mothers' worries. The other way around, women who perceive low levels of social support are aware of the fact, that they have to come to terms with the demands of motherhood on their own and at least prenatally they feel self-efficient about dealing with this. Additionally, mothers who lack a social network may get less advice during pregnancy and also are told less critical experiences from others so that they expect strains that lie ahead as less challenging, hence they overestimate their own abilities of coping with their first child.

Social Support and Stress

Following, results from the TG and CG point to different processes in the protective effect of the environmental coping resource on maternal general stress. Women from the CG benefited most of the times (except at baseline) from social support as stress-reducing, just as other research has shown [37,38]. While social support at baseline helped TG women to deal with stress at 36th week of gestation, this effect was not evident anymore from prenatal assessment to 24 months postpartum, neither cross-sectional nor longitudinal. For sure, a supportive social network for at-risk first-time mothers that helps them to deal with stress can be seen as a positive resource. However, taking into account the approximately ten percent of the Pro Kind sample who live socially isolated, or those who only have access to a rather unsupportive, dysfunctional social network, it is not preferable to be too dependent on the social support system. Hence, the exosystem provides both, helpful social support, as well as stress-inducing factors like dysfunctional social support [16].

PSE and Stress

In both groups, there was a connection between the personal coping resource from the microsystem, PSE, and mothers' general stress cross-sectional at 6 and 12 months postpartum, as well as at 36th week of gestation in the TG. As shown by Halpern et al. [21], Hoven [29] and Reece et al. [33] PSE is a helpful personal resource for mothers to deal with everyday stress. Beyond these cross-sectional relations, a longitudinal protective effect of PSE on general stress was found in TG women from 12 to 24 months postpartum. Thus, there was a more consistent connection between PSE and stress in TG compared to CG women. We may conclude that the home-visiting intervention successfully strengthened mothers' personal coping resource PSE which reduced their levels of general stress.

Mediations

We investigated a possible mediational role of PSE from the microsystem on the effect of the social support from the exosystem on maternal stress. No mediational effect of PSE before birth was detected. However, PSE measured postpartum mediated how social support took effect on stress in both groups showing an effect which leads from the exosystem, to the microsystem leading to the individual's perception of stress. This deserves closer attention in relation to the intervention group and direct effects of social support on stress: Mothers' stress in the TG was solely directly affected by social support at baseline. Social support at 36th week of gestation held effects on maternal stress at 6 and 12 months postpartum in complete dependency on PSE at 6 months postpartum. Hence, this first year after childbirth is a crucial period where mothers' PSE needs to be addressed seriously in the intervention, especially, because PSE at 6 months postpartum prolongs the protective effect of social support before birth until the child's first birthday, which did not occur in the CG. Furthermore in the CG, PSE contributed to the protective effect of social support on stress, but not as

strong as in the TG. Anyway, also in the CG, PSE during the first year postpartum is a crucial aspect to help mothers dealing with general stress and taking advantage from their social network. Social support from the exosystem can only show its full potential as an environmental coping resource when an adequate level of the personal coping resource PSE is available on the microsystem level.

SUMMARY

Results from the TG point to different processes in coping with stress compared to the CG. While the environmental coping resource social support helped TG women to deal with stress during the prenatal period, this direct effect was not evident anymore after birth. In contrast, the personal coping resource PSE functioned as a protective factor for general stress during the second year after birth, and even provided a central mediating role for the effect of social support on maternal stress during the first year postpartum. In the CG, PSE also inherited this mediational role, even though it was not as strong and did not provide a prolongation like in the TG. However, the protective role of social support was evident in the CG up to the children's second birthday.

LIMITATIONS

First, the sample had high rates of missing data due to attrition (at two years postpartum more than 50%). High drop-out rates are quite common in home-visiting programs for at-risk families [57,58]. The statistical method of dealing with data missing at random (MAR) by FIML estimation is the most sufficient way to treat missing data in an SEM causing least bias as possible. In countries like Germany with a well-established social and medical system, interventions could be more accepted when they are embedded within regular health services and thus reduce high drop-out rates. Additionally, to provide realistic, sufficient evaluation research on home-visiting programs, retention of high-risk families is the crucial challenge researchers in this field are confronted with [59]. Particularly, higher incentives and a stronger focus on the helping relationship between home-visitors and participants can be helpful to keep them in the intervention.

Second, all variables included were single-source data, rated by mothers. This may have caused a shared method variance bias [60], creating inflated connections between variables.

FUTURE RESEARCH

According to the limitations above, future research may apply this model on data sets with lower rates of missing data. Including other data sources additionally to mothers' ratings could provide a more realistic view on processes, too.

Further, we used a more comprehensive view on general stress in our model. Including parenting stress to the model might reveal unique processes related to the transition to parenthood.

Future research might also include aspects of program implementation to examine which aspects of the intervention supports the positive development in the TG.

CONCLUSION

To conclude, the Pro Kind home visitation enabled socially and financially disadvantaged first-time mothers to cope with everyday stress by their personal resources – PSE – instead of being more dependent from their environmental resources – social support. Women from the CG relied mainly on their social support network, which can be difficult to access or poorly developed in socially disadvantaged conditions. PSE of CG women helped them to cope with everyday stress but only in short-term instead of a longitudinal protective effect of PSE in the TG. The central role of PSE for reducing general stress in first-time mothers was highlighted. With this model we detected altered processes of coping with stress in an ecological context during the first two years postpartum through the Pro Kind intervention.

IMPLICATIONS

Home visitors should strongly focus on PSE in the intervention process, since it can make a crucial difference for further stress management. Additionally, mothers who are socially isolated should be empowered by home-visitors to build a stable social network which further enhances PSE. Keeping an eye on the ecological perspective of mothers' stress with the directly and indirectly influencing micro- and exosystem may help to provide a more comprehensive view within early interventions.

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