



Research Paper

The impact of motherhood on the course of women's psychological wellbeing

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ARTICLE INFO

Keywords:

Childless
Depression
Psychological wellbeing
Mental health
Motherhood
Women

ABSTRACT

Background: Having children or being childless is associated with differences in women's psychological wellbeing during the reproductive age period.

Methods: An individually matched case-control cohort study, measuring psychological wellbeing with the 5-item Mental Health Inventory (MHI-5) was conducted. Repeated measures analysis of variance and chi-square tests were used to measure the across time changes of MHI-5 scores. ANCOVA and Cochran's Q examined the differences between MHI-5 scores of women with children (cases) and of childless women (controls) at three timepoints. Timepoints were determined by the cases' pre-pregnancy (T1), post-birth (T2), longer-term (T3) moments.

Results: Motherhood status has a significant medium effect on psychological wellbeing [F(1.112) 20.99, $p < .001$, $d = .47$]. Psychological wellbeing of cases declines significantly from T2 to T3 ($p < .001$) and from T1 to T3 ($p < .001$), while psychological wellbeing of controls remains the same. Cases have significantly more often MHI-5 scores below the cut-off value at T2 compared to T3 ($p = .05$) and at T1 compared to T3 ($p < .001$). Controls have significantly more often MHI-5 scores below the cut-off value at T1 compared to T2 ($p < .001$) and at T1 compared to T3 ($p < .001$).

Limitations: We depended on an existing data set with few predetermined variables. There was insufficient information about the full context of women's lives such as (in)voluntary childlessness, life-events affecting happiness, or age of children, affecting a comprehensive representation of possible confounders or mediating factors.

Conclusion: Psychological wellbeing of mothers declines over time, while childless women's wellbeing remains stable. Overall, both groups show evidence of good mental health.

1. Introduction

Affected mood impacts the woman's quality of life. There is a growing recognition that, in particular, women in the reproductive age period (18–45 years) are more vulnerable for affected mood, as this lifespan for women is the time of highest risk for developing mental health problems (Barnes, 2014). In contemporary society, it is considered the norm for women to have children, albeit that for contemporary women motherhood is not self-evident - not all women (consciously) become a mother or are able to. Nearly 70 million partnered women of reproductive age worldwide are not able to conceive spontaneously and about half of these women will seek treatment to become pregnant. The

number of women who give birth to children conceived via Assisted Reproductive Technology (ART) such as In-Vitro Fertilization (IVF), Intracytoplasmic Sperm Injection (ICSI) and intrauterine insemination comprise 0.2 to 4.3% of all births (Andersen and Erb, 2006; Chandra, 2013; Warmelink, 2016). Childlessness is nowadays more accepted than it was for previous generations of women (Fiori et al., 2017; Rybińska and Morgan, 2019). Overall, 80–90% of women in the reproductive age period become a mother, that is, having a biological child (Miettinen et al., 2015). A woman with children will have unique experiences in comparison to a woman without children.

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<https://doi.org/10.1016/j.jadr.2021.100216>

Received 7 May 2021; Received in revised form 30 August 2021; Accepted 31 August 2021

Available online 3 September 2021

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1.1. Motherhood

Motherhood is recognized as a dynamic, life-altering and ongoing process of transition in a woman's identity, and a permanent shift in a woman's life. Pregnancy, birth and the postpartum period are recognized as neurohormonal processes (Hoekzema et al., 2017). A substantial number of women, going through the process of becoming and being a mother, pursue finding an equilibrium in new or renewed motherhood (Mercer, 2004; Emmanuel et al., 2011). Finding this equilibrium takes place during the early stages of pregnancy up to one or even two-year postpartum (Mercer, 2004; George, 2011). Women who try to become pregnant via ART often experience emotional distress related to the impact and uncertainty of the result of the treatment and/or related to conflicting moral values (Nicoloso-SantaBarbara, 2018). Also, the transition from subfertility to motherhood can be complex and emotionally distressing (Warmelink, 2016; Nicoloso-SantaBarbara, 2018). Records of women's perinatal mental health problems, such as depression and anxiety, show that the course of becoming and being a mother can be challenging and that demands can be high - indicating that motherhood strongly influences a woman's state of mind and her psychological wellbeing. The worldwide prevalence rates of antenatal and postpartum depression and anxiety vary between nine to 60.8% (Norhayati et al., 2015; Remes et al., 2016; Dennis et al., 2017; Woody et al., 2017; Dadi et al., 2020; Howard and Khalifeh, 2020). Approximately a quarter of the women enter motherhood with a history of mental health issues, serving as a predictor for maternal perinatal depression and anxiety (Söderquist et al., 2009; Son van et al., 2005; Seimyr et al., 2013; Fontein-Kuipers et al., 2015). Antenatal mental health problems are a predictor for subsequent adverse maternal postpartum mental health (Heron et al., 2004; Söderquist et al., 2009; Seimyr et al., 2013). Other risk factors that support adverse maternal postpartum mood disorders include obstetric factors (e.g., unplanned pregnancy, threatened loss of pregnancy, pregnancy-induced hypertension, premature labour, caesarean section), postpartum hormonal changes and thyroid dysfunction, and psychosocial factors (e.g., negative attitude towards pregnancy, family/personal history of mental health problem/disorders unrelated to childbirth, stressful life events, sleep disruption, poor support, financial stress, marital issues, dissatisfaction infant feeding, unrealistic expectations) (Dennis et al., 2004; Gale and Harlow, 2003; Norhayati, 2015). Postpartum mental health problems can have chronic, adverse mental health effects for women and can lead to maladaptive maternal behaviour (Goodman, 2006; Hillerer, 2012).

In general, motherhood is regarded as meaningful, humbling, precious, fulfilling, rewarding, blissful, gratifying, wonderful and joyful. Motherhood is characterized by connectedness, affection, warmth, closeness and interdependency in the mother-child dyad over the course of motherhood (Taylor et al., 2005; Heisler and Butler Ellis, 2008; Emmanuel and St John, 2010; Umberson et al., 2010; Thomson et al., 2012; Nelson et al., 2014). Despite the positive aspects of motherhood, it is known that the life balance of women who have children, can be affected, in particular among women with children in the (pre)primary school age and among women with more than one child (Craig and Sawrikar, 2009; Hansen, 2012; Rizzo, 2013; Fontein-Kuipers et al., 2015; Kuipers et al., 2019). Some mothers find it difficult and challenging to parent or to relate to their child, causing feelings of stress and guilt (Hansen, 2012; Kopala-Sibley, 2012). Some mothers describe negative emotional responses to motherhood when experiencing negative, paradoxical, or ambivalent feelings towards motherhood and/or the child (Chapman and Gubi, 2019; Hansen, 2012; Heilman and Okimoto, 2008; Miller, 2011; Newby, 2021; Viitanen, 2014). Reduced psychological wellbeing has been recognized as an important factor to negatively affect life balance of mothers with children up to 12 years of age (Kuipers et al., 2019). Poor emotional health while being a mother can be caused by the challenges related to the commitment to nurture another human and to dynamics and changes to relationship and social

context and to experiencing a loss of freedom and (financial) independence (Heisler and Butler Ellis, 2008; APA, 2010; Emmanuel and St John, 2010; Umberson et al., 2010; Chapman and Gubi, 2019; Hansen, 2012; Heilman and Okimoto, 2008; Miller, 2011; Newby, 2021; Viitanen, 2014). For many women, motherhood is combined with high expectations for a career and a supportive relationship – multitasking can add stress (Hoffnung, 2004; Graham, 2015; ; Kuipers et al., 2019; Beeck van et al., 2019).

1.2. Childlessness

Currently, ten to 20% of women remain childless – not having a biological child (Miettinen et al., 2015). Childlessness is not just a limit case of biological reasons. Pathways to childlessness differ among women and involuntary childlessness (infertility, subfertility and sterility) explains only a part of why women do not have children – appointing voluntary childlessness as another part of the phenomenon of childlessness (Doyle et al., 2013; Gotlib, 2018; Van der Borcht and Wyns, 2019). Issues such as world safety and climate change seem to be part of women's thought and decision processes about wanting or not wanting to have children (Beeck van et al., 2019; Schneider-Mayerson and Leong, 2020). More than half of the women in the reproductive age postpone motherhood, around ten percent has ambivalent feelings or intends to remain childless, although women in a relationship are less likely to remain childless. Voluntary childlessness can be a result of competing life goals and decisions (Umberson et al., 2010; Fiori et al., 2017; Rybińska and Morgan, 2019). Findings suggest that childless women experience poorer psychological wellbeing during the reproductive years, compared to women with children, and might suffer from feeling to violate cultural norms (Graham, 2015; Fiori et al., 2017). Involuntary childlessness can result into a lack of self-esteem, isolation and feelings of inadequacy and in separation from the partner, while unsuccessful ART is related to depression (Wirtberg et al., 2007; Nicoloso-SantaBarbara, 2018). One in every 20 non-pregnant women of childbearing age experience major depression and prevalence rates of anxiety range between 14 and 29% (Michael et al., 2007; Guo et al., 2018). On the contrary, positive emotions of being childless are reported. Positive feelings are associated with personal achievement because of educational and career advancement, with freedom in fundamental aspects of life (e.g., eating, sleeping), physical health, having time for leisure activities (e.g., travelling), time for creative and intellectual pursuits, financial benefits, valuing (social and economic) independence and autonomy, keeping own identity, having energy, volunteering, fulfilling dreams and experiences of gender equality (Umberson et al., 2010; Doyle et al., 2013; Peterson, 2015; Fiori et al., 2017; Rybińska and Morgan, 2019).

Whether a woman in the reproductive age period is a mother, or not – given the fundamental differences between the groups, having children versus not having children - these pathways are likely to have different implications for women's psychological wellbeing (Umberson et al., 2010). In the Netherlands, the prevalence rates of mental health among women in the childbearing age period (18–45 years) vary: 6.9% report depressive symptomatology and 19.6% report symptoms of anxiety (Nivel, 2019; Graaf de et al., 2010, 2017; CBS 2021). Rates of antenatal and postnatal distress in the Netherlands vary between 7.4 to 31.6% (Fontein-Kuipers et al., 2016; Witteveen et al., 2016; Fontein-Kuipers and Jomeen, 2019).

There are inconsistent findings regarding psychological wellbeing of mothers versus non-mothers, in particular when studies have not used homogenous statistical controls or reference groups (Nelson et al., 2014; Graham, 2015). Longitudinal research, examining within subjects (separate groups of mothers and non-mothers) and between subjects (mothers vs non-mothers), is needed to establish the effect of motherhood on psychological wellbeing. A large-scale dataset, comprising representative samples of respondents, allows to avoid sampling bias and offers the opportunity to study the relation between psychological

wellbeing and motherhood status across a wider range of ages and cohorts, permitting broader generalization of the findings (Nelson et al., 2014). To study the course of wellbeing over time, it is recommended to use longitudinal panel-data that covers a long period of time including multiple timepoints of measurement and interval periods that allow adjustment to change in life. To examine possible shifts in mothers' psychological wellbeing, it is in particular important to measure before and after pregnancy and birth (Luhmann et al., 2012).

The aim of this study is to explore the relationship between motherhood status (that is, having biological children or not) and women's psychological wellbeing in a sample of similar women in a large population-based sample of Dutch women in the reproductive age group - following these women over a longer course of time, covering a substantial number of years during the reproductive life period.

2. Methods

2.1. Netherlands kinship panel study (NKPS)

The data used in our study originated from the Netherlands Kinship Panel Study (NKPS). NKPS is a large-scale panel multi-method, multi-actor survey on family relationships using a prospective longitudinal design. Data were collected at four timepoints among households in the Netherlands of people between 18 and 79 years of age (Wave 1 in 2002 2004, Wave 2 in 2006 2007, Wave 3 in 2010 2011, Wave 4 in 2014) (Dijkstra et al., 2005; Dykstra et al., 2012; Merz et al., 2012; Hogerbrugge et al., 2014). The NKPS was a collaboration between scientists from a number of Dutch universities and was funded by the Investments Fund of the Netherlands Organization for Scientific Research (NWO) and by the Netherlands Interdisciplinary Demographic Institute (NIDI). Informed consent was obtained from all individual participants in the study. All procedures performed in the NKPS were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its subsequent amendments or comparable ethical standards. The Netherlands Institute for Social Research (SCP) approved the study (Dijkstra et al., 2005). In this study we used the large-scale survey data of all NKPS waves, collected with self-completion questionnaires and we used the codebooks from the public released files from the NKPS.

2.2. Data and sample

NKPS participants were randomly approached via a public address file (Dijkstra et al., 2005). The original data set at wave 1 comprised 8161 participants, including 4741 women - representing Dutch household types, gender, age groups, region and level of urbanization (Dijkstra et al., 2005). One means of data collection was a questionnaire, (online or a printed version) (Dijkstra et al., 2005). Of the 4741 women in survey wave 1, 2708 women were followed up to survey wave 4 (42.9% attrition). Attrition was caused by residential mobility, relationship/family changes, name change, illness and withdrawal from the NKPS study for unknown reasons (Dykstra et al., 2012; Merz et al., 2012; Hogerbrugge et al., 2014).

For the purpose of our study, we selected the survey data of childless women between 18 and 45 years of age at wave 1 who had completed the five-item Mental Health Inventory (MHI-5) at all four waves. Women living abroad (not in the Netherlands), women who already had children at wave 1, and participants who provided ambiguous answers regarding having children were excluded. Women who were pregnant at wave 4 or who had non-biological children were also excluded. A sample of 869 women without children at wave 1 emerged, which were considered as our baseline group. The NKPS unique identification numbers allowed us to follow the 869 baseline women through time, showing that 239 (27.5%) women became a mother after wave 1 and before wave 4 and 630 (72.5%) women remained childless during all four waves (Fig. 1).

To control confounding and to enhance comparability of

characteristics in the study population, we used exact 1:1 matching, pairing the women who became mothers after wave 1 but before wave 4 with women who remained childless over the study period. We created pairs of cases being identical on the covariates: age, background (Dutch or non-Dutch), partner status (in a relationship/not in a relationship) and applied coarsened exact matching for level of education (low, medium, high), resulting in an individually matched case-control cohort (Rose and van der Laan, 2009; Nielsen, 2016). National figures indicated that the probability of reduced mental health among cases is, on average, 20% and 13% among controls. With an odds ratio of 6 for reduced mental health in subjects that are mothers relative to childless subjects, we needed a minimum of 214 cases with 214 matched controls, to be able to reject the null hypothesis that this odds ratio equals 1 with power of 80%, assuming that the Type I error probability associated with this test of this null hypothesis is 5% (Satten and Kupper, 1990). Exact case-control matching was performed using SPSS for Windows®, version 26.

2.3. Characteristics and outcome variables

The following maternal characteristics were collected from the database: motherhood status (having (no) children between wave 1 and 4), age, ethnic background (Dutch or non-Dutch), partner status (married/ co-habiting or single) and level of education. The original data set included 10 levels of education, which we categorized in low (incomplete elementary school, elementary school, lower vocational), medium (lower general secondary education, medium general secondary education, intermediate vocational) and high (upper general secondary education, higher vocational, university, postgraduate) levels of education. At all waves the childless women were asked to indicate if childlessness was a voluntary or involuntary choice and whether childlessness was perceived as a loss or not. There were substantial missing values (96%) for these variables which could therefore not be included.

The primary outcome of interest was psychological wellbeing, which was assessed, during all waves, with use of the Dutch version of the Mental Health Inventory (MHI-5). The MHI was pre-tested prior to data collection at wave 1 (Dijkstra et al., 2005) and showed good internal validity at all four waves (α .85; α .85; α .85; α .83) (Dijkstra et al., 2005; Dykstra et al., 2012; Hogerbrugge et al., 2014). The MHI-5 has been established as a brief, valid and reliable tool for detecting general psychological wellbeing in the general population but has not been developed to specifically evaluate feelings related to motherhood (Ware et al., 2000; Cuijpers et al., 2009). The MHI-5 is the mental health subscale of the 36-item Short-Form Health Survey Questionnaire (SF-36) (Ware and Sharebourne, 1992). The MHI-5 consists of the following five questions: How much of the time during the last four weeks, have you...: (i) 'Been a very nervous person?' (ii) 'Felt so down in the dumps that nothing could cheer you up?', (iii) 'Felt calm and peaceful?' (iv) 'Felt downhearted and blue?', (v) 'Been a happy person?'. Each item has six possible responses ranging from 'all the time' (0 point) to 'at no time' (5 points). The scores of the third and fifth question were reversed. The MHI-5 values were computed (multiplying each score by four) to a total scale varying from 0 to 100, with higher scores indicating good mental health (Driessen, 2011). Although within the NKPS no MHI-5 cut-off point was utilized, based on a Dutch general population-base study, an MHI-5 score of ≤ 60 was regarded as the cut-off value of reduced psychological wellbeing (Perenboom et al., 2000; Hoeymans et al., 2004). This cut-off point is a recognized value to minimize misclassification in a study aiming to identifying cases in a specific context (i.e., motherhood status) (Kelly et al., 2008).

2.4. Analysis

To analyze the data of women who made the transition to parenthood and of women who remained childless at all timepoints, we created

a model using the matched case-control cohort data set including the 239 cases (women who had their first child after wave 1, 2 or 3) and 239 controls (childless women throughout the 4 waves). We structured the MHI-5 mean total scores and lowered scores (≤ 60) of cases and controls in three different timepoints. The cases determined the timepoints: pre-pregnancy (T1), post-birth (T2), longer-term (T3), matching with the MHI-5 scores of the controls at the same timepoint. For the cases who had their firstborn after wave 3 and before wave 4, we could only include the T1 and T2 MHI-5 scores. In case of $<10\%$ missing cases at T3, the mean MHI-5 total score was imputed. Our analysis focused on the within-group and between-group differences of MHI-5 scores between T1 to T2, T2 to T3 and T1 to T3, to describe and compare change of direction within both groups and to examine the between-group differences.

We performed a repeated-measures to examine the within-group changes of psychological wellbeing women with children ($N = 239$ cases) and childless women ($N = 239$ controls) by comparing T1, T2 and T3 MHI-5 total scores in both groups. We compared the proportion of women with scores at cut-off value (≤ 60) using Pearson Chi-square tests and Cochran's Q Test. We performed analysis of covariance (ANCOVA) to determine the effect and significance of differences of motherhood status between cases and controls for MHI-5 scores. Effect sizes were calculated using Cohen's d . According to Cohen (1988), $r < 0.3$ are considered small effects, $0.3 > r < 0.5$ moderate effects, and $r > 0.5$ large effects. A value of $p < .05$ was considered statistically significant. Taking pre-existing psychological problems into account, to interacting with the course of physiological wellbeing (Kuo et al., 2018), we added baseline (wave 1) MHI-5 scores as a covariate (Son van et al., 2005; Söderquist et al., 2009; Seimyr et al., 2013; Fontein-Kuipers et al., 2015). To account for remaining differences in the matched set, we selected other covariates than baseline mental health (Ho et al., 2007; Nielsen, 2016). We performed analysis of variance (ANOVA) to examine the differences between age and partner status between the 239 women who became a mother after wave 1 and before wave 4 and the 630 women who remained childless during all four waves (Niven et al., 2013). Data entry and analysis were performed using SPSS for Windows©, version 26.

3. Results

All analyses of outcomes are presented separately for women with and without children. The 869 nulliparous women at wave 1 were between 18 and 45 years of age and had mainly a Dutch background (98%). ANOVA [$F(2.76) 3.425, p 0.03$] showed statistically significant differences in age at wave 2, 3 and 4 between women who had children after wave 1 and those who remained childless ($p 0.028; p < 0.001; p < 0.001$). On average, women had one child at wave 2, 1.3 children at wave 3 and, on average, 1.49 children at wave 4 with a maximum of three children. The mean age of women with children increased from 27.1 years at wave 1 to 32.2 (wave 2), 33.4 (wave 3) to 35.4 (Wave 4) years. The mean age of childless women increased to 33.1 (wave 2), 36.1 (wave 3) to 38.4 (Wave 4) years. Differences were also observed with regard to partner status at wave 2, 3 and 4 ($p < 0.001; p < 0.001; p < 0.001$). At wave 1 most women (84.5%) were single. At wave 4, none of the women with children were single while 35.4% of the childless

women were single. The matched case-control cohort showed no differences in baseline characteristics (Table 1), confirmed by the Mahalanobis distances, which showed no outliers (Nielsen, 2016). The matching variables showed weak correlations ($r 0.05$ to $r 0.3$) (Rose and van der Laan, 2009). Of the cases, 132 women had a child at wave 2. At the third wave, 224 women had become mother and all 239 women were mother at wave 4. Fifteen cases (6.3%) had their firstborn after wave 3 and before wave 4. The number of missing cases were considered to be small enough for imputation to rule out confounding or to comprise the matching framework (Nielsen, 2016). The MHI-5 values for the 15 missing cases at T3 were imputed with the mean total MHI-5 score.

3.1. Within-group and between group differences

Mauchly's test indicated that the assumption of sphericity had been violated for the main effects of motherhood status ($X^2(2) = 13.23, p 0.001$) and on psychological wellbeing ($X^2(2) = 20.04, p < 0.001$). Therefore, degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (Field, 2013). The analysis shows a significant change in psychological wellbeing across the conditions (childless vs mother), Greenhouse-Geisser correction [$F(1.112) 20.99, p < .001$], showing a medium effect of motherhood status on psychological wellbeing ($d 0.47$). There is a significant interaction effect between psychological wellbeing and the different timepoints: Greenhouse-Geisser correction [$F(2.119) 19.37, p < .001$]. At T2 and T3 MHI-5 scores are significantly more often below the cut-off value ($p .03, p < 0.001$) but not at T1 ($p .9$). Bonferroni post hoc analysis shows a different declining effect on the course of psychological wellbeing among mothers and childless women throughout the overall study period, reflecting significant differences within both groups between T2 and T3 ($p 0.002$) and T1 and T3 ($p < 0.001$) but not between T1 and T2 ($p 0.12$). The MHI-5 scores of childless women are below the observed grand mean (75.55) at all three timepoints while for mothers this is only observed at T3 (Fig. 2). The analysis was adjusted for baseline MHI-5, age and partner status.

Table 2 shows that the psychological wellbeing of mothers declines from T2 to T3 ($p < .001$) as well as from T1 to T3 ($p < .001$). Among mothers, we observed more often MHI-5 scores below the cut-off value at T1 compared to T3 ($p < .001$) and at T2 compared to T3 ($p .05$). Psychological wellbeing of childless women remains similar between the various timepoints. Childless women have significantly more often MHI-5 scores below the cut-off value at T1 compared to T2 ($p < .001$) and significantly more often at T1 compared to T3 ($p < .001$) but not at T2 compared to T3 ($p .9$). There were no significant differences between the MHI-5 scores below the cut-off value of cases and controls ($p .51$).

4. Discussion

Our results indicate that motherhood status has different effects on women's psychological wellbeing across time. The pre-pregnancy (T1) and post-birth (T2) psychological wellbeing scores of women with children are above the observed grand mean and decline afterwards (T3) - below the level of psychological wellbeing of childless women. The

Table 1
Baseline characteristics matched case-control cohort.

		Total group (n = 478)	Cases (n = 239)	Controls (n = 239)
Mean age in years	SD (range)	27.16 (± 3.9 ; 18–37)	27.15 (± 3.9 ; 18–37)	27.17 (± 3.9 ; 18–37)
With partner	n(%)	86/18	44/18.41	42/17.57
Single	n(%)	392/82	196/81.59	197/82.43
Low level of education	n(%)	20/4.1	10/4.2	10/4.2
Medium level of education	n(%)	188/39.4	94/39.3	94/39.3
High level of education	n(%)	270/56.5	135/56.6	135/56.5
MHI-5 total score (T0)	SD (range)	74.2 (± 14.5 ; 12–100)	74.4 (± 12.4 ; 28–100)	74.3 (± 14.4 ; 12–100)
MHI-5 cut-off ≤ 60 (T0)	n(%)	105/22	48/20	57/24

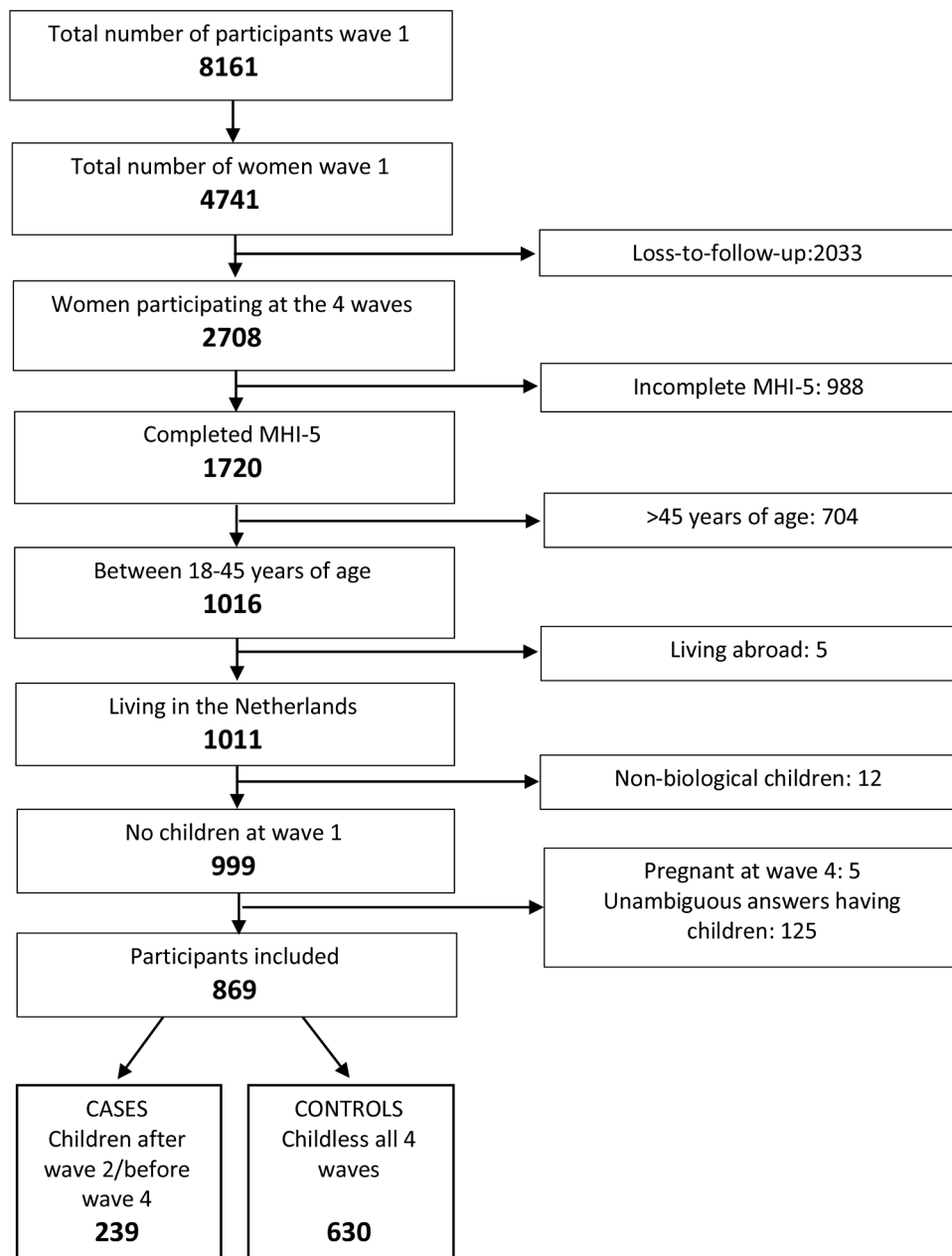


Fig. 1. Flowchart participants.

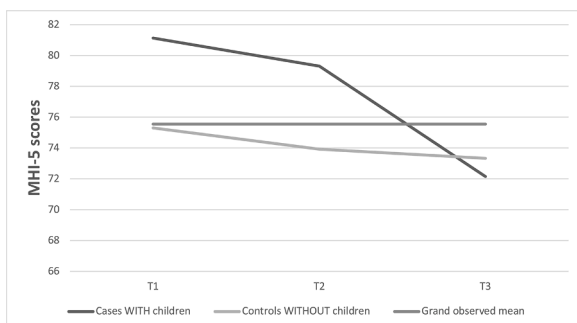


Fig. 2. MHI within group changes in cases and controls from T1 to T3.

psychological wellbeing scores of the childless women, remain stable but are below the observed grand mean at all three timepoints. There is a difference between T1 scores of the cases and controls, where cases have a substantial higher MHI-5 score, suggesting better psychological health compared to the controls. The timeline of psychological wellbeing assessment is important to consider. At T1, none of the participants have children but do show a difference in their mental health scores. Our cases were matched for relationship status and we also controlled for this covariate in our analysis. Among the controls more women remained single from T1 to T3 compared to cases. Being single might explain the lower levels of mental health among the childless women as it is known that being single can contribute to feelings of loneliness, causing emotional distress (Adamczyk, 2016). The controls in our sample may have felt lonely, aspired to having a (heterosexual) relationship or not, wanted to be sexually active, or felt stigmatized by their single status, possibly affecting their individual happiness (Budgeon, 2016). Women without children consider the safety of nowadays society

Table 2
MHI-5 within-group changes in cases and controls from T1 to T3.

CASES: WOMEN WITH CHILDREN	T1 <i>pre-pregnancy period</i>			T2 <i>post-birth period</i>			T3 <i>longer-term period</i>			F(2236)	X ²	p
	mean	SD	n/%	mean	SD	n/%	mean	SD	n/%			
MHI-5 total score*	81.13	±8.73		79.30	±11.59		72.15	±13.96		5.74		.04
MHI-5 cut-off ≤60			33/13.8			35/14.6			28/11.7		(2)21.8	<0.001
CONTROLS: WOMEN WITHOUT CHILDREN												
T1	T1			T2			T3			1.79		
	mean	SD	n/%	mean	SD	n/%	mean	SD	n/%			
MHI-5 total score*	75.30	±11.96		73.93	±11.89		73.33	±9.43				.17
MHI-5 cut-off ≤60			39/16.3			16/6.7			14/5.9		(2)21.2	<0.001

*Adjusted for baseline MHI-5, age and partner status.

as a reason to critically think about choosing to become a mother (Beeck van et al., 2019). It might be that the controls in this study had more pessimistic worldviews, affecting their mood, thus being lower than the women who became mothers. Another explanation can be that being childless may be more stressful in the context towards fertility trajectories, as up to 39% of women in fertility trajectories meet the criteria of major depression (Holley et al., 2015). We have, however, no knowledge whether the controls were voluntary or involuntary childless. More stable levels of psychological wellbeing are being found among women who use oral contraception, which is more likely to be the case in the (voluntary) childless group of women (Garforth et al., 2020). Oral contraception might contribute to the within-group stability of the controls. Given heterogeneity among childless women, there is no solid understanding of different life course pathways that lead to childlessness, likely having different implications on personal wellbeing (Umberson et al., 2010) and should be considered in further research. Research has shown that women in a relationship report a boost in wellbeing lasting up to two years after the start of the relationship (Lucas et al., 2003). The average relationship length when couples have their first child is approximately three years (Claxton and Perry-Jenkins, 2008). Accordingly, our T1 measure might very well represent the pre-pregnancy wellbeing baseline, assessed within the first two years of the relationship - or during the 'honeymoon period' of a couple's relationship - psychological wellbeing may be inflated due to the boost of the relationship or new love.

Despite the differences of the mean MHI-5 scores between cases and controls, the within-group mean scores all remained above the cut-off value of ≤60, suggesting that both groups experience fairly good psychological health. This observation might explain the differences in the literature regarding contradictions about the effect of having children on women's mental health (Dolan et al., 2008). Both groups showed a significant decline in number of women scoring above cut-off level from T1 to T3, but the MHI-5 mean scores only significantly declined among women with children, in particular from the post-birth to the longer-term period. A possible explanation of the decline in psychological wellbeing scores in women with children can be related to the amount of happiness a new-born child brings to a mother. Research has shown that becoming a mother increases the level of happiness (Houwen van der and Moonen, 2013). This increase in happiness peaks around pregnancy and lasts approximately until the first year postpartum and diminishes when time passes (Clark et al., 2008; Luhmann et al., 2012; Houwen van der and Moonen, 2013). The reported effect can thus be temporary, which might explain the declining scores on psychological wellbeing in our cases with children over time. The diminishing positive effect of having children on psychological wellbeing can also be explained by a number of other reasons such as the number of children a woman has, and the age of the child(ren), or women might have children with health issues, experience unexpected negative surprises or life events, experience reduced relationship satisfaction, income reduction (limited maternity leave benefits), time allocation to housework, working hours - all adding to reduced psychological wellbeing of mothers (Dolan et al., 2008; Craig and

Sawrikar, 2009; Churchill and Davis, 2010; Pouwels, 2011; Avendano et al., 2015; Fontein-Kuipers et al., 2015; Kuipers et al., 2019). Further research should examine the effect of personal and living circumstances on the association between motherhood, (in)voluntary childless and psychological wellbeing.

4.1. Strengths and limitations

A strength of this study is the origin of the data set and our sample size, offering sufficient power for our inferences (Nelson et al., 2014). A limitation of our study is that we depended on an existing data set with predetermined variables. Also, mental health was measured with one instrument and the use of the MHI-5 in the field of mental health is relatively modest. In the study we used only a generic screening tool. Its use is functional for screening purposes, but the possibility of integrating the assessment with more accurate tools should be considered in future similar studies (Hoeymans et al., 2004). Because we were relying on an existing data set, the choice of variables was constrained (Nielsen, 2016) and matching occurred therefore on available variables, while there might be more confounding or intermediating factors for exposure of affected psychological wellbeing for mother and childless women. However, since we were bound by the available variables our matching included a small number of variables, keeping the cases and controls close together. We included variables that are known to have no conclusive causal influence on motherhood status (e.g., educational level, background) to reduce similarity on the actual confounders such as age and having a partner. We did not match for baseline MHI-5 scores but adjusted for the baseline scores in our analysis, to reduce overmatching. Overmatching is likely to occur when matching cases and controls on pre-existing mental health issues as this can be linked to the causal pathway of mental health. We believe our matching scheme and adjustment procedure have contributed to a valid, robust and correct estimate of the unbiased causal effect of motherhood status on psychological wellbeing (Jager et al., 2008; Rose and van der Laan, 2009; Niven et al., 2013; Nielsen, 2016; Kuo et al., 2018). A limitation is that we did not control for number of children while it is known that this has an effect on the emotional wellbeing of women (Fontein-Kuipers et al., 2015). We also did not know when exactly women had given birth, making it impossible to distinguish between women early postpartum or women with older children, affecting mental health in a different manner (Houwen van der and Moonen, 2013). Additionally, we had insufficient information about voluntary and involuntary childlessness, which could have affected the results as it is known that the involuntary aspect negatively affects women's mental health compared to mental health of voluntary childless women. Additionally, during the NKPS study, there was substantial attrition from wave 1 to wave 4 (Dykstra et al., 2012; Merz et al., 2012; Hogerbrugge et al., 2014), which could have led to missing crucial information.

5. Conclusion

Women's psychological wellbeing - when measured with the MHI-5

– is high among Dutch women of the reproductive age group. Mothers' to-be MHI-5 scores are higher than the scores of women who remain childless. Motherhood status does have different effects on women's psychological wellbeing across time. We observed that while childless women's psychological wellbeing remains stable, the mother's wellbeing declines over time and declines below the psychological health of childless women. The decrease of psychological wellbeing among women with children highlight the importance of monitoring maternal mental health during postpartum period and thereafter. We have provided a number of reasons that could explain our results, the possible influence of (in)voluntary childlessness and of relationships, the temporary peaks of happiness, context of life and age and number of children. A major limitation was the restriction of available information of the existing NKPS dataset. Future research should aim to include information about women's life courses and context and address the methodological limitations, to gain a better understanding of the psychological wellbeing of women who will and will not become mothers.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The original NKPS study is funded by grant 480–10–009 from the Major Investment Fund of the Netherlands Organization for Scientific Research (NWO), and by the Netherlands Interdisciplinary Demographic Institute (NIDI), Utrecht University, the University of Amsterdam and Tilburg University.

Declaration of interest

None.

CRedit authorship contribution statement

Yvonne J. Kuipers: Conceptualization, Methodology, Validation, Formal analysis, Writing – original draft, Writing – review & editing, Supervision. **Elise van Beeck:** Conceptualization, Methodology, Formal analysis, Writing – review & editing. **Astrid Cijssouw:** Validation, Formal analysis, Writing – review & editing. **Yannic van Gils:** Validation, Writing – review & editing.

Acknowledgements

N/A

Permission has been obtained from NKPS (15–12–2015) for use of the data.

Database NKPS: Wave_1_-v2.0_July_21_2005 Wave 2_-V3.1_October_12_2012 Wave _3_-v1.1_October_12_2012 Wave_4_-v1.0_June_03_2015 www.nkps.nl

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