



Dyadic associations and prediction of maternal and paternal sexual satisfaction in couples—Findings from an 18-year longitudinal study

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ABSTRACT

Background: Sexual satisfaction is one of many crucial factors for the long-term success of romantic relationships. Longitudinal studies examining the dyadic associations between maternal and paternal factors in middle adulthood for predicting sexual satisfaction in later adulthood are scarce.

Method: The German longitudinal intervention study "Future Family" followed families with at least one child over 18-years (Pre: $N = 477$, mothers: $M = 35.2$ years, fathers: $M = 38.8$ years, children: $M = 4.1$ years). At the time of the 18-year follow-up, $N = 150$ mothers ($M = 54.1$ years) were still living together with the biological fathers ($M = 56.1$ years; mean relationship duration: 32 years). Dyadic associations between individual and dyadic factors at Pre were analyzed with Actor-Partner Interdependence models to predict sexual satisfaction 18 years later.

Results: Higher relationship quality was significantly associated with higher levels of one's own sexual satisfaction 18 years later. Higher levels of maternal and paternal mental health problems were linked to lower levels of sexual satisfaction in both the individual themselves and their partner. General life satisfaction of mothers and fathers only predicted their own sexual satisfaction. The model for dysfunctional parenting yielded no significant effects.

Conclusions: The results indicate that relationship quality, mental health problems, and general life satisfaction of both parents could be starting points for preventive and therapeutic interventions to achieve long-term effects in sexual satisfaction in married couples.

Introduction

Sexuality is an essential element for initiating and stabilizing many romantic relationships. Sexual satisfaction plays a significant role in a relationship for many years and is often considered a fundamental component of relationship satisfaction (McNulty et al., 2016; Rausch & Rettenberg, 2021). Empirical studies have previously used various definitions and assessments of sexual satisfaction. The most widely accepted definition has been proposed by Lawrance and Byers (1995), who define sexual satisfaction as "an affective response arising from one's subjective evaluation of the positive and negative dimensions associated with one's sexual relationship" (p. 268). Velten and Margraf (2017) stated in their study that "These dimensions may include personal experiences (e.g., how often one reaches orgasm during sex), the experiences of the sexual partner (e.g., how consistently a partner has an erection during sex), or relationship-related aspects of sexuality (e.g.,

how often a couple has sex or how openly sexual matters are discussed)." (p. 1).

In long-term intimate relationships (e.g., marriages), a variety of factors can interfere with or promote couples' sexual satisfaction. Several meta-analyses have been conducted on predictors of sexual satisfaction (e.g., Petersen & Hyde, 2010; Sanchez-Fuentes, Santos-Iglesias & Sierra, 2014), showing that sex research has focused almost exclusively on individuals rather than couples. The focus of sex studies was mostly on sex-related factors (e.g., focus on lower average sexual satisfaction in women compared to men). Rather than focusing solely on partners as individuals, it is crucial to consider the interpersonal context in which a substantial portion of sexual activity takes place and to examine sexual and relationship factors of middle-aged and older couples in long-term committed relationships (Heimann, 2011; Velten & Margraf, 2017). For this reason, the dyadic associations and the dyadic interplay of couple factors are of great importance. The Actor-Partner

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Interdependence Model (APIM) enables researchers to use a dyadic data analytic approach that estimates actor effects (i.e., the effect of one's own scores on one's own outcomes variable) and partner effects (i.e., the effect of one partner's scores on the other person's outcome variable) on outcome variables such as sexual satisfaction (Kenny, Kashy & Cook, 2006). Velten and Magraf (2017), for example, analyzed data of a representative German sample of 964 couples from the general population using APIMs. They found several actor-effects (e.g., sexual function, sexual communication, masturbation, life satisfaction) and sex-specific partner effects (e.g., sexual functioning in men, partner sexual distress in women) to predict sexual satisfaction.

The most comprehensive recent systematic review of predictors of sexual satisfaction in women was published by Rausch and Rettenberg (2021). The objective of this review was to identify studies published between 2004 and 2019 that had a sample size of at least $N = 400$ women in long-term relationships and used advanced statistical methods and/or research designs (e.g., longitudinal or dyadic analyses). The authors included $N = 204$ studies in their final analysis. Approximately 50 % of these studies implemented advanced quantitative methodology (e.g., hierarchical regression analysis, path analysis, and structural equation modeling). However, the most problematic methodological shortcoming was, that despite the benefits for the deduction of causal relationships, longitudinal studies lasting for more than 10 years were very scarce. Furthermore, approximately 60 % of all studies were conducted in North America and Canada, 19 % in Europe, and 13 % in Asia. The authors presented key findings on the correlates and predictors of sexual satisfaction, focusing on studies that used a "comprehensive statistical research design with several variables and, at the same time, on studies that were identified as the most important analyses for the specific variable" (Rausch & Rettenberger, 2021, p. 3). In this systematic review, relationship quality was the most prominent positive correlate of sexual satisfaction (e.g., McNulty et al., 2016; Yeh et al., 2006). General life satisfaction was another positive correlate (e.g., Neto & Pinto, 2013, Velten & Magraf, 2017). Whereas women's mental health was not addressed in detail in the systematic review of Rausch and Rettenberg (2021), other studies show that there seems to be a strong association between mental health problems, stress, sexual functioning, and sexual satisfaction in women and men (e.g., Bodenmann, Atkins, Schär & Poffet, 2010; Karakose et al., 2023). In particular, depressive symptoms are related to reduced sexual satisfaction (e.g., Bodenmann & Ledermann, 2007; Sánchez-Fuentes & Sierra, 2015). In addition to relationship and individual factors among the partners, parenting behavior has been explored as a predictor of sexual satisfaction, and both no associations as well as negative associations have been found (e.g., Frederick et al., 2017, Schmiedeborg & Schroder, 2016, Træen, 2010), although dysfunctional parenting behaviors have not yet been studied to our knowledge. However, both parenting behavior and general life satisfaction have been investigated only sporadically in studies to date, so further (especially longitudinal) studies are needed.

Considering these findings together, it is notable that there are very few long-term studies examining the dyadic association of individual and dyadic factors in predicting parental sexual satisfaction among couples married over an extended period of time (over 30 years). Studies on men and especially on couples from Germany are barely available. Thus, the present study attempts to begin to fill these research gaps.

One significant theoretical model utilized for predicting sexual satisfaction is the Interpersonal Exchange Model of Sexual Satisfaction (IEMSS; Lawrance & Byers, 1995). This model weighs the costs and benefits of sexual relationships against each other to ascertain the overall level of sexual satisfaction. When an individual experiences more sexual rewards compared to costs, sexual satisfaction manifests for that individual. However, most studies employing this model have primarily concentrated on individual-level data and outcomes, neglecting the interpersonal nature of sexual satisfaction, which necessitates dyadic analyses (Freihart, Sears & Meston, 2020).

Another viable approach for constructing a theoretical framework to predict sexual satisfaction involves analyzing it from an ecological perspective. According to ecological theories, human development is shaped by the interplay between individuals and their environmental surroundings. These theories outline four distinct layers, each varying in its proximity to the individual. The microsystem, situated closest to the individual, encompasses factors such as personal characteristics or emotions (e.g., depressive symptoms or general life satisfaction). Next is the mesosystem, which is slightly more removed from the individual and encompasses elements like intimate partner relationships (e.g., relationship quality). Beyond this lies the exosystem, which includes factors such as family relationships that extend beyond the immediate sphere of the individual (e.g., parenthood). Finally, the macrosystem represents the furthest level from the individual, encompassing institutional factors. It is important to recognize that all layers within this model are perceived as interconnected structures, collectively shaping human development (Bronfenbrenner, 1994; Henderson, Lehavot & Simoni, 2009).

A Spanish cross-sectional study by Sánchez-Fuentes et al. (2016) employed this approach and demonstrated that in men, sexual satisfaction was directly predicted by relationship quality and sexual functioning, whereas in women, sexual satisfaction was directly predicted by relationship quality, sexual functioning, sexual assertiveness, and sexual attitudes. However, political ideology, religious practice, and social support were indirectly associated with sexual satisfaction in both sexes. In relation to parenthood, the authors recommend considering additional factors beyond the age of the children, such as satisfaction with parenthood.

Our study endeavors to substantiate the ecological viewpoint by analyzing longitudinal data from couples with over 30 years of relationship history and by incorporating data from multiple layers, while also examining a novel aspect of parenthood—specifically, parenting behavior—as a potential predictor of sexual satisfaction. In the current investigation, parental assessments in middle adulthood were used to predict sexual satisfaction in older adulthood among couples married/together for an average of 32 years and with at least one child. APIMs were used to explore the long-term dyadic associations between wives and husbands functioning and sexual satisfaction over 18 years. Because there are no studies on this specific topic analyzing dyadic associations across such an extended period of time to our knowledge, it is difficult to formulate specific hypotheses. Thus, the broad objectives of this study were to examine the longitudinal dyadic associations between initial (a) maternal/paternal relationship quality, (b) parental mental health problems, (c) parental general life satisfaction, and (d) dysfunctional parenting practices in predicting parental sexual satisfaction assessed years later (outcome). This also addresses the need to examine variables at both the individual and partnership levels.

Methods

Participants

The present study used data from the longitudinal study "Future Family" (FF), which started in 2001/2002. The FF I-study (Heinrichs et al., 2006) was a randomized controlled trial, while the FF II-study (Heinrichs, Krüger & Guse, 2006) was a non-controlled open trial. Both studies examined the effectiveness of the Positive Parenting Program (Triple P; Sanders et al., 2014). The FF III-study is the 10-year catamnesis (FU10; Hahlweg & Schulz, 2018) and the FF IV-study the 18-years catamnesis (FU18) of the FF-I and FF-II study. The catamneses are based on a longitudinal design examining the effectiveness of the Triple P and the prediction of mental health problems among children from the study once they reached adolescence and young adulthood, considering risk and protective factors in kindergarten age.

For the first assessment (Pre), families with children aged 2.5 to 6 years were recruited from kindergartens in Braunschweig (Germany).

The original sample consisted of $N = 477$ families (FF-I: $n = 280$ families, FF-II: $n = 197$ families). At Pre, the mothers were on average $M = 35.2$ years ($SD = 5.0$); the fathers were on average $M = 38.8$ years ($SD = 6.0$), and the children were on average $M = 4.1$ years ($SD = 1.0$) old. $N = 458$ families participated in the follow-up after one year (FU1; retention rate: 96 %); $N = 449$ families participated in the two-year follow-up (FU2; 94.1 %); $N = 361$ families still participated after 10 years (FU10; 75.7 %), and $N = 316$ families participated in the 18 years follow up (FU18; 67.1 %, six of the original 477 families were not included because they did not meet the inclusion criteria). At FU18, the young adults were on average 22.3 years old ($SD = 1.2$, Range: 20–25).

Drop-out analyses using data from the baseline assessment (Pre) yielded no significant differences between FU18 participants and non-participants in terms of child's gender, father's age, and maternal parenting behavior. Non-participant mothers were significantly younger, more likely to be single parents, had a lower education level (all $p < .001$), and reported significantly more symptoms of psychopathology at baseline ($p = .027$). The dropouts were more likely to have a migration background ($p = .036$). Non-participant fathers also had a lower education level ($p < .001$). The representativeness of the FU18-sample therefore is substantially limited compared to the total baseline sample.

Of the $N = 316$ families (FU18), relationship information was available from $n = 290$ families. Of these, $n = 150$ (51.7 %) dyads were still together/married, while $n = 115$ (39.7 %) of parents had dissolved their relationship through separation/divorce. For $n = 18$ (6.2 %) families, the relationship was ended by the death of one parent (13 fathers, 5 mothers), and seven mothers (2.4 %) never had a relationship with the biological father (e.g., pregnancy after a one-night stand or as a consequence of a rape).

Sample characteristics

In the following analyses, only those dyads who were still living together at FU18 (meaning married or cohabiting after 18 years) were considered (final sample $N = 150$ dyads, 96.7 % of the dyads were married). Completed questionnaires were available from $N = 150$ mothers and $N = 117$ fathers (78 %). The mothers were on average 54.1 years old ($SD = 4.3$, Range: 41–63 years) at FU18, while the fathers were on average 56.1 years old ($SD = 5.2$; Range: 41–70 years). The parents' educational qualifications were distributed as follows: Mothers: without school leaving certificate or 9 classes $n = 6$ (4.0 %), 10 classes $n = 49$ (32.9 %), and A-Levels/High school $n = 94$ (63.1 %); Fathers: without school leaving certificate or 9 classes $n = 15$ (10.1 %), 10 classes $n = 34$ (22.8 %), and A-Levels/High school $n = 100$ (67.1 %). According to the socioeconomic index score (used in the representative German KiGGS study – German Health Interview and Examination Survey for Children and Adolescents study, see Lampert et al., 2018), $n = 48$ (32.2 %) families were assigned to the middle (index: 8.8–16.9), and $n = 101$ families (67.8 %) were assigned to the high socioeconomic class (index: ≥ 17). The average length of the parental relationship was 32.3 years ($SD = 4.8$; Range: 21–45 years). On average, 2.2 children lived in the families at FU 18 ($SD = 0.83$). The $N = 150$ young adults of the families that were included in the following analyses had a mean age of 22.4 years ($SD = 1.2$; Range: 19–26 years), with $n = 70$ (46.7 %) being female.

Procedure

The survey at FU18 consisted of a combination of personal structured interviews with the parents and the young adults separately and a package of standardized questionnaires. Until FU10 the interviews were conducted in person. Due to the COVID-19 pandemic, the assessments at FU18 were conducted largely by telephone and online via the Survey-Monkey survey platform (<https://www.surveymonkey.de>). The young adults and parents each received 50€ for their participation in the approximately 2.5-hour survey. Prior to the survey, written informed

consent was obtained from all participants. The study was conducted according to the principles stated in the Declaration of Helsinki. The project received ethical approval by the ethics committee of the German Psychological Society (DGPs; identification number: WS 12_2010) and by the independent ethics committee of Technische Universität Braunschweig (identification number d-2019-01; Faculty of Life Sciences).

Measures

Given the focus of the current investigation, predictor variables were assessed at pretest (Pre), 18 years before the follow-up data were collected, and sexual satisfaction was assessed at the 18-year follow-up (FU18) as detailed below.

Dysfunctional Parenting (Pre). The German version (EFB; Naumann et al., 2010) of the Parenting Scale (Arnold et al., 1993) was used to assess dysfunctional parenting using 35 items. Parents rated their parenting behavior on a 7-point Likert scale (e.g., “If my child is naughty or behaves inappropriately, ... “ [1] ... I do something about it right away.” or “[7] ... I will deal with it later.”). The items can be summarized to a mean total score, where higher scores indicate more use of dysfunctional parenting practices (e.g., verbosity or laxness). The internal consistencies in our total baseline sample are satisfactory for mothers and fathers ($\alpha_{\text{mothers}} = 0.87$, $\alpha_{\text{fathers}} = 0.86$).

General Life Satisfaction (Pre). The German Questions on Life Satisfaction^{Modules} (FLZ^M; Henrich & Herschbach, 2000) consists of 16 items and was used to assess parents' subjective quality of life in eight areas: health, occupation/work, financial situation, leisure/activities/hobbies, family life/children, partnership/sexuality, friends/acquaintances, and living situation. The parents rated the importance (1 = Not important - 5 = Very important) of each area as well as their satisfaction (1 = Very poor - 5 = Very good) in each area. In addition, global general life satisfaction was assessed by a 17th item. Based on the two values for satisfaction and importance, the weighted satisfaction could be determined for each area. The higher the weighted satisfaction, the higher the satisfaction. By summing up the weighted satisfactions of the eight areas, the global weighted satisfaction can be computed. The results for the internal consistency of the total value at Pre are satisfactory (mothers: $\alpha = 0.76$, fathers: $\alpha = 0.75$).

Parental Mental Health Problems (Pre). Mental health problems of the parents in middle adulthood were assessed using the German version (Schulz, Hahlweg, Job & Supke, 2023) of the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995). This self-report questionnaire consists of 42 items, where parents rate their symptoms of anxiety, depression, and stress during the last four weeks (e.g., “During the last 4 weeks I could not get up to do anything.” - (1 = never to 4 = very often). Higher scores indicate more parental mental health problems. The internal consistency in our sample can be rated as excellent ($\alpha_{\text{mothers}} = 0.94$, $\alpha_{\text{fathers}} = 0.93$).

Relationship Quality (Pre). Parental relationship quality was rated using the German version (FBZ-K; Hahlweg & Schulz, 2023) of the Abbreviated Dyadic Adjustment Scale (Sharples & Rogers, 1984). The seven items assess the couples' agreement about domains of the relationship (e.g., philosophy of life) and the occurrence of positive interactions between the partners (e.g., “How often do you calmly discuss with each other?”). Additionally, on the last item, the parents rate their overall relationship quality (0 = very unhappy to 5 = very happy). The item scores are summed up to provide a total score, with scores of 22 and above indicating a high relationship quality. The internal consistencies at Pre are satisfactory ($\alpha_{\text{mothers}} = 0.80$, $\alpha_{\text{fathers}} = 0.81$).

Parental Sexual Satisfaction (FU18). For measuring sexual satisfaction, the German version of the Multidimensional Sexuality Questionnaire (MSQ) by Snell, Fischer and Walters (1993) was used. The MSQ consists of twelve different dimensions to assess psychological aspects of sexuality. Each scale contains five items (e.g., “I am very satisfied with the way my sexual needs are being met at the moment.”) and

corresponds to one dimension (Brenk-Franz & Strauß, 2011). Within the FF-project, only the twelfth dimension, *Sexual Satisfaction*, was rated by parents. Each of the five items was rated on a 5-point Likert scale (1 = *Not at all characteristic* - 5 = *Very characteristic of me*). The individual item scores are summed to create a total score. Higher scores indicate greater parental sexual satisfaction. Internal consistencies can be viewed as excellent with $\alpha_{\text{mothers}} = 0.97$, $\alpha_{\text{fathers}} = 0.98$ in our total sample at FU18.

Statistical analyses

We estimated the cross-partner associations between individual and familial factors (relationship quality, mental health problems, general life satisfaction, dysfunctional parenting practices) and sexual satisfaction using four separate Actor-Partner Interdependence Models (APIM; Cook & Kenny, 2005) to account for the interdependent nature of partners' data. A general theoretical APIM can be found in Fig. 1. One of the advantages of APIMs is that actor effects (e.g., associations between *maternal* mental health problems and their own sexual satisfaction) and partner effects (e.g., associations between *maternal* mental health problems and *paternal* sexual satisfaction) can be estimated simultaneously while controlling for the other.

Even though we are analyzing both mothers and fathers, and sex could potentially affect distinguishability in the variables being studied, it is crucial to conduct statistical tests for distinguishability. We conducted a test of distinguishability using the DINGY program (<https://davidakenny.shinyapps.io/Dingy/>; Kenny, 2015). Our aim was to assess whether there were statistically significant differences based on sex in the data (relationship quality, mental health problems, general life satisfaction, and dysfunctional parenting of both parents at Pre were compared and tested), and if so, what those differences were. Statistical differences were examined in terms of means ($\chi^2 [5] = 10.40, p = .065$), variances ($\chi^2 [25] = 21.71, p = .652$), and correlations ($\chi^2 [5] = 3.43, p = .634$) between variables. In summary, the results showed no evidence of distinguishability, indicating that dyad members should be treated as indistinguishable. Therefore, we calculated indistinguishable APIMs for our analyses. In these models, there are constraints where actor and partner effects as well as means and variances are held equal (see Olsen & Kenny, 2006).

Because our sample came from an intervention study and 67.3 % of the 150 mothers participated in Triple P, (no participation, 32.7 %), participation was included as a covariate at FU18. Furthermore, socioeconomic status (0 = middle [32.2 %] / 1 = high [67.8 %]) was added as another possible covariate in the APIMs.

Analyses were conducted using SPSS Version 26 (for descriptive analyses) and APIM_SEM (for APIMs using lavaan-package [Rosseel, 2012] and Full Information Maximum Likelihood Method; Stas et al., 2018). Hu and Bentler (1999) as well as Yu (2002) formulated the following criteria for model goodness of structural equation models:

Comparative Fit Index (CFI) >0.95, Tucker-Lewis Index (TLI) >0.95, Root Mean Square Error of Approximation (RMSEA) <0.06, and a nonsignificant chi-square test.

Results

Descriptive analyses

Being sexually inactive, meaning that mothers reported no longer having sexual intercourse, was reported by 39.3 % mothers, while 36.7 % of mothers had sexual intercourse one to three times per month, and 24.0 % of mothers had sex at least once a week. Furthermore, 26.8 % of mothers were dissatisfied or somewhat dissatisfied and 51.7 % were satisfied or very satisfied with their sexuality at the time of the survey (21.5 % somewhat satisfied). Both variables were significantly correlated at $r = 0.45 (p < .001)$. Comparable data about sexual activity were not collected for the fathers.

Means, standard deviations, and intercorrelations between men's and women's scores for all factors included in the analyses are presented in Table 1. A significant correlation was found between maternal and paternal sexual satisfaction. Furthermore, maternal and paternal sexual satisfaction at FU18 were significantly associated with mothers' and fathers' relationship quality, mothers' mental health problems, as well as mothers' and fathers' general life satisfaction at Pre (see Table 1 for the specific correlations). Paired *t*-tests only revealed a significant difference between maternal ($M = 60.39, SD = 30.77$) and paternal general life satisfaction ($M = 54.52, SD = 32.17$) at Pre ($t (141) = 2.19, p = .030, d = 0.18$).

Actor-Partner-Interdependence models: actor and partner effects

In total, four APIMs were computed using (a) relationship quality, (b) mental health problems, (c) general life satisfaction, and (d) dysfunctional parenting to predict sexual satisfaction at the 18-year follow-up. The model fit of all models was excellent. The individual data on the model quality can be found under the respective figure of the model as a note. The standardized coefficients are reported and interpreted. The effects of the covariates Triple P and socioeconomic status were not statistically significant in any model ($p > .05$).

Model 1: dyadic associations between relationship quality and sexual satisfaction

The APIM results ($R^2 = 0.13$) for relationship quality are shown in Fig. 2. The actor effect was $\beta = 0.23 (SE = 0.08, p < .001)$, while the partner effect was not statistically significant ($\beta = 0.13, SE = 0.09, p = .063$). Higher levels of maternal and paternal relationship quality were linked to higher levels of one's own sexual satisfaction.

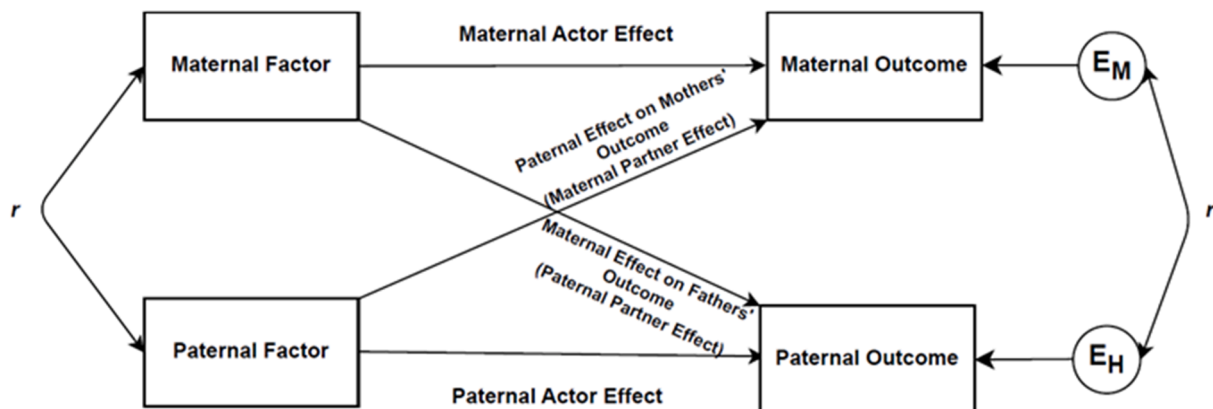


Fig. 1. Theoretical General Actor-Partner Interdependence Model.

Table 1
Descriptive Statistics and Correlations Between Mothers and Fathers for Key Study.

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Maternal Sexual Satisfaction (MSQ)	–									
2. Paternal Sexual Satisfaction (MSQ)	.49***	–								
3. Maternal Relationship Quality (FBZ-K)	.30***	.38***	–							
4. Paternal Relationship Quality (FBZ-K)	.24**	.36***	.71***	–						
5. Maternal Mental Health Problems (DASS)	–0.20*	.34***	–0.41***	–0.27***	–					
6. Paternal Mental Health Problems (DASS)	–0.11	–0.13	–0.18*	–0.28***	.27**	–				
7. Maternal General Life Satisfaction (FLZ)	.34***	.25**	.37***	.24**	–0.44***	–0.24**	–			
8. Paternal General Life Satisfaction (FLZ)	.27**	.40***	.31***	.45***	–0.36***	–0.39***	.46***	–		
9. Maternal Dysfunctional Parenting (EFB)	–0.14	.05	–0.19*	–0.12	.35***	.16	–0.31***	–0.24**	–	
10. Paternal Dysfunctional Parenting (EFB)	.04	–0.02	–0.07	–0.16	.16	.37***	–0.04	–0.24**	.30***	–
Mean (SD)	18.06 (5.97)	17.03 (6.32)	23.73 (4.88)	23.94 (5.16)	21.00 (13.99)	21.25 (15.78)	60.39 (30.77)	54.52 (32.17)	3.26 (0.52)	3.19 (0.51)
Paired <i>t</i> -Tests	0.93		–0.30		0.06		2.19*		1.54	
N _{Mothers}	144		147		149		149		149	
N _{Fathers}	117		142		143		143		143	

Variables Note. * $p < .05$, ** $p < .01$, *** $p < .001$ (two-tailed).

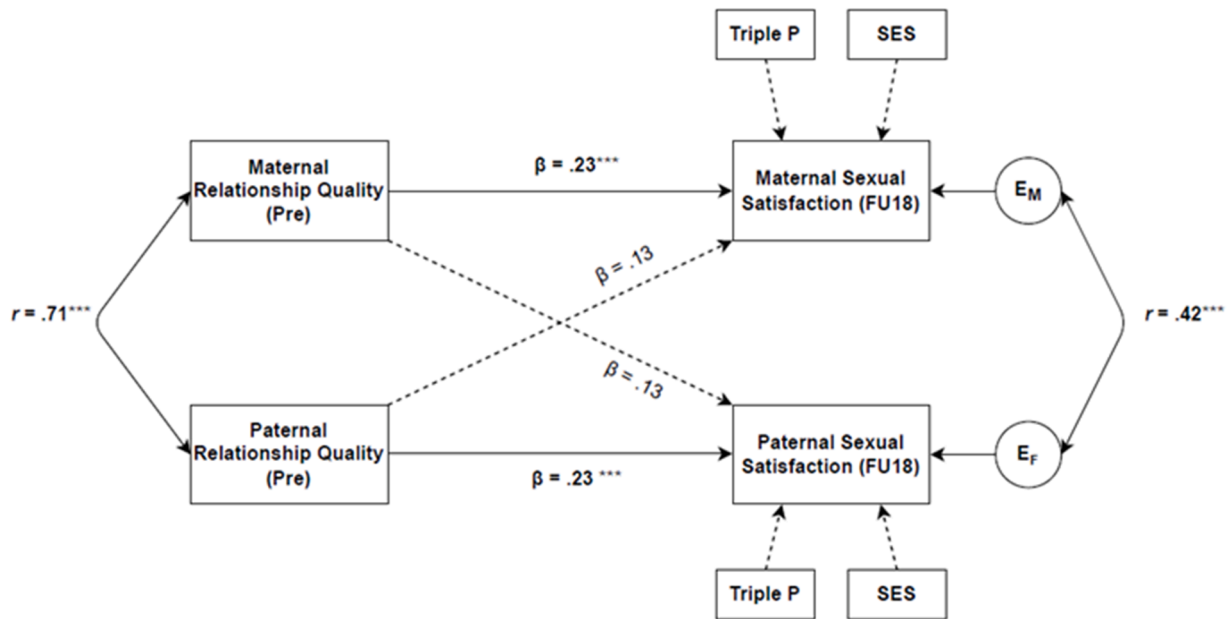


Fig. 2. Actor-Partner Interdependence Model for the Dyadic Associations Between Relationship Quality (Pre) and Sexual Satisfaction (FU18) Among Wives and Their Husbands.

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; Model Fit: $\chi^2 = 5.18$, $df = 11$, $p = .922$, CFI = 1.00, TLI = 1.00, RMSEA = 0.00.

Model 2: dyadic associations between mental health problems and sexual satisfaction

The second model ($R^2 = 0.07$) computed the APIM for the dyadic associations between parental mental health problems and sexual satisfaction (see Fig. 3). In this model, both a significant actor effect ($\beta = -0.11$, $SE = 0.02$, $p = .049$), and partner effect ($\beta = -0.16$, $SE = 0.02$, $p = .005$), were identified. This indicated that higher levels of maternal and paternal mental health problems were linked to lower levels of sexual satisfaction in both the individual themselves and their partner.

Model 3: dyadic associations between general life satisfaction and sexual satisfaction

In the third APIM (see Fig. 4), parental general life satisfaction was used to predict sexual satisfaction ($R^2 = 0.15$). Significant actor effects were found effect ($\beta = 0.31$, $SE = 0.01$, $p < .001$). However, no significant partner effects were identified in this model. That is, each partner's own general life satisfaction predicted their own sexual satisfaction 18 years later.

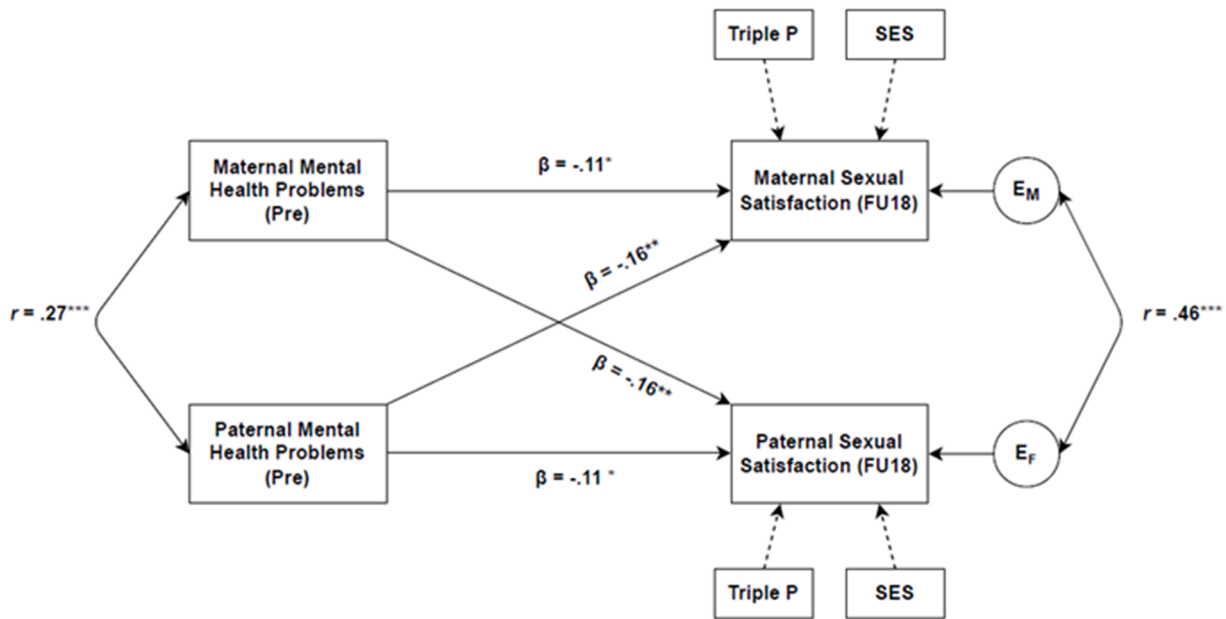


Fig. 3. Actor-Partner Interdependence Model for the Dyadic Associations Between Mental Health Problems (Pre) and Sexual Satisfaction (FU18) Among Wives and Their Husbands.

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; Model Fit: $\chi^2 = 7.65$, $df = 11$, $p = .744$, CFI = 1.00, TLI = 1.00, RMSEA = 0.00.

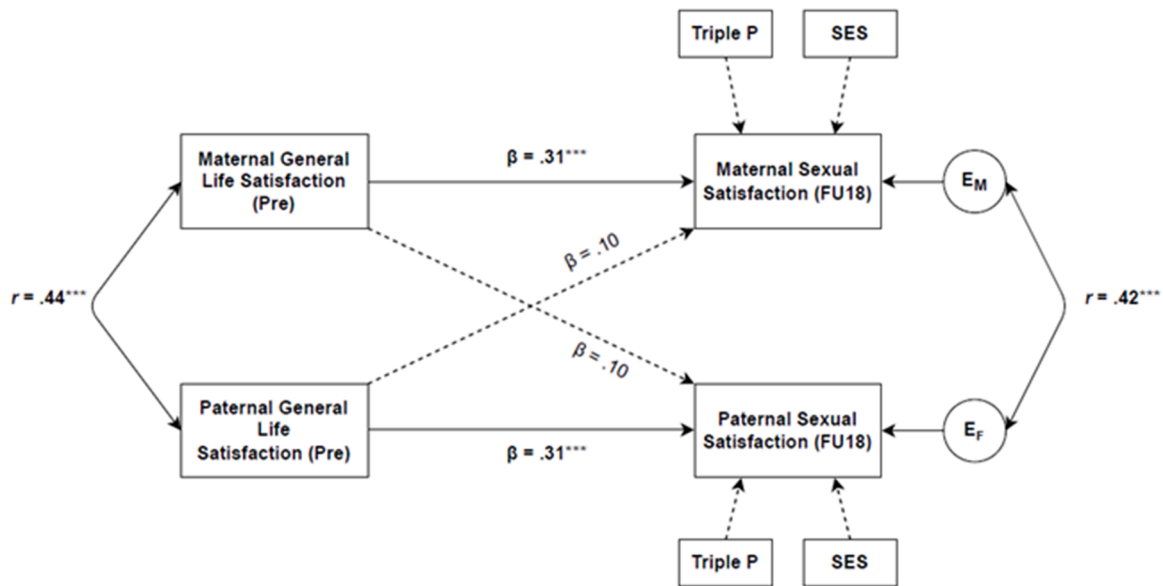


Fig. 4. Actor-Partner Interdependence Model for the Dyadic Associations Between General Life Satisfaction (Pre) and Sexual Satisfaction (FU18) Among Wives and Their Husbands.

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; Model Fit: $\chi^2 = 7.58$, $df = 11$, $p = .751$, CFI = 1.00, TLI = 1.00, RMSEA = 0.00.

Model 4: dyadic associations between dysfunctional parenting and sexual satisfaction

The dyadic associations between parental dysfunctional parenting practices at Pre and sexual satisfaction at FU18 were analyzed in the fourth APIM (see Fig. 5). No significant actor nor partner effects were found. However, the actor effect only narrowly failed to reach the significance level using the data from our sample (actor-effect: $\beta = -0.11$, $SE = 0.71$, $p = .067$).

Discussion

The present German longitudinal study examined the dyadic associations between individual and dyadic factors and sexual satisfaction among mothers and fathers who had been married or were together for an average of 32 years and had at least one child. The dyadic analyses over 18 years after entering the study showed noteworthy results using Actor-Partner Interdependence Models (APIM). The main objective of the study was to identify factors in middle adulthood that were associated with sexual satisfaction in later adulthood. Based on these factors, indications for possible preventive measures and clinical interventions could be derived.

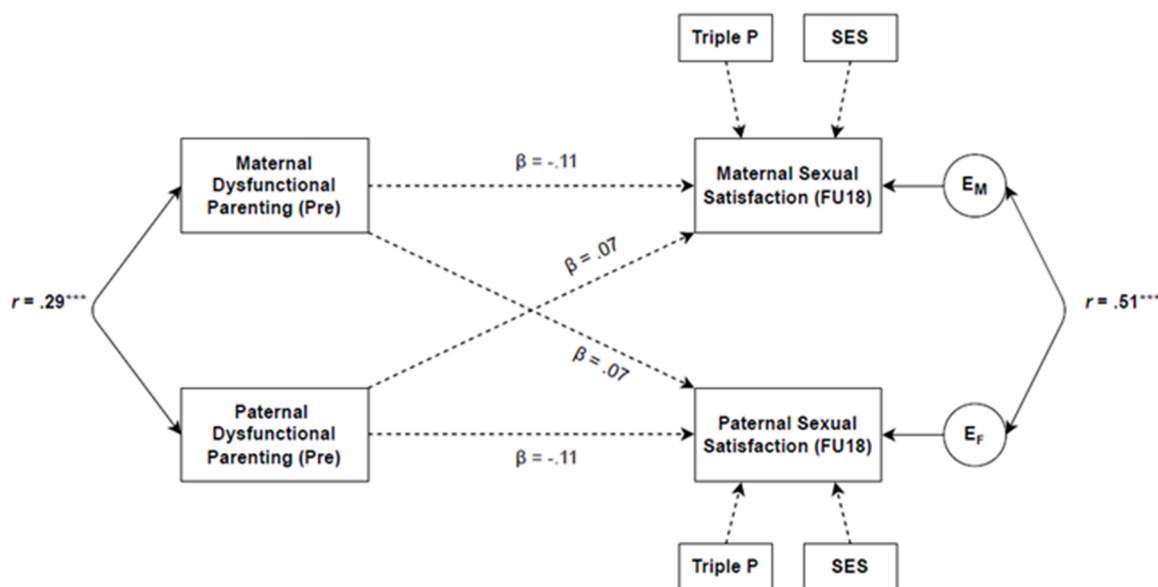


Fig. 5. Actor-Partner Interdependence Model for the Dyadic Associations Between Dysfunctional Parenting (Pre) and Sexual Satisfaction (FU18) Among Wives and Their Husbands.

Note. * $p < .05$; ** $p < .01$; *** $p < .001$; Model Fit: $\chi^2 = 8.88$, $df = 11$, $p = .633$, CFI = 1.00, TLI = 1.00, RMSEA = 0.00.

Sexual activity

In terms of sexual activity, 4 out of 10 mothers reported being sexually inactive at the 18-year follow-up. Thus, sexual inactivity in an average 32-year relationship is far from a rare phenomenon. Yet only one in four mothers were dissatisfied with their sexuality, so lower levels of sexual activity do not seem to be automatically associated with sexual dissatisfaction. The observed inactivity rate seems to be comparable with the results of the recent representative German study by Briken et al. (2020; $N = 2400$ German women), in which 50 % of the participants reported decreased sexual desire. The higher rate found in the Briken et al.-study can possibly be explained by the fact that not all women were having a romantic relationship at the time of the survey. Moreover, the age range of 17–75 years was significantly greater compared to our study.

General findings across all models

First, general patterns observed across all APIMs will be outlined. Subsequently, specific individual models and their corresponding associations will be discussed in detail.

Studies analyzing the link between couples' socioeconomic status and sexual satisfaction are scarce (Sánchez-Fuentes, Santos-Iglesias & Sierra, 2014). In our study, socioeconomic status did not play a significant role in our dyadic models as a control variable. The direct correlations between education level, income, and sexual satisfaction seem to be small or non-existent for female sexuality in the existing literature (Rausch & Rettenberger, 2021).

To our knowledge, no study has yet explored the (longitudinal) effects of parent trainings (e.g., Triple P) on parental sexuality. For maternal sexual satisfaction 18 years later, the significance level was between $p = .070$ (model for relationship quality) and $p = .137$ (model for dysfunctional parenting). Although speculative, in a larger sample, the association might reach statistical significance, suggesting long-term associations. If so, such an association might result from the finding that Triple P improves parental relationship quality in the long term, in addition to child mental health (Hahlweg & Schulz, 2018; Sanders et al., 2014), which in turn could then improve parental sexuality, i.e., a mediational model. If improving relationship functioning through parent training does not lead to increases in sexual satisfaction, it will be

important to understand why such associations do not hold, given the findings noted below.

Specific findings for relationship quality and sexual satisfaction

The correlation analyses showed that both maternal and paternal relationship quality at Pre were positively related to sexual satisfaction of both parents after 18 years. However, the corresponding APIM showed a different pattern. Here, higher levels of maternal and paternal relationship quality were associated with higher levels of one's own sexual satisfaction. Consequently, couples in which both mothers and fathers experienced higher relationship quality (on average during their mid to late 30 s) also reported elevated levels of personal sexual satisfaction 18 years later.

In the literature, relationship quality is one of the most studied positive correlates of sexual satisfaction, although longitudinal studies are scarce (Rausch & Rettenberger, 2021). A longitudinal study by McNulty et al. (2016) analyzed data from the first four to five years of 207 married couples. The investigators found that one's own marital and sexual satisfaction were bi-directionally positively associated. Higher marital satisfaction at one assessment point predicted more positive changes in subsequent sexual satisfaction, whereas higher sexual satisfaction also predicted higher subsequent marital satisfaction. Yeh et al. (2006) analyzed data from 283 married couples (married an average of 30 years) in their five-wave longitudinal study that spanned 11 years. In their cross-lagged models, higher levels of sexual satisfaction at one assessment point predicted higher subsequent marital satisfaction for wives and husbands. In contrast, marital satisfaction did not predict changes in sexual satisfaction over time. It is difficult to frame our findings in this context because McNulty et al. (2016) focused on the early years of marriages, whereas Yeh et al. (2006) did not analyze their data dyadically. In addition, the focus of both studies tended to be on the change in factors over time. In our study, the focus of the analyses was on the longitudinal prediction of sexual satisfaction. The current dyadic models revealed that an individual's own relationship quality in long-term married couples may have a more significant impact in middle adulthood than the relationship quality of their partner when predicting their own long-term sexual satisfaction.

Specific findings for mental health and sexual satisfaction

Regarding mental health, the correlative analyses showed associations only between maternal mental health and parental sexual satisfaction. Our APIM revealed that higher levels of maternal and paternal mental health problems were linked to lower levels of sexual satisfaction in both the individual themselves and their partner 18 years later. Therefore, the mental health of both partners seems to be important for the prediction of sexual satisfaction in long-term married couples.

In a cross-sectional study from Switzerland, Bodenmann and Ledermann (2008) examined dyadic relationships between depressed mood and various aspects of sexual functioning ($N = 198$ couples, mean relationship duration: $M = 12.3$ years). The wives' depression scores were related to her own sexual satisfaction as well as to that of their husbands. In addition, the investigators found an actor effect of husbands' mental health problems on their own sexual satisfaction. A Turkish study by Karakose et al. (2023) analyzed 102 heterosexual couples (mean age = 30.1 years, Range: 21–50 years) using APIMs. On the one hand, the authors showed that wives' depression and stress were significantly associated with their own sexual satisfaction (actor effects) but were not related to the sexual satisfaction of their husbands. On the other hand, husbands' anxiety and stress were related to their own sexual satisfaction (actor effects), whereas husbands' depression was associated with both their own and their wives' sexual satisfaction (actor and partner effects). It should be noted that the couples of the Karakose et al.-study only had been married for an average of 2.3 years. We also found an actor effect, but at the same time we also found a partner effect. The different results could be explained, first, by cultural differences (e.g., culturally different views on living together). Second, Karakose et al. analyzed the three dimensions of the DASS (anxiety, stress, depression) separately. In our study, however, we decided against separate analyses due to the complexity of the analyses and the high intercorrelations of the three dimensions.

Specific findings for life satisfaction and sexual satisfaction

So far, there are few studies examining the longitudinal association between life satisfaction and sexual satisfaction. Life satisfaction was significantly positively correlated with sexual satisfaction for both mothers and fathers in our study. At Pre, fathers reported a significantly lower general life satisfaction compared to mothers. Further analyses showed that fathers were significantly more dissatisfied with family life in general and with their friends compared to mothers. When the "Future Family" project was launched in 2000/2001, many families in Germany tended towards a rather traditional family role model. This means that fathers usually went to work to make money, and mothers usually took care of the children. This could be one reason why fathers had less time for friends and family, which led to more dissatisfaction. In recent years, however, this traditional role model has increasingly decreased in Germany. Fathers are often more involved in raising children, while many mothers often also go to work to earn money for the family (Juncke, Braukmann & Heimer, 2018).

Among the APIMs, both parents showed positive longitudinal actor effects of life satisfaction on their own sexual satisfaction 18 years later. However, no partner effects were significant in this model. This is consistent with the cross-sectional findings of a study by Velten and Magraf (2017). The authors demonstrated within their APIMs that general life satisfaction was a positive predictor of sexual satisfaction. However, as in our study, only significant actor effects and no partner effects were identified for both partners. Another study by Neto and Pinto (2013) analyzed data from 1144 participants (mean age: 38.99 years, Range: 20–80 years). The authors found that the satisfaction with sex life and the satisfaction with life were significantly correlated in young adults ($r = 0.44$), adults ($r = 0.32$), and older adults ($r = 0.28$). Additionally, general life satisfaction was also a significant predictor for sexual satisfaction in their multiple regression models for all three age

groups. The key findings of both studies are comparable to our findings.

Specific findings for parenting behavior and sexual satisfaction

The associations between parenting behavior and sexual satisfaction also have been examined only indirectly in most past studies (e.g., addressing whether there are young children in the family or parenthood in general; see Rausch & Rettenberg, 2021); in the current investigation, all couples had young children at Pre. Both the correlational analyses and the APIMs revealed no associations between dysfunctional parenting and sexual satisfaction. Because there has been little systematic exploration of how parenting might impact the couple's sexual relationship, it is important to articulate how parenting might affect the couple, particularly in a longitudinal investigation such as the current one. Thus, how parents engaged in parenting behavior with their young children might not be central to their sexual relationship 18 years later when the children are now young adults. This is not to say that parenting is unimportant but rather that a more comprehensive evaluation is likely needed to understand this potential area of importance. For example, if parents continue to struggle with parenting over many years, this might be experienced as a long term, chronic stressor that could impact multiple aspects of their relationship, including sexual satisfaction. Træen (2010) conducted an analysis of sexual dissatisfaction within couple relationships in Norway, utilizing data from 797 web interviews with individuals aged 18 to 67 years. Their cross-sectional logistic regression model revealed significant associations among sexual dissatisfaction, a low frequency of sexual activity, and having children under the age of 12 in the household. In contrast, our study suggests potential longitudinal associations between (dysfunctional) parenting behavior and sexual satisfaction. Future investigations could explore whether dysfunctional parenting behavior is a significant predictor of sexual satisfaction, or if other moderating/mediating factors exist. A German study by Schmieberg and Schröder (2016) indicated that "sexual satisfaction declined in the initial years following the birth of a child and subsequently increased as children matured, with part of this effect being mediated by relationship quality, partners' living distance, labor force status, and health" (p. 104). One remaining question is the durability of these associations as children age, particularly into adolescence or young adulthood.

Strengths and limitations

An important strength of the current study is the survey period of 18 years, which allows for longitudinal analyses from couples on average from their thirties to their fifties. Furthermore, data were collected from both mothers' and fathers' perspectives at all assessment points, allowing for dyadic analyses. However, our sample represented a unique case because the dyads had to be treated as indistinguishable. As a result, it was not possible to examine sex-specific differences. This would be desirable to offer interventions tailored to individual needs.

The generalizability of the results is limited in some important ways: First, a very specific sample of families with at least one child with an average relationship duration of 32 years was analyzed (around 97 % were married). Therefore, the results cannot be generalized to all different types of couples (e.g., young couples, same-sex couples, couples without children, non-married couples). Second, the sample, and especially the sample of participating fathers is rather small. This could have resulted in reduced statistical power. A post-hoc power analysis for indistinguishable dyads was conducted using APIMPowerR (Ackerman & Kenny, 2016). A small effect size of $d = 0.20$ and correlations of $r = 0.40$ were assumed for all actor and partner effects due to the 18-year time period. The results showed that 394 dyads were needed to have adequate power (80 %) to detect these small actor and partner effects. Third, due to time constraints, no data were collected on the presence of sexual dysfunction or other reasons for sexual inactivity and sexual dissatisfaction. It could have been useful to consider this additional

information in the analyses. Fourth, the present longitudinal intervention study was not designed to examine sexual satisfaction in detail. Sexual satisfaction was one of several topics covered; therefore, several important explanatory variables are missing in the assessments (e.g., sexual communication, sexual practices, sexual desire). Furthermore, the family's living situation (e.g., whether it is an "empty nest") and the physical health of parents could not be included in the models, but they could be important influencing factors.

Conclusion and clinical implications

Our study was able to show interesting dyadic relationships between individual and dyadic variables for the prediction of parental sexual satisfaction 18 years later. Preventive measures and clinical interventions for couples' sexuality in the long term can be considered cautiously from these results, with the awareness that the associations do not demonstrate causality. With this caution in mind, if factors earlier in the relationship do impact sexual satisfaction 18 years later, then the results would suggest that interventions might begin in middle adulthood in order to achieve possible long-term positive effects. The relationship quality of both mothers and fathers, as well as their individual functioning, predicted their subsequent sexual satisfaction. Additionally, their mental health was associated with the sexual satisfaction of their partners 18 years later. Therefore, improving relationship quality and parental mental health might lead to an increase in sexual satisfaction for both parents in long-term married couples. In addition, an improvement in general life satisfaction could also improve the sexual satisfaction of the respective parent in the long term. Whereas clinicians might focus on couple therapy to improve relationship quality, it is unclear whether individual or couple-based interventions might more effectively improve parental mental health and each partner's general life satisfaction (Baucom et al., 2020). In part, the modality of intervention to improve individual well-being within the context of a committed relationship might vary as a function of the basis for individual distress (e.g., does depression result from relationship factors or not). Thus, the current findings provide areas for additional investigation that will be important to explore before making strong clinical recommendations.

Returning to the Bonfennrenner model mentioned earlier, it is important to consider predictors at various ecological levels and their interaction in predicting sexual satisfaction. Our study revealed potential significant longitudinal associations of factors on the micro- (mental health problems and general life satisfaction), meso- (relationship quality), and exosystems (trendwise for dysfunctional parenting) in this prediction. However, further exploration is required to understand how these factors interact, with particular attention to the role of parenting and parenthood. Furthermore, considering the multitude of factors influencing sexual satisfaction across various ecological layers, it is advisable to approach preventions and treatment efforts similarly to multidimensional sexual therapy (e.g., Markovic, 2013; Sánchez-Fuentes et al., 2016).

In addition, future longitudinal studies on this topic using dyadic data analyses are desirable and should attempt to replicate our findings and explore these dyadic aspects for different couple types as well as sex-specific aspects to strengthen the generalizability of the results. Furthermore, the role of parenting programs like Triple P and the associations between dysfunctional parenting, life satisfaction, and parental sexuality should further be investigated longitudinally also using dyadic models. The role and importance of paternal associations should be investigated in this context using larger samples. While much is still to be explored, the findings do add to our current understanding of the role of various individual and relationship factors in understanding partner's satisfaction with the important domain of sexual satisfaction.

Declarations

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Ethics approval and consent to participate

Informed consent was obtained from all individual participants included in the "Future Family" project. The project was conducted according to the principles stated in the Declaration of Helsinki (64th WMA General Assembly, Fortaleza, Brazil, 2013). The project received ethical approval by the ethics committee of the German Psychological Society (DGPs; identification number: WS 12.2010) and by the independent ethics committee of the Technische Universität Braunschweig (identification number d-2019-01; Faculty of Life Sciences).

Authors' contributions

Max Supke wrote 50 % of the manuscript and performed the data analyses. Kurt Hahlweg manuscript 20 %; Donald H. Baucom manuscript 10 %; Ann-Katrin Job 10 % manuscript; Wolfgang Schulz 10 % manuscript. All authors have read and approved the final version of the manuscript.

Availability of data and materials

The datasets generated and/or analyzed during the current study are not publicly available as they contain sensitive material. Furthermore, it is a longitudinal study with several assessment points. The data could possibly be used to draw conclusions about individuals. The questionnaires used can be found in the corresponding references.

Declaration of competing interest

On behalf of all authors, the corresponding author states that there are no conflicts of interests.

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